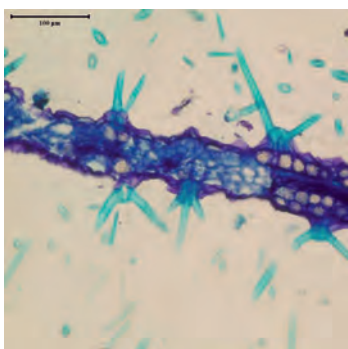
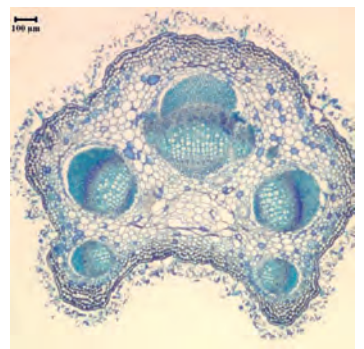
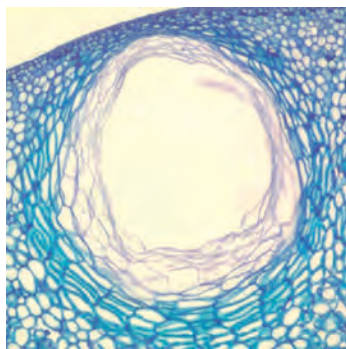
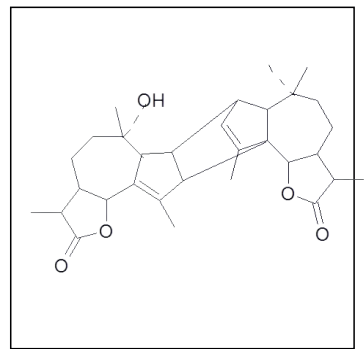
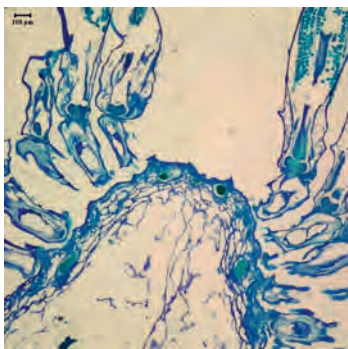
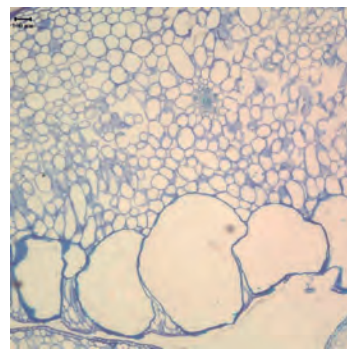
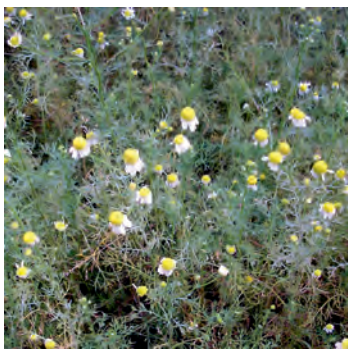


Development of digital learning materials for renewable pharmaceutical practice-oriented skills in English and Hungarian. Preparing university lecturers for educational challenges of the 21st century.

# Digital Herbarium and Drug Atlas

Dr. Ágnes Farkas, Dr. Nóra Papp, Dr. Tímea Bencsik, Dr. Györgyi Horváth



SZÉCHENYI PLAN





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Part I  
Characters of Plants



## ***Achillea millefolium* L. s. l. – Common yarrow**

Asteraceae – Sunflower family



### **I.1**

*Achillea millefolium* L. s. l. – Common yarrow

#### **Distribution, habitats**

It is a perennial herbaceous plant widespread in Europe and living in grazing lands, grasslands, meadows, marshes and at the edges of drainage ditches.

#### **Morphology**

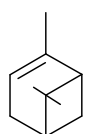
The shoot is 20-80 cm tall. The leaves are lanceolate or narrow lanceolate, 2-3-fold pinnately segmented, with as many as 50 segments. The capitulum is composed of 4-6 white or pinkish ray- and disc-florets. The fruits are 2 mm long achenes.

#### **Drug**

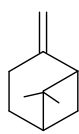
*Millefolii herba* – Yarrow (Ph. Eur. 5.0)

#### **Phytochemistry**

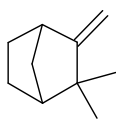
essential oil (main component: chamazulene), sesquiterpene lactones, polyins (esters of matricaria acid), flavonoids, triterpenes, coumarin and tannin



$\alpha$ -pinene

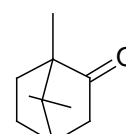


$\beta$ -pinene

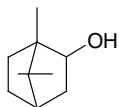


camphene

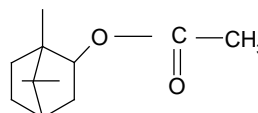
1,8-cineole



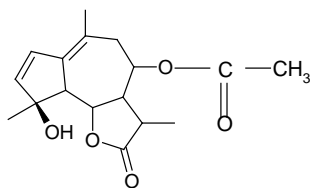
camphor



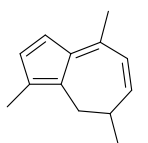
borneol



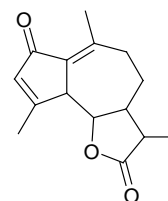
bornyl acetate



matricine



chamazulene



achillin

## I.2

### Active compounds of *Millefolii herba* – Yarrow

#### Uses

Yarrow is antiphlogistic, antibacterial, spasmolytic, amarum, can be used internally as anti-inflammatory, spasmolytic (for colitis, enteritis, ulcus ventriculi, ulcus duodeni), against stomach problems and common cold. It can be used externally as antiseptic, anti-inflammatory and for healing of wounds. It is useful to heal burn injuries, varicose veins, ulcus cruris and eczema. The essential oil is used to prepare anti-inflammatory ointments.

## ***Acorus calamus* L. s. l. – Calamus**

Araceae – Arum family



### **I.3**

*Acorus calamus* L. s. l. – Calamus

#### **Distribution, habitats**

It is a perennial herb living in wetlands and coastlines.

#### **Morphology**

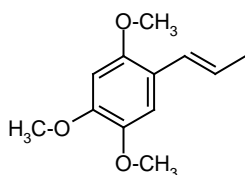
The fragrant, spongy rhizome is 1.5 cm thick and horizontally creeping. From the lower side of the rhizome adventitious roots arise, while the upper side bears the triangular remains of leaf bases. The foliage leaves are sward-shaped, the leaf blade being transversely wrinkled at some places, the leaf base surrounded by a sheath. The base peduncle is rectangular, with a bract protecting the inflorescence (spathe), which pushes the spadix (raceme of flowers without pedicel, densely arranged on a fleshy stem) to one side. Flowers bloom from May to June. The tiny flowers are 5-whorled and 3-merous.

#### **Drug**

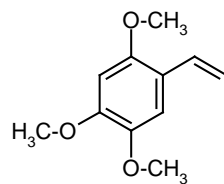
*Calami rhizoma* – Calamus root (Ph. Hg. VII.)

#### **Phytochemistry**

essential oil ( $\beta$ -asarone), cis-isoeugenol methyl ether, diketo spirane mono- and sesquiterpenes (acorone, acorenone)



t-asarone



β-asarone

#### I.4

Active compounds of *Calami rhizoma* – Calamus rhizome

#### Uses

Calamus is stomachic and carminative and used as raw material in alcohol industry.



## ***Aesculus hippocastanum* L. – Horse-chestnut**

Hippocastanaceae – Horse-chestnut family



### **I.5**

*Aesculus hippocastanum* L. – Horse-chestnut

#### **Distribution, habitats**

Horse-chestnut is native to the Balkans. In Hungary, it is cultivated as ornamental tree.

#### **Morphology**

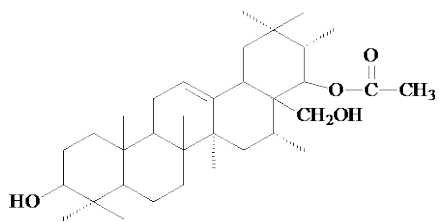
The trunk of the tree is covered with scaly cork, the branches are arched. The leaf buds are large and covered with a resinous substance. The long-petiolate leaves are opposite, palmately compound and composed of 5-7 leaflets. The leaflets are ovate (egg-shaped) with serrate margin. The blooming period lasts from April to May. The zygomorphic flowers form a cymose raceme. The calyx consists of 5 sepals with uneven lobes (teeth); the petals are white, with wavy edges, and bearing yellow spots that turn red as the blooming proceeds. The filaments of the 7 stamens are much longer than the corolla and bend outwards. The fruit is a round, thorny capsule, which develops from a superior ovary consisting of 3 carpels. The seed is shining brown, with a greyish-white spot at the hylum.

#### **Drugs**

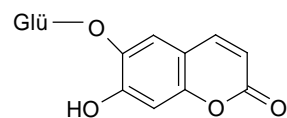
*Hippocastani semen* – Horse-chestnut seed, *Hippocastani cortex* – Horse-chestnut bark, *Hippocastani folium* – Horse-chestnut leaf

#### **Phytochemistry**

The seed contains saponin glycosides (aescin glycosides), flavonoids, tannins, coumarins (esculin and fraxin), triterpenes and sterols. The bark contains coumarin glycosides, saponins and catechin tannins. The leaf and the flowers contain flavonoids, sterols, tannins and coumarins.



protoaescygenin



aesculin

### I.6

Active compounds of *Hippocastani semen* – Horse-chestnut seed

#### Uses

Horse-chestnut is a constituent of ointments and sunscreen lotions (due to esculin). It is supposed to strengthen capillaries and improve the peripheral circulation. Horse-chestnut is used externally to treat phlebitis, haemorrhoids and ulcus cruris.

## ***Agrimonia eupatoria* L. – Common agrimony**

Rosaceae – Rose family



### **I.7**

*Agrimonia eupatoria* L. – Common agrimony

#### **Distribution, habitats**

It is a rhizomatous plant occurring in both grassy and shrubby habitats.

#### **Morphology**

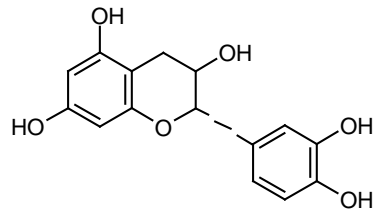
The branching shoot is 40-100 cm tall and covered with short and long hairs. The leaves are alternate and pinnately compound. The leaflets are ovate (egg-shaped) and coarsely serrate, similarly to the stipules. Agrimony flowers from June to August. The apical inflorescence is a slender spike with yellow flowers. The ovary is cone-shaped, sunken into the thorny receptacle, from which a downward-bending nutlet will develop.

#### **Drug**

*Agrimoniae herba* – Agrimony (Ph. Eur. 5.0)

#### **Phytochemistry**

catechin tannins, ellagitannins and gallotannins, triterpenes (ursolic acid) and flavonoids



catechin

### I.8

Active compound of *Agrimoniae herba* – Agrimony

#### Uses

Agrimony is mildly astringent and antibacterial, therefore used internally to treat stomach and intestinal catarrhs, as well as inflammations of the gallbladder and bile ducts. It can be used for gargle. The tea is especially useful to treat summer diarrhea or inflammations of small and large intestines. It is traditionally used against common cold and pneumonia, as well.

## ***Agropyron repens* L. – Couch grass**

Poaceae – Grass Family

### Distribution, habitats

It is a perennial herb occurring in arable lands, uncultivated lands and weed associations.

### Morphology

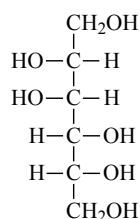
It has a branching, 2-3 mm wide, tubular, yellowish-brown creeping rhizome, which may grow up to several metres long, bearing membranous scale leaves (cataphyll bracts) and fine roots. The stems are 20-100 cm tall, ending in a compound spike. The leaves are linear, narrower than 5 mm and rough. Flowers from June to August. The compound spike is 8-12 cm long. The compound spike bears single spikelets alternately; the glumes, lemma and palea are pointed. Mature spikelets break up into separate parts.

### Drug

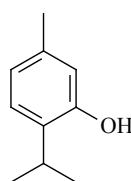
*Graminis rhizoma* – Couch grass rhizome (Ph. Eur. 5.0)

### Phytochemistry

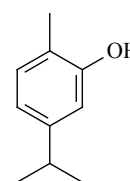
polyfructose (inulin-like triticin), mucilage, saponins, sugar alcohols (mannitol, inositol), essential oil



mannitol



thymol



carvacrol

### I.9

Active compounds of *Graminis rhizoma* – Couch grass rhizome

### Uses

Couch grass rhizome has a diuretic effect, it is used to support healing of urinary tract infections, cystitis, urethritis, irritable bladder and kidney stones. It is traditionally used against cough and tracheal catarrh, is used externally to help heal wounds and especially to treat acne.

## ***Alchemilla vulgaris* L. – Lady's mantle**

Rosaceae – Rose family



### **I.10**

*Alchemilla vulgaris* L. – Lady's mantle

#### **Distribution, habitats**

It is a perennial herb growing in moist alpine meadows.

#### **Morphology**

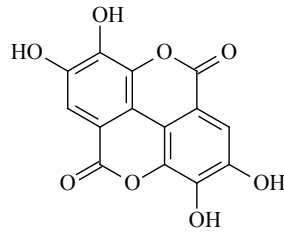
This rhizomatous plant is 20-30 cm tall. The shoot is made up by petiolar, mantle-like leaves with 7 to 9 lobes and an axil bearing flowers which bloom from June to July. The yellowish-green flowers form an umbel-like rhpidium (a type of cymose inflorescence).

#### **Drug**

*Alchemillae herba* – Alchemilla (Ph. Eur. 5.0)

#### **Phytochemistry**

tannins, ellagitannin (galloyl pedunculagin), flavonoids, salicylic acid in traces



ellagic acid

### I.11

Active compound of *Alchemillae herba* – Alchemilla

#### Uses

Lady's mantle has antioxidant, antimutagenic, astringent, antidiarrhoeal and local hemostyptic effects. It is used to wash wounds, eczema or rashes. Its leaves are consumed as salad, vegetable and spice. It is traditionally used as sitting bath to treat menorrhoea.



## ***Allium ursinum* L. – Ramson, wild garlic**

Alliaceae – Onion or garlic family



### **I.12**

*Allium ursinum* L. – Ramson, wild garlic

#### **Distribution, habitats**

It is a perennial herb living in wet hornbeam and mixed beech forests, native to Europe and Northern Asia.

#### **Morphology**

Two large, flat, oval base leaves with long petiole and tapered apex develop from the white, elongated bulb. Flowers from April to May. The inflorescence buds are protected by two brown, membranous bracts. The greenish or yellowish white flowers form umbrella-like clusters. The fruit is a capsule with three locules.

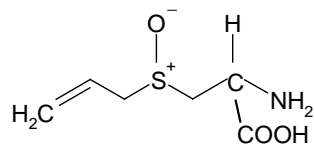
#### **Drug**

*Allii ursini herba* – Wild garlic shoot

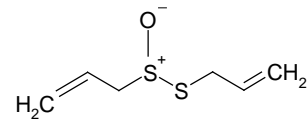


Phytochemistry

essential oil (alliin transformed into allicin by the enzyme alliinase), ascorbic acid,  $\gamma$ -glutamyl peptide, flavonoids, prostaglandins in traces and lectins



alliin



allicin

**I.13**

Active compounds of *Allii ursini herba* – Wild garlic shoot

Uses

Wild garlic is antibacterial, is particularly used against infections of the stomach and the intestines as well as for digestive disorders. It has carminative, antihypertonic, antiarteriosclerotic and cardioprotective effects. Its leaves are consumed as salads, vegetables or soups.

## ***Aloë ferox* Mill. – Cape aloë, bitter aloë, red aloë and tap aloë**

Aloëaceae – Aloe family



### **I.14**

*Aloë ferox* Mill. – Cape aloë, bitter aloë, red aloë and tap aloë

#### **Distribution, habitats**

Aloes originated in the dry areas of Africa (some species are native to islands close to Africa and the Mediterranean), but today several aloë species are cultivated on other continents, as well. The succulent species grow in the dry climate regions of South and Eastern Africa.

#### **Morphology**

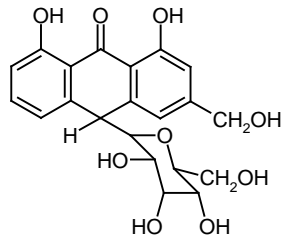
Succulent species often consist of a leaf rosette with no trunk. The leaves are green, but species exposed to excessive light develop a protecting wax layer, which lends them a bluish-green or greyish-green colour. The margin of the leaves is entire, rarely wavy, often serrate or spiny; and the leaf surface sometimes bears darker or lighter spots. The succulent leaves contain a jelly-like sap. Aloes are characterised by a one-sided racemose inflorescence bearing a large number of flowers. The peduncle of the raceme arises from the leaf-axil. The flowers are often pendant, their colour varies from yellow to orange or red. The fruit is a loculicidal capsule.

#### **Drugs**

*Aloë capensis* – Cape aloes, *Aloes extractum siccum normatum* –Standardized aloes dry extract (Ph. Eur. 5.0)

#### **Phytochemistry**

aloin A and B, aloesin B



aloin

### I.15

Active compound of *Aloe capensis*, *A. barbadensis* – Cape aloes, Barbados aloes

#### Uses

Cape aloes is laxative, but it can be used to treat enteritis due to the anti-inflammatory effects of aloesin, as well. It is a frequently used raw material of skin care products, especially gels.

## ***Aloë barbadensis* Mill. – True/medicinal aloe**

Aloëaceae – Aloe family



### **I.16**

*Aloë barbadensis* Mill. – True/medicinal aloe

#### **Distribution, habitats**

It is widespread in Macaronesia.

#### **Morphology**

The leaves are arranged in a leaf rosette, their colour varies from green to bluish or greyish green due to the wax layer. The margin of the leaves is entire, rarely wavy, often serrate or spiny. The succulent leaves contain a jelly-like sap. Several, often pendant, orange or red flowers form a racemose inflorescence, whose stalk grows from the leaf-axil. The fruit is a loculicidal capsule.

#### **Drug**

*Aloë barbadensis* – Barbados aloe (Ph. Eur. 5.0)

#### **Phytochemistry**

aloin A and B, hydroxyaloin A and B, aloe-emodin, aloeresin A, B and F

#### **Uses**

Barbados aloe is laxative, but it can be used to treat enteritis due to the anti-inflammatory effects of aloesin, as well. It is a frequently used raw material of skin care products, especially gels.



## ***Althaea officinalis* L. – Common marshmallow**

Malvaceae – Mallow family



### **I.17**

*Althaea officinalis* L. – Common marshmallow

#### **Distribution, habitats**

Marshmallow occurs alongside rivers and drainage ditches, as well as on alkaline soils.

#### **Morphology**

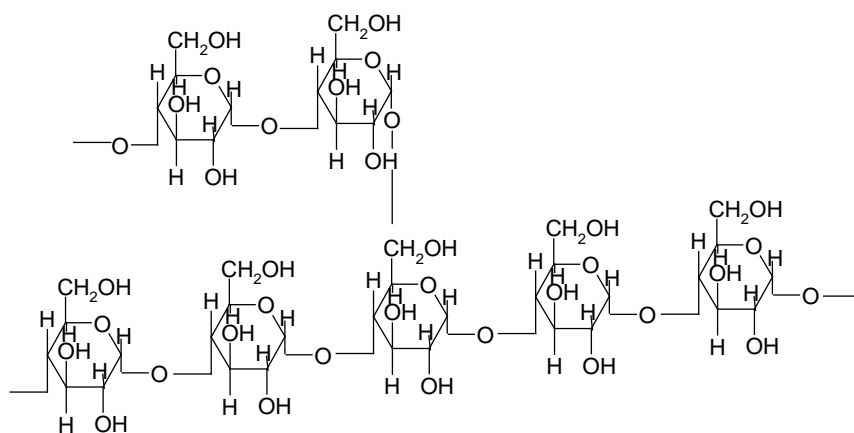
The allorhizic root system is 10 to 30 cm long and 2 to 3 cm thick, filled with white inner tissues. Close to the soil surface a rhizomatous part develops. The stem is 60-150 cm tall, the whole plant is velvety hairy and silky. The alternating leaves are deltoid-shaped, with 3 to 5 lobes and crenate or serrate edge. Marshmallow flowers from June to September. The cymose inflorescence (rhipidium) arises from the leaf axil. The flowers have a double calyx, the outer whorl of which consists of 6 to 9 pointed leaves, the inner whorl comprises 5 sepals. The corolla is made up of 5 light pink, obovate, truncate petals. The androecium consists of several stamens, the filaments grow together into a tube or column. The gynoecium comprises 12 to 18 carpels. The fruit is a schizocarp of mericarps: a capsule breaking into several little parts.

#### **Drugs**

*Althaeae folium* – Marshmallow leaf (Ph. Eur. 5.0), *Althaeae radix* – Marshmallow root (Ph. Eur. 5.0)

#### **Phytochemistry**

mucilages (arabinogalactans and galacturonorhamnans)



amylopectin

**I.18**

Active compound of *Althaeae folium*, *A. radix* – Marshmallow leaf, M. root

**Uses**

It is used to rinse the mouth and throat to treat mucous membrane irritation in cases of respiratory or gastrointestinal catarrhs.

***Anethum graveolens* L. – Dill**

Apiaceae – Carrot or parsley family



**I.19**

*Anethum graveolens* L. – Dill

**Distribution, habitats**

It is an annual herb frequently cultivated in Europe and used as a spice.

**Morphology**

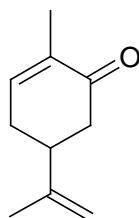
It has a tap root system, which is rich in fibres. The shoot is 40 to 100 cm tall. The whole plant has a special strong smell. The greyish-green stem is finely ribbed. The alternate leaves are first arranged in a leaf rosette at the beginning of the vegetation period. The lower leaves are petiolate, the upper ones are sessile. The leaves are 3-4-fold pinnately compound, the leaflets are narrow. The main and side branches bear a compound umbel, the flowers are yellow. The inferior ovary, composed of 2 carpels, develops into a 4-5-mm-long, ovate, dark brown schizocarp (double achene), which will split into two halves (mericarps).

## Drug

*Anethi fructus* – dill fruit (dill seed)

## Phytochemistry

essential oil (carvone,  $\alpha$ -phellandrene, carveol, carvacrol), coumarins (bergapten, umbelliprenin, scopoletin, esculin)



carvone

### I.20

Active compound of *Anethi fructus* – Dill fruit

## Uses

The essential oil obtained from the seeds is antiseptic, stimulant in small doses, but sedative in higher doses. The seeds are consumed as spice and used in the food industry. They have carminative effects.



## ***Angelica archangelica* L. – Garden angelica**

Apiaceae – Carrot or parsley family



### **I.21**

*Angelica archangelica* L. – Garden angelica

#### **Distribution, habitats**

It is native to Northern Europe and the Carpathian Mountains, and it is cultivated in Northern, Central and Western Europe, so in Hungary, as well.

#### **Morphology**

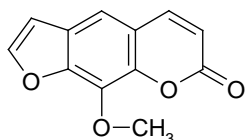
The rhizome is 5 cm thick with transversely annulate thickenings and several root branches. The shoot is 1 to 2 m tall. In the first year the leaves form a leaf rosette, but later stem leaves appear, as well. The latter are pinnately compound, at the leaf base surrounded by an inflated sheath. Flowers from June to August. The inflorescence is a round, compound umbel, with greenish flowers. The fruit is a 6-7-mm-long pale yellow double achene.

#### **Drug**

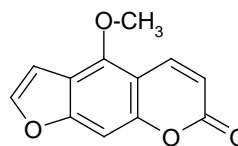
*Angelicae radix* – Angelica root (Ph. Eur. 5.0)

#### **Phytochemistry**

essential oil (monoterpenes and sesquiterpenes), macrocyclic lactones, furocoumarins, prenylcoumarins, coumarins (umbelliferone), flavanone (archangelenone)



xanthotoxin



bergaptene

### **I.22**

Active compounds of *Angelicae radix* – Angelica root

### Uses

Angelica root stimulates the excretion of the gastric acid and pancreatic enzymes, it is an appetizer, mild spasmolytic, carminative, diuretic and mild expectorant. It is used as raw material in liqueur industry.

## ***Arctium lappa* L. – Greater burdock**

Asteraceae – Sunflower family



### **I.23**

*Arctium lappa* L. – Greater burdock

#### **Distribution, habitats**

This biennial weed lives along roads.

#### **Morphology**

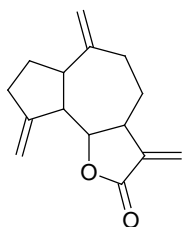
The taproot bears few branches, the root system reaches 20 to 25 cm. In the first year the root is dense, fleshy, but in the second year it becomes spongy. The base leaves form a rosette: the leaf blades are large, up to 50 cm. The stem leaves are smaller. The main stem and the side branches bear an apical capitulum. Burdock flowers from July to September. The capitulum is surrounded by spiny, hook-tipped involucre bracts, the disc (tubular) florets are purple. The fruit is an oval cypsela (a kind of achene) with spots.

## Drug

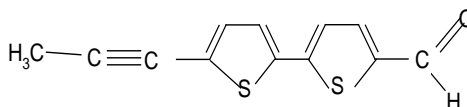
*Bardanae radix* – Burdock root

## Phytochemistry

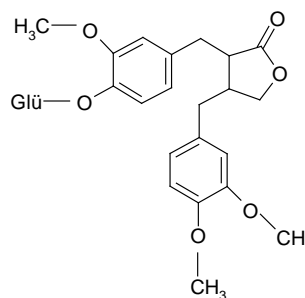
inulin, mucilage, essential oil, polyins and tannins



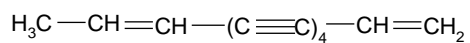
dehydrocostus lactone



arctinal



arctiin



trideca-1,11-diene-3,5,7,9-tetrayne

### I.24

Active compounds of *Bardanae radix* – Burdock root

## Uses

Burdock root is diuretic, choleric, diaphoretic, antirheumatic and mildly antibiotic, and helps to remove kidney stones. It is used externally to help restore and maintain healthy scalp in hair products and treat eczema.



## ***Arctostaphylos uva-ursi* L. – Bearberry**

Ericaceae – Heath or heather family



### **I.25**

*Arctostaphylos uva-ursi* L. – Bearberry

#### **Distribution, habitats**

It is a small procumbent groundcover shrub living in subalpine regions. It cannot be found in Hungary.

#### **Morphology**

The root system is strong and woody, the shoot is creeping, the flower-bearing shoots are erect. The alternate leaves are leathery and evergreen, obovate, with an obtuse or sometimes truncate tip. The venation is reticular, hardly visible. Bearberry flowers from April to May. The 3 to 12 small, white or red, pitcher-shaped flowers cluster into a short

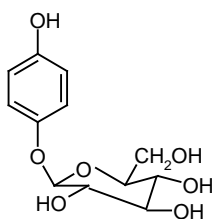
raceme. The calyx lobes are triangular, the corolla is pitcher-shaped, with the edge sticking out. The 10 stamens are free, the lower third of the filaments is thickened and hairy, the anthers bear a horn-like appendage. The fruit is a red berry (stonefruit) with 6 to 7 seeds.

### Drug

*Uvae ursi folium* – Bearberry leaf (Ph. Eur. 5.0)

### Phytochemistry

phenol heterosides, hydroquinine monoglucosides, arbutin, methylarbutin, piceoside, phenol-carboxylic acids, tannins, flavonoids, triterpenes, resin



arbutin

### I.26

Active compound of *Uvae ursi folium* – Bearberry leaf

### Uses

Bearberry leaves can be used to treat mild, uncomplicated urinary tract infections (UTIs), but it should not be used for more than 2 weeks due to its high tannin content.



## ***Artemisia absinthium* L. – Absinthe wormwood**

Asteraceae – Sunflower family



### **I.27**

*Artemisia absinthium* L. – Absinthe wormwood

#### **Distribution, habitats**

It is a perennial plant with woody stem, living in uncultivated lands, dry grasslands and ruderal habitats.

#### **Morphology**

It has a rhizomatous root system. The flower-bearing stem develops only in the second year growing up to 50-150 cm tall. The whole plant has a silver-grey colour, the base leaves are petiolated, the stem leaves are sessile and completely segmented, divided into multiple segments. Flowers from July to September. The capitulum inflorescences are spherical and pendant, forming racemose panicles. The capitulum contains disc (tubular) florets. The edge of the capitulum bears pistillate (female) florets, while in the

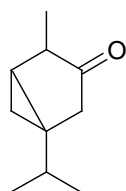
inner parts bisexual, golden florets can be found. The fruits are small, striped achenes (cypselae).

### Drug

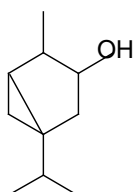
*Absinthii herba* – Wormwood (Ph. Eur. 5.0)

### Phytochemistry

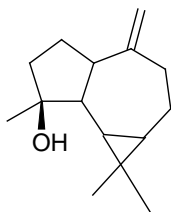
essential oil ( $\alpha$ - and  $\beta$ -thujone, thujole, linalool, cineol), sesquiterpenes, sesquiterpene lactones, flavonoids, cinnamic acid derivatives and polyins



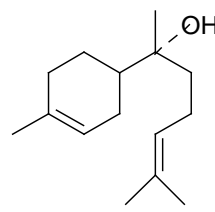
thujone



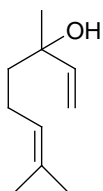
thujol



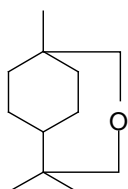
spatulenol



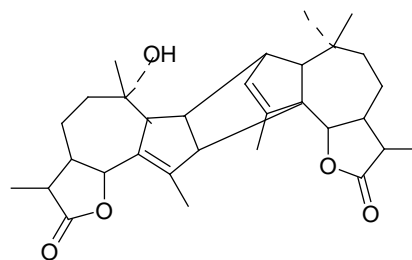
$\alpha$ -bisabolol



linalool



cineole



absinthin

### I.28

#### Active compounds of *Absinthii herba* – Wormwood

### Uses

Wormwood is amarum (in dyspepsia, anorexia or gastritis) and choleric (but thujone dissolved in alcoholic extracts can lead to headache, temporary confusion and hallucinations).



## ***Artemisia vulgaris* L. – Common wormwood, Mugwort**

Asteraceae – Sunflower family



### **I.29**

*Artemisia vulgaris* L. – Common wormwood, Mugwort

#### **Distribution, habitats**

Weed associations, forest edges, uncultivated areas. Occurs in large numbers, a perennial species.

#### **Morphology**

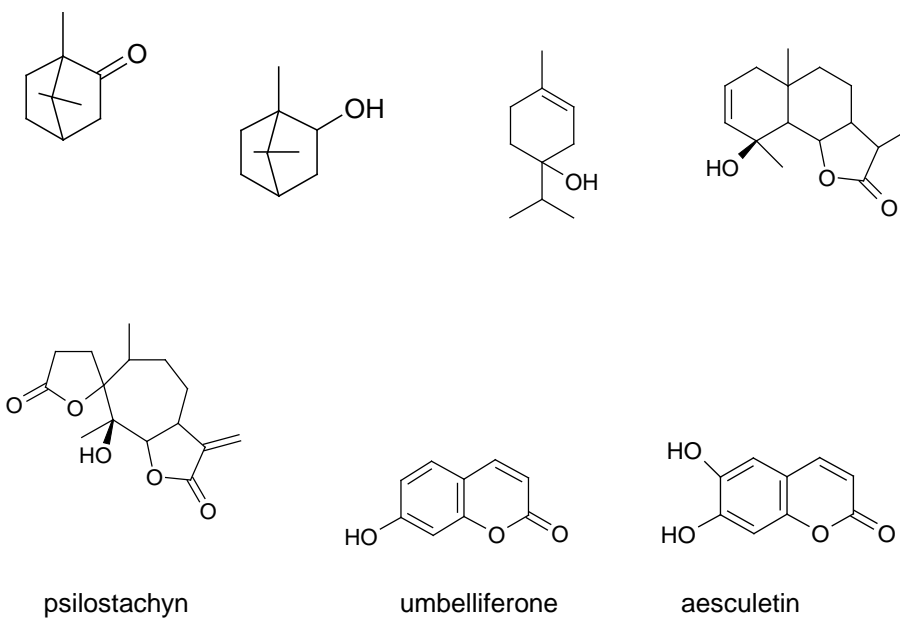
The stem is erect, growing up to 2 m tall. A robust, branching plant, with a rhizome that continues in strong roots. The leaves are alternate, at the bottom lobate, at the top completely segmented; the upper (adaxial) surface is dark green, the lower (abaxial) surface is white, tomentose (richly covered with hairs). The base leaves are petiolate, the upper leaves are sessile. The small capitula cluster into a dense racemose panicle, with narrow involucre bracts. The capitulum comprises disc (tubular) florets, which are yellow or reddish brown; the inner ones are bisexual, the outer ones are pistillate (female). The receptacle is hairless. The achene bears a colourful pappus.

#### **Drug**

*Artemisia vulgaris herba* – common wormwood flowering shoot

### Phytochemistry

essential oil (cineol, camphor, borneol, thujone, linalool), sesquiterpene lactone, flavonoid, coumarin and plicin



### I.30

Active compounds of *Artemisiae vulgaris herba* – Common wormwood flowering shoot

### Uses

Wormwood is amarum, cholagogue, anthelmintic, antibacterial and antimitotic.

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## ***Astragalus gummifer* Labill. – Tragacanth**

Fabaceae – Bean family

### Distribution, habitats

Originally grows in dry, warm rocky grasslands. It is native to the Middle East (Iran, Turkey, Syria).

### Morphology

It is a sparsely branching dwarf shrub growing up to 0.6-1 m tall bearing even pinnate leaves. The greyish bark is covered by long spines. The small flowers are pale yellow and form large, protruding flower heads. The small fruit is an oblong pod (legume) covered with white hairs.

### Drug

*Tragacantha* – Tragacanth (Ph. Eur. 5.0)

### Phytochemistry

tragacanthin (mainly a polymer of galacturonic acid)

### Uses

Tragacanth is used as emulgent and stabilizer in the pharmaceutical industry. The gum turns into white, tasteless and odourless powder during the cleaning processes. It forms a viscous jelly with some water. It can be used to decrease blood-sugar levels and to increase stool weight (it absorbs certain proportions of liquid and swells very much). It is a mild laxative, bears adaptogenic and anticancer activities.

## ***Atropa belladonna* L. – Deadly nightshade, Belladonna**

Solanaceae – Nightshade family



### **I.31**

*Atropa belladonna* L. – Deadly nightshade, Belladonna

#### **Distribution, habitats**

It is a perennial herb living in hedges and verges of forests.

#### **Morphology**

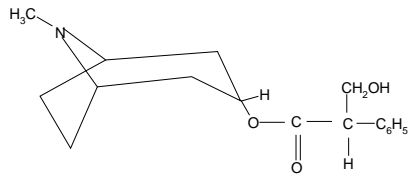
It has a vigorous rhizome and root system. The sympodial shoot is 50 to 150 cm tall. Each node bears two types of leaves: one is a regular foliage leaf, while the other leaf has been pushed up from a lower level. Both types of leaves are elliptic, entire and attenuate. Belladonna flowers from June to August. The flowers in the axils of the leaves are single and have short peduncles. The calyx is deeply divided into 5 lobes, the corolla is bell-shaped, brownish purple. The filaments are arching. The ovary has two carpels. The fruit is a round, shining purple or black berry with several seeds.

#### **Drugs**

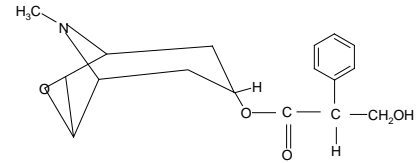
*Belladonnae folium* – Belladonna leaf (Ph. Eur. 5.0), *Belladonnae radix* – Belladonna root (Ph. Hg. VII.)

#### **Phytochemistry**

tropane alkaloids (L-hyoscyamine, atropine, apoatropine, belladonnine, scopolamine, kuskigrin)



atropine  
(L- and D-hyoscyamine)



L-scopolamine

### I.32

Active compounds of *Belladonnae radix*, *B. folium* – Belladonna root, Belladonna leaf

#### Uses

Atropine is processed by pharmaceutical industry as active substance of anticholinergic and neurotrop spasmolytic drugs. It is used as analgesic in ulcus ventriculi, hyperacidity, asthma bronchiale, renal and biliary cholic and menstrual cramps. It can influence the central nervous system: sedative in neurovegetative dystonia and neurasthenia, but overdose may lead to psychomotor agitation, anxiety or hallucinations. In ophthalmology, it is frequently used as mydriatic.



## ***Avena sativa* L. – Common oat**

Poaceae – Grass Family

### Distribution, habitats

Runs wild in weed associations. Oat finds the best growing conditions on wet, nutrient rich, slightly acidic clay or sandy soils.

### Morphology

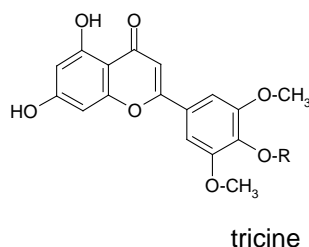
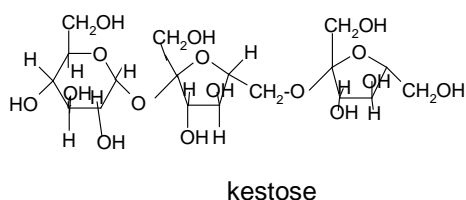
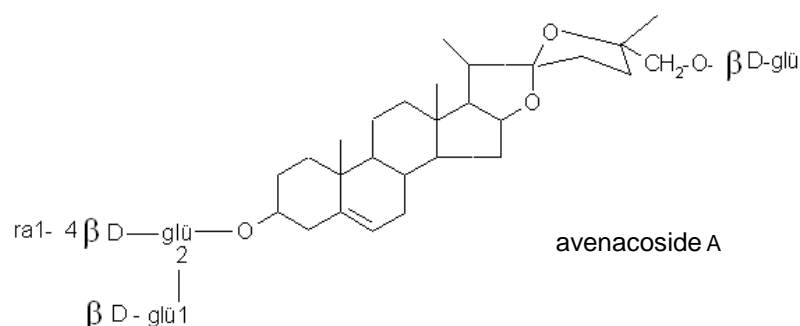
Annual grass, with smooth and glabrous, 60 to 150 cm tall shoots. The base is branching, bushy. The greyish green, rough leaf blade is 10 to 16 mm wide and 30 cm long, tapering into a pointed tip. The ligule is short, ovate, sharply dentate. The glabrous sheath closes loosely round the stem, the auricle is missing. Oat flowers in June. The branches of the loose panicle face one side, their length is uneven, they are horizontally sticking out or slightly directed upwards, with 1 to 3 spikelets. The glumes are longer than each floret. The tip of the lemma is divided into two teeth. The fruit is a caryopsis, where the seed coat and the fruit wall grow together

### Drug

*Avenae herba* – Common oat herb (fresh)

### Phytochemistry

saponins, flavonoids, phenethylamine (hordenine), betaine, trigonelline, glucan, pentosan, kestose, neokestose



### I.33

Active compounds of *Avenae herba* – Common oat herb

### Uses

Avena is food and fodder plant. It is traditionally used as a diuretic, mild sedative, against rheumatism and gout. The tea made from the oatstraw and fruits has antitussive effect.

## ***Ballota nigra* L. – Black horehound**

Lamiaceae – Mint family



### **I.34**

*Ballota nigra* L. – Black horehound

#### **Distribution, habitats**

The perennial, herbaceous plant occurs in roadside weed associations, as well as in robinia forests, forest edges and along hedges.

#### **Morphology**

The obliquely growing rhizome develops close to the soil surface. The aboveground shoot is 30-80 cm tall, branching and frequently spreading over the ground. The whole plant is richly covered by hairs and has an unpleasant smell. The green stem becomes purplish-brown by autumn. The petiolate leaves are arranged opposite (decussate) on the rectangular stem, the leaf blade is ovate or obtusely triangular. The edge of the leaf is crenate at the bottom, while it tends to be serrate in the upper part. Flowers from June to September (secondary flowering may occur until frosts). The labiate flowers form a dichasium with reduced axes in the upper third of the shoots, the 1-3-cm-long inflorescence axis turning away the whole inflorescence from the plane of the leaves. The flowers themselves arise from the axil of bracts, which are awl-shaped and soft. The calyx is fused, funnel- or bell-shaped, with 5 teeth, the tip of each bearing an awn. The corolla is bilabial, purplish red, sometimes whitish. The dorsal surface of the upper corolla lip is densely hairy, even the mouth of the corolla bears a crown of hairs. The tip of the dark brown to black nutlets (mericarps) is rounded, their surface is smooth.

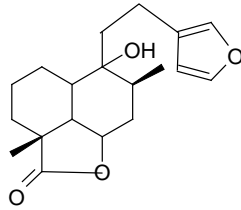
#### **Drug**

*Ballotae nigrae herba* – Black horehound herb (Ph. Eur. 5.0)



Phytochemistry

essential oil; diterpene marrubiin, sesquiterpene lactones in traces, tannins, caffeic acid



marrubiin

**I.35**

Active compound of *Ballotae nigrae herba* – Black horehound herb

Uses

It is used as sedative in hysteria, hypochondriasis, menopause, sleep disorders, abdominal pain and spasmodic cough. It has spasmolytic and choleric effects, and can be useful externally against gout. It is traditionally used against nausea, whooping cough and nervousness.

## ***Berberis vulgaris* L. – Barberry, European barberry, common barberry**

Berberidaceae – Barberry family



### **I.36**

*Berberis vulgaris* L. – Barberry, European barberry, common barberry

#### **Distribution, habitats**

It is a 1-3-m-tall branching shrub, growing in bushy habitats, especially in karst scrub-forests.

#### **Morphology**

The shoot system consists of long and short shoots. The shoots with long internodes bear leaf spines, which are the modifications of spirally arranged leaves. In the axil of the long internodes a shoot with short internode develops, bearing 4 to 6 foliage leaves. These leaves are leathery, ovate or obovate. The edge of the bottom leaves is entire or slightly dentate, while that of the upper leaves is coarse-toothed. Barberry flowers from the end of April to May. Its yellow flowers form a 3-6-cm-long, loose raceme. In the bisexual flowers two yellowish green bracts are followed by petal-like tepals, which are bending inwards. The stamens in the outer two whorls are similar to the tepals, with nectaries (staminodes) on their basal part. The inner 3+3 stamens also have a peculiar structure: the connective is widening at the tip of the filament, with the thecae sitting on

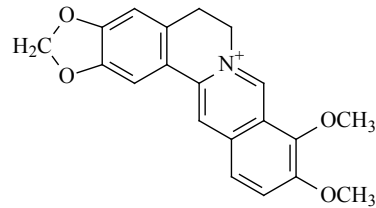
the two sides of the connective. The theca dehisces with an upward flapping slit, also when someone touches it, and the pollen gets to the stigma surface or the insect visitor. The tip of the receptacle bears a unicarpellary, cylindrical ovary. The fruit is an oblong red berry with two flat light brown seeds.

### Drug

*Berberidis radix* – Barberry root

### Phytochemistry

alkaloids (berberine), tannins, resin, wax, gum and chelidonic acid



berberine

### I.37

Active compound of *Berberidis radix* – Barberry root

### Uses

Barberry root is analgesic and spasmolytic in cholecystitis, cholelithiasis, nephrolithiasis, nephritis, gout, rheumatism, lumbago and arthritis (parenterally, only under medical supervision, due to its strong physiological effect).

***Betula pendula* Roth. – Silver birch, *Betula pubescens* Ehrh. – Downy/white birch**

Betulaceae – Birch family



**I.38**

*Betula pendula* Roth. – Silver birch

**Distribution, habitats**

Under natural conditions these monoecious tree species occur in the taiga climatic zone (northern conifer forests). They have moderate demands and good adaptability. The downy or white birch is a protected plant.

**Morphology**

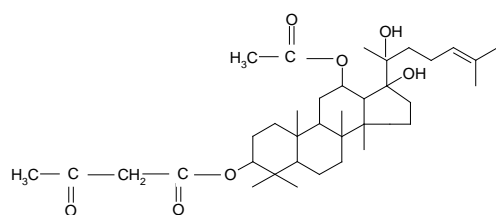
The white bark is scaly, the boughs of the canopy are bending downwards. The spirally arranged leaf buds are shiny and sticky. The leaves are triangular-ovate or rhomboid, double serrate, sometimes slightly lobate. The young shoots and the lower surface of the leaves in downy birch are hairy, the leaf is ovate or rhomboid, with an irregularly serrate leaf edge. At the tip of the long shoots the staminate (male) flowers cluster into one to three cylindrical catkins. The flowers open at the time of leafing in April and May, but the catkins appear already in the autumn of the previous year. The female catkins are shorter, and appear at the tip of short shoots. The fruit is a kind of nut with a pericarp extended into a membranous wing.

**Drug**

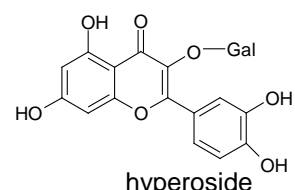
*Betulae folium* – Birch leaf (Ph. Eur. 5.0)

**Phytochemistry**

flavonoids, flavonoid methyl ethers soluble in lipids, essential oil, leucoanthocyanidins, phenolcarboxylic acids (chlorogenic acid) and resin



triterpene saponin-1



hyperoside

### I.39

#### Active compounds of *Betulae folium* – Birch leaf

##### Uses

Birch leaf is a diuretic, adjuvant in kidney and urinary infections, used against gout and rheumatism, as well as for detoxifying. It is traditionally used to quicken the removal of kidney stones. With producing large amounts of urine it also helps to flush the urinary system, washing bacteria out of the urinary tract. It is used externally to prevent hair loss. Birch tar is useful in dermatology as antiparasitic, keratolytic and antipruritic agent to treat scabies, pruritus, psoriasis or chronic eczema. Birch sap can be collected during spring, it contains sugars (namely xylitol), which is a popular sweetening agent. Birch sap is traditionally used as a diuretic and against hair loss. The infusion of the leaves is traditionally used against frostbite and leg pain.

## ***Calendula officinalis* L. – Calendula, Pot marigold**

Asteraceae – Sunflower family



### **I.40**

*Calendula officinalis* L. – Calendula, Pot marigold

#### **Distribution, habitats**

It is an annual plant native to Western Asia, but sometimes it is able to survive the winter.

#### **Morphology**

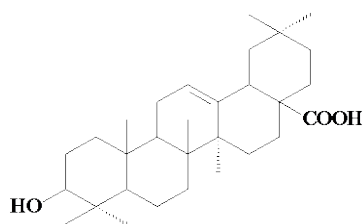
It has a taproot system. The shoot is 40-50 cm tall, the stem is squared. The alternate leaves are spatulate and attenuate at the bottom, while the upper leaves are sessile and ovate. The apical inflorescences are 3 to 5 cm in diameter. The capitulum is composed of ray (ligulate) and disc (tubular) florets, whose colour varies from pale yellow to dark orange. Only the ovaries at the edge of the capitulum are able to develop into cypsela fruits, which are curved like a claw.

#### **Drug**

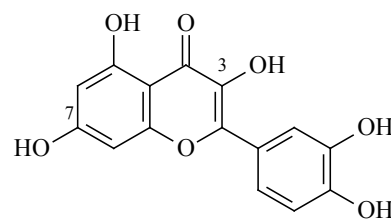
*Calendulae flos* – Calendula flower (Ph. Eur. 5.0)

#### **Phytochemistry**

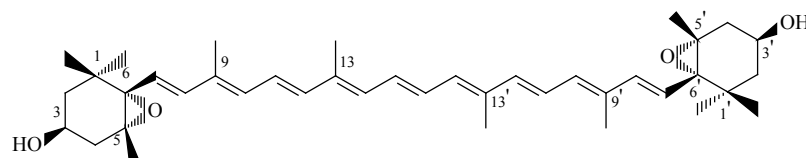
little essential oil, triterpenes, flavonoids, carotenoids, bitter substances



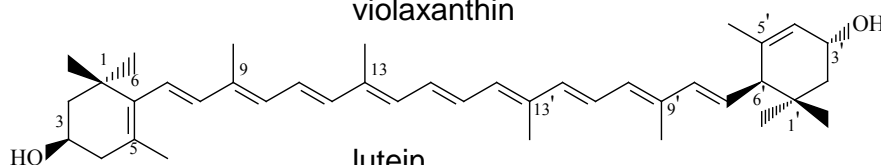
oleanolic acid



quercetin



violaxanthin



lutein

### I.41

Active compounds of *Calendulae flos* – Calendula flower

#### Uses

Calendula flower is used as antibacterial, antiviral, antimutagenic, antiphlogistic, spasmolytic, non-specific immune stimulant and choleric drug in cases of pharyngitis, dermatitis, ulcus cruris, ulcus duodeni and gastritis. It is used in many ointments and other medicines, as dyeing agent and component of salads. It is traditionally used as a diaphoretic, diuretic, anthelmintic and emmenagogue plant.



## ***Cannabis sativa* L. – Cannabis, Hemp**

Cannabaceae – Hemp family



### **I.42**

*Cannabis sativa* L. – Cannabis, Hemp

#### **Distribution, habitats**

It is an annual taxon native to Central Asia. Some varieties are cultivated for their high fibre and/or oil content.

#### **Morphology**

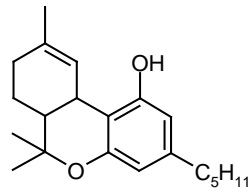
It has a taproot system. The shoot is 1-2 m tall. Hemp is a dioecious plant, the female plants being more vigorous. The leaves are decussate, the upper leaves are alternate, palmately compound with 3 to 7 leaflets. The leaflets are slender lanceolate and serrate. Flowers from July to August. Staminate flowers form a pseudoumbel, pistillate flowers cluster into a cymose inflorescence. The perianth is a calyx-like perigonium in both types of flowers. In addition, female flowers are surrounded by hooded bracts, which bear resinous glandular hairs. The fruit is a brown nut with a marble-like pattern, covered with bracts.

#### **Drug**

*Cannabis sativae fructus* – Cannabis seed, hemp seed

#### **Phytochemistry**

The fruit contains fatty oil, proteins and resin. The leaves (herb) contain little resin, flavonoids and phenol-carboxylic acids.



THC (tetrahydrocannabinol)

**I.43**

Active compound of *Cannabis sativae herba* – Cannabis herb

**Uses**

Fibers are obtained from the stem, oil is extracted from the fruit, and the protein-containing residue is utilised as fodder. The emulsion made from the oil is used against gout, rheumatism and problems of the stomach and intestines.

***Capsella bursa-pastoris* (L.) Medic. – Shepherd's-purse**

Brassicaceae – Mustard family

**Distribution, habitats**

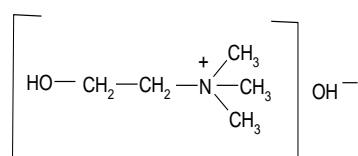
Annual or biennial overwintering weed species.

**Morphology**

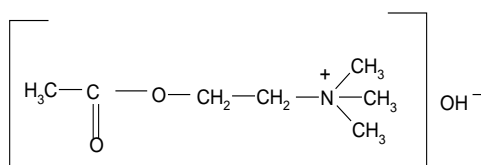
It is a 20-40 cm tall weed with a 10-15-cm-long, spindle-shaped root. First the plant develops a leaf rosette, with segmented or completely segmented leaves, and later it develops long internodes. The spirally arranged stem leaves are sessile, stem-clasping and lanceolate, with a sagittate leaf base. The main blooming period lasts from April to May. The inflorescence is a racemose corymb. The sepals are green and ovate, the petals are white and 2-3 mm long. There are 2 shorter and 4 longer stamens. A columnar nectar gland is located at the base of the shorter stamens. The ovary consists of 2 carpels, which later develop into a heart-shaped or inverse triangular silicle. The small seeds are brown.

**Drug***Bursae pastoris herba* – Shepherd's purse flowering shoot**Phytochemistry**

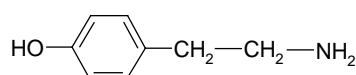
biogenic amines (choline, acetylcholine, histamine, tyramine), hemostyptic peptid, saponins, flavonoids (rutin, diosmin) and glucosinolates.



choline



acetylcholine



tyramine

**I.44**Active compounds of *Bursae pastoris herba* – Shepherd's purse flowering shoot**Uses**

It is traditionally used as hemostyptic in dysmenorrhoea and used externally to treat wounds.

***Capsicum annuum* L. var. *minimum* (Mill.) Heiser – pepper, paprika; *Capsicum frutescens* L. s. l. – Chili pepper**



**I.45**

*Capsicum annuum* L. var. *minimum* (Mill.) Heiser – pepper, paprika

**Solanaceae – Nightshade family**

**Distribution, habitats**

These taxa are native to Central America, but many varieties of them are cultivated.

**Morphology**

These plants have a taproot system and a 20-50 cm tall branching stem. The leaves are alternate, petiolate, with an ovate-triangular blade and smooth margin. The pendant white flowers appear in the axil of the upper leaves. When cultivated outdoors, the plants flower from June to October. The calyx is bell-shaped, with 5 lobes. The corolla is short tubular, white or yellowish, the corolla lobes are triangular. The 5 stamens are

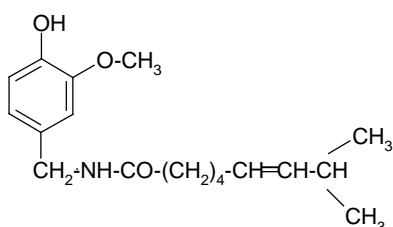
fused with the corolla, the anthers are purple. The ovary is superior, the fruit is an inflated berry varying in shape and colour. The seeds are whitish-yellow.

### Drug

*Capsici fructus* – Capsicum (Ph. Eur. 5.0)

### Phytochemistry

capsaicin, ascorbic acid, carotenoids and flavonoids (rutin)



capsaicin

### I.46

Active compound of *Capsici fructus* – Capsicum

### Uses

*Pepper or paprika* is a vegetable, spice and important for food industry. The fruit is roborant, antioxidant and free radical scavenger, because it is rich in vitamins. Extracts of different types of hot peppers are used externally in preparations such as liniments, adhesive plasters or rubs to induce hyperaemia and relieve pain in rheumatism or neuralgia. The seeds contain fatty oil. Consumption of *chili pepper* increases peristalsis and secretion of gastric juices.

## ***Carthamus tinctorius* L. – Safflower**

Asteraceae – Sunflower family



### **I.47**

*Carthamus tinctorius* L. – Safflower

#### **Distribution, habitats**

Safflower is native to Asia Minor and India. In Hungary, it is cultivated as an annual plant.

#### **Morphology**

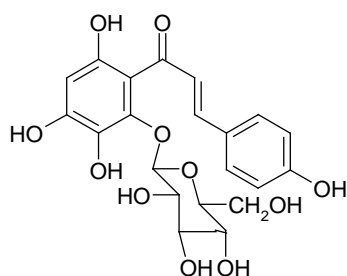
The root is a well-developed, thick taproot. The shoot is 60-150 cm tall, branching in the upper third of the plant. The stem is cylindrical, light green, becoming white towards the end of the vegetation period. The leaves are spiral, ovate, sessile, with a sharp pointed tip. The plant flowers from June to July. The inflorescence is a racemose corymb composed of capitula. Each capitulum is 2 to 4 cm in diameter, spherical, surrounded by rigid, leathery bracts with a spiky tip. The capitulum axis is covered with glumaceous trichomes, at the base of which only bisexual tubular florets are present. The corolla of these flowers is first yellow or orange, but becomes fiery red towards the end of flowering. The inferior ovary, composed of two carpels, develops into a 5-8-cm-long cypsela (achene), with a hairy pappus.

#### **Drug**

*Carthami flos* – Carthamus flower, safflower florets

#### **Phytochemistry**

The sepals contain natural pigments: carthamin (red) and safflor yellow (yellow). Safflower oil (the oil of the mature achene) is enriched in linoleic acid, essential fatty acids and vitamin E.



carthamin

**I.48**

Active compound of *Carthami flos* – Safflower florets

**Uses**

This drug is a food additive, the oil can be used for food or preventing atherosclerosis. Its alcoholic extract is used as colouring agent in foods, drinks and cosmetics. It is also known as the most important substitute for saffron (*Crocus sativus*). The petals are edible.



## ***Carum carvi* L. – Caraway**

Apiaceae – Carrot or parsley family



### **I.49**

*Carum carvi* L. – Caraway

#### **Distribution, habitats**

Originally a biennial plant living in montane meadows with poor soils. When cultivated, caraway might be either annual or biennial.

#### **Morphology**

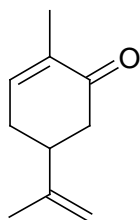
Caraway has a taproot and a shoot that can grow up to 1 m tall. The leaves are bi- or tripinnately compound with narrow leaflets. The compound umbel is without involucrets (bracts at the base of the umbel), and even involucels (bracts at the base of the umbellets) appear rarely. The single flowers are white. The fruits are brown, ribbed, 3-3.5 mm long, hairless double achenes (cremocarpis). Parts of these fruits (mericarpis) are crescent-shaped with five pale ridges.

## Drug

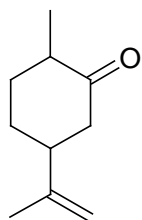
*Carvi fructus* – Caraway fruit (Ph. Eur. 5.0)

## Phytochemistry

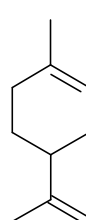
essential oil (especially carvone, then limonene, pinene, sabinen, 3-carene, dihydrocarvone, carveol)



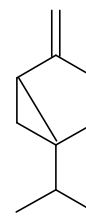
carvone



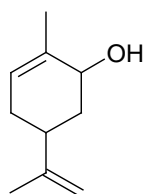
dihydrocarvone



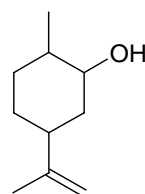
limonene



sabinene



carveol



dihydrocarveol

## I.50

Active compounds of *Carvi fructus* – Caraway fruit

## Uses

Caraway fruit is amarum, carminative, choleric, galactagogue and spasmolytic in cramps of the stomach or the intestine. It helps digestion and is used as spice and raw material in liqueur industry.

## ***Cassia angustifolia* Vahl. – Tinnevelly senna, *Cassia senna* L. – Alexandrian senna**

Caesalpiniaceae – Senna family

### Distribution, habitats

Tinnevelly senna is native to Saudi Arabia and Sudan, but it is cultivated in India as well. Alexandrian senna is native to North and Northeast Africa.

### Morphology

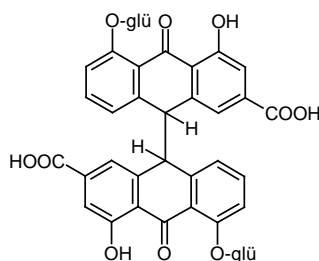
Both species are 100-150-cm-tall semi-shrubs. The even pinnately compound leaves are composed of 3 to 7 usually lanceolate leaflet pairs. The leaves of Alexandrian senna are membranous, those of Tinnevelly senna are leathery. The leaflets of both species have acuminate apex and entire margin. The zygomorphic flowers are yellow. The pods (legumens) are pergamen-like and slightly curved. Pods of Alexandrian senna are 4-5 cm long and 2-3 cm wide containing 4-10 seeds, while pods of Tinnevelly senna are longer and thinner containing 7-10 seeds.

### Drugs

*Sennae folium* – Senna leaf (Ph. Eur. 5.0), *Sennae folii extractum siccum normatum* – Senna leaf dry extract, standardised (Ph. Eur. 5.0), *Sennae fructus angustifoliae* – Tinnevelly senna pods, *Sennae fructus acutifoliae* – Alexandrian senna pods (Ph. Eur. 5.0)

### Phytochemistry

anthraquinone derivatives (sennosides), flavonoids and mucilage



sennoside A

### I.51

Active compound of *Sennae folium*, *S. fructus* – Senna leaf, Senna pods

### Uses

Senna leaves and pods are laxative drugs; teas, extracts or products of the purified sennosides are used to treat constipation.

## ***Centaurium erythraea* Rafn. – Common / European centaury**

Gentianaceae – Gentian family



**I.52**

*Centaurium erythraea* Rafn. – Common / European centaury

### Distribution, habitats

It is an annual or biennial herbaceous plant living in forests, bushy habitats or wet meadows.

### Morphology

It has spindle-shaped root and 10-30 cm tall stem, branching only in its upper one-third segment. The small leaves are opposite (decussate), the lower ones are short petiolate, the upper ones are sessile. The leaf shape is ovate or lanceolate with entire margin. Flowers in July. The inflorescence is a corymbose pseudoumbel with pink

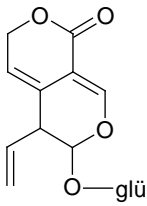
gamopetalous corolla (with fused petals). The superior, bicarpellary ovary develops into a dehiscent capsule, with persistent calyx.

**Drug**

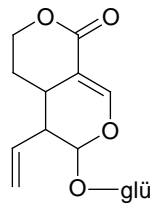
*Centaurii herba* – Centaury (Ph. Eur. 5.0)

**Phytochemistry**

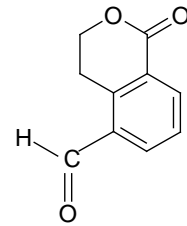
secoiridoid glycosides, flavonoids, methoxyxanthone derivatives (methylbellidifoline), phenol-carboxylic acids, triterpenoids and sterols



genciopicrin



sverosid



erythrocentaurin

**I.53**

Active compounds of *Centaurii herba* – Centaury

**Uses**

Centaury improves digestion, is used to treat chronic dyspepsia, hypoaciditas and prostate problems, it is appetizer, cholagog, roborant and tonic agent.

## ***Cephaelis ipecacuanha* (Brot.) A. Rich, *Cephaelis acuminata* H. Karst. – Ipecac, Ipecacuanha**

Rubiaceae – Coffee family

### Distribution, habitats

They are native to humid forests of Brazil.

### Morphology

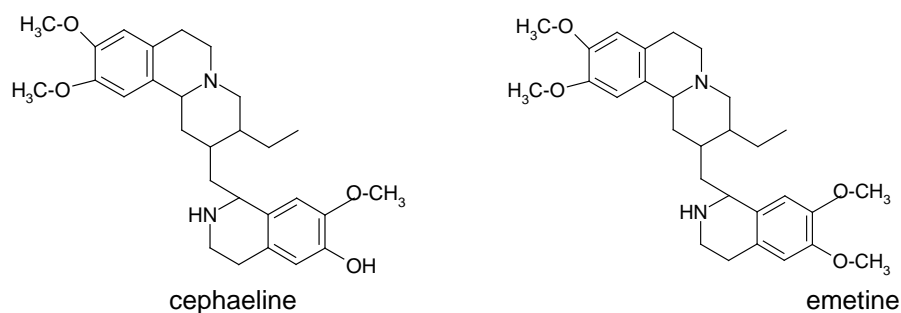
They are 30 to 50 cm tall, climbing, evergreen semi-shrubs. The leaves are bright green, 8-15 cm long, oval and acuminate. The white flowers are 1-2 cm in diameter. There are 2 seeds in the bluish-purple berries.

### Drug

*Ipecacuanhae radix* – Ipecacuanha root (Ph. Eur. 5.0), *Ipecacuanhae extractum fluidum normatum* – Ipecacuanha liquid extract, standardized (Ph. Eur. 5.1), *Ipecacuanhae pulvis normatus* – Ipecacuanha, prepared (Ph. Eur. 5.0), *Ipecacuanhae tinctura normata* – Ipecacuanha tincture, standardized (Ph. Eur. 5.0)

### Phytochemistry

isoquinoline alkaloids (2-4% the main compounds are cephaeline and emetine), saponins and iridoid glycosides



### I.54

Active compounds of *Ipecacuanhae radix* – Ipecacuanha root

### Uses

Ipecacuanha has reflex expectorant and emetic actions. Its extracts are components of expectorants and cough-suppressants used to treat chronic respiratory diseases.



## ***Cetraria islandica* (L.) Ach. – Iceland moss**

Parmeliaceae family

### Distribution, habitats

A bushy lichen growing on sandy, humic soils of mountains.

### Morphology

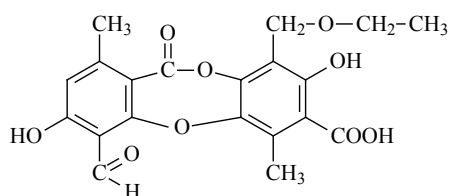
The shoot is 4-12 cm tall. This forking or horn-like branching lichen forms lamellar bushes on the ground. The individual shoots are 5 to 20 mm wide, leaf-like, but usually curved or bending. The surface receiving more light is olive or brownish green, the lower side is whitish green or light brown with white spots.

### Drug

*Lichen islandicus* – Iceland moss (Ph. Eur. 5.0)

### Phytochemistry

heteropolysaccharides as mucilage (lichenin and isolichenin), galactomannans, lichen acids, vitamins A and B



cetraric acid

### **I.55**

Active compound of *Lichen islandicus* – Iceland moss

### Uses

Iceland moss is antitussive and expectorant in bronchitis, tuberculosis and catarrhs of the upper respiratory tract. The antibacterial effect is owing to the lichen acids. It can be used as brown dye.

## ***Chamaemelum nobile* (L.) All. – Roman chamomile**

Asteraceae – Sunflower family

### Distribution, habitats

It grows wild in southwest Europe, and it is cultivated throughout Europe.

### Morphology

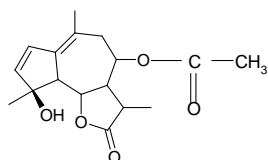
Vegetative, as well as rising, 15-30-cm-high flowering shoots arise from a below-ground thick, woody rhizome. The shoots spreading on the ground may even develop roots at the nodes. The leaves are alternate, bipinnately segmented, the leaf segments being narrow linear and usually tomentose. Flowers bloom from June to August. The capitulum, which is 0.8 to 2 cm in diameter, rises on a long stalk from the lawn-like stand. The outer surface of capitula is covered by ovate, hairy bracts with truncate edge. The inflorescence axis is generally dome-shaped, covered with receptacular bracts, which are divided and boat-like. From their base arise the white ligulate florets on the edge of the inflorescence, while the middle part is occupied by few yellow tubular florets. All of the 12 to 20 ligulate florets are pistillate, with a reduced androecium. The corolla is showy, the tubular part is 3 mm long, the ligule is 7 mm long with 3 teeth. The tubular (disc) florets are bisexual, with a 5-toothed corolla. The smooth ovary is conical, with three edges.

### Drug

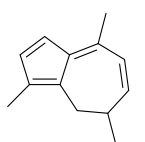
*Chamomillae romanae flos* – Chamomile flower, Roman (Ph. Eur. 5.0)

### Phytochemistry

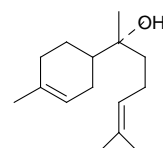
essential oil, esters of carbonic acid, sesquiterpene lactones, flavonoids, poliiins and caffeic acid derivatives



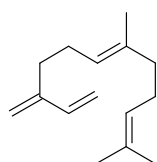
matricine



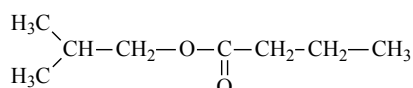
chamazulene



$\alpha$ -bisabolol



farnesene



isobutyl butyrate

### I.56

Active compounds of *Chamomillae romanae flos* – Chamomile flower, roman

### Uses

Roman chamomile flowers have antiphlogistic, spasmolytic (in dysmenorrhoea), carminative (improves digestion) and antibacterial effects. The essential oil can be produced on a large scale.

## ***Chelidonium majus* L. – Greater celandine**

Papaveraceae – Poppy family



**I.57**

*Chelidonium majus* L. – Greater celandine

### Distribution, habitats

It is a perennial herb living in ruderal areas and banks of ditches by the roadside.

### Morphology

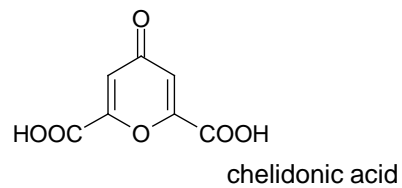
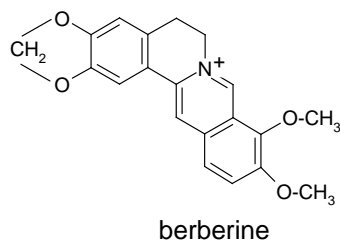
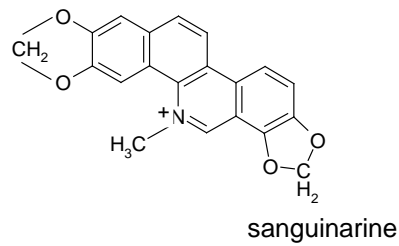
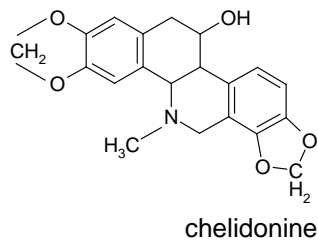
The below-ground organs include a rhizome with multiple branches and brownish yellow roots. The rhizome gives rise to a leaf rosette, and later to a 30-50-cm-tall shoot system, with long internodes, covered with fine hairs. Both the base- and stem-leaves are alternate, pinnately segmented, and the leaf segments are coarsely crenate. Greater celandine flowers from April to May. Umbel-like rhipidium inflorescences, consisting of 6 to 8 yellow flowers, appear on the tip of the main axis and side branches. The hairy sepals are shed early, the petals are free. The androecium comprises a large number of stamens, while the gynoecium is composed of 2 carpels, with a superior ovary. The fruit is a silique-like capsule, opening along two lines. The brownish black, shining seeds bear a protruding hilum. The whole plant contains a yellow to orange latex.

### Drug

*Chelidonii herba* – Greater celandine (Ph. Eur. 5.0)

### Phytochemistry

alkaloids (chelidonine, chelerythrine, sanguinarine, coptisine and berberine, protopine)  
malic acid, citric acid, succinic acid, chelidonic acid, flavonoids, saponins, proteolytic enzymes



### I.58

Active compounds of *Chelidonii herba* – Greater celandine

#### Uses

Greater celandine has a strong effect internally, it can only be used under strict medical supervision. It is spasmolytic, mild analgesic and bactericide. Chelidone is antimitotic, the crude sap is proteolytic (externally used against warts and moles). Berberine is a well-known constituent of cholagogue tea mixtures, because it stimulates the secretion of bile. It is used in homeopathy as well.

## ***Cichorium intybus* L. – Common chicory**

Asteraceae – Sunflower family



**I.59**

*Cichorium intybus* L. – Common chicory

### **Distribution, habitats**

A latex-containing plant occurring on roadsides and ruderal-detrital areas; but it is cultivated, as well.

### **Morphology**

The root is spindle-shaped, with rhizomes. The shoot is 15-100 cm tall. The leaves are spirally arranged, at the bottom obovate or lanceolate, runcinate, the upper leaves are narrow. Chicory flowers from July to September. Capitula cluster into cymose inflorescences. The outer surface of the capitulum is covered by biserial scale leaves (involucral bracts), the glabrous receptacle bears light blue ligulate florets. The fruit is a cypsela (achene), with a crown on the top.

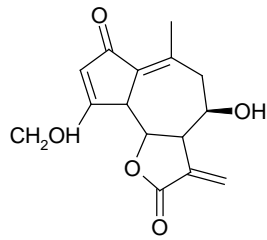
### **Drug**

*Cichorii radix* – Chicory root

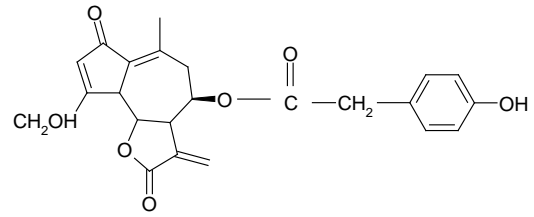
### **Phytochemistry**

sesquiterpene lactones (lactucin and lactucopicrin), triterpenes (taraxasterol), phenol-carboxylic acids; inulin in the root; cichoriin in the herb

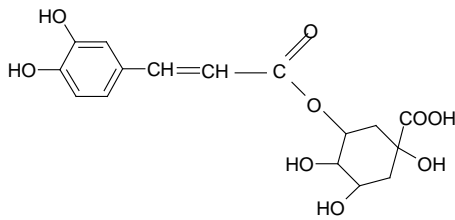




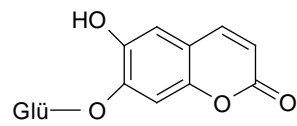
lactucin



lactucopicrin



chlorogenic acid



cichoriin

### I.60

#### Active compounds of *Cichorii radix* – Chicory root

##### Uses

Chicory root has cholagogue, tonic and stomachic properties. The roots of its selected variety (*Cichorium intybus* L. var. *foliosum* Hegi) are known as coffee substitute.

## ***Cinnamomum zeylanicum* Nees. – Ceylon cinnamon**

Lauraceae – Laurel family

### Distribution, habitats

It is native to Southeast Asia, particularly to Sri Lanka and the Sunda Islands. It grows in tropical rainforests up to 500 m altitude.

### Morphology

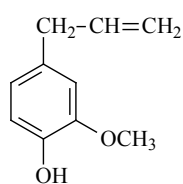
It is an 8-10-m-tall evergreen tree. The trunk is profusely branched. The cultivated specimens are cut back each year, which does not allow them to grow above 3 m height. The narrow, lanceolate leaves are 20 cm long, thick and fleshy (succulent). The freshly emerging leaves are red. The white flowers are arranged in loose panicles. The fruits are dark-brown to purple berries.

### Drug

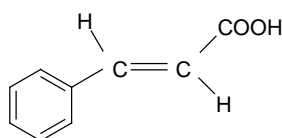
*Cinnamomi cortex* – Cinnamon (Ph. Eur. 5.0)

### Phytochemistry

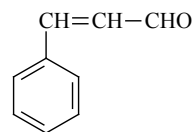
essential oil, cinnamic aldehyde, eugenol, sesquiterpenes, diterpenes, phenol-carboxylic acids, coumarin and oligomeric procyanidins



eugenol



cinnamic acid



cinnamic aldehyde

### I.61

Active compounds of *Cinnamomi cortex* – Cinnamon

### Uses

Cinnamon helps digestion, has carminative, tonic and aromatic effects. It is used internally in dysmenorrhoea, externally as antifungal and antibacterial drug (in rinsing and soaking solutions). The vapours of the oil (or its active constituents) are used against fungi involved in respiratory tract mycoses. The oil of the leaves is antiseptic, refreshing, vitalizing and can be used for the treatment of high blood pressure. It is used as spice and raw material in food and alcohol industry.

## ***Citrus aurantium* L. ssp. *amara* – Bitter orange**

Rutaceae – Rue or citrus family

### Distribution, habitats

It is native to Northeast India and South China, but it is cultivated in the East, as well as in Southern Europe.

### Morphology

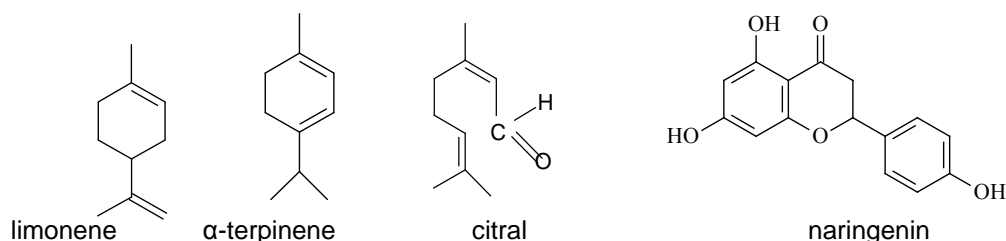
It is an evergreen tree growing up to 5 m, with a spherical canopy. The flower-buds are white or yellowish-white reaching 25 mm in length. The free corolla is composed of 5 thick, dome-shaped, white petals, on which essential oil cavities can be observed with a magnifying glass. The short, yellowish green, remaining, fused calyx consists of 5 broad sepals, which are fused at their base. This star-shaped structure is connected to the 5-10-mm-long receptacle. The flowers contain at least 20 stamens, which form groups of 4 or 5, due to the fusion of filaments; the anthers are yellow. The superior ovary is brownish black and roundish, with 8 to 10 loculi, each holding several ovules. The thick, cylindrical style ends in a head-like stigma. The hesperidium fruit tastes bitter, the outer fruit wall (exocarp) is rough, wrinkled.

### Drug

*Aurantii amari epicarpium et mesocarpium* – Bitter-orange epicarp and mesocarp (Ph. Eur. 5.0)

### Phytochemistry

linalil acetate; bitter-orange oil contains monoterpene esters; the immature fruit contains bitter triterpene-lactone (limonin), vitamin C, terpene alcohols and carotenoids (hesperidin, neohesperidin)



### I.62

*Aurantii amari epicarpium et mesocarpium* – Bitter-orange epicarp and mesocarp

### Uses

It is used as aromatic and amarum, flavouring agent and taste corrigent in pharmaceutical as well as confectionery industries. Linalil acetate is sedative, the oil of the seeds helps reduce blood cholesterol levels. It has antibacterial, antifungal, antiemetic, antitussive, spasmolytic, carminative, diaphoretic, stomachic and tonic properties. The essential oil is largely processed by the perfume industry (cosmetics, perfumes, soaps).

## ***Claviceps purpurea* (Fr.) Tul. – Ergot**

### Clavicipitaceae

#### Distribution, habitats

Ergot is usually seen in rye, but it also occurs in wheat, barley and oat, as well as the majority of other grass species.

#### Morphology

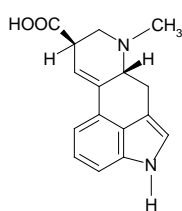
Ergot is a plant pathogen fungus, which appears as an elongated, 2-5-cm-long, curved, deep purple or black sclerotium in the mature ear of cereals. Sclerotium is one of the developmental stages of the fungus.

#### Drug

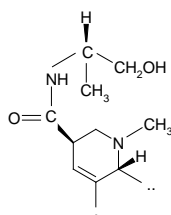
*Secale cornutum* – Ergot (the sclerotium itself)

#### Phytochemistry

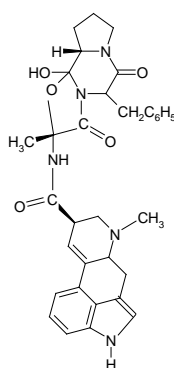
fatty oil, indole alkaloids (lysergic acid derivatives: ergotamine, ergotoxine, ergoxine, ergometrine)



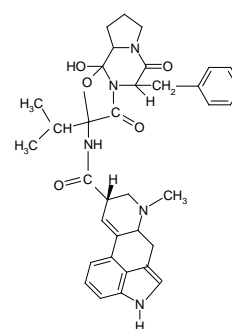
D-lysergic acid



ergometrine



ergotamine



ergocristine

### I.63

#### Active compounds of *Secale cornutum* - Ergot

#### Uses

Ergotamine is a sympatholytic, which causes peripheral vasoconstriction (hemostyptic in obstetrics and useful against migraine). Ergotoxine is antihypertensive. Ergometrine is oxytocic and uterotonic (its methylated derivatives are used to reduce postpartum and other bleedings of the uterus). The pure active compounds are processed by the pharmaceutical industry.

## ***Cnicus benedictus* L. – St. Benedict's thistle, blessed thistle, holy thistle or spotted thistle**

Asteraceae – Sunflower family



### **I.64**

*Cnicus benedictus* L. – St. Benedict's thistle, blessed thistle, holy thistle or spotted thistle

#### **Distribution, habitats**

It is an annual plant native to the Mediterranean, cultivated in many places.

#### **Morphology**

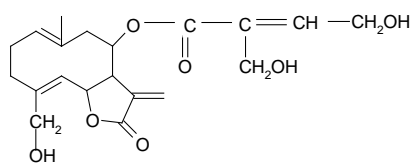
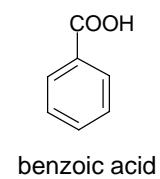
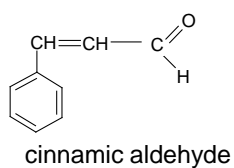
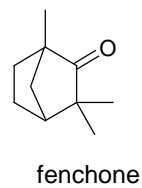
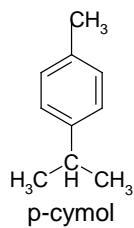
It has a taproot system, the ribbed stem is about 50 cm tall, often procumbent. The whole plant is sticky-hirsute. The leaves are alternate, sinuate, with spiny edges. The leaf blade is tapering into the petiole, in the case of the upper leaves into the stem. Flowers bloom in June. The apical, ovate capitulum is surrounded by woolly involucral bracts with a spiky end. The axis of the capitulum is flat, covered with silky receptacular hairs. The flowers are yellow and tubular, the outer ones being sterile. The fruit is a cypsela with pappus.

#### **Drug**

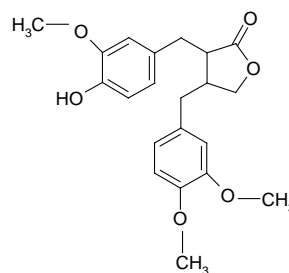
*Cardui benedicti herba* – Benedict's thistle flowering shoot (Ph. Hg. VII.)

#### **Phytochemistry**

sesquiterpene lactones (cnicine), lignan lactones (arctiin), essential oil (cimene, fenchon, citral, cinnamic aldehyde), triterpenes, flavonoids and mucilage



cnicin



arctigenin

### I.65

Active compounds of *Cardui benedicti herba* – Benedict's thistle flowering shoot

#### Uses

It is appetizer and amarum, improves digestion and increases the secretion of gastric juices and bile. Benedict's thistle is often a component of bitter drinks.



## ***Commiphora myrrha (molmol)* Engl. – Common myrrh, gum myrrh**

Burseraceae – Torchwood family

### Distribution, habitats

Native to the desert regions of North Africa, as well as to the Somalian shores of the Red Sea.

### Morphology

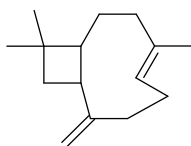
A 3-m-tall shrub or small tree (up to 10 m), with hard and tuberous branches. The trunk is low and thick, with a greyish yellow colour. The branches are covered with pointed spines. The small leaves are alternate, arranged sparsely. The compound leaves are made up of three leaflets, each with a pointed tip. The small flowers are white or greenish. The fruit has a bitter taste.

### Drug

*Myrrha* – Myrrh (Ph. Eur. 5.0)

### Phytochemistry

essential oil (pinene), sesquiterpene alcohols, furanosesesquiterpenes, resin and mucilage



caryophyllene

### **I.66**

Active compound of *Myrrha* – Myrrh

### Uses

Previously, it was used in respiratory diseases. Myrrh is disinfectant, deodorant and astringent. The essential oil is used to treat bronchitis. Used in the perfume industry and for toothpaste production, as well as in paints to relieve teething problems. The resin is used to treat inflammations of the oral cavity and the pharynx. Used as incense.

## ***Coriandrum sativum* L. – Coriander**

Apiaceae – Carrot or parsley family

### Distribution, habitats

Coriander is native to the Mediterranean region, and it is cultivated as an annual plant.

### Morphology

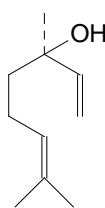
The below-ground part of the plant is a taproot system, the above-ground shoot is 40 to 80 (100) cm tall, smelling like a bug. The leaves are arranged alternately. Coriander is typically heterophyllous: the lower leaves are simple, cordate-orbicular or reniform, lobate and serrate; the middle ones are pinnately compound, with cleft leaflets; while the upper leaves are similarly compound, but here the leaflets are segmented. Coriander flowers in June. The inflorescence is a compound umbel, with 7 to 15 branches. Involucral bracts and involucels are mostly missing. The calyx is reduced in the bisexual flowers. The purplish petals are somewhat larger at the margin of the umbel. The fruit is a yellowish brown, round double achene (cremocarp, schizocarp), the mericarps stay together after ripening.

### Drug

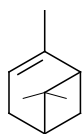
*Coriandri fructus* – Coriander (Ph. Eur. 5.0)

### Phytochemistry

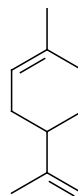
essential oil (linalool, pinene, limonene, 1,8-cineole, camphor, geraniol, geranyl acetate and trans-tridecen-2-al)



linalool



$\alpha$ -pinene



limonene

### **I.67**

Active compounds of *Coriandri fructus* – Coriander

### Uses

Coriander is carminative, spasmolytic and appetizer. It is raw material for the food and perfume industries. It is a well-known spice.

***Cotinus coggygia* Scop. – Eurasian smoketree, smoke tree, smoke bush**

Anacardiaceae – Cashew or sumac family



**I.68**

*Cotinus coggygia* Scop. – Eurasian smoketree, smoke tree, smoke bush

**Distribution, habitats**

A branching shrub or small tree, growing up to 3 m height, with dense foliage. Typical in karst scrub forests, particularly in the Transdanubian Mountains.

**Morphology**

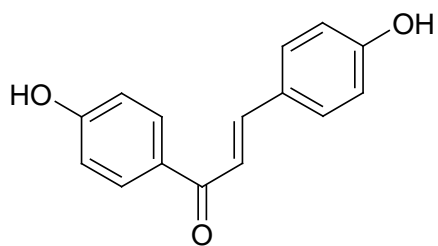
Older branches are greyish brown, the shoot tips are carmine red. Leaves are alternate, with a rigid petiole and entire margin. The blade is broad ovate, the apex is obtuse or truncate. The green colour of the leaves turns maroon-purple or golden yellow by autumn. The flowering period lasts from May to June. The flowers cluster into a large apical panicle. The perianth comprises 5 sepals with pointed lobes and 5 ovate yellowish or whitish green petals. The androecium is 5-merous. The tricarpellary, superior ovary develops into brown, ribbed, dry fruitlets (stones). The majority of the flowers remains sterile and is shed early. The remaining sterile peduncles develop into feathery, branching structures – hence the popular name ‘wig tree’.

**Drug**

*Cotini folium* – Smoke tree leaf

**Phytochemistry**

gallotannins (gallic acid and ellagic acid esters), catechin tannins, flavonoids and essential oil



isoliquiritigenin

**I.69**

Active compound of *Cotini folium* – Smoke tree leaf

**Uses**

It is used for rinsing the mouth due to its astringent, antiseptic and hemostyptic effects, e.g. after tooth extraction and in gingivitis. Tinctures can be applied in treating the oral cavity. It can be used as sitting bath to help healing of haemorrhoids.

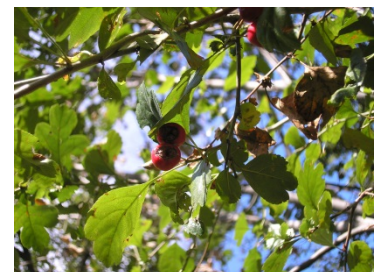
***Crataegus monogyna* Jacq. – Common hawthorn, *C. laevigata* (Poir.) DC. – Woodland hawthorn, *C. pentagyna* – Small-flowered black hawthorn, *C. nigra* W. et K. – Hungarian hawthorn, *C. azarolus* L. – Azarole**

Rosaceae – Rose family



**I.70**

*Crataegus monogyna* Jacq. – Common hawthorn



**I.71**

*Crataegus oxyacantha*



### Distribution, habitats

Spiny shrubs that occur on pasture lands and forest edges.

### Morphology:

*C. monogyna*: The alternate leaves are lobate or cleft, the leaf base bearing a stipule. The corymb-like inflorescence comprises white flowers, which bloom after leafing, in May. The flowers are 5-cyclic and 5-merous. The fruit is a 10-12 mm dark red haw (pome fruit, false fruit).

*C. laevigata*: The leaves are slightly divided, the stipules are well developed, there are mostly two styles in the flowers.

*C. nigra*: There are 5 styles in the flowers, the pseudofruits are blackish. It is a protected taxon.

*C. pentagyna*: There are 5 carpels in the pistil. The fruits are purple or black.

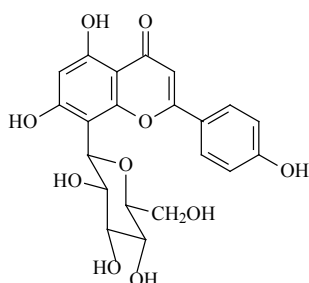
*C. azarolus*: Native to the Mediterranean Basin. The haw fruits are similar to those of *C. monogyna*, but plumper.

### Drug

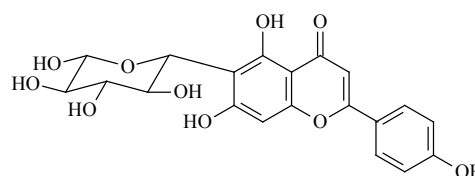
*Crataegi folium cum flore* – Hawthorn leaf and flower (Ph. Eur. 5.0), *Crataegi folii cum flore extractum siccum* – Hawthorn leaf and flower dry extract (Ph. Eur. 5.0), *Crataegi fructus* – Hawthorn berries (Ph. Eur. 5.0)

### Phytochemistry

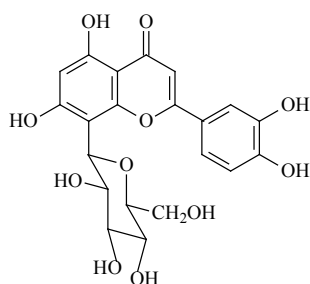
oligomeric procyanidins, catechin, epicatechin, flavonoids (hyperoside, rutin and other O-glycosides), phenol-carboxylic acids, amines and triterpenoids



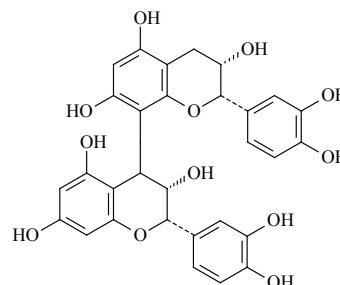
**vitexin:** apigenin-8-C-glucoside



**isovitexin:** apigenin-6-C-glucoside



**orientin:** luteolin-8-C-glucoside



**dimeric procyanidin (4β→8)**

### I.72

Active compounds of *Crataegi folium cum flore*, *Crataegi fructus* – Hawthorn leaf and flower, Hawthorn fruit



### Uses

Hawthorn has coronary vasodilator and positive inotropic effects, it is used as antihypertensive agent in coronary sclerosis, improves myocardial oxygen supply and is a mild antihypertensive and sedative drug.

## ***Crocus sativus* L. – Saffron**

Iridaceae – Iris family

### Distribution, habitats

It is a sporadically cultivated herb and medicinal plant.

### Morphology

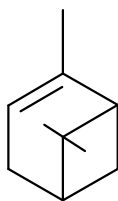
The corm (bulbotuber) is tiny and fleshy, covered with light brown scale leaves. The narrow linear leaves appear at the time of flowering, forming a leaf rosette until next June. The purplish pink flowers appear in late autumn. The 2-5-cm-long fiery red stigma is conspicuous, with 3 lobes. Since there are no ripe fruits and seeds, the plant is propagated with daughter corms.

### Drug

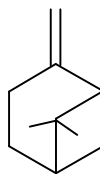
*Croci stigma* – Saffron stigma

### Phytochemistry

essential oil (safranal, pinenes, 1,8-cineole), carotenoids (crocin, crocetin) and heteropolysaccharides



$\alpha$ -pinene



$\beta$ -pinene

### **I.73**

Active compounds of *Croci stigma* – Saffron stigma

### Uses

Preclinical studies (animal models) provided evidence for the antitumor and hemostyptic activities of crocetin. Saffron is sedative, appetizer, spasmolytic and antioxidant. Larger doses of this drug can lead to poisoning. It is traditionally used as sedative, spasmolytic and stomachic. It is raw material of alcohol and cosmetic industry but mainly used as food dye and in homeopathy.

## ***Cucurbita pepo* L. – Field pumpkin**

Cucurbitaceae – Gourd Family



**I.74**

*Cucurbita pepo* L. – Field pumpkin

### Distribution, habitats

It is an annual cultivated plant native to America.

### Morphology

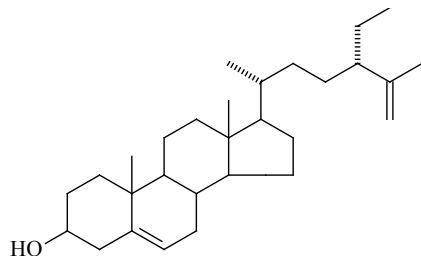
The root system penetrates deep into the soil. The 3-4-m long shoot is a runner, climbing with tendrils. The leaves are alternate, petiolate, the leaf blade is broad ovate, divided, varying from lobate to segmented, sometimes with a marble-like pattern of spots. Pumpkin is in flower from June to August. This plant is monoecious and unisexual, bearing yellow flowers. The female flowers are sessile, the male flowers have a long peduncle. The fruit is a pepo. The seeds are flat and oval, their shell is hard.

### Drug

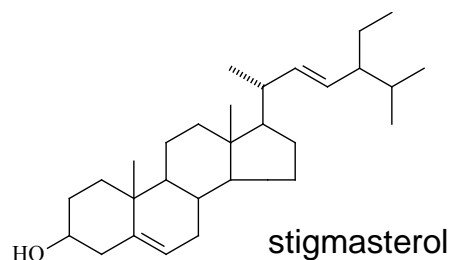
*Cucurbitae semen* – Pumpkin seed

### Phytochemistry

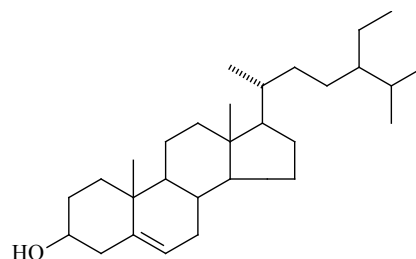
fatty oil, sterols, tocopherol, fitynic acid, amino acids and cucurbitin (amino-carboxy-pyrrolidine)



clerosterol



stigmasterol



$\beta$ -sitosterol

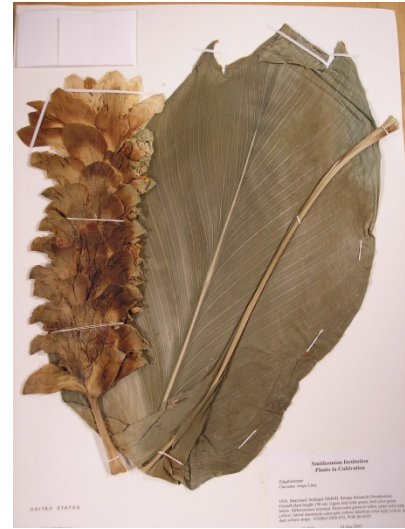
### I.75

Active compounds of *Cucurbitae semen* – Pumpkin seed

#### Uses

The main indication of extracts of pumpkin seeds is benign prostatic hyperplasia (BPH), but they have diuretic and anthelmintic properties as well.

## ***Curcuma xanthorrhiza* Roxb. – Javanese turmeric**



**I.76**

*Curcuma xanthorrhiza* Roxb. – Javanese turmeric

### Zingiberaceae – Ginger family

#### Distribution, habitats

It is native to and cultivated in Indonesia.

#### Morphology

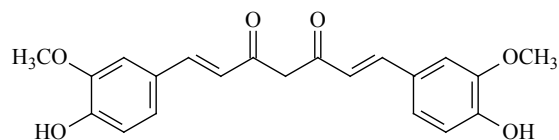
It can grow up to 1-2 m tall. The leaves are tapering into the petiole, the leaf blade is ovate with an entire margin. The inflorescence is composed of pinkish flowers. The inner surface of the rhizomatous root is yellow.

#### Drug

*Curcuma xanthorrhizae rhizoma* – Turmeric, Javanese (Ph. Eur. 5.0)

#### Phytochemistry

curcuminoids (curcumin, desmethoxycurcumin), diarylheptanoids, essential oil (curcumenes)



curcumin

**I.77**

Active compound of *Curcuma xanthorrhizae rhizoma* – Turmeric, Javanese

### Uses

Javanese turmeric is choleric and cholekinetic in the treatment of cholangitis and cholecystitis, but it has also stomachic, carminative, antiphlogistic, antibacterial and insecticide properties.



## ***Cymbopogon winterianus* Jowitt – Citronella grass, Java grass, Cymbopogon grass**

Poaceae – Grass family

Distribution, habitats

It is native to Java.

Morphology

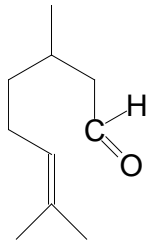
Citronella grass is a 2 m tall plant. The lower part of the stem is reddish, the leaves are narrow linear with entire margin and parallel leaf venation.

Drug

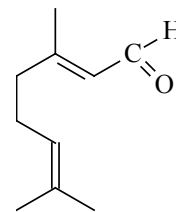
*Citronellae aetheroleum* – Citronella oil (Ph. Eur. 5.0)

Phytochemistry

essential oil (geraniol, citronellol, citronellal) and sesquiterpenes



citronellal



geranial = citral a

### **I.78**

Active compounds of *Citronellae aetheroleum* – Citronella oil

Uses

It is used in the perfume industry.

## ***Datura stramonium* L. – Jimsonweed, thorn-apple, datura**

Solanaceae – Nightshade family



**I.79**

*Datura stramonium* L. – Jimsonweed, thorn-apple, datura

### Distribution, habitats

It is an annual plant frequently occurring in arable lands and ruderal areas.

### Morphology

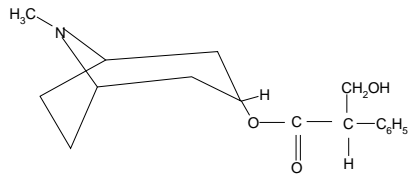
The extensively branching stem is 30 to 120 cm tall, with dichotomous branching. The allorhizous root system comprises a thick taproot. The leaves are petiolate and irregularly lobed. The flowering period lasts from June to September. The funnel-shaped white flowers are 6 to 8 cm long. The tubular corolla has 5 lobes, the calyx is similarly tubular with 5 lobes. The lower part of the calyx remains on the flowers, and by bending backwards encloses the base of the fruit. The bicarpellary ovary is divided into 2 locules at the top and 4 locules at the bottom. The fruit is an egg-shaped septifragil capsule, covered with stiff thorns. When mature, fruits split along 4 lines of opening. The black seeds are kidney-shaped.

### Drug

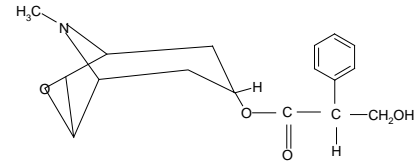
*Stramonii folium* – Stramonium leaf (Ph. Eur. 5.0), *Stramonii pulvis normatus* – Stramonium, prepared (Ph. Eur. 5.0)

### Phytochemistry

Tropane alkaloids (L-hyoscyamine, L-scopolamine, atropine, apoatropine, belladonnine)



atropine  
(L- and D-hyoscyamine)



L-scopolamine

### I.80

Active compounds of *Stramonii folium* – Stramonium leaf

#### Uses

Atropine has anticholinergic and spasmolytic effects (used in hyperacidic ulcer ventriculi, bronchial asthma, renal or biliary colic). Atropine overdose can lead to psychomotor agitation and hallucinations. Scopolamine can reduce the psychomotor agitation. The leaves were traditionally used to treat asthma in the form of cigarettes. It is raw material for pharmaceutical industry.

## ***Elettaria cardamomum* White et Maton – Cardamom**

Zingiberaceae – Ginger family



### **I.81**

*Elettaria cardamomum* White et Maton – Cardamom

#### **Distribution, habitats**

It is native to Southeast Asia, the Indian subcontinent, and it is cultivated in the tropics.

#### **Morphology**

It is a perennial herb with a thick rhizome or an underground (leafy) stem and roots. The leaf base is broad; the flowers are white or pale green. The plant is in flower from March to April. The many-seeded fruits are 1 to 2 cm long and 0.6 to 0.8 cm wide, greenish-gray, tri-locular capsules. The brownish-black, angular seeds are 2-3 mm in diameter and they have a pleasant odor.

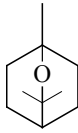
#### **Drug**

*Cardamomi fructus* – Cardamom fruit (seed)

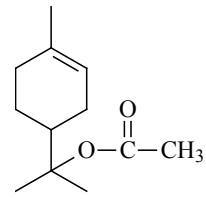
The seeds are released from the capsule only before using, for two reasons. One of them is to prevent the evaporation of the essential oil, the other is the fact that seeds of *Elettaria* species are very similar, and they can only be distinguished based on capsule morphology – in order to avoid adulteration.

#### **Phytochemistry**

essential oil (1,8-cineole, terpinyl acetate)



1,8-cineole (= eucalyptol)



$\alpha$ -terpinil-acetate

### **I.82**

Active compounds of *Cardamomi fructus* – Cardamom fruit

#### **Uses**

Spice, aromatic, carminative, used in the perfume industry.

## ***Ephedra distachya* L. – Ephedra**

Ephedraceae – Ephedra family

### Distribution, habitats

It is a 0.5 m tall dioecious sub-shrub, native to Central and South-East Europe. In Hungary, it is a very rare, protected plant, occurring sporadically in sandy and loess grasslands or dolomite rock grasslands.

### Morphology

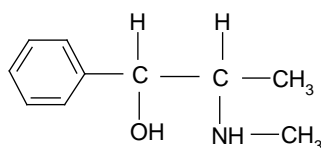
The rusty brown, woody root system is creeping, stolon-like. The 1-3-mm-thick, articulated shoot branches look like sticks. The scale-like leaves are decussate (opposite). Staminate (male) flowers form catkin-like inflorescences at the shoot tips, or sometimes in leaf axils. The pistillate (female) flowers are surrounded by scaly bracts. The plant is in flower from April to June. On the female plants the bracts surrounding the developing seed become fleshy and red showing a berry-like appearance.

### Drug

*Ephedrae herba* – Ephedra herb

### Phytochemistry

protoalkaloids [L-ephedrine, (+)ψ-ephedrine, (+)nor-ψ-ephedrine]



L-ephedrine

### **I.83**

Active compound of *Ephedrae herba* – Ephedra herb

### Uses

Ephedrine is a sympathomimetic compound, used in the relief and prevention of bronchospasm (bronchial asthma, bronchitis) and it has vasoconstrictor properties (nasal drops, eye drops). The use of ephedrine requires medical supervision. Prolonged use can lead to tolerance.



***Epilobium parviflorum* Schreb., *E. roseum* Schreb. –  
Smallflower hairy willowherb, pale willowherb**

Onagraceae – Willowherb family or Evening primrose family



**I.84**

*Epilobium roseum* Schreb. – Smallflower hairy willowherb

**Distribution, habitats**

*E. parviflorum* is a stoloniferous plant that prefers moist mountain meadows, marshes and swamps. *E. roseum* is a perennial herb of damp disturbed places, found near streams and canals.

**Morphology**

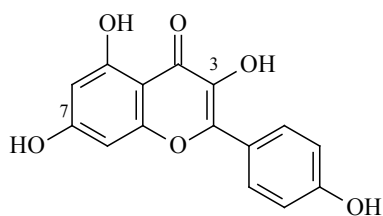
The branching shoot is 20 to 50 cm tall. The leaves are decussate (opposite), narrow ovate (egg-shaped), almost sessile. The leaf margin is sharply dentate. The stem and the leaves are pubescent. The flowers are pale purple, arising from the axil of the upper leaves. The plant is in flower from June to August. Each floral whorl consists of 4 members; the sepals are obtuse, ovate to lanceolate; the petals are cordate (heart-shaped). The fruit is a slender, cylindrical capsule opening along 4 lines. The numerous brownish-black seeds are covered with hairs which aid seed dispersal.

## Drug

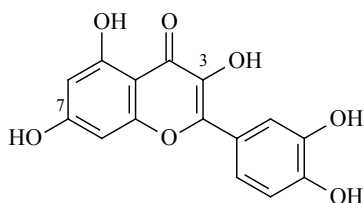
*Epilobii herba* – Willowherb

## Phytochemistry

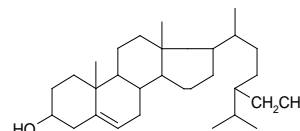
tannins (ellagitannins), gallic acid lactones, flavonoids,  $\beta$ -sitosterol



kaempferol



quercetin



$\beta$ -sitosterol

## I.85

Active compounds of *Epilobii herba* – Willowherb

## Uses

benign prostatic hyperplasia (BPH), anti-inflammatory effect

## ***Equisetum arvense* L. – Field horsetail**

### Equisetaceae – Horsetail family

#### Distribution, habitats

This perennial plant grows in moist meadows or arable lands. It is native to Europe, East Asia and North America.

#### Morphology

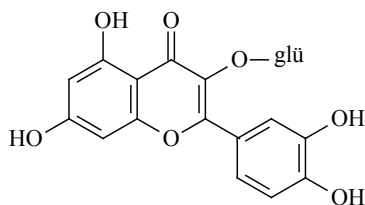
Fertile, spore-bearing shoots arise from the horizontal rhizome in April. The fertile stem is 15 to 20 cm tall, brown and unbranched. A whorl of several small, black-tipped, scale-like leaves occurs at each node. Whorled sporangiophores (sporophylls) consist of a peltate axis bearing sac-like structures called sporangia (holding the spores). After the fertile stem has wilted, a sterile, green stem starts to grow. It is 20 to 40 cm tall, lacks spores, bears whorls of branches and its main task is photosynthesis. The upper branch segments are shorter than the lower ones. 8-10 vestigial, marginally fused leaves can be seen on each node of the ribbed stem. The surface of the stem is rough to the touch in contrast to the poisonous marsh horsetail (*E. palustre*), which has a smooth stem.

#### Drug

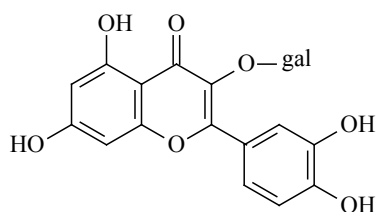
*Equiseti herba* – Equisetum stem (Ph. Eur. 5.0)

#### Phytochemistry

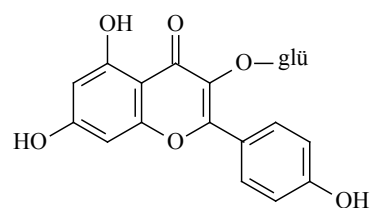
minerals (silicic acid, 10% of which is water soluble silicate), potassium salts, flavonoids, polienic acids, dicarboxylic acids (equisetolic acid), saponins



**isoquercitrin**  
quercetin-3-O-glucoside



**hyperoside**  
quercetin-3-O-galactoside



**astragalin**  
kaempferol-3-O-glucoside

#### I.86

Active compounds of *Equiseti herba* – Equisetum stem

#### Uses

*Equisetum* stem is diuretic (and does not influence the electrolyte homeostasis), mild urinary antiseptic, is used to quicken the removal of kidney stones. It was traditionally

used for the treatment of gout and rheumatism. Previously, it was used for dish-washing due to its high silicic acid content.

## ***Eucalyptus globulus* Labill. – Eucalyptus**

Myrtaceae – Myrtle family

### Distribution, habitats

It is native to Australia, but *Eucalyptus* species are cultivated throughout the subtropical and Mediterranean areas of the world.

### Morphology

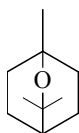
The stem is quadrangular. The juvenile leaves are opposite, 6 to 15 cm long and bluish grey with rounded apex and a waxy cuticle. The mature leaves are 15 to 35 cm long, narrow, sickle-shaped and dark green. They are arranged decussately on the cylindrical stems. The pointed, ribbed and warty buds are arranged around a central knob. The cream-colored flowers develop individually along the leaf axis, and a strongly flavoured honey can be made from its copious nectar. The woody fruits range from 1.5 to 2.5 cm in diameter and dehisce at their apex. The number of the seeds varies between 3 and 6 per fruit.

### Drug

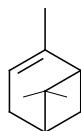
*Eucalypti folium* – Eucalyptus leaf (Ph. Eur. 5.0), *Eucalypti aetheroleum* – Eucalyptus oil (Ph. Eur. 5.0)

### Phytochemistry

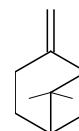
essential oil (monoterpenes: 1,8-cineole, p-cimene; low amounts of sesquiterpenes: globulol, aromadendrene), ellagitannins, flavonoids, triterpenes (oleanolic acid)



1,8-cineole (= eucalyptol)



$\alpha$ -pinene



$\beta$ -pinene

### I.87

Active compounds of *Eucalypti folium* – Eucalyptus leaf

### Uses

expectorant (in bronchitis), available in the form of lozenges, antibacterial, antiviral; traditionally used as anti-inflammatory agent in diseases of the stomach, intestines and urinary tract

## ***Euphrasia rostkoviana* Hayne – Eyebright**

Scrophulariaceae – Figwort family



**I.88**

*Euphrasia rostkoviana* Hayne – Eyebright

### **Distribution, habitats**

It is an annual herbaceous plant, native to Europe. In Hungary, it is common in the Transdanubian Mountains and in the mountain meadows of Northeast Hungary.

### **Morphology**

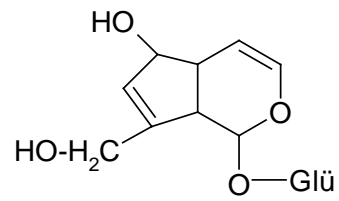
Eyebright is a 10-30-cm-tall herb, with a spindle-shaped tap root. The shoot is hirsute-glandular. The decussate leaves are relatively small, broad ovate, with serrate edge. The flowers appear singly, the corolla is white or purplish. Eyebright is in flower from July to September. The fruit is a septicidal capsule, with tiny seeds.

### **Drug**

*Euphrasiae herba* – Eyebright flowering shoot

### **Phytochemistry**

iridoids (aucubin, catalpol, ixoroside), little essential oil, gallotannins, phenol-carboxylic acids, flavonoids (e.g. rutin)



aucubin

**I.89**

Active compound of *Euphrasiae herba* – Eyebright flowering shoot

**Uses**

traditionally used against mild inflammations of the eye



## ***Filipendula ulmaria* (L.) Maxim. – Meadowsweet**

Rosaceae – Rose family



**I.90**

*Filipendula ulmaria* (L.) Maxim. – Meadowsweet

### Distribution, habitats

It is a perennial herb native to Mongolia, Siberia and the eastern and northern regions of Europe. In Hungary, it can be found in the Transdanubian Mountains growing in tall-herb vegetations along streams and damp meadows.

### Morphology

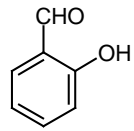
The rhizome is reddish brown, the stem is 1 to 1.5 m tall. The stipulated, large, odd pinnate leaves are made up of 2 to 5 pairs of leaflets. The terminal leaflet is slightly lobed, and all of the leaflets are serrated. The creamy white flowers are clustered in irregularly branched cymes, having a strong, sweet scent. The flowering period lasts from June to August. The fruit is a twisted, indehiscent achene.

### Drug

*Filipendulae ulmariae herba* – Meadowsweet (Ph. Eur. 5.0)

### Phytochemistry

essential oil (salicylaldehyde, methyl salicylate), flavonoids (e.g. spireozide), tannins



salicylaldehyde

**I.91**

Active compound of *Filipendulae ulmariae herba* – Meadowsweet

**Uses**

diaphoretic in common cold, diuretic, antiphlogistic, immunomodulant

***Foeniculum vulgare* Mill. ssp. *vulgare* var. *dulce* L. – Sweet fennel; *F. vulgare* Mill. ssp. *vulgare* var. *vulgare* – Bitter fennel**

Apiaceae – Carrot or parsley family



**I.92**

*Foeniculum vulgare* Mill. ssp. *vulgare* var. *dulce* L. – Sweet fennel; *F. vulgare* Mill. ssp. *vulgare* var. *vulgare* – Bitter fennel

**Distribution, habitats**

It is a perennial (with a lifespan of 2 to 4 years) herbaceous plant native to Eurasia and the Mediterranean region, and it is cultivated in many places.

**Morphology**

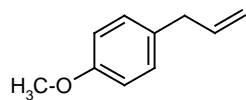
The well-developed, fleshy taproot is 20 to 30 cm long, bearing thinner root branches. The extensively branched shoot is 1-2 m tall. The thick stem is cylindrical and longitudinally striated. The lower leaves are petiolate, the upper leaves are sessile and multi-pinnately compound. The sparsely arranged leaflets are thread-like. The leaf base is modified into a well-developed sheath surrounding the stem. The plant starts to flower from July. The compound umbel comprises 10 to 16 secondary umbels (umbellets) whose peduncles are of varying length, and the umbellets consist of 13 to 16 flowers. Involucral bracts and involucels are missing. The fruits are greenish yellow to brown double achenes (cremocarp, schizocarp), the elongated mericarps are 6 to 10 mm long and ribbed.

**Drug**

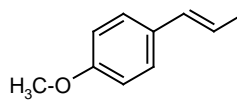
*Foeniculi dulcis fructus* – Fennel, sweet (Ph. Eur. 5.0), *Foeniculi amari fructus* – Fennel, bitter (Ph. Eur. 5.0)

**Phytochemistry**

essential oil (trans-anethole, fenchon, methyl-chavicol, anisaldehyde, limonene), flavonoids, fatty acids



methyl chavicol



t-anethole

**I.93**

Active compound of *Foeniculi dulcis fructus* – Fennel, sweet

**Uses**

antibacterial, expectorant (in catarrhs of the upper respiratory tract), carminative (safe for children), galactagogue, spasmolytic (especially in biliary and renal colic)



## ***Frangula alnus* Mill. (syn. *Rhamnus frangula* L.) – Alder buckthorn**

Rhamnaceae – Buckthorn family

### Distribution, habitats

It is a shrub native to temperate climate regions of Asia, North Africa and Europe living in wet forests.

### Morphology

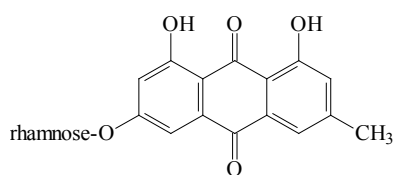
The shrub is generally 3 to 5 m tall. The shoot is covered with cork warts. The shiny, dark green, ovate leaves are alternate and simple, with entire margin and prominent venation. The flowers develop in the axils of the leaves and bloom from May to August. The fruit is a drupe-like berry.

### Drug

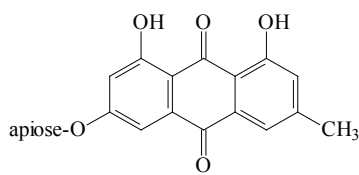
*Frangulae cortex* – Frangula bark (Ph. Eur. 5.0); *Frangulae corticis extractum siccum normatum* – Frangula bark dry extract, standardised (Ph. Eur. 5.0)

### Phytochemistry

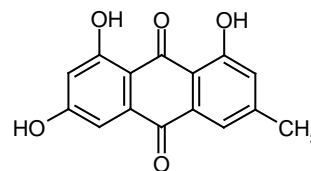
anthraquinone glycosides (glucofrangulin A, B, frangulin A, B, frangula emodin, chrysophanol), flavonoids, peptide alkaloids (frangulanin, franganin) and tannins



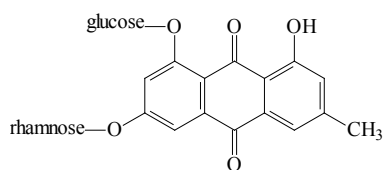
frangulin A



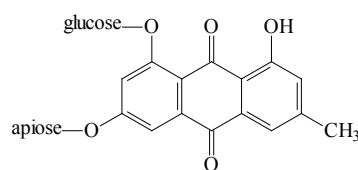
frangulin B



frangulaemodin



glucofrangulin A



glucofrangulin B

### I.94

Active compounds of *Frangulae cortex* – Frangula bark

### Uses

Frangula bark is laxative, while it can increase peristalsis in the large intestine.

***Fraxinus ornus* L. – Manna ash**

Oleaceae – Olive family

**I.95***Fraxinus ornus* L. – Manna ash**Distribution, habitats**

It is native to Europe and Western Asia. This Mediterranean plant grows predominantly on limestone and dolomite bedrock. It is a characteristic member of karst scrub-forests.

**Morphology**

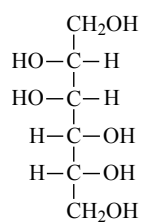
Manna ash is 2 to 8 m tall with a rugged growth habit. The trunk is smooth and light grey, the young boughs are glabrous, green or ash grey. The buds are protected by scales densely covered with fine grey hairs. The leaves are decussate and odd pinnately compound. The leaflets are ovate (egg-shaped) with serrate margin. Manna ash flowers in May after the appearance of the leaves. The pale yellow or white flowers cluster into a dense panicle emitting a sweet scent. The fruit is a samara (an achene with a pericarp extended into a membranous wing, aiding seed dispersal).

**Drug**

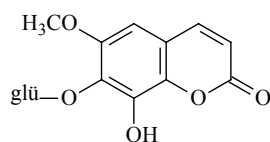
*Manna* – Manna

**Phytochemistry**

mannitol, sugars, oligosaccharides, fraxin (hydroxycoumarin derivative) in traces



mannitol



fraxin

### I.96

Active compounds of *Manna* – manna

#### Uses

mild laxative without side effects, it can be given to children



## ***Fucus vesiculosus* L. – Bladder wrack**

Phaeophyceae – Brown algae



**I.97**

*Fucus vesiculosus* L. – Bladder wrack

### Distribution, habitats

Different species of brown algae can be found on rocky coasts of the North Sea, Baltic Sea and the Atlantic Ocean. These perennial plants may grow up to 1 m long. Preparations consist of their dried thallus.

### Morphology

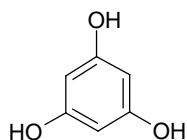
The thalli are bright olive-green to brown, dichotomously or subpinnately branched and flattened, ribbon-like. The central midrib (a prominent vein-like structure) of the thalli is flanked by airfilled pods or bladders on both sides.

### Drug

*Fucus vel Ascophyllum* – Kelp (Ph. Eur. 5.0)

### Phytochemistry

0.03-0.3% iodine, minerals and trace elements, polysaccharides (alginic acid, fucane, fucoidine), polyphenols (fucols), fucosterine, carotenoids (fucoxantin)



floroglucinol

**I.98**

Active compound of *Fucus vel Ascophyllum* – Kelp

**Uses**

iodine supplement, for the treatment of hyperthyreosis and atherosclerosis

## ***Fumaria officinalis* L. – Common fumitory**

Fumariaceae – Fumitory family



### **I.99**

*Fumaria officinalis* L. – Common fumitory

#### Distribution, habitats

This annual plant is native to Europe occurring along arable fields and roadsides, as well as ruderal areas. It has been naturalized in several countries of Asia and America.

#### Morphology

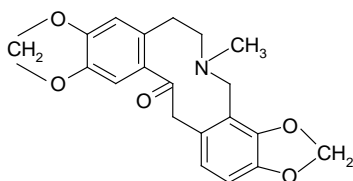
Its branching stem is 10 to 30 cm tall, bearing bipinnately compound leaves. The small, pink to purple flowers have a short pedicel and cluster into a loose raceme, which arise from the axil of bracts. Fumitory is in flower from May to October. The fruit is a one-seeded, greenish-brown acorn (nutlet) with a notched tip.

#### Drug

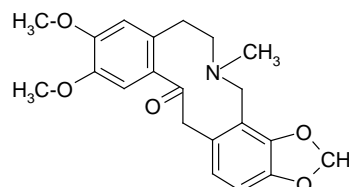
*Fumariae herba* – Fumitory (Ph. Eur. 6.8)

#### Phytochemistry

isoquinoline alkaloids (protopine, criptopine), caffeic acid, chlorogenic acid, flavonoids



protopine



criptopine

### **I.100**

Active compounds of *Fumariae herba* – Fumitory

**Uses**

against spastic discomfort in the area of the gall bladder and bile ducts, cholagogue, mild laxative, diuretic, homoeopathy

***Galega officinalis* L. – Goat's rue**

Fabaceae – Bean family



**I.101**

*Galega officinalis* L. – Goat's rue

**Distribution, habitats**

It is native to Southeast Europe and the Middle East. In Hungary, it grows along streams and in moist, marshy areas, gallery forests and edge-weed associations.

**Morphology**

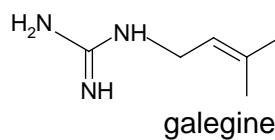
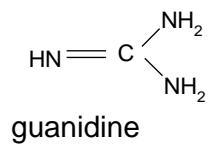
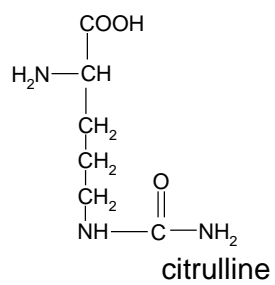
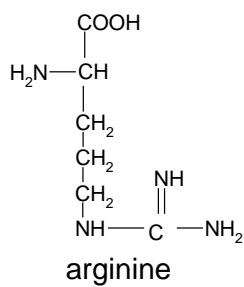
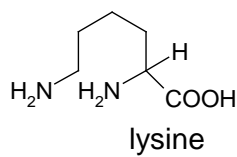
The rhizome continues in a taproot. The 40-100-cm-long shoots are prostrate on the ground. The alternately (spirally) arranged leaves are pinnately compound, composed of 11 to 17 leaflets. Its white to lilac papilionaceous flowers cluster into racemes. The flowering period lasts from July to August. The cylindrical pod (legume) contains numerous seeds, with delicate pinches between adjacent seeds.

**Drug**

*Galegae herba* – Goat's rue flowering shoot

**Phytochemistry**

guanidine derivatives (galegine, hydroxygalegine), flavonoids (galein), tannins, saponins, alkaloid (peganin)



### I.102

Active compounds of *Galegae herba* – Goat's rue

#### Uses

against mild diabetes in the elderly



***Gelidium* sp., *Gracilaria* sp. – Red algae**



**I.103**

*Gelidium attenuatum* sp., *Gracilaria* sp. – Red algae



**I.104**

*Gracilaria* sp. – Red algae

**Gelidiaceae – Red algae**

**Distribution, habitats**

They can be found in the Indian and Pacific Oceans.

**Morphology**

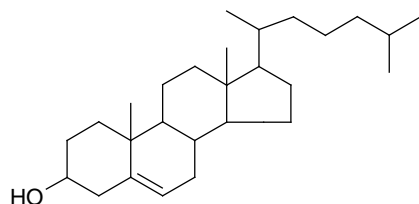
The *Gelidium* genus comprises about 124 species ranging in size from 2 to 40 cm. The branches present an irregular pattern or are arranged in rows on either side of the main stem. The branching thalli of the *Gracilaria* species vary from cylindrical to somewhat flattened, reaching up to 60 cm in length. Representatives of these algae often grow in large clumps in shallow waters.

## Drug

*Agar* – Agar (Ph. Eur. 5.0)

## Phytochemistry

heteropolysaccharides (composed of D-galactose and 3,6-anhydro-L-galactose units). Agar is a mixture of agarose (a linear polysaccharide) and agaropectin (a heterogeneous mixture of smaller molecules).



cholesterol

### **I.105**

Active compound of *Agar* – Agar

## Uses

laxative; a general medium in microbiology, gelling agent in the pharmaceutical, food and cosmetics industry

## ***Gentiana lutea* L. – Great yellow gentian**

Gentianaceae – Gentian family



### **I.106**

*Gentiana lutea* L. – Great yellow gentian

#### **Distribution, habitats**

This herbaceous perennial plant is native to Europe and Western Asia growing in alpine and sub-alpine pastures, usually on calcareous soils. In Hungary, members of this genus are protected.

#### **Morphology**

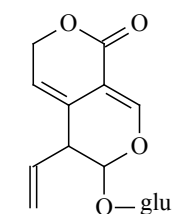
The root can reach 1 m in total length and 3-6 cm in width. The brown root bears longitudinal wrinkles, has a characteristic smell and very bitter taste. The shoot is 1 to 2 m tall. The decussate, broad lanceolate to elliptic leaves are 10 to 30 cm long and 4 to 12 cm wide. The corolla is composed of narrow, yellow petals.

## Drug

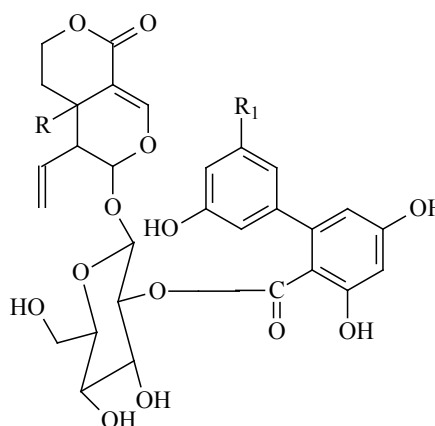
*Gentianae radix* – Gentian root (Ph. Eur. 5.0), *Gentianae tinctura* – Gentian tincture (Ph. Eur. 5.0)

## Phytochemistry

secoiridoids (gentiopicrin - with bitterness values of 12 000; amaropanin - with bitterness values of 20 000 000; amarogentin - with bitterness values of 58 000 000); gentiobiose (disaccharide with bitter taste)



gentiopicrin



R = R <sub>1</sub> = H	amaropanin
R = H R <sub>1</sub> = OH	amarogentin
R = OH R <sub>1</sub> = OH	amarosverin

### I.107

Active compounds of *Gentianae radix* – Gentian root

## Uses

Gentian root is used as amarum for treatment of dyspepsia; it is tonic, roborant and cholagogue. It is used as raw material in liqueur industry.



## ***Geum urbanum* L. – Colewort, wood avens**

Rosaceae – Rose family



### **I.108**

*Geum urbanum* L. – Colewort, wood avens

#### **Distribution, habitats**

It is native to Europe, as well as to temperate regions of Asia and North Africa. It is a perennial herbaceous plant living in forests (particularly in woods mixed with oak trees) and thickets.

#### **Morphology**

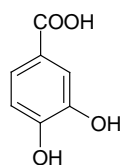
Its purple rhizome is cylindrical, with several roots arising from it and with a pleasant scent. The pubescent stem is 50 to 80 cm tall with only few branches. The base- and stem-leaves are petiolate, compound with 3 leaflets, while the upper leaves are simple. The main axis and the side branches terminate in a yellow flower. The perianth consists of a double, backward bending calyx and ovate petals. The flowering period lasts from May to late autumn. The apocarpous gynoecium develops into a group of achenes, the styles forming hard, hooky burrs that aid dispersal.

#### **Drug**

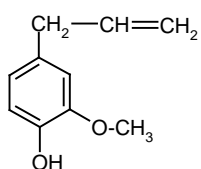
*Gei urbani rhizoma et radix* – Colewort root and rhizome

#### **Phytochemistry**

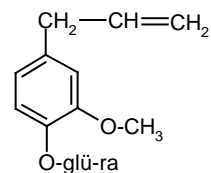
essential oil (eugenol, gein), about 30% tannin (mainly gallotannins), triterpenes, phenol-carboxylic acids



protocatechuic acid



eugenol



gein

### I.109

Active compounds of *Gei radix et rhizoma* – Colewort root and rhizome

#### Uses

astringent, antidiarrhoeal, against fever, homoeopathy

## ***Ginkgo biloba* L. – Ginkgo**

Ginkgoaceae – Ginkgo family



### **I.110**

*Ginkgo biloba* L. – Ginkgo

#### **Distribution, habitats**

It is native to China and Japan, but it can be cultivated in Europe, South Africa and America. Ginkgo is the only living representative of the order Ginkgoales and is planted worldwide as an ornamental tree.

#### **Morphology**

It is a large, dioecious, deciduous tree. The short shoots bear fan-shaped, often two-lobed leaves with dichotomous venation. The juvenile leaves are yellowish green, then turn dark green, and finally they are golden yellow in autumn. The catkin-like reproductive structures of the male trees are called „cones”, bearing microsporangia that release pollen grains. The female trees are lacking cones, and their reproductive structures bear 2 free-standing ovules. Ginkgo is in flower in May. The hard, stone-like seed surrounded by a fleshy aril is 1.5 to 2 cm large, resembling a small plum. When ripe, the seeds fall on the ground and the outer fleshy coat starts decaying, emitting a strong, unpleasant smell due to the released lactic acid and valeric acid.

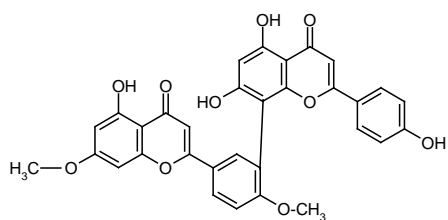
#### **Drug**

*Ginkgo folium* – ginkgo leaf (Ph. Eur. 5.0)

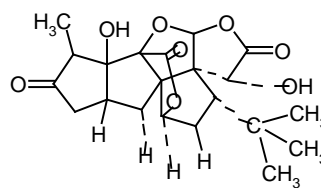
#### **Phytochemistry**

diterpene lactones (ginkgolides A, B, C and J), sesquiterpene lactones (bilobalide), flavonoids (kaempferol, quercetin and isorhamnetin glycosides), biflavonoids (bilobetin, ginkgetin, amentoflavone), procyanidins





ginkgetin



ginkgolide A

### I.111

Active compounds of *Ginkgo bilobae folium* – Ginkgo leaf

#### Uses

It is used to improve cerebral and peripheral circulation, especially in the elderly or against dizziness, headaches and to prevent age-related memory loss. It has an inhibitory effect on platelet aggregation, and therefore may be helpful in the treatment of varicose veins and diabetes. It is raw material for pharmaceutical industry.

***Glycyrrhiza glabra* L. – Liquorice**

Fabaceae – Bean family



**I.112**

*Ginkgo biloba* L. – Ginkgo

**Distribution, habitats**

It is a perennial herb, native to Eurasia and North Africa, spreading with stolons.

**Morphology**

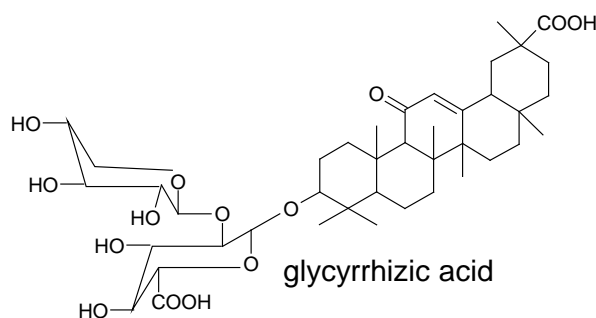
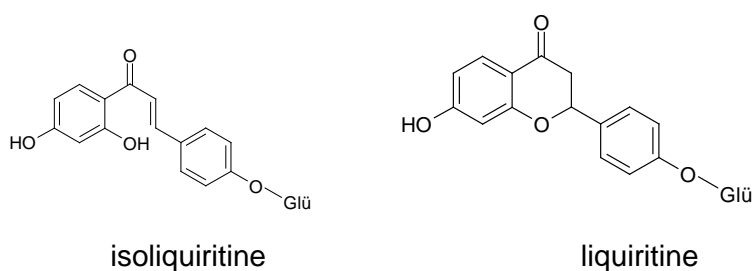
The rhizome is well-developed, giving rise to stolons and 1-2-m-long root branches whose inner surface is yellowish. The shoot is about 1 m tall. The leaves are alternate and odd pinnately compound. The leaflets are entire and truncate, the abaxial surface is sticky. The blue to purple papilionaceous flowers cluster into 10-15-cm-long racemes. Liquorice is in flower in June. The fruit is a laterally compressed, brown, non-dehiscent legume with a smooth surface and holding several seeds. The fruits of *G. glabra* ssp. *glandulifera* are glandular.

## Drug

*Liquiritiae radix* – Licorice root (Ph. Eur. 5.0), *Liquiritiae extractum fluidum ethanolicum normatum* – Standardised licorice ethanolic liquid extract (Ph. Eur. 5.0)

## Phytochemistry

triterpene saponins (glycyrrhizin, consists of glycyrrhizic acid in a mixture of potassium and calcium salts, it has a sweet taste), flavonoid glycosides (liquiritine, isoliquiritine), isoflavonoids



### I.113

Active compounds of *Liquiritiae radix* – Licorice root

## Uses

glycyrrhizin is about 150 times sweeter than sucrose (flavouring and sweetening agent for candies), the aqueous extract of the drug can be used to treat peptic ulcer, has anti-inflammatory, spasmolytic and expectorant properties

## ***Gypsophila paniculata* L. – Baby's breath**

Caryophyllaceae – Pink family or carnation family



### **I.114**

*Gypsophila paniculata* L. – Baby's breath

#### **Distribution, habitats**

This herbaceous perennial plant is native to East, South-East and Central Europe, as well as the temperate climate zones of Asia. The plant prefers open sandy grasslands, loose sandy soils and embankments. It can be cultivated along streams and sedimentary soils.

#### **Morphology**

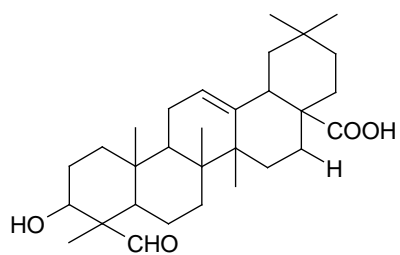
The branching rhizome continues in a root system which can be as long as 1.5 to 2 m. The profusely branched stem is 60-90 cm tall. The leaves are decussate, sessile and lanceolate. The numerous tiny white flowers cluster into a pseudo-umbel. The flowering period lasts from July to August. The calyx is fused, the petals are free. The androecium consists of 2 whorls. The fruit is a capsule dehiscent with teeth, containing numerous seeds.

#### **Drug**

*Saponariae albae (hungaricae) radix* – (White) soap root (Ph. Hg. VII.)

#### **Phytochemistry**

15-20% triterpene saponins (gypsogenine)



gypsogenine

**I.115**

Active compound of *Saponariae albae radix* – White soap root

**Uses**

expectorant in bronchitis, traditionally used against rheumatoid arthritis and skin diseases. Due to its white flowers, it is frequently used as an ornamental plant.



## *Harpagophytum procumbens* (Burch.) DC. – Devil's claw

Pedaliaceae – Sesame family



### I.116

*Harpagophytum procumbens* (Burch.) DC. – Devil's claw

#### Distribution, habitats

It is a perennial, drought tolerant plant originating from the savannah and desert regions of South Africa.

#### Morphology

The 10-20-cm-long, 3-5-cm wide, greyish brown to dark brown, secondarily thickened tuberous root is medicinally valuable. The climbing stem bears decussate leaves, the flowers are standing alone with a corolla whose bottom part is yellow, and the upper part is bright red. The fist-sized, woody, brown fruit bears pointed hooks, which aid fruit dispersal and explain the peculiar common name of the plant.

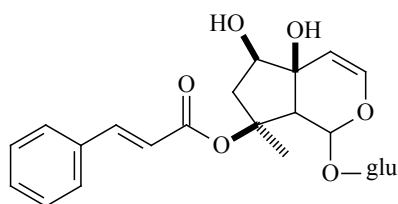
#### Drug

*Harpagophyti radix* – Devil's claw root (Ph. Eur. 5.0)

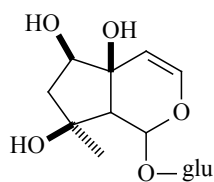


### Phytochemistry

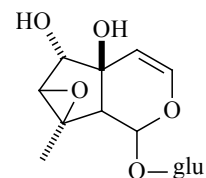
iridoid glycosides (harpagoside, harpagid, procumbid), phenolic glycosides (acteoside, isoacteoside), sterols, triterpenes, flavonoids



harpagoside



harpagid



procumbid

### I.117

Active compound of *Harpagophyti radix* – Devil's claw root

### Uses

antirheumatic, analgesic in arthritis, antiphlogistic (used in form of drugs)

## ***Hedera helix* L. – Common ivy**

Araliaceae – Ginseng family or ivy family



### **I.118**

*Hedera helix* L. – Common ivy

#### **Distribution, habitats**

It is native to Europe, West Asia, the Caucasus and North Africa. This evergreen climbing shrub can be collected particularly in moist forests.

#### **Morphology**

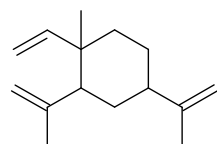
The woody stem clings to trees, fences or walls with its suckers (climbing aerial roots), which are winding, hence the name *helix*. The vegetative shoot bears two kinds of leaves (heterophylly): the bottom ‘shade leaves’ are divided, tri- to pentangular, palmately lobed; the upper ‘sun leaves’ are unlobed, with entire margin. The greenish yellow, pentamerous flowers form a spherical simple umbel. Ivy is in flower from September to October. The pistil consists of 5 carpels, with an inferior ovary and a broad surface disc-like stigma. The berry-like, blackish brown pseudofruit ripens by the following spring.

#### **Drug**

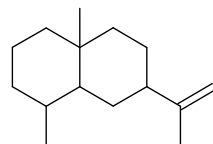
*Hederae folium* – Ivy leaf (Ph. Eur. 6.8)

#### **Phytochemistry**

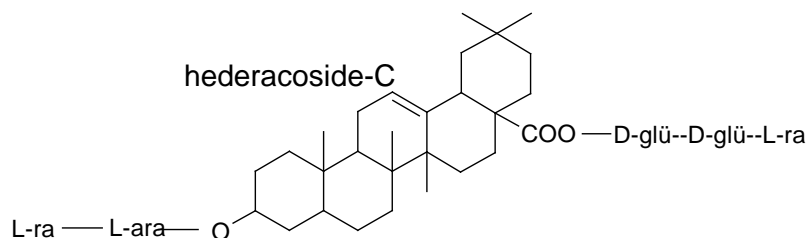
triterpene saponins (hederacoside C), polyacetylenes, flavonoids, mucilage, little essential oil



$\beta$ -elemene



germacrene



hederacoside-C

### I.119

Active compounds of *Hederae helix folium* – Ivy leaf

#### Uses

It is expectorant and spasmolytic in catarrhs of the upper respiratory tract, and antibacterial, due to its saponin content. It is used to treat recurrent spastic bronchitis and chronic obstructive bronchitis in children. It is raw material for pharmaceutical industry.

## ***Helianthus annuus* L. – Sunflower**

Asteraceae – Sunflower family



### **I.120**

*Helianthus annuus* L. – Sunflower

#### **Distribution, habitats**

This is an annual plant that originates from the West Coast of the United States to Mexico. Sunflower and especially its hybrids are cultivated worldwide in continental climate regions. Sometimes it appears in weed associations due to accidentally scattered seeds.

#### **Morphology**

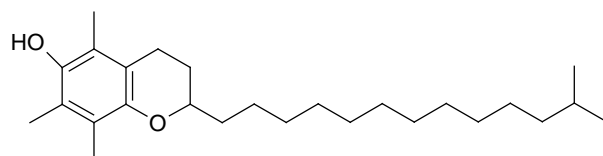
The allorhizous root system is well-developed. The length of the shoot varies from 80 to 180 cm depending on the cultivar. The stem is cylindrical, and becomes woody in older specimens. The leaves are alternate, petiolate, the leaf blade is orbicular to cordate. The plate-like capitulum is covered with elongated, triangular scales on the outside. The surface of the capitulum bears bracts, then golden yellow ligulate (ray) florets on the margin, followed by bisexual tubular (disc) florets in the middle, with inferior, bicarpellary ovary. Sunflower is in flower in July. The top of the ovary bears 2 larger achene scales. The ovary develops into a cypsela (achene) with a hard shell.

#### **Drug**

*Helianthi annui flos* – Sunflower flower, *Helianthi annui oleum raffinatum* – Sunflower oil, refined (Ph. Eur. 6.6)

#### **Phytochemistry**

flavonoids, triterpene glycosides, saponins, carotenoids, heteropolysaccharides



$\alpha$ -tocopherol

**I.121**

Active compound of *Helianthi annui oleum* – Sunflower oil

**Uses**

ingredient for cosmetic formulations (oil), antipyretic (petals)

## ***Herniaria glabra* L., *H. hirsuta* L. – Smooth rupturewort, hairy rupturewort**

Caryophyllaceae – Pink family or carnation family

### Distribution, habitats

They are annual herbaceous plants, native to Eurasia. *H. hirsuta* can be found particularly in the southern areas. In Hungary, they grow sporadically in acidophilous, sandy grasslands. Here we discuss the main characteristics of hairy rupturewort, which is more common in Hungary.

### Morphology

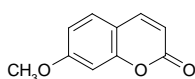
The taproot is thin, the prostrate shoot is greyish green and hairy (in contrast with smooth rupturewort, whose shoot is bright green and glabrous). The leaves are decussate, but seem to be alternate in the upper third of the shoots, due to reduction. The leaves are ovate to lanceolate. 5 to 10 tiny, white flowers cluster into a cymose head in the leaf axil. The flowering period lasts from May to July. The basal part of the sepals is fused, the petals are free and shorter than the sepals. The fruit is an egg-shaped, indehiscent capsule.

### Drug

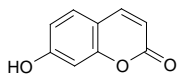
*Herniariae herba* – Rupturewort flowering shoot

### Phytochemistry

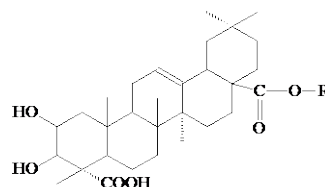
triterpene saponins (herniariasaponin 1-7, medicagenic acid), flavonoids (derivatives of quercetin and isorhamnetin), coumarin (herniarin, umbelliferone)



herniarin



umbelliferone



R=1-β-D-glucose-6-1- β-D-glucose = herniariasaponin I.

### I.122

Active compounds of *Herniariae herba* – Rupturewort flowering shoot

### Uses

diuretic in chronic cystitis, urethritis



## ***Hibiscus sabdariffa* L. – Roselle**

Malvaceae – Mallow family

### Distribution, habitats

It is an annual plant native to tropical Africa, but it is cultivated in many places with suitable climate.

### Morphology

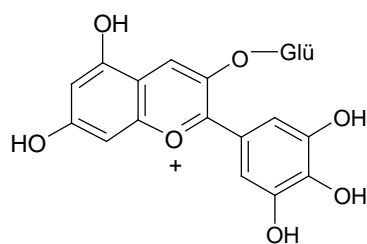
A woody shrub growing up to 1-2.5 (4) m tall. The upright stem branches profusely at the base; the red-crimson branches are also erect. The leaves are alternate, 7.5 to 12 cm long and narrow. The bottom leaves are ovate and entire, the upper leaves become 3-lobed. The funnel-shaped, typically pale yellow flowers open up to 10 cm wide, the mouth of the corolla is deep crimson. The red sepals become fleshy after shedding the petals. The calyx is surrounding the developing capsule.

### Drug

*Hibisci sabdariffae flos* – Roselle flower (Ph. Eur. 5.0)

### Phytochemistry

15-30% organic acids (citric acid, malic acid, and tartaric acid), a special organic acid – hibiscus acid (allo-hydroxycitric acid lactone), anthocyanins (cyanidin and delphinidin glycosides) and flavonol glycosides. Petals contain 65% water-soluble polysaccharides, pectin-like substances.



delphinidin-3-glucoside

### **I.123**

Active compound of *Hibisci sabdariffae flos* – Roselle flower

### Uses

coloring and flavoring in foods and beverages, anti-inflammatory, antibacterial, mild laxative

## *Humulus lupulus* L. – Common hop

Cannabaceae – Hemp family



**I.124**

*Humulus lupulus* L. – Common hop

### Distribution, habitats

It is native to Europe, temperate regions of Asia, North Africa and North America. Hop is a perennial, dioecious herbaceous plant climbing like a liana. It occurs frequently in gallery forests, but it is common along abandoned fences as well. Its varieties are cultivated in many places.

### Morphology

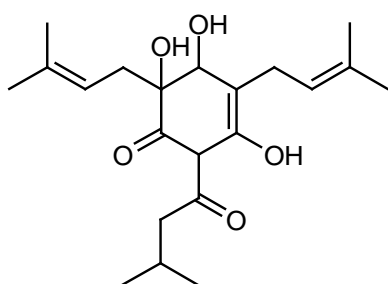
The below-ground organs include the rhizome, the roots and the stoloniferous shoots. The above-ground shoots are 10 to 40 m long, climbing and winding. The stem and the leaves are covered with hooked bifid hairs. The leaves are decussate, with a long petiole, the leaf blade is broad ovate, palmately divided with 3 to 5 segments, covered with glandular scales. Hop is in flower in July. The staminate (male) flowers cluster into a cymose inflorescence in the leaf axil, the perigonium and the androecium is 5-merous. The pistillate (female) flowers form a cone-like structure, the so-called hop strobile: the pseudo-racemose inflorescence consists of flowers with 5 tepals, which are surrounded by enlarged, membranous bracts, covered with yellow glands on their base. The fruit is a nut, which develops from 2 carpels.

## Drug

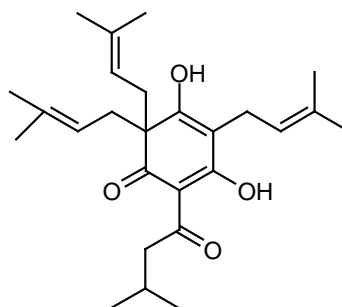
*Lupuli flos* – Hop strobile (Ph. Eur. 5.0)

## Phytochemistry

in the strobile 5-30%, in the glands 50-80% hop resin (phloroglucinol derivatives, i.e. humulon, lupulon); in the strobile 0.3-1%, in the glands 1-3% essential oil (mono- and sesquiterpenes, e.g. mircene, humulene, caryophyllene); metabolite of 2-methyl-3-buten-2-ol, in the strobile 2-4% oligomeric procyanidins, flavonoids, xanthohumol (a prenylated chalcone), prenylflavonoids with estrogen-like activities (e.g. prenylnaringenin)



humulon



lupulon

## I.125

Active compounds of *Lupuli flos* – Hop strobile

## Uses

sedative, amarum, stomachic, antibacterial. It is a raw material for pharmaceutical and brewing industry.



## ***Hypericum perforatum* L. – St. John's wort**

Hypericaceae – St. John's-wort family



### **I.126**

*Hypericum perforatum* L. – St. John's wort

#### **Distribution, habitats**

It is an herbaceous perennial plant native to Europe, temperate regions of Asia, the Indian subcontinent and North Africa. It is common in semi-dry grasslands, meadows, dry acidophilous oak woods and clearings. Its varieties are cultivated in many places.

#### **Morphology**

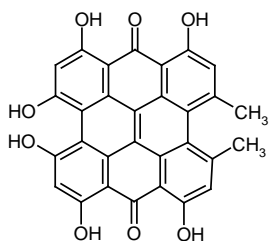
The below-ground rhizome gives rise to several 30-80-cm-long shoot systems, with a rigid stem, branched in the upper section. The leaves are decussate, sessile (stalkless), oblong-oval. When held up to the light, leaves exhibit translucent dots corresponding to essential oil cavities in the mesophyll. The bright yellow flowers form a cymose corymb. The flowering period lasts from June to September. The calyx consists of 5 lanceolate sepals. The sepals are pointed, ca. 1 cm long, with conspicuous black glands at their margin. The numerous (50 to 60) stamens are united at the base of the filaments into 3 bundles. The ovary is superior, consisting of 3 carpels, with 3 locules. The fruit is an egg-shaped septicidal capsule with 3 longitudinal grooves, containing cylindrical, blackish brown seeds.

## Drug

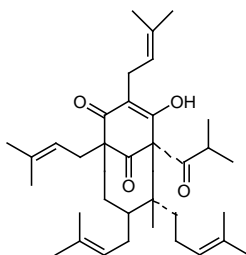
*Hyperici herba* – St. John's wort (Ph. Eur. 5.0); *Hypericum perforatum ad praeparationes homoeopathicas* – Hypericum for homeopathic preparations (Ph. Eur. 7.0)

## Phytochemistry

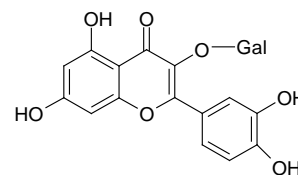
0.1-0.3% naftodianthrone (hypericin and derivatives similar to hypericin), 0.5-1% flavonoids (hyperoside, rutin, biapigenine), about 3% hyperforin, 0.05-0.3% essential oil and about 10% tannins



hypericin



hyperforin



hyperoside

### I.127

Active compounds of *Hyperici herba* – St. John's wort

## Uses

used against mild neurotic and depressive symptoms (menopause, exhaustion associated with nervousness, anxiety). It is used externally as an ulcer and wound healing agent. It is traditionally used against liver and biliary diseases, gout, stomach pain, external bleedings. Use of this plant may lead to mild dermatitis. Homoeopathy.

## ***Hyssopus officinalis* L. – Hyssop**

Lamiaceae – Mint family



**I.128**

*Hyssopus officinalis* L. – Hyssop

### **Distribution, habitats**

This perennial plant is native to the Mediterranean region. It is a dwarf semi-shrub that is able to tolerate rocky sites and slopes, as well as other dry habitats. Its Arabic name means "sacred grass".

### **Morphology**

Hyssop's root is woody, the shoots are 50 to 70 cm long, the narrow, lanceolate leaves are decussate. The inflorescence comprises pseudowhorls of 7 to 9 blue, pink or white flowers grouped on one side of the shoot. Flowers bloom from June to August. The fruits are egg-shaped nutlets.

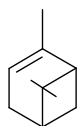
### **Drug**

*Hyssopi herba* – Hyssop flowering shoot

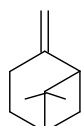
### **Phytochemistry**

0.3-1% essential oil (particularly pinocamphone – a monoterpene ketone; pinene, pinokamfeol), flavonoids, tannins

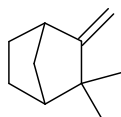




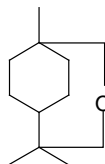
$\alpha$ -pinene



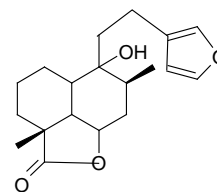
$\beta$ -pinene



camphene



cineole



marrubiin

### I.129

Active compounds of *Hyssopi herba* – Hyssop flowering shoot

#### Uses

expectorant, mild spasmolytic, aromatic, mild hypertensive, antiseptic, fungistatic, antiperspirant; spice, perfume industry

***Ilex paraguariensis* St. Hill. – Yerba plant, yerba mate**

Aquifoliaceae – Holly family

**Distribution, habitats**

This small evergreen shrub is native to Brasilia and the southern areas of South America.

**Morphology**

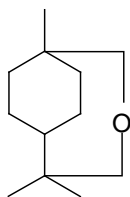
In its original habitat the plant can grow into a 4-10-m-tall tree with a spherical canopy. Its cultivated variety is a spreading, ramifying shrub. The oval, 10-16-cm-long leaves are evergreen and leathery with a crenate or serrate margin. The white flowers form a cluster. The small drupe fruit resembles that of pepper; when ripe it is fleshy, purple to red.

**Drug**

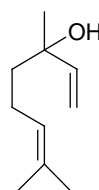
*Mate folium* – Mate leaf

**Phytochemistry**

0.3-2.4% caffeine, 0.1-0.5% theobromine, theophylline in traces, phenol-carboxylic acids and their esters, flavonoids, triterpene saponins (mate saponin – ursolic acid, oleanolic acid)



cineole



linalool

**I.130**

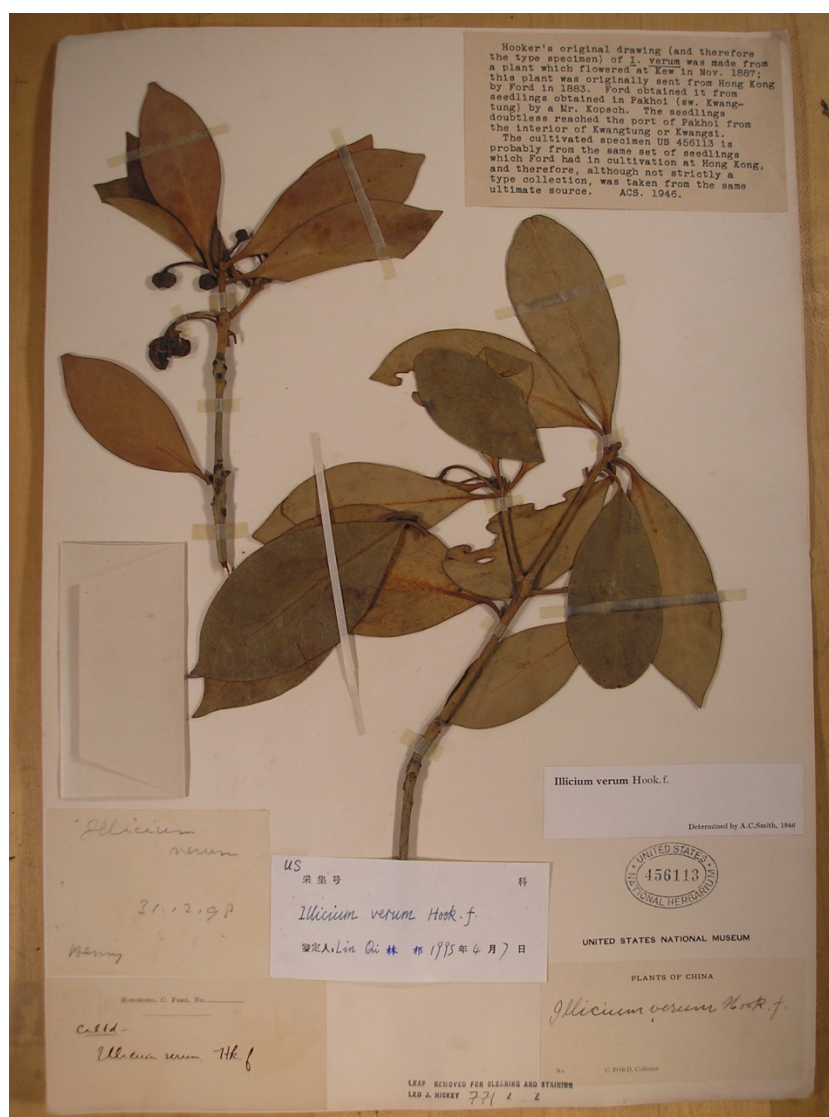
Active compounds of *Mate folium* – Mate leaf

**Uses**

central nervous system stimulant, diuretic. A national beverage is made from the smoked drug, which has a very characteristic flavour.

## *Illicium verum* Hook. – Star anise

Illiciaceae – Star-anise family



### I.131

#### *Illicium verum* Hook. – Star anise

##### Distribution, habitats

It is native to China, Indo-China.

##### Morphology

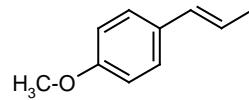
It is an evergreen tree with white bark, growing up to 8-15 m tall. Its narrow to elliptic leaves are glossy. The flowers are yellow and solitary. The fruit is made up of 8 radially arranged, hard, lignified follicles with glossy brown seeds.

##### Drug

*Anisi stellati fructus* – Star anise (Ph. Eur. 5.0), *Anisi stellati aetheroleum* – Star anise oil (Ph. Eur. 5.0)

**Phytochemistry**

5-8% essential oil (trans-anethole as the main component; phellandrene, cimol, limonene, terpineol, aniseketone, etc.), sesquiterpenes (bisabolene, cadinene), resin, tannins, phenol-carboxylic acids (e.g. protocatechuic acid, shikimic acid, quinic acid) and about 20% fatty oil



t-anethole

**I.132**

Active compound of *Anisi stellati fructus* – Star anise

**Uses**

expectorant, carminative, stomachic, flavouring agent, taste corrigent, homoeopathy

## ***Inula helenium* L. – Elecampane**

Asteraceae – Sunflower family



### **I.133**

*Inula helenium* L. – Elecampane

#### **Distribution, habitats**

It is an herbaceous perennial plant native to East and Southeast Europe and temperate climate zones of Asia. Occurs mainly in mountains with medium height, but sporadically also elsewhere. It is a protected plant in gallery forests.

#### **Morphology**

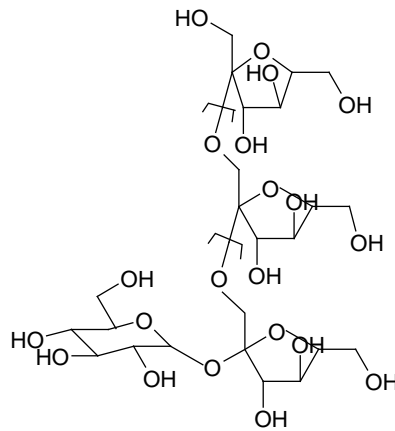
A thick rhizome develops below-ground, bearing the previous year's pittings (remains of the leaf bases from the previous year). The roots are well-developed, ca. 1 cm wide. The leafy-flowering branched shoot grows up to 1-2 m. The shoots first bear base-leaves, which are 10 to 20 cm wide and 50 to 100 cm long, ovate, tapering into the petiole. The stem leaves are smaller than the base leaves, their leaf base is cordate, surrounding the stem, and the lower leaf surface is tomentose, with a greyish colour due to the rich coverage by hairs. The main axis and the side branches bear terminal capitulum inflorescences. The capitulum is 5 to 8 cm in diameter at the time of flower opening, the receptacle is dome-shaped. The bracts subtending the capitulum are broad spatulate or ovate, the tip of the outer ones is bending backwards. The receptaculum bears yellow, narrow ligulate (ray) florets on the margin, and yellow tubular (disc) florets in the centre. The bicarpellary ovary develops into a rectangular to pentangular cypsela (achene) bearing a long pappus on the tip.

#### **Drug**

*Inulae radix* – Elecampane root, inula root

**Phytochemistry**

1-3% essential oil (sesquiterpene lactone – alantolactone, isoalantolactone; alantolic acid, alantol, azulene), 20-40% inulin, resin, dammaradienol



inulin

**I.134**

Active compound of *Inulae radix* – Elecampane root

**Uses**

antibiotic (alantolactone), diuretic, cholagogue, anthelmintic, stomachic, expectorant, tonic. It is used as raw material in alcohol industry and homoeopathy.



## ***Juglans regia* L. – Common walnut**

### Juglandaceae – Walnut family

#### Distribution, habitats

It is native to the Balkans, Central and Western Asia, the Caucasus and the Indian subcontinent, but it is cultivated in many places in the temperate climate zones. In Hungary, it has been used from the ancient Roman times, and today its varieties are planted in many places.

#### Morphology

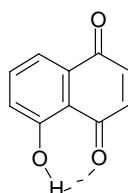
The bark of the trunk and the branches is light or dark grey, the cork is longitudinally cracked. The leaves are petiolate and odd pinnately compound with 5 to 9 leaflets. The ovate, entire leaflets have a short petiole and a strongly aromatic odour when rubbed between the fingers. The flowers are unisexual; the staminate (male) flowers cluster into a dense and pendant catkin; while 2 to 5 pistillate (female) flowers form a small flower head. The flowering period lasts from April to May. The fruit is an oval or spherical drupe, the cotyledons contain high levels of fatty oil. The drug part comprises the leaflets without the rachis, they are collected when the developing fruits are small and green.

#### Drug

*Juglandis folium* – Walnut leaf

#### Phytochemistry

naphthoquinones (juglone, hydrojuglone glucoside, hydrojuglone), in the leaves 10% ellagitannins, flavonoids (hyperoside, quercetin and kaempferol glycosides), phenol-carboxylic acids, about 0.01-0.03% essential oil (caryophyllene, germacrene-D, ocimene, pinene, limonene, etc.)



juglone

#### **I.135**

Active compound of *Juglandis folium* – Walnut leaf

#### Uses

antidiarrheal, antibacterial, antimitotic, anthelmintic; traditionally used to treat eczema, acne and skin suppuration. Juglone is an allelopathic agent. The dried leaves can be used against moths.

***Juniperus communis* L. – Common juniper**

Cupressaceae – Cypress family

**I.136***Juniperus communis* L. – Common juniper**Distribution, habitats**

Circumpolar plant. In Hungary, it occurs on calcareous or low lime soils, in the region between the Danube and the Tisza, in sandy areas on the Great Plain. On plains the dioecious shrubs or small trees can form large stands.

**Morphology**

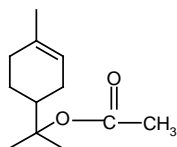
It is a 1-3 m tall dioecious shrub or small tree. The shoots bear whorls of 3 needles that are 1 to 2 cm long. The flowering period lasts from April to May. The staminate (male) flowers form catkin-like inflorescences, the pistillate (female) flowers resemble buds. Pistillate flowers bear 3 scales with 1 ovule on each. The female flowers will develop into round fleshy cones (also known as cone berries), which are green in the first year, and become dark purple by the end of the second year.

## Drug

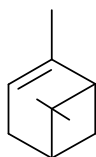
*Juniperi pseudo-fructus* – Juniper (Ph. Eur. 5.0), *Juniperi aetheroleum* – Juniper oil (Ph. Eur. 5.0)

## Phytochemistry

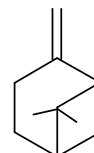
0.8-2% essential oil (mainly  $\alpha$ -pinene, sabinene, mircene, limonene, terpinen-4-ol), sesquiterpene ( $\beta$ -caryophyllene), catechin tannins, flavonoids, sugars (glucose, fructose). Juniper wood (lignum) contains only 0.1% essential oil with sesquiterpenes and diterpenes.



terpenyl acetate



$\alpha$ -pinene



$\beta$ -pinene

### I.137

Active compounds of *Juniperi fructus* – Juniper

## Uses

strong diuretic, urinary antiseptic, diaphoretic, spasmolytic. Its use is not recommended during pregnancy and for patients with kidney disease. It can be used for arthritis and painful joints. Spice; the essential oil is used in alcohol industry (e.g. borovička).

## ***Lavandula angustifolia* Mill. – Common lavender, true lavender, narrow-leaved lavender**

Lamiaceae – Mint family



### **I.138**

*Lavandula angustifolia* Mill. – Common lavender, true lavender, narrow-leaved lavender

#### **Distribution, habitats**

This perennial semishrub is native to the Mediterranean region. In Hungary, its varieties can be cultivated on protected southern slopes.

#### **Morphology**

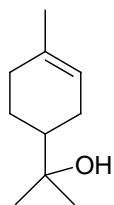
Lavender's root system is fairly shallow, the taproot is woody. The shoot system is spherical, woody at the bottom part, growing up to 40-60 cm tall. The decussate leaves are narrow linear to narrow lanceolate. The inflorescence is a terminal, intermittent pseudo-spike. The calyx is greyish blue, with hardly visible lobes; the bilabial corolla is blue to purplish blue. Flowers bloom from the middle of June. The fruits are ovate nutlets, which develop from the ovary with 4 locules.

#### **Drug**

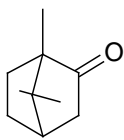
*Lavandulae flos* – Lavender flower (Ph. Eur. 5.0), *Lavandulae aetheroleum* – Lavender oil (Ph. Eur. 5.0)

#### **Phytochemistry**

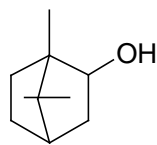
1-3% essential oil (30-55% linalil acetate, 20-35% linalool, ocimen, cineol, camphor, etc.), sesquiterpenes (e.g. caryophyllene epoxide), 5-10% Labiatae tannins (especially esters of rosmarinic acid), coumarin, flavonoids



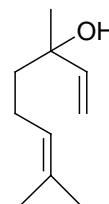
$\alpha$ -terpineol



camphor



borneol



linalool

### I.139

Active compounds of *Lavandulae flos* – Lavender flower

#### Uses

mild sedative, spasmolytic, carminative. External use: evaporation, relaxing aromatic bath, insect repellent. It is used in the perfume industry and aromatherapy, as well.



***Leonurus cardiaca* L. – Motherwort**

Lamiaceae – Mint family

**I.140***Leonurus cardiaca* L. – Motherwort**Distribution, habitats**

It is an herbaceous perennial plant native to Eurasia and the Mediterranean region. It occurs sporadically in weed associations and uncultivated lands. It can be cultivated. Its hairy subspecies (*L. c. ssp. villosus* Desf. = *L. quinquelobatus* Gilib.), which occurs sporadically in East Hungary, to the east of the river Tisza, is also worth gathering or cultivating due to its higher yield.

**Morphology**

A rhizomatous taproot can be found below-ground. The shoot can grow up to 1 m. The stem is quadrangular and hairless (*L. c. ssp. cardiaca*) or pubescent (*L. c. ssp. villosus*). The leaves are decussate, petiolate, palmately cleft or segmented, with serrate margin. The inflorescence comprises pseudowhorls of 8 to 10 flowers. The sepal lobes are punchon-shaped and hooked; the corolla is pink, longer than the calyx and hirsute on its outer surface. The flowering period lasts from June to July.

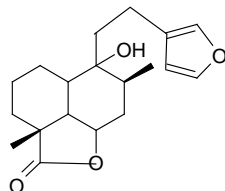
**Drug**

*Leonuri cardiaca*e herba – Motherwort (Ph. Eur. 5.0)



### Phytochemistry

iridoids (ajugol, ajugoside, leonurid), diterpene (marrubiin), furanolabdane diterpene (leosibirin), flavonoids, phenol-carboxylic acids, essential oil (mono- and sesquiterpenes) in traces, nitrogen-containing compounds (leonurine)



marrubiin

### I.141

Active compound of *Leonuri cardiaca herba* - Motherwort

### Uses

mild sedative, spasmolytic, antihypertensive, against cardiac symptoms associated with neurosis, and sleep disorders

***Linum usitatissimum* L. – Flax, Linseed**

Linaceae – Flax family

**I.142***Linum usitatissimum* L. – Flax, Linseed**Distribution, habitats**

It is an annual plant with eastern Mediterranean origin. Cultivated flax varieties are valued for their high fiber and/or oil content.

**Morphology**

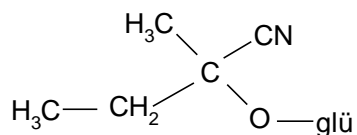
The taproot is spindle-shaped. The stem is about 1 m tall. The leaves are alternate and slender lanceolate. The sky blue flowers cluster into a loose cyme. Flax is in flower in June. The sepals are ovate, the petals are obovate. In the originally 2-whorled androecium the inner stamens have changed to nectariferous staminodes. The pistil consists of 5 carpels, developing into a dehiscent or indehiscent capsule, holding glossy, brown, 4-mm-long seeds.

**Drug**

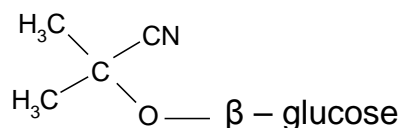
*Lini semen* – Linseed (Ph. Eur. 5.0), *Lini oleum virginale* –Linseed oil, virgin (Ph. Eur. 5.0)

**Phytochemistry**

3-19% heteropolysaccharides as mucilage, 25% crude fiber, 30-45% fatty oil, 25% protein, sterols, triterpenes, 0.1-1.5% cyanogenic glycoside (linustatin, neolinustatin and their aglycones lotaustralin and linamarin), lignan secoisolariciresinol diglucoside, lignan pinoresinol diglucoside



lotaustralin



linamarin

### I.143

Active compounds of *Lini semen* – Linseed

#### Uses

mild laxative (the seeds should be taken with plenty of water); the oil is used to soften and protect dry skin, against eczema and furuncles, to reduce the risk of atherosclerosis, boost the immune system and prevent cancer (probably due to its lignans, which have oestrogen-like effects). The poultice prepared from linseed powder (linseed meal) can alleviate burn injuries; slightly enhances blood circulation, softens the skin and alleviates rheumatic pain.

## ***Lycopodium clavatum* L. – Wolf's foot club moss**

Lycopodiaceae – Club moss family



### **I.144**

*Lycopodium clavatum* L. – Wolf's foot club moss

#### **Distribution, habitats**

It is a circumpolar, perennial, herbaceous pteridophyte. In Hungary it occurs sporadically in the mountains, in acidophilous beech and oak forests, heaths with birch trees and young spruce forests. In Hungary it is protected, and it is becoming rare in other parts of Europe, as well. Larger stands can be found in China.

#### **Morphology**

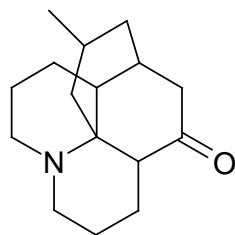
The roots are dichotomously branched, similarly to the prostrate shoots that can reach 30 to 70 cm or sometimes even 2 m in length. The small leaves (microphylls) cover the stem in a scale-like fashion; their shape is lanceolate and taper to a fine hair-like white point. The erect shoots bear the sporophylls arranged in spikes, the sporangia hold pale yellow spores that become mature and are shed in July and August.

#### **Drug**

*Lycopodii herba* – Wolf's foot club moss shoot, *Lycopodii spora* – Club moss spores

#### **Phytochemistry**

0.1-0.4% quinolizidine alkaloid (e.g. lycopodine, clavatine, lycodoline), about 0.2% flavonoid (derivatives of apigenin and chrysoeriol), triterpenes; in the spores fatty oils and sterols



lycopodine

**I.145**

Active compound of *Lycopodium herba* - Wolf's foot club moss shoot

**Uses**

traditionally used as diuretic and emmenagogue. Spores have been used as powder. Internal use requires caution due to its toxic property, nonetheless it is used to quit smoking and drinking alcohol. The shoots are traditionally used against back pain. Homoeopathy.



## ***Lythrum salicaria* L. – Purple loosestrife**

Lythraceae – Loosestrife family



### **I.146**

*Lythrum salicaria* L. – Purple loosestrife

#### **Distribution, habitats**

This plant is native to Eurasia and the Mediterranean region, but it was introduced to North America, as well. In Hungary, it is widespread living in wetlands, marshes, wet meadows and river banks. One of its cultivars ('Morden Pink') is a popular ornamental plant blooming in September.

#### **Morphology**

It is an about 1-m-tall rhizomatous perennial plant. The quadrangular stem is hairless or slightly pubescent. The 5-15 cm long lanceolate leaves have an entire margin. The leaf base of the sessile leaves is obtuse or cordate with protruding leaf-veins on the abaxial surface. The lower stem-leaves are arranged opposite or in whorls of three, the middle and upper leaves are alternate or opposite. The erect flowers form an elongated terminal spike which can be longer than 10 cm. Floral bracts are ovate (egg-shaped), small and pubescent. The 4-7-mm-long calyx is pubescent, consists of 6 sepals bearing 6 small, triangular teeth alternating with 6 large acute teeth at least half as long as the tube. The large teeth are twice as long as the short ones. The polypetalous corolla consists of 6 lanceolate, 6-12-mm-long purple (rarely white) petals. The number of stamens is 12. This plant provides an example for trimorphic heterostyly, we can distinguish long-, medium-, and short-styled forms. The ovary is superior. The fruit is a 3-6-mm-long capsule surrounded by a persistent calyx.

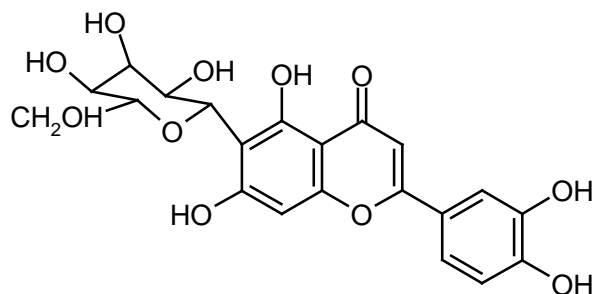


## Drug

*Lythri herba* – Loosestrife (Ph. Eur. 5.0)

## Phytochemistry

5-12% tannin (gallotannins), phenol-carboxylic acids, flavon-C-glycosides, in the flower malvidin and cyanidin glycosides



isoorientin

### I.147

Active compound of *Lythri herba* – Loosestrife

## Uses

astringent, antidiarrhoeal, hemostyptic; homoeopathy.

***Majorana hortensis* L. (syn.: *Origanum majorana* L.) – Marjoram**

Lamiaceae – Mint family



**I.148**

*Majorana hortensis* L. (syn.: *Origanum majorana* L.) – Marjoram

**Distribution, habitats**

It is an annual herbaceous plant native to the Mediterranean region and Western Asia, and cultivated in many places.

**Morphology**

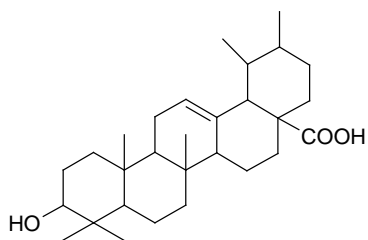
The root system is allorhizous, the shoots are 30 to 40 cm long and greyish green due to the rich coverage of hairs. The leaves are opposite, round to ovate. The branches bear dense terminal pseudowhorls of flowers. The small whitish or purplish flowers emerge slightly from the obtuse bracts. The flowering period lasts from July to August. The fruits are dark brown nutlets, from which only 1 or 2 mericarps become mature.

**Drug**

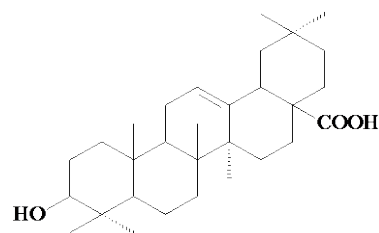
*Majoranae herba* – Marjoram flowering shoot

**Phytochemistry**

0.5-1.3% essential oil (sabinene, pinene, terpineol, carvacrol, etc.), about 10% Labiatae tannins (rosmarinic acid)



ursolic acid



oleanolic acid

### I.149

Active compounds of *Majoranae herba* – Marjoram flowering shoot

#### Uses

carminative, mild sedative, externally against rheumatism; spice, its essential oil is used in perfume industry

***Malva neglecta* Wallr. – Common mallow, *M. sylvestris* L. – Tall mallow**

Malvaceae – Mallow family



**I.150**

*Malva sylvestris* L. – Tall mallow

**Distribution, habitats**

*M. neglecta* is native to south and central areas of Eurasia and North Africa. This annual or perennial herbaceous plant is also common throughout Hungary, particularly in weed associations. *M. sylvestris* is a circumpolar, widespread, annual or perennial herbaceous plant, common particularly in weedy habitats.

**Morphology**

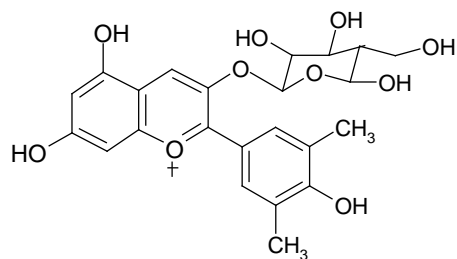
Here we discuss the main characteristics of *M. sylvestris*, which is official in the Hungarian and European Pharmacopoeias. The root system is allorhizous, the shoot is prostrate, 50 to 100 cm long. The palmately divided and veined leaves are alternate, reniform, with long petioles. The inflorescence is a rhipidium arising from the leaf axil. Mallow is in flower from June to September. The flowers are surrounded by a double calyx; the petals are truncate, purplish red. The ovary, consisting of 10 carpels, will develop into a schizocarp splitting into mericarps.

**Drug**

*Malvae sylvestris flos* – Mallow flower (Ph. Eur. 5.0), *Malvae folium* – Mallow leaf

**Phytochemistry**

about 8% heteropolysaccharides as mucilage (e.g. arabinogalactan, rhamnogalactan, polygalacturonan), flavonoids, little tannin; in the flowers cyanidin glycosides



malvidin glycoside

**I.151**

Active compound of *Malvae flos* – Mallow flower

**Uses**

used against common cold, inflammation of the throat, catarrhs of the upper respiratory tract, stomach and the intestines; externally used to heal superficial bruises.



***Marrubium vulgare* L. – White / common horehound**

Lamiaceae – Mint family



**I.152**

*Marrubium vulgare* L. – White / common horehound

**Distribution, habitats**

It is native to Europe, temperate climate zones of Asia, North Africa and the Indian subcontinent. In Hungary this perennial herbaceous plant is becoming less common, sometimes occurring on road edges, weed associations, uncultivated lands and grazing grasslands.

**Morphology**

The root system is rhizomatous, the shoot is 30 to 40 cm long, whitish-woolly. The decussate, short-stalked leaves are ovate to orbicular, crenate and wrinkled. The white flowers cluster into dense pseudowhorls of 20 to 40 members. The calyx bears 10 hooked teeth. The plant is in flower from June to August. The ovary has four locules, the fruits are nutlets.

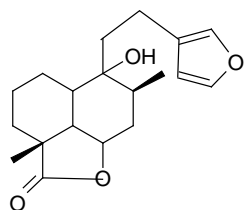
**Drug**

*Marrubii herba* – White horehound (Ph. Eur. 5.1)

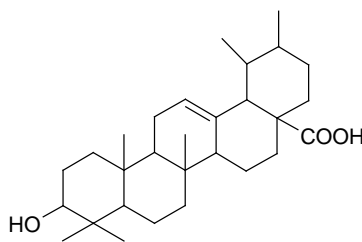


### Phytochemistry

diterpenes (premarrubiin, marrubiin, marrubenol), caffeic acid derivatives, alkaloids (stachydrine, betonicine), flavonoids, triterpenes, essential oil



marrubiin



ursolic acid

### I.153

Active compounds of *Marrubii herba* – White horehound

### Uses

expectorant, amarum, cholagogue, used against catarrhs of the upper respiratory tract and to prepare lozenges

***Matricaria recutita* L. – German chamomile**

Asteraceae – Sunflower family

**I.154***Matricaria recutita* L. – German chamomile**Distribution, habitats**

It is native to Europe and temperate climate zones of Asia. Annual or over-wintering herbaceous plant. It is frequent on soils low in lime, on arable lands, in weed associations, grazing grasslands and alkaline steppes. Its horticultural varieties are cultivated in many places.

**Morphology**

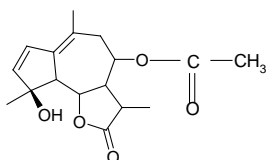
It has a taproot system, the stem is 15 to 40 cm long, ribbed and hairless. The leaves are alternate, sessile, the leaf blade is 2 to 3 times completely segmented, in the upper section simply divided. The inflorescence is a rhipidium made up of capitula. The receptacle is cone-shaped and glabrous, the inside is hollow, while the outer surface is covered with overlapping bracts. On the margin of the capitulum there are 12 to 18 white ligulate (ray) florets, lacking the androecium. Towards the centre follow the yellow tubular (disc) florets, with transversal pinches and 5 lobes. The outer surface of both types of florets is densely covered with glossy Asteraceae-type glandular trichomes. The androecium consists of 5 stamens, whose base fuses with the corolla; the upper section of the filaments is free, but the anthers fuse, forming a tube. The gynoecium comprises 2 carpels, the ovary is inferior, and the 2 stigma lobes are protruding out of the anther tube. The flowering period lasts from May to June. The fruit is a slightly curved, ribbed cypsela (achene).

**Drug**

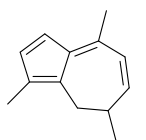
*Matricariae flos* – Matricaria flower (Ph. Eur. 5.0), *Matricariae aetheroleum* – Matricaria oil (Ph. Eur. 5.0), *Matricariae extractum fluidum* – Matricaria liquid extract (Ph. Eur. 5.0)

### Phytochemistry

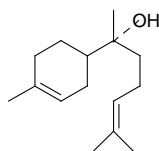
0.3-1.5% essential oil (it has a blue colour, since matricin turns to chamazulene during the steam distillation process;  $\alpha$ -bisabolol and its oxidative derivatives, spathulenol, cis/trans-en-in-dicycloethers), flavonoids, (glycosides of apigenin, luteolin and quercetin), sesquiterpene lactones (matricin, matricarin, desacetyl-matricarin), coumarin (umbelliferone, herniarin), phenol-carboxylic acids, fructans



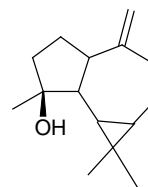
matricin



chamazulene



$\alpha$ -bisabolol



spathulenol

### I.155

Active compounds of *Matricariae flos* – Matricaria flower

### Uses

antiphlogistic, antibacterial, spasmolytic, carminative, stomachic, against catarrhs of the upper respiratory tract, externally used in the form of baths, compress or rinse. The essential oil is used in cosmetics and perfume industry.

***Melissa officinalis* L. – Melissa, lemon balm**

Lamiaceae – Mint family

**I.156***Melissa officinalis* L. – Melissa, lemon balm**Distribution, habitats**

This herbaceous perennial plant is native to Southwest Asia and the Mediterranean region. It occurs sporadically in wet oak woods, but it may run wild from cultivated stands as well.

**Morphology**

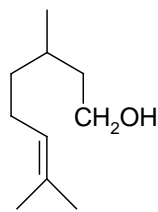
Below-ground the plant develops a thin rhizome, from which yellowish brown roots and horizontally creeping stolons arise. The branched shoot system is 50 to 100 cm tall, the stem is quadrangular, with a whitish-purplish shade. The decussate leaves are petiolate, the leaf blade is broad ovate or cordate, with serrate-crenate margin and pinnate venation. The leaf is slightly hairy along the main vein and its primary branches. The pseudowhorls of the inflorescences arise from the leaf axils, consisting of few bilabiate flowers. The flowering period lasts from June to September. The calyx is bell-shaped, the corolla is white at the time of flowering. The pistil is made up of 2 carpels. The fruits are 4 light brown, 1.5-2-mm-long nutlets.

**Drug**

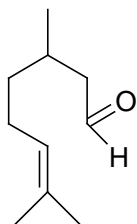
*Melissae folium* – Melissa leaf (Ph. Eur. 5.0)

**Phytochemistry**

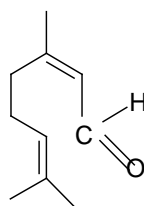
0.05-0.3% essential oil (30-40% citronellal; geranial, nerol, neral, geraniol; sesquiterpene germacrene D and  $\beta$ -caryophyllene epoxide), triterpenes, 4-7% Labiatae tannins, especially phenol-carboxylic acids, rosmarinic acid, chlorogenic acid, caffeic acid; flavonoids



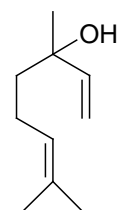
citronellol



citronellal



citral



linalool

### I.157

Active compounds of *Melissae folium* – Melissa leaf

#### Uses

against gastrointestinal disturbance associated with nervous irritability; headache, dysmenorrhoea; spasmolytic, cholagogue; diseases of upper respiratory tract in children; externally used in the form of baths, and medicines to treat herpes simplex virus infections



***Mentha spicata* L. var. *crispa* (Benth.) Mansf. –  
Spearmint, curled mint**

Lamiaceae – Mint family



**I.158**

*Mentha spicata* L. var. *crispa* (Benth.) Mansf. – Spearmint, curled mint

**Distribution, habitats**

This perennial herbaceous plant is a species hybrid of uncertain origin. It has long been cultivated. Its vegetative propagation is possible.

**Morphology**

It has a wide-spreading fleshy underground rhizome. The square-shaped stem is 30 to 100 cm tall, hairless or covered with hairs. The decussate leaves are 5 to 9 cm long and 1.5 to 3 cm wide. The margin of the leaves is serrate. The slender spikes consist of pink or white flowers, which are 2.5 to 3 mm long and broad.

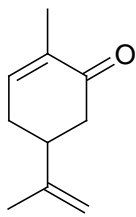
**Drug**

*Menthae crispae folium* – Spearmint leaf

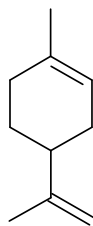
**Phytochemistry**

about 0.8-2.5% essential oil (about 50-60% carvone, limonene, pinene, dihydrocarveol, etc.), methoxyflavones, rosmarinic acid, tannins





carvone



limonene

### I.159

Active compounds of *Menthae crispae folium* – Spearmint leaf

#### Uses

The leaf is applied as an aromatic and spice. It is used in cosmetics and perfume industry (toothpaste, mouthwash, chewing gum, perfume).

***Mentha x piperita* (L.) Huds. – Peppermint**

Lamiaceae – Mint family

**I.160***Mentha x piperita* (L.) Huds. – Peppermint**Distribution, habitats**

A hybrid of uncertain origin, probably derived from the ancestors *M. aquatica* (water mint) x *M. spicata* (spearmint). It is a perennial herb, cultivated worldwide. There are varieties with green (*M. x p. f. pallescens*), as well as with purplish stem (*M. x p. f. rubescens* = Mitcham-type). It can be propagated vegetatively with stolons or rooted cuttings.

**Morphology**

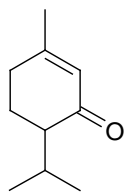
The rhizome is stoloniferous, the shoot grows up to 30-100 cm tall, the base develops runners, the stem is quadrangular and purplish. The short-stalked, decussate leaves are ovate to lanceolate, with serrate margin. The purplish red corolla is not typically bilabial. Peppermint is in flower in June. The plant does not produce seeds that would be able to germinate; it is propagated vegetatively.

**Drug**

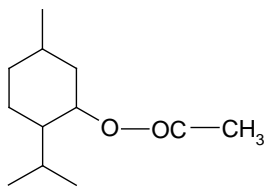
*Menthae piperitae folium* – Peppermint leaf (Ph. Eur. 5.0), *Menthae piperitae aetheroleum* – Peppermint oil (Ph. Eur. 5.0)

**Phytochemistry**

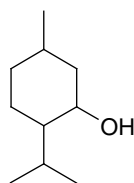
1-3% essential oil (about 50% menthol, 20% menthon, menthyl acetate), flavonoids, rosmarinic acid



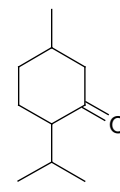
piperitone



menthyl acetate



menthol



menthon

### I.161

Active compounds of *Menthae piperitae folium* – Peppermint leaf

#### Uses

spasmolytic, carminative, cholagogue, stomachic, appetizer, against common cold, acute and chronic gastritis and enteritis. It is raw material for cosmetics industry (toothpaste) and food industry (spice, liqueur, soft drinks, chewing gum, candies).

***Menyanthes trifoliata* L. – Bogbean**

Menyanthaceae – Buckbean or bogbean family



**I.162**

*Menyanthes trifoliata* L. – Bogbean

**Distribution, habitats**

Bogbean is native to Central and North Europe, Siberia, Eastern Canada and subarctic regions of America. It is a perennial herbaceous plant living in aquatic habitats, as well as fens and bogs. In Hungary it is strictly protected, due to the reduction of its stands. In Hungary it cannot be cultivated on large scale, consequently it must be imported.

### Morphology

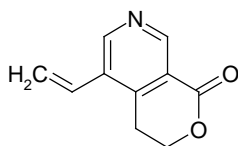
The horizontal rhizome is long and thick. The long-stalked leaves are compound with 3 leaflets (trifoliolate), connected by a well-developed leaf sheath to the axis of the rhizome. The leaflets are obovate, with an entire or wavy margin. The white flowers form a terminal simple raceme. The corolla is somewhat fleshy, the petal lobes and the mouth of the corolla bearing beard-like hairs. The anthers are violet, arrow-shaped. The flowering period lasts from April to May. The bicarpellary ovary develops into a capsule with persistent calyx.

### Drug

*Menyanthis trifoliatae folium* – Bogbean leaf (Ph. Eur. 5.0)

### Phytochemistry

about 1% bitter secoiridoids (dihydrofoliamenthin, foliamenthine, sweroside), flavonoids (rutin, hyperoside, trifolin), coumarins, cinnamic acid derivatives, pyridine alkaloids (gentianin), triterpenes



gentianin

### I.163

Active compound of *Menyanthis trifoliatae folium* – Bogbean leaf

### Uses

amarum, used against indigestion and loss of appetite



## ***Ocimum basilicum* L. – Sweet basil**

Lamiaceae – Mint family



**I.164**

*Ocimum basilicum* L. – Sweet basil

### Distribution, habitats

This annual herbaceous plant is presumably native to Asia and North Africa, and it is supposed to have developed through cross-breeding of ancient species. It is widespread in the Mediterranean region and the Indian subcontinent. In Hungary, sweet basil is a vegetable garden herb, but it can be cultivated in arable lands, as well.

### Morphology

The allorhizous root system comprises a well-developed taproot. The shoot is about 40 to 60 cm tall. The decussate, petiolate leaves are ovate, glossy, with green or purple shade and entire margin. The inflorescence is a terminal spike that consists of pseudowhorls of white, labiate flowers, subtended by plate-like broadening bracts. Basil is in flower from June. The fruits are dark brown nutlets, which develop inside the bilabiate calyx.

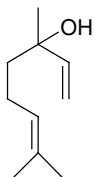
### Drug

*Basilici herba* – Basil herb

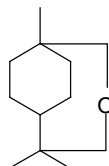


### Phytochemistry

0.1-0.5% essential oil (up to 1.5% in some varieties) (about 85% linalool in the "linalool chemotypes", about 90% methyl-chavicol = estragol in the "estragol chemotype"), sesquiterpenes, phenylpropane (methyl cinnamate), flavonoids, phenol-carboxylic acids



linalool



cineole

### I.165

Active compounds of *Basilici herba* – Basil herb

### Uses

carminative, stomachic, galactagogue, diuretic, mouthwash, against neurotic cardiac problems; spice; used in food, alcohol and perfume industries as well as homoeopathy. *O. gratissimum* L. (clove basil or african basil) is a tropical, perennial, bushy plant, having antiseptic and anti-inflammatory effects. The leaves have strong lemon-like scent. The fragrant *O. tenuiflorum* L. (= *O. sanctum* L.) is native to India and Malaysia and, it is a sacred plant in Hinduism.

## ***Ononis spinosa* L. – Spiny restharrow**

Fabaceae – Bean family

### Distribution, habitats

It is native to Europe, North Africa, Western Asia and the Indian subcontinent. In Hungary, it is common in meadows and pastures. *O. arvensis*, field restharrow (syn.: *O. hircina* Jacq.) is common in fresh meadows or pastures and has no spines. The latter species can also be the source of the drug.

### Morphology

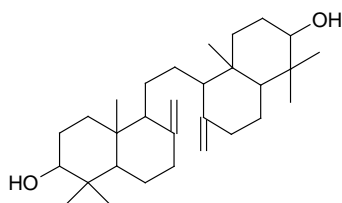
This perennial semishrub can grow up to 0.8 m. It has a twisted, greyish-brown, robust root system. The shoot is covered with spines, and bears both trifoliolate and simple leaves. The compound leaves are short-stalked with 3 leaflets, which are narrow ovate and coarsely toothed. It has pink or purple papilionaceous flowers. The fruit is a pod, developing inside the calyx, containing 1-3 seeds.

### Drug

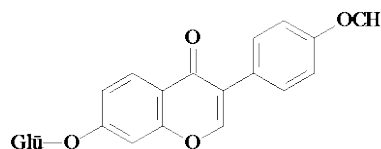
*Ononidis radix* – Restharrow root (Ph. Eur. 5.0)

### Phytochemistry

isoflavone formononetin and ononin (formononetine-7-O- $\beta$ -D-glucoside), genistein, biochanin A, flavonoids (apigenin, kaempferol), triterpene ( $\alpha$ -onocerin), essential oil (anethole, carvone, etc.) in traces



$\alpha$ -onocerin (=onocol)



ononin

### I.166

Active compounds of *Ononidis radix* – Restharrow root

### Uses

mild diuretic, traditionally used against gout and rheumatism

***Origanum vulgare* L. – Common (greek) oregano, *O. onites* L. – Cretan oregano**

Lamiaceae – Mint family



**I.167**

*Origanum vulgare* L. – Common (greek) oregano

**Distribution, habitats**

Common oregano is a perennial herb with Mediterranean origin, occurring in calciphilous oak forests, in deforested areas and shrubberies. In Hungary, two subspecies of *O. vulgare* (*O. v. ssp. vulgare* and *O. v. ssp. prismaticum*) can be found.

**Morphology**

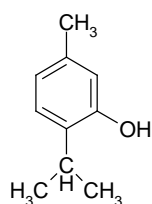
The above-ground shoot of common oregano is erect, 30 to 60 cm tall and slightly hairy. The leaves are opposite and ovate with an entire or serrate margin and rounded apex. It blooms from July to September. The inflorescence is a cymose corymb with purple or pinkish flowers. The fruit is a nutlet.

**Drug**

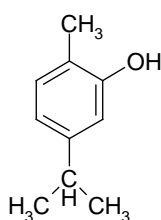
*Origanum herba* – Oregano (Ph. Eur. 5.0)

**Phytochemistry**

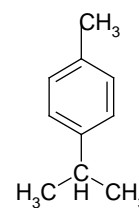
essential oil (thymol, cimol, thujone, carvacrol), flavonoids, phenolic acids (rosmarinic acid), tannins, saponins, cinnamic acid derivatives and triterpenes



thymol



carvacrol



p-cimol

**I.168**

Active compounds of *Origani herba* – Oregano

**Uses**

Oregano is a spice and dye plant, it has diuretic, carminative, anitiseptic, diaphoretic, antibacterial, antifungal, spasmolytic, antioxidant and diaphoretic effects, it is also used against common cold, asthma, digestive problems and intestinal catarrh.

## ***Panax ginseng* C. A. Mey. – Ginseng**

Araliaceae – Ginseng or ivy family

### Distribution, habitats

It is native to East Asia and China, but it is cultivated in many places. It is a perennial species found in shady habitats, like underwood.

### Morphology

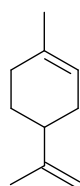
It is 30-40 cm tall. The palmately compound leaves are composed of 5 cordate (heart-shaped) or narrow ovate leaflets having serrate margin and acuminate apex. The white flowers form a simple umbel. The fruit is a red berry.

### Drug

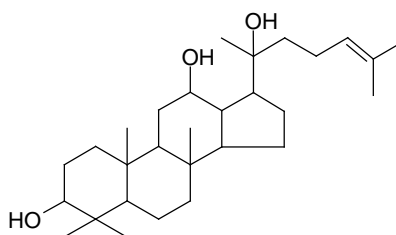
*Ginseng radix* – Ginseng (Ph. Eur. 5.0)

### Phytochemistry

0.8-5% triterpene saponins (ginsenosides), polyacetylenes (panaxadiol, panaxytriol, panaxynol), polysaccharide (ginsenans, panaxans) and essential oil (limonene, citral)



limonene



protopanaxadiol

### **I.169**

Active compounds of *Ginseng radix* – Ginseng

### Uses

Ginseng root is used to increase appetite, stimulate physical and mental ability, improve circulation, decrease blood pressure, blood cholesterol and sugar levels as well as to reduce the risk of tumour and menopausal complaints. It also has roborant, adaptogenic, tonic, antioxidant and immunostimulant effects.

***Papaver rhoeas* L. – Corn poppy, corn rose, field poppy, red poppy**

Papaveraceae – Poppy family



**I.170**

*Papaver rhoeas* L. – Corn poppy, corn rose, field poppy, red poppy

**Distribution, habitats**

It is native to Eurasia, but can be found in other continents as well. It is an annual herb living in uncultivated lands, along roads and arable lands.

**Morphology**

The shoot is 20 to 90 cm tall and contains white or pinkish latex. The leaves are narrow and lanceolate with serrate margin. The bright red petals bear a black spot at their base. The flowering period lasts from May to July. The fruit is an egg-shaped poricidal capsule (releasing seeds through pores).

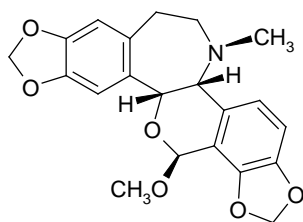
**Drug**

*Papaveris rhoeados flos* – Red poppy petals (Ph. Eur. 5.0)

**Phytochemistry**

isoquinoline alkaloid (rhoeadine), accompanying alkaloids (papaverrubine), mucilage, anthocyanin glycosides, saponins, the seeds contain fatty oil





rhoeadine

**I.171**

Active compound of *Papaveris rhoeados flos* – Red poppy petals

**Uses**

Rhoeadine is sedative. Red poppy petals are traditionally used as analgesic and antitussive. It is used by food industry for preparing herbal tea mixtures, syrups and candies.

## ***Papaver somniferum* L. – Opium poppy**

Papaveraceae – Poppy family



**I.172**

*Papaver somniferum* L. – Opium poppy

### Distribution, habitats

It is an annual plant, native to Southern Europe, North Africa and Western Asia. Varieties of opium poppy containing high amounts of morphine are widely cultivated.

### Morphology

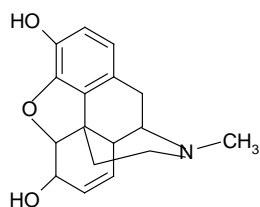
The shoot is 50 to 150 cm tall, greyish-green and contains a white latex. The simple leaves are hairless, the upper ones are surrounding the stem. Flowers can be white, pinkish or violet with a dark patch at the base of the petal. Spring varieties flower in June, autumn varieties in May. The fruit is a 3-5-cm-long poricidal capsule.

### Drug

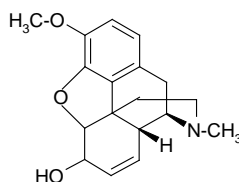
*Papaveris fructus (caput)* – poppy fruit (head); *Opium crudum* – Opium, raw (Ph. Eur. 5.0); *Opii pulvis normatus* – Opium, prepared (Ph. Eur. 5.0)

### Phytochemistry

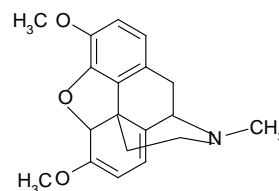
opium contains 25-30% alkaloids (10-14% morphine, min. 1% codeine, 0.2-0.5% thebaine, 0.1-0.4% papaverine, 4-8% noscapine), organic acids (fumaric acid, lactic acid), the seeds contain fatty oil



morphine



codeine



thebaine

### I.173

Active compounds of *Papaveris fructus (caput)* – Poppy fruit (head)

### Uses

Various opium alkaloids have markedly different effects: morphine is analgesic, narcotic and sedative; papaverine is spasmolytic and vasodilator; while noscapine, codeine and narcotine are antitussive. Ethylmorphine, diacetylmorphine (heroin) and hydrocodone are semi-synthetic opioid derivatives. *Pulvis opii* and *Tinctura opii* are used in infectious diarrhea and *Pulvis opii et ipecacuanhae* can be used in intestinal catarrh and as an analgesic and antidiarrhoeal agent. Industrial poppy varieties are used for the production of alkaloids in pharmaceutical industry; while the seeds of food poppies with minimal alkaloid content are processed by food industry.

## ***Passiflora incarnata* L. – Purple passion flower**

### Passifloraceae – Passion-flower family

#### Distribution, habitats

It is a perennial species widespread from North America to South America, but can be found in India and Europe as well.

#### Morphology

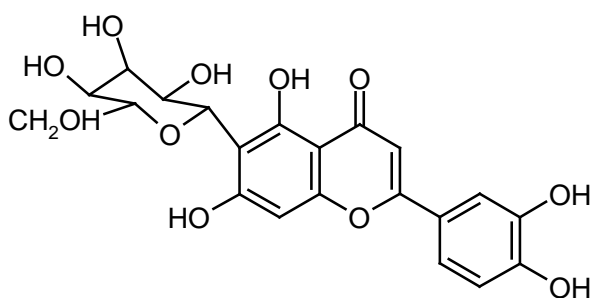
A climbing plant with tendrils; it can grow up to 10 m tall. The leaves are opposite, lobed and 5 to 15 cm long, bearing glands on the petiole. The flowers are bluish white, with a white or purple crown of numerous radial filaments between the corolla and the androecium. The stigma is 3-lobed. The insect-pollinated flowers bloom in July. The fruit is a yellowish berry.

#### Drug

*Passiflorae herba* – Passion flower (Ph. Eur. 5.0)

#### Phytochemistry

flavonoids (isovitexin, isorientin), coumarins,  $\gamma$ -benzopyrone derivatives (maltol), harman alkaloids and polysaccharide arabinoglucane



isorientin

#### **I.174**

Active compound of *Passiflorae herba* – Passion flower

#### Uses

Passion flower is used as sedative in neurovegetative dystonia, and as spasmolytic and anxiolytic particularly for children.

## *Peumus boldus* Mol. – Boldo tree

Monimiaceae – Pigeonwood family



### I.175

#### *Peumus boldus* Mol. – Boldo tree

##### Distribution, habitats

It is native to South America. In Chile, it is a common evergreen shrub or a small tree.

##### Morphology

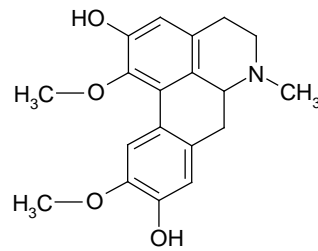
The glossy dark green leaves are ovate and have entire margin, rounded apex, waxy surface and bitter taste. The white flowers bloom from August to September. The edible fruit develops from December to February.

##### Drug

*Boldi folium* – Boldo leaf (Ph. Eur. 6.0)

##### Phytochemistry

isoquinoline alkaloids (boldin), 2-3% essential oil (p-cimene, cineol, ascaridol), triterpenes, tannins, rubber and flavonoids



boldin

**I.176**

Active compound of *Boldi folium* – Boldo leaf

**Uses**

Boldo leaf increases the secretion of gastric juices, it is choleric and stomachic, so it can be used as appetizer in dyspepsia. It is useful against rheumatism and gout, and is used in homeopathy. In South America, it is traditionally used to treat indigestion and gonorrhoea. It is contraindicated in the following cases: pregnancy, biliary obstruction, gallstones and kidney disease (since terpinen-4-ol may cause kidney irritation and damage). Ascaridol previously was considered to be anthelmintic, now it is thought to be hepato- and neurotoxic, and the oil must not be used for pharmaceutical purposes.



## ***Phaseolus vulgaris* L. – Common bean**

Fabaceae – Bean family

### Distribution, habitats

It is an annual plant native to the tropical regions of America. Many varieties are cultivated worldwide.

### Morphology

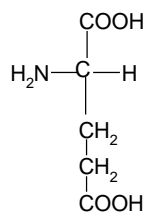
The shoot of runner beans is climbing and winding. The leaves are cordate (heart-shaped), have entire margin and acuminate apex. The 1-1.5-cm-long yellow or greenish-white papilionaceous flowers cluster into a raceme and bloom from June to September. The fruit is a pod containing 9-16-mm-long seeds.

### Drug

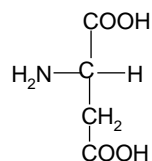
*Phaseoli pericarpium* (*legumen*) – Bean fruit wall (Bean pod)

### Phytochemistry

betaine, amino acids, cyanogenic glycosides in traces, inosite, hemicellulose and silicic acid



glutamic acid



asparagic acid

### **I.177**

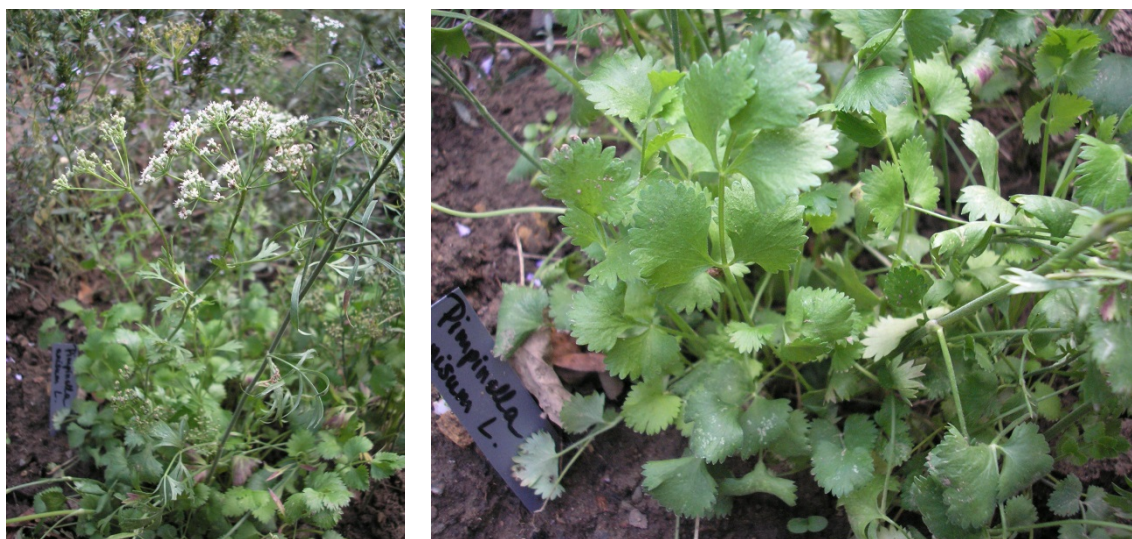
Active compounds of *Phaseoli pericarpium* (*legumen*) – Bean fruit wall (Bean pod)

### Uses

In elderly patients it is used against mild diabetes, gout and rheumatism, but it also has diuretic effects.

***Pimpinella anisum* L. – Anise, Aniseed**

Apiaceae – Carrot or parsley family

**I.178***Pimpinella anisum* L. – Anise, Aniseed**Distribution, habitats**

It is an annual herbaceous plant native to the Eastern Mediterranean, but it is cultivated in many countries.

**Morphology**

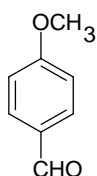
The shoot can grow up to 1 m tall. The lower leaves are simple, cordate or segmented, the upper ones are bi- or tripinnately compound with segmented leaflets. The compound umbel is composed of white flowers which bloom from May to June. The fruit is a ribbed double achene.

**Drug**

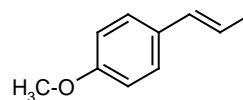
*Anisi fructus* – Aniseed (Ph. Eur. 5.0)

**Phytochemistry**

essential oil (trans-anethole, anisaldehyde, cis-anethole, anisic acid), 25-30% sesquiterpene, coumarins, flavonoids and flavonoid glycosides



anisaldehyde



t-anethole

**I.179**Active compounds of *Anisi fructus* – Aniseed

### Uses

Aniseed is a common spice. It is expectorant, carminative, spasmolytic, aromatic, digestive agent, galactagogue, aphrodisiac, abortive, antibacterial, antifungal and insecticide. It is processed by the liqueur and food industries.

## ***Plantago lanceolata* L. – Ribwort plantain**

Plantaginaceae – Plantain family



**I.180**

*Plantago lanceolata* L. – Ribwort plantain

### Distribution, habitats

It is a perennial herbaceous plant native to Eurasia. It occurs along roads, in meadows, rock grasses and sunny habitats.

### Morphology

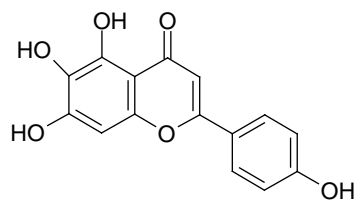
The above-ground part is 20 to 30 cm tall. The narrow, lanceolate leaves have entire margin and parallel leaf venation and form a leaf rosette. The inflorescence is a spike borne on the scape. The inflorescence is composed of small brownish white flowers, which open acropetally. The flowering period lasts from April to August. The fruit is a 3-4-mm-long capsule containing 2-3-mm-long seeds.

### Drug

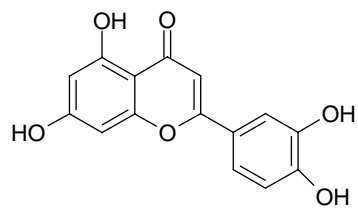
*Plantaginis lanceolatae folium* – Ribwort plantain (Ph. Eur. 5.0)

### Phytochemistry

polysaccharides, flavonoids (luteolin, apigenin), iridoid glycosides (catalpol, aucubin), tannins, chlorogenic acid, silicic acid and coumarin (esculetin)



scutellarin



luteolin

### I.181

Active compounds of *Plantaginis lanceolatae folium* – Ribwort plantain

#### Uses

Ribwort plantain is antibacterial, antiphlogistic and immunostimulant, so it can be used to treat respiratory diseases, common cold and heartburn. It is traditionally used externally to treat wounds and haemorrhoids.



***Podophyllum peltatum* L. – Mayapple, may apple**

Berberidaceae – Barberry family



**I.182**

*Podophyllum peltatum* L. – Mayapple, may apple

Distribution, habitats

It is a perennial herbaceous plant, native to North America.



### Morphology

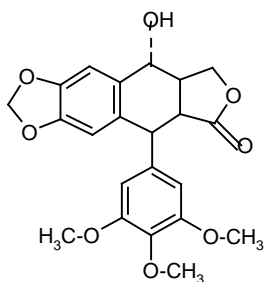
The shoot is 20 to 30 cm tall. The leaves are palmately compound, the leaflets are ovate and strongly divided. The white or pinkish flowers bloom from March to May. The fruit is a yellow or pinkish fleshy berry.

### Drug

*Podophylli resina* – Mayapple resin, *Podophylli rhizoma* – Mayapple rhizome

### Phytochemistry

resin, lignans (podophyllotoxin),  $\alpha$ - and  $\beta$ -peltatin and flavonoids



podophyllotoxin

### I.183

Active compound of *Podophylli rhizoma* – Mayapple rhizome

### Uses

It is cholagogue, laxative, anthelmintic, diuretic, cytotoxic, citostatic (podophyllotoxin). Mayapple rhizome is a very poisonous drug, which can only be used under strict medical supervision. It is also used in homoeopathy.

## ***Polygonum aviculare* L. s. l. – Common knotgrass**

Polygonaceae – Buckwheat family



**I.184**

*Polygonum aviculare* L. s. l. – Common knotgrass

### Distribution, habitats

It is a cosmopolitan, overwintering species in the temperate climate zone. Frequently occurs in roadside weed associations, tolerates being trodden on.

### Morphology

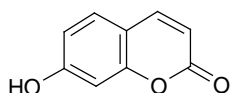
The shoot is 5 to 50 cm tall and creeping. The alternate leaves are small and ovate with an entire margin and obtuse apex, bearing an ochrea at their base. The white flowers bloom from June to October. The fruit is a nut (acorn).

### Drug

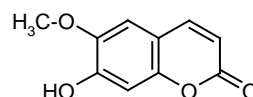
*Polygoni avicularis herba* – Knotgrass (Ph. Eur. 5.0)

### Phytochemistry

flavonoids (avicularin, kaempferol and quercetin glycosides), silicic acid, tannins, cinnamic acid derivatives, coumarins (scopoletin, umbelliferone), phenol-carboxylic acids and lignans (aviculin)



umbelliferone



scopoletin

**I.185**

Active compounds of *Polygoni avicularis herba* - Knotgrass

### Uses

Knotgrass is anti-inflammatory, astringent and acetylcholinesterase inhibitor, traditionally used as hemostyptic, secretolytic, expectorant, diuretic, against rheumatism and gout.

## ***Populus nigra* L. – Black poplar**

Salicaceae – Willow family



### **I.186**

*Populus nigra* L. – Black poplar

#### **Distribution, habitats**

It is native to Europe, North Africa and Southern Asia. Frequently occurs in gallery forests, willow and poplar woods. It is also planted as an ornamental tree.

#### **Morphology**

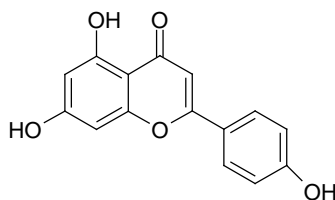
It is an about 30-m-tall dioecious tree. The bark is dark grey. The leaves are triangular or deltoid with serrate margin and acute apex. The buds, covered with sticky bud scales, can be collected from the end of February to the emergence of leaves. Both staminate (male) and pistillate (female) flowers cluster into catkins. The maturing anthers are red, later greyish. The pistillate inflorescences are green. Flowering starts from March. The fruit is a capsule with hairy seeds that can be dispersed by wind.

#### **Drug**

*Populi gemma* – Poplar bud, *Populi gemmae aetheroleum* – Poplar bud oil

#### **Phytochemistry**

essential oil ( $\alpha$ - and  $\beta$ -caryophyllene), flavonoids (apigenin, kaempferol, rhamnetin, isorhamnetin, galangin), populine, salicine, wax and phenol-carboxylic acids



apigenin

### **I.187**

Active compound of *Populi gemma* – Poplar bud

### Uses

This drug can be a component of cosmetics (e.g. hair lotions) or ointments used in chronic polyarthritis, wounds, haemorrhoids, rheumatism and gout. The bud can be used as diuretic, against common cold and fever, similarly to propolis.



***Primula veris* Huds. – Cowslip, *P. elatior* (L.) Hill. – Oxlip**

Primulaceae – Primrose family



**I.188**

*Primula veris* Huds. – Cowslip

**Distribution, habitats**

These herbaceous perennial plants can be found in the Caucasus and Europe. *P. veris* occurs on clearings and edges of deciduous forests, while *P. elatior* is a montane species. *P. elatior* and other *Primula* species occurring in Hungary are protected, with the exception of *P. veris*.

**Morphology**

The scapes of these plants are 10 to 15 cm tall. The leaf rosette is formed by spatulate leaves, whose lower surface is strongly ribbed due to protruding veins (vascular bundles). The yellow flowers are borne on the scape. The fruit is a capsule dehiscing with apical teeth.

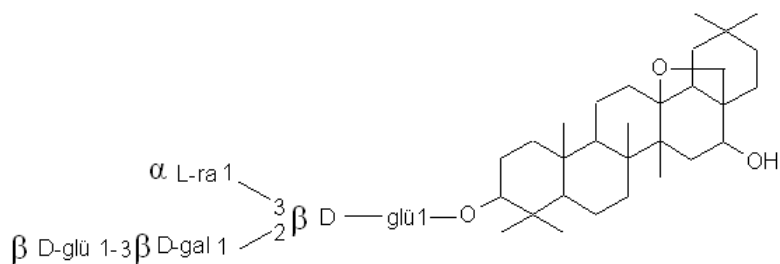
**Drug**

*Primulae radix* – Primula root (Ph. Eur. 5.0), *Primulae flos* – Primula flower

**Phytochemistry**

triterpene saponins, phenolic glycosides, tannins and flavonoids





primula acid A

**I.189**

Active compound of *Primulae radix* – Primula root

**Uses**

Primula root is expectorant, secretomotoric, secretolytic, broncholytic, traditionally used against asthma, gout, headaches and heart muscle weakness.

## ***Prunus avium* L. (*Cerasus avium* (L.) Moench) – Wild cherry, sweet cherry**

Rosaceae – Rose family

### Distribution, habitats

It is native to the Caucasus, Europe and Western Asia. It is a tree living in hornbeam-oak and slope forests. Its many varieties are cultivated.

### Morphology

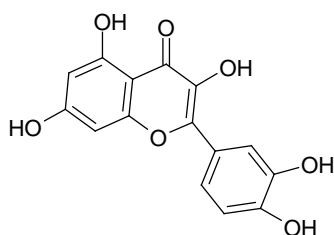
It is a 5-25-m-tall tree with reddish brown bark. The leaves are narrow ovate with serrate margin and acute or acuminate apex. The petiole bears two red glandular scales. The white flowers bloom in April. The red fleshy fruit is a drupe.

### Drug

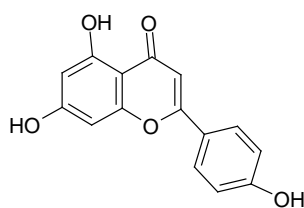
*Cerasi stipes* – Cherry peduncle, *Cerasi folium* – Cherry leaf

### Phytochemistry

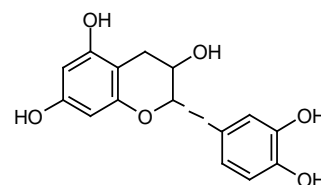
leucoanthocyanidins, polyphenols, flavonoids (naringenin, taxifolin), genistin, genistein, catechin, ursolic acid, oleanolic acid, cyanogenic glycosides (amygdalin), organic acids, the seeds contain fatty oil



quercetin



naringenin



catechin

### I.190

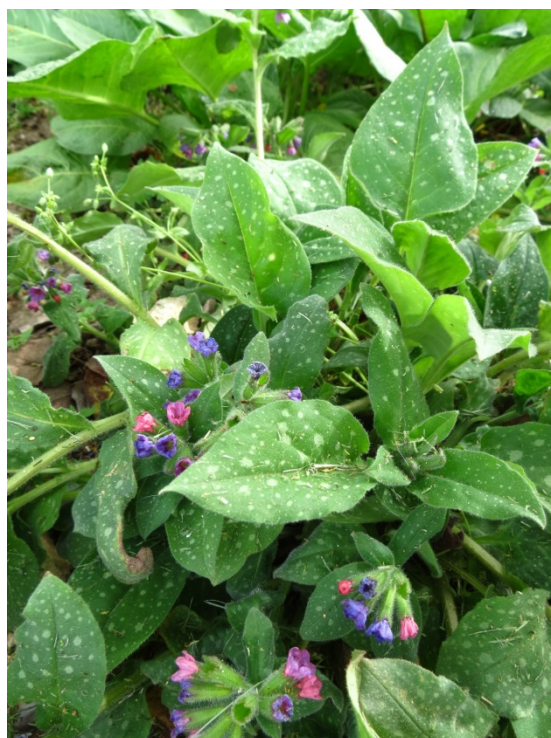
Active compounds of *Cerasi stipes* – Cherry peduncle

### Uses

It is used as diuretic, antidiarrhoeal and for heart muscle weakness in the elderly. It is used as aroma in liqueur industry. The leaves are raw material for homoeopathy.

***Pulmonaria officinalis* L. – Lungwort, Common lungwort, Our Lady's milk drops**

Boraginaceae – Borage or Forget-me-not family



**I.191**

*Pulmonaria officinalis* L. – Lungwort, Common lungwort, Our Lady's milk drops

**Distribution, habitats**

In Hungary the plant frequently occurs in the Northern Mountains and Transdanubia, while it is sporadic in the Great Plain. Lungwort typically lives in the underwood of hornbeam-oak, Turkey oak and beech forests.

**Morphology**

The shoot is 15 to 20 cm tall. The oval or obovate base leaves have entire margin. The leaf surface is densely covered with trichomes (Boraginaceae-type bristles or setae) and

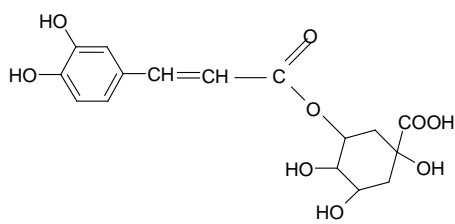
white spots. The purplish blue or pink flowers are borne on a base peduncle (scape), forming a cincinnus. The flowering period lasts from March to May. The fruits are nutlets.

### Drug

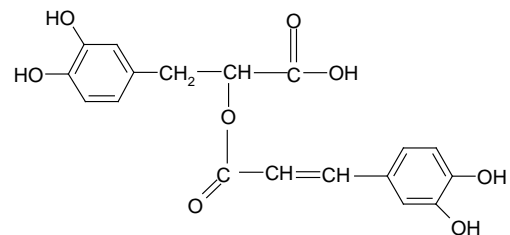
*Pulmonariae folium* – Lungwort leaf, *Pulmonariae herba* – Lungwort flowering shoot

### Phytochemistry

heteropolysaccharides as mucilage, phenol-carboxylic acids (rosmarinic acid, chlorogenic acid), tannins (gallotannins), flavonoids, silicic acid, allantoin and toxic pyrrolizidine alkaloids



chlorogenic acid



rosmarinic acid

### I.192

Active compounds of *Pulmonariae folium* – Lungwort leaf

### Uses

The drug is expectorant and mucolytic. Because of the alkaloids it is not recommended for long-term use.

***Quercus robur* L. – Pedunculate oak, *Q. petraea* (Matt.)  
Liebl. – Sessile oak, *Q. pubescens* Willd. –  
Downy/pubescent oak**

Fagaceae – Beech family



**I.193**

*Quercus robur* L. – Pedunculate oak

**Distribution, habitats**

These trees are native to Europe and the Caucasus.

**Morphology**

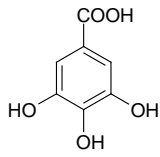
They are 10 to 30 m tall trees. The leaves are 8 to 10 cm long and lobed. The leaves of pedunculate oak have short petioles, while the leaves of sessile oak are long-stalked. Staminate (male) flowers cluster into catkins. Pistillate (female) flowers of *Q. robur* form a spike, while these flowers of *Q. petraea* and *Q. pubescens* form a capitulum composed of few flowers. The fruit is an acorn (nut) sitting in a cupule. In downy oak the cupule is covered with small thread-like structures. The fruits of *Q. robur* are borne on a few cm long peduncle, while the acorns of *Q. petraea* and *Q. pubescens* are sessile.

**Drug**

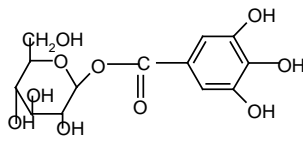
*Quercus cortex* – Oak bark (Ph. Eur. 5.0), *Quercus semen* – Oak seed, *Quercus folium* – Oak leaf, *Quercus lignum* – Oak wood

**Phytochemistry**

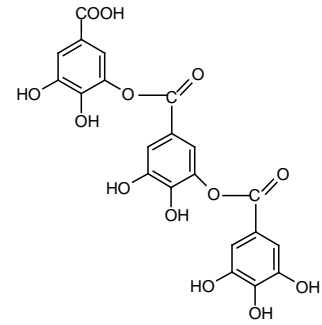
tannins (ellagitannins, catechins), triterpene saponins, sterols, leucocyanidin, saponins, steroidal saponins; the seeds contain fatty oil, tannins, starch and proteins; the leaves contain tannins, flavonoids, sugar alcohols; in the wood esters of gallic acid (castalagin, vescalagin, castlin, vescalin)



gallic acid



glucogallin



m-trigallic acid

### I.194

Active compounds of *Quercus cortex* – Oak bark

#### Uses

It is astringent in diarrhoea, antibacterial, haemostyptic, can be used as throat rinse, anthelmintic, antiphlogistic and to reduce cholesterol levels. Oak bark is traditionally used in bleeding of the uterus, fever, hemorrhoids, varicose veins, eczema and inflammation of the throat. The roasted nuts are known as coffee substitutes.



## ***Robinia pseudoacacia* L. – Black Locust, Robinia**

Fabaceae – Bean family



### **I.195**

*Robinia pseudoacacia* L. – Black Locust, Robinia

#### **Distribution, habitats**

This tree is native to North America, in the eastern and central parts of the USA. It is widespread in Eurasia, and its selected varieties are cultivated in many places. Black locust is able to bind loose sandy soils.

#### **Morphology**

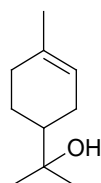
The tree grows to heights of 5 to 30 m. The leaflets of the odd pinnate leaves are ovate with entire margin and rounded apex. The white papilionaceous flowers are arranged in racemes, yielding copious amounts of nectar. Flowering occurs in May. The fruit is a pod.

#### **Drug**

*Robiniae pseudacaciae flos* – Robinia flower, *Robiniae pseudacaciae cortex* – Robinia bark, *Robiniae pseudacaciae folium* – Robinia leaf

#### **Phytochemistry**

the flowers contain flavonoids (robigenin, acaciin), essential oil (linalool, benzyl alcohol, terpineol) and robinin; the bark contains toxalbumins (robin and phasin); the leaves contain essential oil and flavonoids (acacetin, acaciin, apigenin)



$\alpha$ -terpineol

### **I.196**

Active compound of *Robiniae pseudoacaciae flos* – Robinia flower

### Uses

The flower is aromatic and used in perfume industry; its tea can be used in the treatment of reflux disease, by lowering gastric acid levels. The bark is used in homoeopathy; while the leaf is antibacterial, aromatic, emetic and insecticide.

***Rosa canina* L. – Dog rose, *Rosa pendulina* L. –  
Mountain rose**

Rosaceae – Rose family



**I.197**

*Rosa canina* L. – Dog rose

**Distribution, habitats**

*R. canina* is a shrub native to North Africa, the Caucasus, the Indian subcontinent and Europe. It frequently occurs in forest edges and shrubberies, with no specific requirements for plant associations. *R. pendulina* occurs in beech and slope forests and spirea shrubberies.

**Morphology**

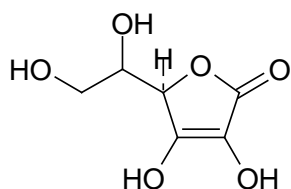
*R. canina* grows to a 1-4-m-tall shrub, while *R. pendulina* reaches 0.5 to 2 m. In *R. canina* the stems are covered with sharp, hooked prickles; in *R. pendulina* there are no prickles on the flowering shoots, but they may appear on the suckers. The leaves are odd pinnately compound with 5 to 7 (*R. canina*) or 7 to 11 leaflets (*R. pendulina*) that have serrate margin. The flowers are pinkish in *R. canina*, deep purple-red in *R. pendulina*, flowering lasts from May to June. In *R. pendulina* the peduncles are glandular-pubescent, the calyx is erect and persistent. The red false fruits (rose hips) can be collected from the end of August until the first frosts. The false fruit consists of hairy achene fruits (“rose seeds”) and the surrounding fleshy receptacle. In *R. pendulina* the orange-red pseudofruit is pendant and covered with glands.

**Drug**

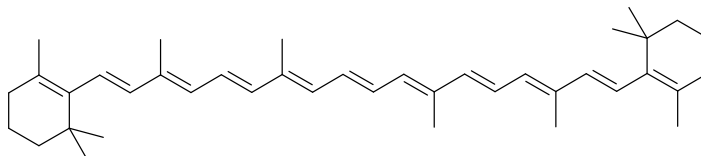
*Rosae pseudofructus* – Dog rose (Ph. Eur. 5.0), *Rosae semen* – Dog rose seed

**Phytochemistry**

carotenoids (lycopene,  $\beta$ -carotene), vitamins (B and C), flavonoids, pectin, malic acid, citric acid, sugars, tannins, anthocyanins, essential oil, in the achene fatty oil, tannins and polysaccharides as mucilage



ascorbic acid



$\beta$ -carotene

**I.198**

Active compounds of *Rosae pseudofructus* – Dog rose

**Uses**

Rose hip can be laxative (due to fruit acids) and anti-diarrhoeal (due to pectin and tannins). It is antioxidant, diuretic, vitamin supplement, and useful in digestive and urinary disorders as well as common cold. It is a common raw material for food industry (jams, syrups).



## ***Rosmarinus officinalis* L. – Rosemary**

Lamiaceae – Mint family



### **I.199**

*Rosmarinus officinalis* L. – Rosemary

#### **Distribution, habitats**

It is an evergreen semi-shrub native to the Mediterranean region and Western Asia.

#### **Morphology**

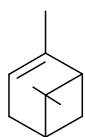
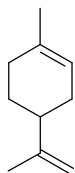
The shoot can grow up to 1 m tall. The bottom section of the stem becomes woody, which aids overwintering. The decussate leaves are slender lanceolate and leathery. The bilabiate flowers are pale pink or pale blue and bloom from May to June. The fruits are nutlets.

#### **Drug**

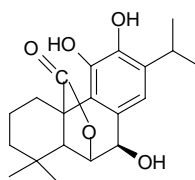
*Rosmarini folium* – Rosemary leaf (Ph. Eur. 5.0), *Rosmarini aetheroleum* – Rosemary oil (Ph. Eur. 5.0)

**Phytochemistry**

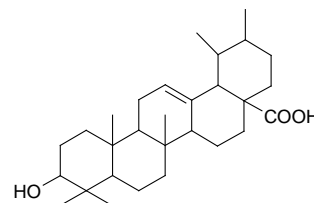
the leaves contain essential oil (borneol, cineol, camphor,  $\alpha$ -pinene, limonene, terpineol, caryophyllene), phenolic diterpene (carnosolic acid), tannins, rosmarinic acid, flavonoids (luteolin, diosmetin) and triterpenes


 $\alpha$ -pinene


limonene



rosmanol



ursolic acid

**I.200**

Active compounds of *Rosmarini folium* – Rosemary leaf

**Uses**

Rosemary is a spice, choleric, carminative, aromatic, spasmolytic, stomachic, useful against eczema and raw material for liqueur and perfume industries. In the 16<sup>th</sup> century rosemary was one of the components of *Aqua Reginae Hungariae*, together with lavender, lemon and lemon balm. This preparation was consumed, inhaled and rubbed in to relieve headache and gout, externally applied in the case of bruises. The sweetened form was drunk as a liqueur and applied as perfume.



***Salix alba* L. – White willow, *S. purpurea* L. – Purple willow, *S. fragilis* L. – Crack willow**

Salicaceae – Willow family



**I.201**

*Salix alba* L. – White willow

**Distribution, habitats**

These plants are native to Europe and Asia along rivers, streams and lakes as well as in gallery forests.

**Morphology**

They are 15-35-m-tall trees. The leaves are slender lanceolate with entire margin, covered with silky hairs on both sides, the lower surface is silver grey. Willows are dioecious, the male and female catkins appear on different individuals. At the base of both the staminate and the pistillate flowers a nectar-producing gland (scale) can be found. The insect-pollinated flowers appear from March to April. The fruit is a capsule.

**Drug**

*Salicis cortex* – Willow bark (Ph. Eur. 5.0), *Salicis folium* – Willow leaf



## ***Salvia officinalis* L. – Sage, Garden sage, Common sage**

Lamiaceae – Mint family



### **I.203**

*Salvia officinalis* L. – Sage, Garden sage, Common sage

#### **Distribution, habitats**

It is a semi-shrub native to South-eastern Europe. In Hungary, it is cultivated, often planted as ornamental plant.

#### **Morphology**

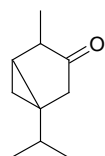
It can grow up to 50 cm tall. The bottom part of the shoot becomes woody. The decussate leaves are narrow, with conspicuous, protruding venation, particularly on the lower leaf surface. The violet, pinkish or white labiate flowers are arranged in racemes and bloom from June to July. The fruits are nutlets.

#### **Drug**

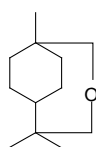
*Salviae officinalis folium* – Sage leaf (Ph. Eur. 5.0), *Salviae tinctura* – Sage tincture (Ph. Eur. 5.0), *Salviae officinalis aetheroleum* – Sage oil

#### **Phytochemistry**

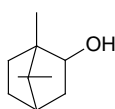
leaves contain essential oil (cineole, camphor, thujone, borneol), sesquiterpenes (caryophyllene), flavonoids, Labiatae tannins, triterpene saponins, diterpenes, and seeds contain fatty oil



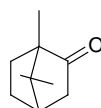
thujone



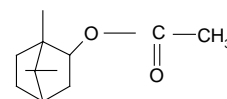
cineole



borneol



camphor



bornyl acetate

### **I.204**

Active compounds of *Salviae officinalis folium* – Sage leaf

### Uses

Sage is antibacterial, antiviral, fungistatic, antiphlogistic, antioxidant, astringent, used to relieve hot flushes and sweating during menopause, to treat stomatitis, haemorrhoids and diarrhoea and to rinse in gingivitis. It is traditionally used as diuretic, hemostyptic, appetizer, choleric and to relieve toothache. The tea is used as rinsing and anti-inflammatory agent.



## ***Salvia sclarea* L. – Clary, clary sage**

Lamiaceae – Mint family



### **I.205**

*Salvia sclarea* L. – Clary, clary sage

#### **Distribution, habitats**

It is a biennial or short-lived herbaceous perennial native to the Indian subcontinent, the Caucasus, as well as South and Central Europe, but it is often planted as an ornamental plant, too.

#### **Morphology**

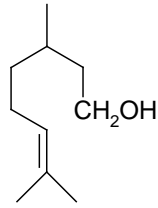
It can grow up to 1 m tall. The thick, square stems are densely covered with hairs. The decussate leaves are broad ovate, strongly ribbed and have a rounded (obtuse) apex. The upper leaf surface is covered with glandular hairs. The labiate flowers are pinkish on a white ground, and are arranged in spikes consisting of flower whorls. Whorls of 2 to 6 flowers are held in large colourful bracts. Flowering occurs from June to July. The fruit is a nutlet.

#### **Drug**

*Salviae sclareae aetheroleum* – Clary sage oil (Ph. Eur. 5.0), *Salviae sclareae herba* – Clary sage flowering shoot

#### **Phytochemistry**

essential oil (linalil acetate, linalool, geranyl acetate, sclareol, pinenes, phellandrene, limonene)



citronellol

**I.206**

Active compound of *Salviae sclareae herba* – Clary sage flowering shoot

**Uses**

Clary sage is a cytotoxic, antibacterial and antifungal drug, used for rinsing the mouth and throat. It is traditionally used as a diuretic and digestive agent, to treat digestive and urinary disorders, cough and wounds. The essential oil is important for cosmetics, previously it was used as muscatel flavouring in wines and liqueurs. The fatty oil is used in the production of ceramics and chinaware. The infusion of the flower and the leaf can relieve tired eyes. Aromatherapy recommends clary for nervous fatigue, exhaustion, asthma, digestive and menstrual problems.



## ***Sambucus nigra* L. – Black elder, European elder**

Caprifoliaceae – Honeysuckle family



### **I.207**

*Sambucus nigra* L. – Black elder, European elder

#### **Distribution, habitats**

It is native to Europe, Western Asia, the Mediterranean region and the Caucasus. This deciduous shrub or small tree frequently occurs in woods and shrubberies.

#### **Morphology**

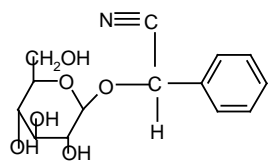
It can grow up to 2-3 (4-6) m tall. The leaves are arranged in opposite pairs, each leaf being odd pinnately compound, composed of 5-7 ovate and serrate leaflets. The white flowers are arranged in a pseudo-umbel (corymb) and bloom from May to June. The petals are 5-6 mm in diameter, the anthers are yellow. The fruit is a dark purple to black berry.

#### **Drug**

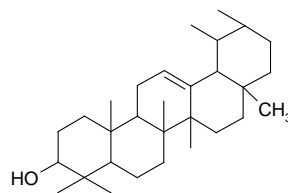
*Sambuci flos* – Elder flower (Ph. Eur. 7.0), *Sambuci fructus* – Elder fruit, *Sambuci folium* – Elder leaf, *Sambuci cortex* – Elder bark, *Sambuci radix* – Elder root

#### **Phytochemistry**

flavonoids (hyperoside, rutin, kaempferol, astragalin, quercetin), triterpenes, sterols, phenol-carboxylic acids (caffeic acid, ferulic acid), essential oil, mucilage and potassium salts



sambunigrin



$\alpha$ -amyrin

### I.208

Active compounds of *Sambuci flos* – Elder flower

#### Uses

Elder flower is diaphoretic and antiphlogistic in fever and common cold, antioxidant, diuretic and can increase the bronchial secretions. The jam made from the berries is laxative. It was traditionally used for the treatment of gout.

## ***Satureja hortensis* L. – Summer savory**

Lamiaceae – Mint family

### Distribution, habitats

It is an annual herbaceous plant native to the Mediterranean region. It is cultivated in many places as spice.

### Morphology

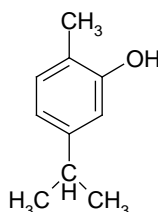
The stem is 20-30 cm tall. The leaves are decussate, slender lanceolate and 3 to 4 cm long with an entire margin. The small white to purple, labiate flowers can be found in the leaf axils and bloom in June. The fruit is a nutlet.

### Drug

*Saturejae herba* – Savory flowering shoot, *Saturejae aetheroleum* – Savory oil

### Phytochemistry

essential oil (carvacrol, linalool, thymol), tannins, saponins and sitosterol



carvacrol

### **I.209**

Active compound of *Saturejae herba* – Savory flowering shoot

### Uses

Savory is a spice, has antidiarrhoeal, carminative, stomachic, digestive, emmenagogue, hypertensive and diaphoretic effects and is useful in diseases of the gallbladder, liver and kidney.

## ***Silybum marianum* (L.) Gärtn. – Milk thistle**

Asteraceae – Sunflower family



### **I.210**

*Silybum marianum* (L.) Gärtn. – Milk thistle

#### **Distribution, habitats**

It is an overwintering herbaceous plant native to the Mediterranean region and Asia Minor.

#### **Morphology**

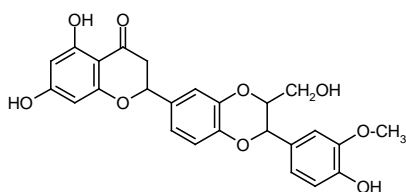
The height of this plant is in the range of 30 to 200 cm. The leaves are rigid, with a marble-like pattern, which is the result of white veins and spots. The leaf shape is oblong to lanceolate, either lobate or pinnate, with spiny edges and a prickly tip. The red to purple tubular (disc) florets form heads (capitula), which are 4 to 12 cm long and wide. The bracts subtending the capitulum are hairless, with triangular, spine-edged appendages. Blooming occurs from June to July. The achenes (cypsela) bear a white pappus.

#### **Drug**

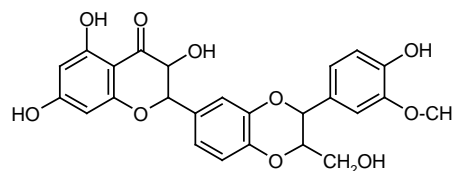
*Silybi mariani fructus* – Milk-thistle fruit (Ph. Eur. 5.0)

#### **Phytochemistry**

flavonolignans (silymarin: silybin = silibinin, silicristin, silidianin), fatty oil, protein, flavonoids, sterols, poliins, bitter substances and resin



siliandrin



silybin

### **I.211**

Active compound of *Silybi mariani fructus* – Milk-thistle fruit

### Uses

Milk-thistle fruit is antioxidant, used to treat jaundice, liver diseases like hepatitis, but it is also useful against biliary problems as a cholagogue. It is traditionally used as galactagogue and against amenorrhoea. Silibinin is used in the treatment of poisoning with  $\alpha$ -amanitin and phalloidin (toxic compounds of death cap, *Amanita phalloides*, a mushroom species causing fatal poisoning). It is also used in homoeopathy.

## ***Sinapis alba* L. – White mustard**

Brassicaceae – Mustard family



### **I.212**

*Sinapis alba* L. – White mustard

#### Distribution, habitats

It is an annual herbaceous plant native to Eurasia and the Mediterranean region. It is cultivated in many countries.

#### Morphology

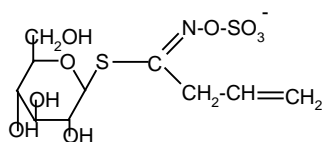
The shoot is 20 to 80 cm tall, the leaves are pinnately unevenly divided. The tetramerous, yellow flowers form long racemes and bloom from June to July. The silique is 2.5 to 4.5 cm long, cylindrical, hairy or hairless. The round seeds are yellow and 1 to 1.5 mm in diameter.

#### Drug

*Sinapis albae semen* – White mustard seed, *Sinapis oleum* – Mustard oil

#### Phytochemistry

sinigrin, hydroxy-benzyl-thiocyanate, glucosinolate sinalbin



sinigrin



(alkyl)isothiocyanate

### **I.213**

Active compounds of *Sinapis albae semen*, *S. nigrae semen* – White mustard seed,  
Black mustard seed

#### Uses

Mustard seed can be used in dyspepsia and influenza, externally as compress for joint pains, the powdered seeds as liniment against rheumatism.



## ***Solanum tuberosum* L. – Potato**

Solanaceae – Nightshade family



### **I.214**

*Solanum tuberosum* L. – Potato

#### **Distribution, habitats**

This herbaceous perennial plant is native to South and Central America, but its varieties are widely cultivated in many places.

#### **Morphology**

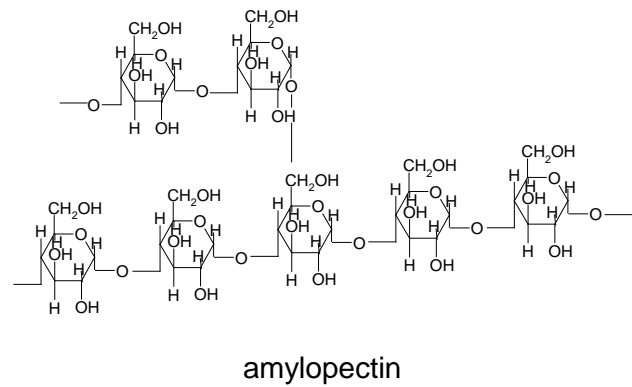
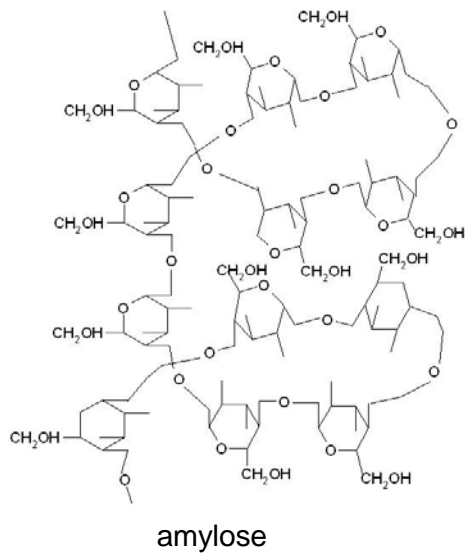
It is a 30 to 80 cm tall cultivated plant. The edible part is the below-ground tuber, which is a modified stem. The leaves are odd pinnately compound, the leaflets are ovate and have an entire margin. The white or pale purple, 2 to 4 cm long, 5-merous flowers bloom from July to September. The fruit is a light green berry.

#### **Drug**

*Solani amyllum* – Potato starch (Ph. Eur. 5.0)

#### **Phytochemistry**

starch



### I.215

#### Active compounds of *Solani amyllum* – Potato starch

#### Uses

Potato starch is important for the food and pharmaceutical industries. Potato was traditionally used as antipyretic, placing raw potato on the sole or the palm, and as anti-inflammatory compress in frostbite.

***Solidago canadensis* L. – Canada goldenrod, *S. gigantea* Ait. – Giant goldenrod**

Asteraceae – Sunflower family



**I.216**

*Solidago canadensis* L. – Canada goldenrod



**I.217**

*Solidago gigantea* Ait. – Giant goldenrod

Distribution, habitats

They are perennial herbaceous plants, native to North America.

### Morphology

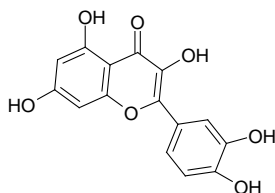
They can grow up to 1-2 m tall. The leaves are slender lanceolate. The yellow ligulate (ray) and tubular (disc) florets form a capitulum which is 6 to 8 mm in diameter. In *S. gigantea* the ligulate florets are slightly longer than the tubular florets. In *S. canadensis* the ligulate florets are not longer than the tubular florets. Capitulum inflorescences form a compound raceme. Flowering occurs from July to September. The fruit is a cypsela (achene).

### Drug

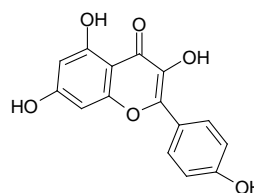
*Solidaginis herba* – Goldenrod (Ph. Eur. 5.0)

### Phytochemistry

flavonoids (mainly quercetin, kaempferol, isorhamnetin and rhamnetin glycosides), triterpene saponins, labdane-type diterpenes, essential oil (mono- and sesquiterpenes), phenol-carboxylic acids, tannins and fructans



quercetin



kaempferol

### I.218

Active compounds of *Solidaginis herba* – Goldenrod

### Uses

It is antiphlogistic, diuretic, spasmolytic, antibacterial, antimutagenic, antioxidant and astringent. It is useful against nephritis and cystitis. The saponin-free extracts can reduce high blood pressure and fructans have antitumor activity. The extract of the flower is repellent and toxic for insects. *S. canadensis* is mucolytic, anti-inflammatory, sedative, and used to reduce cholesterol levels, to treat cough, asthma, kidney and bladder problems like kidney stones and as compress for wounds and chronic dermatitis. It was traditionally used internally against gout and rheumatism and externally as gargle to treat inflammations of the mouth and throat.



## ***Solidago virgaurea* L. – European goldenrod**

Asteraceae – Sunflower family

### Distribution, habitats

This is a perennial plant native to North Africa, Europe and moderate climate regions of Asia.

### Morphology

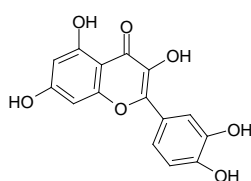
The rhizome is slanting, the stem is 50 to 100 cm tall, usually without branching. The lower leaves are obovate to oblanceolate and serrate, the upper ones are narrower, usually with entire or slightly serrated margin. The capitulum inflorescences comprise yellow ligulate (ray) and tubular (disc) florets. These capitulum inflorescences form a compound raceme. Ligulate florets are significantly longer (5 to 7 mm long) than tubular florets. The flowering period lasts from July to October. The fruit is a cypsela (achene).

### Drug

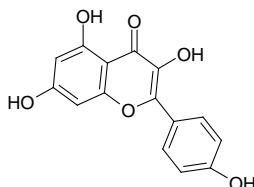
*Solidaginis virgaureae herba* – Goldenrod, European (Ph. Eur. 5.0)

### Phytochemistry

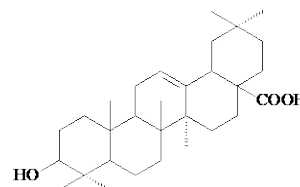
flavonoids (especially rutin, quercetin, isoquercetin, hyperoside, astragalin), catechin tannins, essential oil, triterpene saponins (polygalic acid), anthocyanidins, sesquiterpene lactones, diterpenes, phenolic glycosides, phenol-carboxylic acids and acidic polysaccharide



quercetin



kaempferol



oleanolic acid

### I.219

Active compounds of *Solidaginis virgaureae herba* – Goldenrod, European

### Uses

It is diuretic, antiphlogistic, spasmolytic and antioxidant, traditionally used to treat wounds, common cold, diarrhoea, urinary problems (e.g. kidney stone) and fever. It is also used as raw material in homoeopathy.

## ***Sophora japonica* L. – Japanese pagoda tree, Chinese scholar tree**

Fabaceae – Bean family

### Distribution, habitats

The tree is native to China and Japan, but it is also planted as an ornamental tree in many areas of Europe.

### Morphology

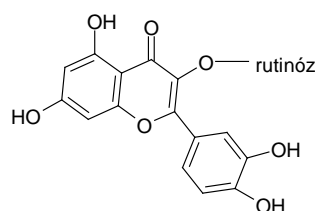
The leaves are alternate, odd pinnately compound, composed of 9 to 21 leaflets, which are ovate with entire margin. The greenish-white, papilionaceous flowers are arranged in compound racemes. The fleshy fruit is a loment, i.e. a modified legume (pod) with a constriction between each seed.

### Drug

*Sophorae flos* – Pagoda tree flower, *Sophorae semen* – Pagoda tree seed

### Phytochemistry

the bud contains rutin, the seeds contain quinolizidine alkaloids



rutin

### **I.220**

Active compound of *Sophorae flos* – Pagoda tree flower

### Uses

Rutin is processed by the pharmaceutical industry and homoeopathy.



## ***Symphytum officinale* L. – Comfrey**

Boraginaceae – Borage or Forget-me-not family



### **I.221**

*Symphytum officinale* L. – Comfrey

#### **Distribution, habitats**

This is a perennial plant native to Europe and moderate climate regions of Asia, growing in damp, grassy places.

#### **Morphology**

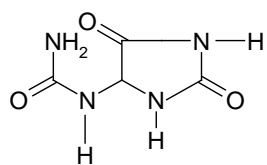
The taproot is black. The shoot is 50 to 60 cm tall, the stem and the leaves are densely covered with rigid hairs (Boraginaceae-type bristles or setae). The leaves are broad, 15 to 20 cm long, with entire margin. The lower leaves are petiolated, while the upper ones are sessile, tapering into the stem. The purple or cream-coloured, bell-shaped flowers are arranged in a cincinnus and bloom from May to July. The fruits are nutlets.

#### **Drug**

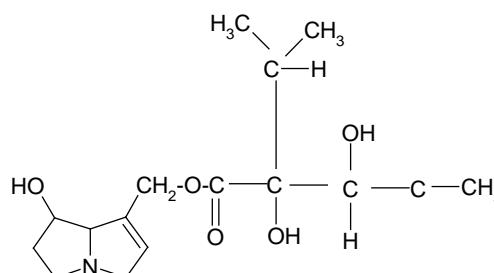
*Symphyti radix* – Symphytum root, Comfrey root; *Symphyti folium* – Comfrey leaf, *Symphyti herba* – Comfrey flowering shoot

#### **Phytochemistry**

allantoin, pyrrolizidine alkaloids (symphytine, echimidine, lycopsamine), tannins, saponins, triterpenes, sterols, phenol-carboxylic acids and salicylic acid



allantoin



intermedine

**I.222**

Active compounds of *Symphyti radix* – Comfrey root

**Uses**

It used to be applied internally in intestinal catarrhs and externally as wash in ulcus cruris and thrombophlebitis. This drug can be used only with restrictions, and internal use is discouraged, due to its pyrrolyzidine alkaloid content. It is raw material for homoeopathy as well.

## ***Syzygium aromaticum* (L.) Merr. et Perry (syn. *Eugenia caryophyllata* Thunb.) – Clove tree**

Myrtaceae – Myrtle family

### Distribution, habitats

It is an evergreen tree native to Malaysia and cultivated in tropical regions (e.g. the Philippines, Madagascar, Sri Lanka, Indonesia).

### Morphology

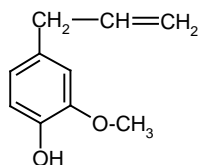
The tree grows to a height ranging from 8 to 20 m. The leaves are ovate, dark green and waxy with an entire margin and acute apex. The flowers are borne in terminal clusters. The initially green floral buds gradually turn red, when they are ready for collecting. These buds consist of a long receptacle bearing four spreading sepals, and four unopened petals which form a ball-shaped centre. The flowering period varies between areas of distribution: from February to May, from May to September, or from September to January. The fruit is olive-shaped and 1-seeded.

### Drug

*Caryophylli flos* – Clove (Ph. Eur. 5.0), *Caryophylli floris aetheroleum* – Clove oil (Ph. Eur. 5.0)

### Phytochemistry

essential oil (eugenol, eugenyl acetate,  $\alpha$ - and  $\beta$ -caryophyllene), flavonoids, tannins, sterols, phenol-carboxylic acids and triterpenes



eugenol

### **I.223**

Active compound of *Caryophylli flos* – Clove

### Uses

Clove is antibacterial, antifungal, antiphlogistic, spasmolytic, sedative, analgesic, repellent and useful in musculoskeletal complaints. It is traditionally used in fever, dyspepsia and bleeding gums. It is a spice and has aromatic, carminative and stomachic properties.

## ***Tanacetum parthenium* (L.) Sch. Bip. – Feverfew**

Asteraceae – Sunflower family



**I.224**

*Tanacetum parthenium* (L.) Sch. Bip. – Feverfew

### Distribution, habitats

It is a perennial herbaceous plant native to Asia Minor and the Caucasus. The plant frequently occurs in roadside weed associations, but has been long cultivated as an ornamental and traditional medicinal plant.

### Morphology

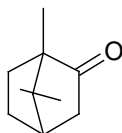
Feverfew can grow to 30-60 cm tall. The leaves are pinnately or bipinnately segmented, with crenate margin, the lower (abaxial) surface is somewhat hairy. Each capitulum holds white ligulate (ray) and yellow tubular (disc) florets. Flowering occurs from June to November. The fruit is a cypsela (achene). The plant has a characteristic, strong odour.

### Drug

*Tanacetii parthenii herba* – Feverfew (Ph. Eur. 5.0), *Tanacetii parthenii folium* – Feverfew leaf

### Phytochemistry

sesquiterpene lactone (parthenolide), flavonoid glycosides, essential oil (camphor, pinene) and pyrethrins



camphor

**I.225**

Active compound of *Tanacetum parthenium* herba – Feverfew

**Uses**

It can reduce the production of leukotrienes, thromboxanes, and prostaglandins and inhibits the contraction of blood vessels, consequently it can relieve migraine. It is also antibacterial. It can reduce the aggregation of platelets and histamine release. Use of feverfew can lead to side effects like diarrhoea, bloating, nausea or thrush. Sesquiterpene lactones can cause allergy, which is rare in the case of oral administration, but feverfew is not recommended to people who are allergic to plants belonging to the Asteraceae family. It is contraindicated in women who are pregnant or breast-feeding. It is traditionally used to reduce fever and alleviate headache, as antiphlogistic, analgesic, and to treat hysteria, menstrual problems and insect bites. In the Middle Ages the infusion of feverfew was used as antipyretic in malaria. In Italy, it is a popular spice and digestive agent.



## ***Taraxacum officinale* Weber ex Wiggers – Dandelion**

Asteraceae – Sunflower family



**I.226**

*Taraxacum officinale* Weber ex Wiggers – Dandelion

### Distribution, habitats

It is a perennial herbaceous plant native to temperate climate regions of Eurasia, growing in lawns, on roadsides and areas with moist soil.

### Morphology

The plant grows from generally unbranched taproots. The shoot is 30 to 40 cm tall. The strongly divided, runcinate leaves are basal and form a rosette. Each flowering stem (scape) bears a single flower head. The capitulum consists of yellow, bisexual ligulate florets. The fruit is a cypsela (achene) bearing a pappus. The plant produces white, milky latex.

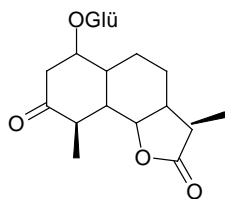
### Drug

*Taraxaci radix* – Dandelion root, *Taraxaci folium* – Dandelion leaf

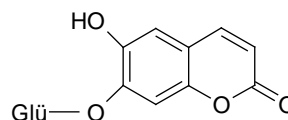
### Phytochemistry

sesquiterpenes, triterpene taraxasterol, sterols, carotenoids, flavonoids (apigenin, quercetin and luteolin glycosides), phenol-carboxylic acids (caffeic acid, ferulic acid, cichoriic acid, chlorogenic acid), coumarins (scopoletin, umbelliferone, cichoriin), heteropolysaccharides as mucilage and inulin





taraxacolid-β-D-glucoside



taraxasterol

### I.227

Active compounds of *Taraxaci radix*, *T. herba* – Dandelion root, Dandelion herb

#### Uses

Dandelion is diuretic, amarum, choleric and useful against dyspepsia. It is traditionally used as laxative, against gout, rheumatism and eczema. The leaves are consumed as salad, the flowers are used to make syrups which are cough suppressants.

## ***Thymus serpyllum* L. – Wild thyme**

Lamiaceae – Mint family



**I.228**

*Thymus serpyllum* L. – Wild thyme

### **Distribution, habitats**

It is an overwintering semi-shrub native to Europe, North Africa and Siberia.

### **Morphology**

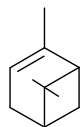
Thyme can grow to 10-20 cm tall. The shoots are prostrate close to the ground. The decussate narrow leaves have entire margin and rounded (obtuse) apex. The pale violet labiate flowers bloom from May to August. The fruits are nutlets.

### **Drug**

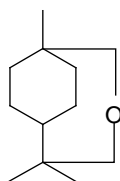
*Serpylli herba* – Wild thyme (Ph. Eur. 5.0), *Serpylli aetheroleum* – Wild thyme oil

### Phytochemistry

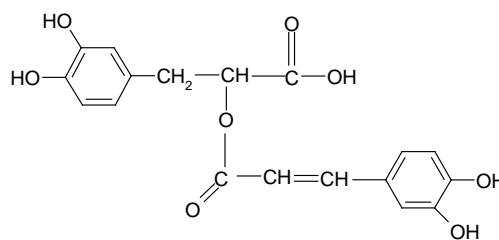
essential oil (thymol, pinene, linalool) flavonoids, Labiatae tannins and phenol-carboxylic acids



$\alpha$ -pinene



cineole



rosmarinic acid

### I.229

Active compounds of *Serpylli herba* – Wild thyme

### Uses

Wild thyme is expectorant, carminative, aromatic, stomachic as well as useful against rheumatism, kidney and bladder problems. It is a spice, raw material for perfume industry and homoeopathy.

***Thymus vulgaris* L. – Common thyme, *T. zygis* Loefl. ex L. – Spanish thyme**

Lamiaceae – Mint family



**I.230**

*Thymus vulgaris* L. – Common thyme

**Distribution, habitats**

They are perennial semi-shrubs. Common thyme is native to South Europe and North Africa, Spanish thyme is native to Spain and Portugal.

**Morphology**

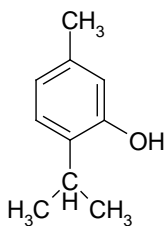
They are 20-40 cm tall. The decussate leaves are small and lanceolate to oval, with an entire margin. In common thyme the leaves are greenish grey, reflexed at the margins. Spanish thyme has cylindrical, succulent leaves. The white to pale purple labiate flowers terminate the branches in whorls. Both the calyx and the corolla are divided into two lips. Flowering occurs from May to August. The fruits are nutlets.

**Drug**

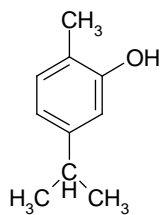
*Thymi herba* – Thyme (Ph. Eur. 5.0), *Thymi aetheroleum* – Thyme oil (Ph. Eur. 5.0)

### Phytochemistry

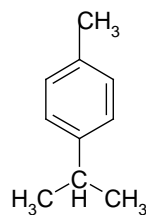
essential oil (thymol, p-cimol, linalool, carvacrol, terpinen-4-ol,  $\gamma$ -terpinene,  $\beta$ -mircen), Labiatae tannins, resin, triterpenes, saponins and flavonoids



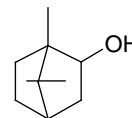
thymol



carvacrol



p-cimol



borneol

### I.231

Active compounds of *Thymi herba* – Thyme

### Uses

Thyme can be used against common cold and rheumatism, for inhalation, rinse, as expectorant, spasmolytic, carminative, roborant, antibacterial, diuretic, anthelmintic, in baths relaxing. It is a spice and raw material for perfume and liqueur industries as well as homoeopathy.



***Tilia cordata* Mill. – Small-leaved linden/lime;**  
***T. platyphyllos* Scop. – Large-leaved linden/lime;**  
***T. x vulgaris* Heyne [syn. *T. x europaea*] – Common lime, European lime (= *T. cordata* x *T. platyphyllos*)**

Tiliaceae – Basswood or linden family



I.232

*Tilia cordata* Mill. – Small-leaved linden/lime

#### Distribution, habitats

They are trees native to Europe. Small-leaved and large-leaved linden occur in gallery forests, common lime is a popular ornamental.

#### Morphology

They are 20 to 30 (40) m tall. The leaves are alternate, simple and cordate with serrate margin. In small-leaved linden the leaves are mostly hairless, except for small tufts of brown hair in the leaf vein axils. In large-leaved linden white hairs occur on the lower side of the leaf, particularly along the veins and in the leaf vein axils. Silver lime (*T. tomentosa* Moench) is not included in pharmacopoeias as a drug source, due to its densely tomentose surfaces, which may cause allergy. The yellow bisexual flowers are borne in clusters of 3 to 4 and 5 to 11 in large-leaved and small leaved linden, respectively, with a leaf-like yellowish green subtending bract. The flowers have a sweet scent and produce large volumes of nectar. The flowering period is in June. The



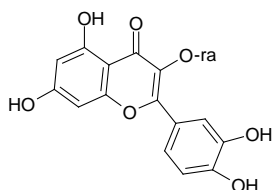
fruit is a nut; its dispersal is aided by the bract attached to the fruits. In small-leaved linden the fruits are smooth, in large-leaved linden they are ribbed.

## Drug

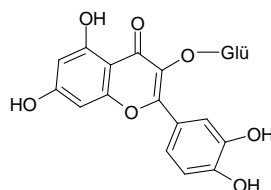
*Tiliae flos* – Lime flower (Ph. Eur. 5.0)

## Phytochemistry

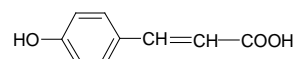
flavonoids (hyperoside, astragalin, isoquercitrin, quercitrin, tiliroside), tannins, proanthocyanidins, leucoanthocyanidins, essential oil (aldehydes, monoterpenes), mucilage and cyanogenic glycosides



quercitrin



isoquercitrin



p-coumaric acid

### I.233

Active compounds of *Tiliae flos* – Lime flower

## Uses

Lime is diaphoretic, diuretic, a cough suppressant, sedative, analgesic, anti-inflammatory, reduces oedema and increases the production of bile. It can be used against rheumatism, as well as for rinsing the mouth and throat. It is also important for perfume industry. A valuable monofloral honey is produced by bees from the floral nectar.

***Trigonella foenum-graecum* L. – Fenugreek**

Fabaceae – Bean family



**I.234**

*Trigonella foenum-graecum* L. – Fenugreek

**Distribution, habitats**

It is an annual herbaceous plant native to Eastern Europe, the Caucasus and Central Asia and cultivated in many places.

**Morphology**

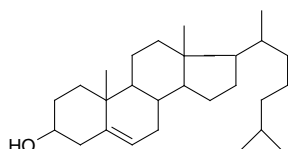
The shoot is 10 to 50 cm tall. The leaves are alternate, petiolate and compound with 3 leaflets, which are 2 to 5 cm long, broadening in the upper third, with toothed margin at the apex. The middle leaflet is larger than the other two. The white to yellow papilionaceous flowers appear in the leaf axils. Flowering occurs from April to July. The fruit is a long, somewhat curved, many-seeded legume (pod); the yellow to amber seeds are cube-shaped and verrucose.

## Drug

*Trigonellae founugraeci semen* – Fenugreek (Ph. Eur. 5.0)

## Phytochemistry

heteropolysaccharides as mucilage (mannogalactan), protein, amino acid (4-hydroxyisoleucine), coumarins, fatty oil, flavones, steroidal saponins (diosgenin, yamogenin), chromium, selenium, fatty oil, sterols (cholesterol, sitosterol), vitamin C, nicotinic acid, choline and essential oil



cholesterol

### I.235

Active compound of *Trigonellae foenugraeci semen* – Fenugreek

## Uses

Fenugreek can be used to reduce cholesterol and blood sugar levels and to increase the production of bile. It is also applied as appetizer, carminative, galactagogue and antiphlogistic in respiratory catarrhs (as gargle). The seeds are used externally as compress for abscesses, wounds, ulcers, eczema, furuncles and rashes. The ground seeds have coumarin-like odor, which explains use as spice, tobacco fragrance and insecticide. It is also used in homoeopathy. Use of fenugreek can lead to side effects like diarrhoea, feeling of fullness or nausea. It can increase the effects of anti-diabetic drugs and reduce the absorption of drugs taken at the same time. It is contraindicated during pregnancy due to its oxytocin-like effects. It is traditionally used to treat peptic ulcer in China, diabetes in Morocco and spasms, abscesses, dysentery, malaria and kidney diseases in Africa.

## ***Tussilago farfara* L. – Coltsfoot**

Asteraceae – Sunflower family



**I.236**

*Tussilago farfara* L. – Coltsfoot

### Distribution, habitats

This is a perennial herbaceous plant native to North Africa, Europe and temperate climate regions of Asia. It occurs in disturbed places, forest edges and loess walls.

### Morphology

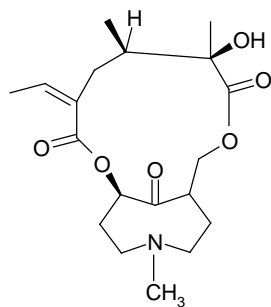
The plant can spread with rhizomes or seeds. Vegetative reproduction by rhizomes leads to the emergence of coltsfoot colonies. The flowering shoot is 15 to 20 cm tall. The flower heads (capitula) appear from March to April, before the emergence of the leaves. The capitulum consists of yellow florets, comprising thread-like ligulate (ray) florets and tubular (disc) florets. The leaves, resembling a colt's foot (→ vernacular name: coltsfoot), usually do not appear before seed set. They are kidney-shaped, lobed and the abaxial surface is whitish, because it is densely covered by trichomes. Fruits are cypsela with pappus.

### Drug

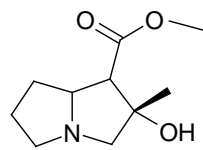
*Farfarae folium* – Coltsfoot leaf, *Farfarae flos* – Coltsfoot flower, *Farfarae radix* – Coltsfoot root

### Phytochemistry

heteropolysaccharides as mucilage, inulin, tannins, triterpenes, pyrrolizidine alkaloids and sterols



senkirkine



tussilagin

### I.237

Active compounds of *Farfarae folium* – Coltsfoot leaf

#### Uses

It can be useful in upper respiratory disorders, dry cough and chronic bronchitis. Because of the alkaloids it is not recommended for long-term internal use. The leaf is used in homoeopathy.



***Urtica dioica* L. – Stinging nettle, *U. urens* L. – Annual nettle, dwarf nettle or small nettle**

Urticaceae – Nettle family



**I.238**

*Urtica dioica* L. – Stinging nettle

**Distribution, habitats**

They are cosmopolitan perennial herbaceous species and can be found in weed associations and forest edges.

**Morphology**

Stinging nettle can grow up to 1 m tall, but dwarf nettle is only 10 to 15 cm tall. The decussate leaves are ovate with serrate margin and acuminate apex, the surface of the leaves and the stem is densely covered by stinging hairs. The small, greenish flowers are arranged in spike-like structures at the leaf axils and bloom from May to autumn. The fruits are nutlets.

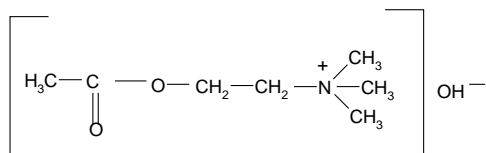
**Drug**

*Urticae folium* – Stinging nettle leaf, *Urticae radix* – Stinging nettle root, *Urticae fructus* – Stinging nettle fruit, *Urtica dioica ad praeparationes homoeopathicas* – Stinging nettle for homoeopathic preparations (Ph. Eur. 6.0)

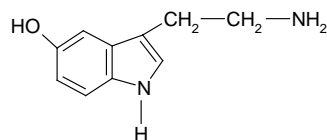
**Phytochemistry**

The aboveground plant parts contain scopoletin, sterols, chlorophyll, flavonols, flavonoids, lectin-like molecules, vitamins (B and C), potassium salts; the glandular trichomes (stinging hairs) contain histamine, formic acid, serotonin, acetylcholine; the root contains fatty acids, lignans, sterols, polysaccharides, coumarin, tannins; the mature fruit contains fatty oil, polysaccharides in the form of mucilage and coumarins





acetylcholine



serotonin

### I.239

Active compounds of *Urticae folium*, *U. radix* – Stinging nettle leaf, root

#### Uses

The leaf is diuretic, antiphlogistic, aquaretic, anti-inflammatory, immunostimulant, used against rheumatism and can increase the metabolism. The root is diuretic and used to treat mild and moderate benign prostatic hyperplasia (BPH). Gastrointestinal problems may occur as side effects. Nettle is traditionally used in diabetes, gastrointestinal and respiratory disorders. Nettle extract can be used as a natural plant-protecting agent against insect pests and pathogenic fungi. The fibers can be used in textile industry; the shoots are sources of food and fodder; for industrial extraction of chlorophyll.

## ***Valeriana officinalis* L. – Valerian**

Valerianaceae – Valerian family



### **I.240**

*Valeriana officinalis* L. – Valerian

#### **Distribution, habitats**

It is a perennial herbaceous plant native to Europe and temperate climate zones of Asia. It frequently occurs on wet meadows, along ditches and hayfields.

#### **Morphology**

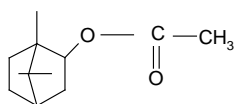
The well-developed rhizome along with its roots has a strong, unpleasant smell. The shoot can grow up to 1.5 m tall. The decussate leaves are odd pinnately compound with 5 to 15 leaflets, which are narrow with serrate margin. The bisexual, whitish or pink flowers appear in cymes from May to July. The flower's symmetry is slightly zygomorphic. The 3 stamens have fused with the 5-lobed corolla tube. The fruit is a cypsela (achene) bearing a pappus.

#### **Drug**

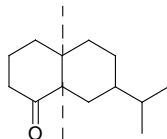
*Valerianae radix* – Valerian root (Ph. Eur. 5.0)

#### **Phytochemistry**

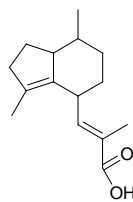
essential oil, valepotriates (e.g. valtrate, isovaltrate, didrovaltrate, their metabolite is isovalerianic acid which is responsible for the unpleasant smell), baldrinal, lignans, flavonoids, glutamine, GABA and alkaloids (valerianin, valerin)



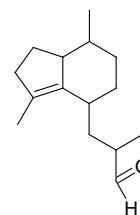
bornyl acetate



valeranone



valerenic acid



valeranal

### I.241

#### Active compounds of *Valerianae radix* – Valerian root

#### Uses

Valerian root is used as a sedative, spasmolytic and tranquilizer drug. It was traditionally used against epileptic seizures, inflammations and common cold. It is also important in homoeopathy.

***Verbascum thapsus* L. – Great/common mullein,  
*V. densiflorum* Bertol. – Dense-flowered mullein,  
*V. phlomoides* L. – Orange mullein**

Scrophulariaceae – Figwort family



**I.242**

*Verbascum densiflorum* Bertol. – Dense-flowered mullein

**Distribution, habitats**

They are biennial herbaceous plants native to Europe and temperate climate zones of Asia. *V. thapsus* lives in dry grasslands, the other two species live mainly in weed associations.

**Morphology**

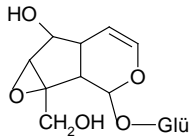
The height of the shoot is in the range of 1 to 1.5 m. The plant produces a leaf rosette in its first year of growth. In the second year the plant typically produces a single stem, which will later hold the spike-like inflorescence. The base leaves are large, oval, densely covered with trichomes, similarly to the stem. On flowering plants the leaves are arranged alternately, their shape varies from oblong to oblanceolate. The terminal spikes that appear in the second year consist of bisexual, 5-merous yellow flowers. The flowering period lasts from June to October. The fruit is a many-seeded capsule.

**Drug**

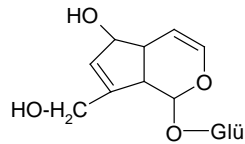
*Verbasci flos* – Mullein flower (Ph. Eur. 5.0)

**Phytochemistry**

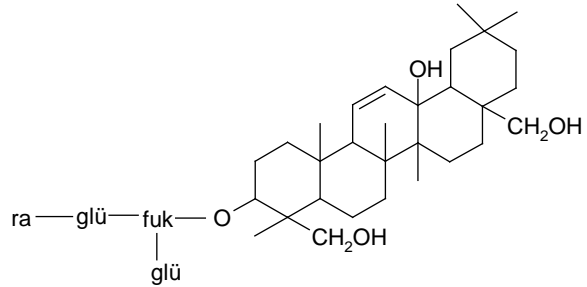
mucilage, iridoids (aucubin), triterpene saponins, caffeic acid derivatives, invert sugar, essential oil, fat, carotenoids (crocetin) and flavonoids (rutin, hesperidin)



catalpol



aucubin



verbascosaponin

**I.243**

Active compounds of *Verbasci flos* – Mullein flower

**Uses**

Mullein is antitussive, expectorant and antiphlogistic (due to iridoids) and traditionally used internally in gastrointestinal and urinary disorders, externally for treatment of skin disorders and wounds. It is also used in homoeopathy.

## ***Veronica officinalis* L. – Heath speedwell, common speedwell, common gypsyweed**

Scrophulariaceae – Figwort family

### Distribution, habitats

It is native to Europe, Western Asia and the Caucasus. It is an overwintering herbaceous plant. It frequently occurs in the underwood of acidophilous oak woods, as well as along roads and ditches.

### Morphology

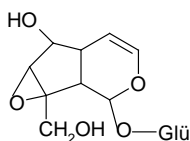
The plant's height is in the range of 5 to 15 cm, the prostrate stem reaches lengths of 15 to 40 cm. The stem and the leaves are silvery green, due to the presence of hairs. The leaves are ovate and finely serrated. The short vertical shoots bear pale violet or purple flowers that bloom from June to July. The corolla consists of 4 petals, the androecium is reduced to 2 stamens. The fruit is a capsule.

### Drug

*Veronicae herba* – Veronica flowering shoot

### Phytochemistry

iridoid glycosides (catalpol, veronicoside), phenol-carboxylic acids, flavonoids (luteolin glycosides), triterpenes and sitosterol



catalpol

### **I.244**

Active compound of *Veronicae herba* – Veronica flowering shoot

### Uses

It is traditionally used as expectorant (in bronchitis and asthma), against gout and rheumatism. It is also used in homoeopathy.



## ***Vinca minor* L. – Lesser periwinkle, dwarf periwinkle**

Apocynaceae – Dogbane family



**I.245**

*Vinca minor* L. – Lesser periwinkle, dwarf periwinkle

### **Distribution, habitats**

It is native to Central and Eastern Europe, the Caucasus and Asia Minor. It is an overwintering evergreen herbaceous plant, frequently occurring in hornbeam-oak forests, on meadows and other grasslands.

### **Morphology**

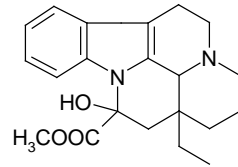
The plant is spreading along the ground and rooting along the stem, thus forming colonies. Its height can reach 10 to 30 cm and the creeping stem can be up to 50 cm long. The evergreen, glabrous (hairless), glossy dark green, waxy, oval leaves are opposite, with entire margin, acute apex and a leathery texture. The flowers are solitary in the leaf axils, 2 to 3 cm in diameter, with a five-lobed violet or light blue corolla, the petals bearing a white spot at their base. The flowering period lasts from April to May. The fruit is a double follicle, containing numerous seeds.

### **Drug**

*Vincae minoris herba* – Periwinkle flowering shoot

### **Phytochemistry**

indole alkaloids (vincamine), phenol-carboxylic acids, flavonoids, tannins, sitosterol and ursolic acid



vincamine

**I.246**

Active compound of *Vincae minoris herba* – Periwinkle flowering shoot

**Uses**

It is antihypertensive, sedative, used against migraine and tachycardia. It is traditionally used as hemostyptic, amarum, diuretic and tonic as well as against tumours and menorrhagia. It is also used in homoeopathy.

## ***Viscum album* L. – Mistletoe**

Loranthaceae – Mistletoe family



**I.247**

*Viscum album* L. – Mistletoe

### **Distribution, habitats**

It is an evergreen perennial taxon native to the southern areas of Eurasia and the Mediterranean region.

### **Morphology**

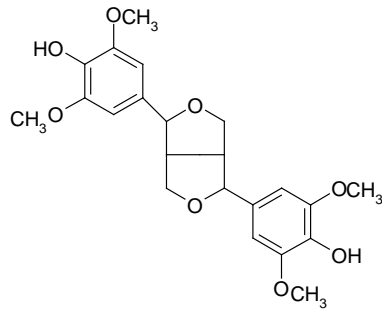
Mistletoe is a dioecious plant. The stem is 30 to 100 cm tall and woody. The plant is a hemiparasite living on various tree species: mistletoe obtains water and mineral nutrients from the host plant with the help of parasitic roots called haustoria. The leaves can be found at the top of dichotomously branching twigs, they are opposite and ovate with entire margin, rounded apex and parallel leaf venation. The perianth is a 4-merous, yellowish perigonium; the flowers cluster into a tight, cymose umbel. Flowering occurs from February to April. The fruit is a white berry.

### **Drug**

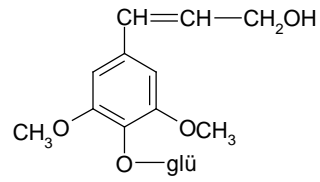
*Visci herba*, *Visci stipes* – Mistletoe, *Visci albi folium* – Mistletoe leaf

### **Phytochemistry**

lectins, viscotoxin (composed of 46 amino acids), flavonoids (isorhamnetin), lignans, caffeic acid derivatives, biogenic amines (tyramine), heteropolysaccharides as mucilage (arabinogalactan, galacturonan)



syringaresinol



syringin

### I.248

Active compounds of *Visci stipes* – Mistletoe

#### Uses

Viscotoxin and mistletoe lectins were found to be cytotoxic, with antitumor activity. Mistletoe extracts are used as immunomodulant in cancer therapy. Mistletoe is traditionally used as antihypertensive, against dizziness, amenorrhoea and joint disorders. It is also used in homoeopathy.

## ***Zea mays* L. – Corn, Sweet corn, Maize**

Poaceae – Grass family

### Distribution, habitats

It is native to Mexico, but many of its cultivars and hybrids are well known and cultivated in many places. It is an annual herbaceous plant.

### Morphology

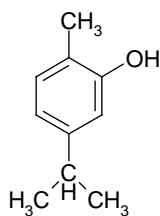
It can grow up to 1 to 3 m tall. The stem is robust, the inside is spongy, and it is divided into well-distinguishable internodes and nodes, each bearing a leaf. The leaves are lanceolate with an entire margin, acute apex and parallel leaf venation. It is a monoecious species. The pistillate (female) inflorescence is the spadix, which is 10 to 25 cm long, enveloped by several layers of husks (ear leaves). The elongated stigmas (silks) can be as long as 10 to 40 cm, they are pale yellow and resemble tufts of hair. The apex of the stem ends in the male inflorescence, which is a compound spike (tassel). The flowering period lasts from June to August. Ears develop in the midsection of the plant. The fruit is a caryopsis: the fruit wall (pericarp) is fused with the seed coat.

### Drug

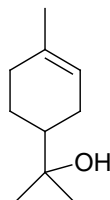
*Maydis amyllum* – Maize starch (Ph. Eur. 5.0), *Maydis oleum raffinatum* – Maize oil, refined (Ph. Eur. 5.0), *Maydis stigma* – Maize stigma

### Phytochemistry

the seeds contain fatty oil, flavonoids, heteropolysaccharides as mucilage, resin, saponins, betaine, potassium and starch; the stigma contains essential oil (carvacrol, terpineol),



carvacrol



$\alpha$ -terpineol

### I.249

Active compounds of *Maydis stigma* – Maize stigma

### Uses

The stigma is diuretic, traditionally used as antidiabetic agent, against gout, rheumatism, diarrhoea and cystitis. Starch is important for food and pharmaceutical industries. It is also used in homoeopathy.



## ***Zingiber officinale* Roscoe – Ginger**

Zingiberaceae – Ginger family



### **I.250**

*Zingiber officinale* Roscoe – Ginger

#### **Distribution, habitats**

It is an herbaceous perennial plant native to Southeast Asia, India and China. It is cultivated in many countries as well.

#### **Morphology**

The rhizome is aromatic, fleshy and creeping, some sections are swollen like a tuber. The leafy stems are about 1 m high. The leaves arise from sheathing leaf bases, are alternate and simple, 20 cm long with an entire margin, acute apex and parallel leaf venation. The white or yellowish-green flowers bear cream-coloured spots, and are arranged in spikes, subtended by bracts. Blooming occurs intermittently during the summer. The fruit is a 3-angled capsule enclosed within bracts.

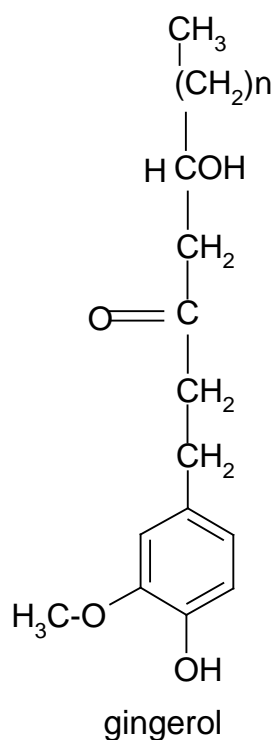
#### **Drug**

*Zingiberis rhizoma* – Ginger (Ph. Eur. 5.0), *Zingiberis aetheroleum* – Ginger oil

#### **Phytochemistry**

essential oil, pungent gingerols (6-gingerol), resin and starch



**I.251**

Active compound of *Zingiberis rhizoma* – Ginger

**Uses**

Ginger is useful in gastrointestinal problems. It is a digestive, appetizer, antiemetic, carminative, stomachic agent, increases the secretion of saliva, bile and gastric juices and stimulates the peristalsis, but it has also expectorant effect and can have a role in prevention of tumours as well. It is a spice and important for food, liqueur and perfume industries. It is also used in homoeopathy. Ginger is contraindicated for people with gallstones. The essential oil is useful in chronic arthritis to relieve knee pain. In China and India it is traditionally used to treat common cold and cough.

Part II  
Characters of Drugs



## ***Millefolii herba* – Yarrow (Ph. Eur. 5.0)**

### **Definition**

Yarrow consists of the whole or cut, dried flowering tops of *Achillea millefolium* L. It contains not less than 2 ml/kg of essential oil and not less than 0.02 per cent of proazulenes, expressed as chamazulene (C<sub>14</sub>H<sub>16</sub>; Mr 184.3), both calculated with reference to the dried drug.

### **Macroscopic characters**

The leaves are green or greyish-green, faintly pubescent on the upper surface and more pubescent on the lower surface, two to three pinnately divided with linear lobes and a finely pointed whitish tip. The capitula are arranged in a composed corymb at the end of the stem. Each capitulum, 3 mm to 5 mm in diameter, consists of the receptacle, usually four or five ligulate ray-florets and three to twenty tubular disk-florets. The involucre consists of three rows of imbricate lanceolate, pubescent green bracts with a brownish or whitish, membranous margin. The receptacle is slightly convex and, in the axillae of paleae, bears a ligulate ray floret with a three-lobed, whitish or reddish ligule and tubular disk-florets with a radial, five-lobed, yellowish or light brownish corolla. The pubescent green, partly brown or violet stems are longitudinally furrowed, up to 3 mm thick with a light-coloured medulla.



### **II.1**

#### ***Millefolii herba* – Yarrow (Ph. Eur. 5.0)**

### **Microscopic characters**

The powder is green or greyish-green; shows fragments of the stems, leaves and bracts bearing (i) glandular trichomes with a short stalk and a head formed of two rows of three to five cells enclosed in a bladder-like membrane (cuticula), and (ii) uniseriate covering trichomes consisting of four to six small, more or less isodiametric cells at the base and a thick-walled, often somewhat tortuous terminal cell, about 400 µm to greater than 1000 µm long; fragments of the ligulate corolla with papillary epidermal cells; small-celled parenchyma from the corolla tubes containing cluster crystals of calcium oxalate; groups of lignified and pitted cells from the bracts; spherical pollen grains, about 30 µm in diameter, with three germinal pores and spiny exine; groups of

sclerenchymatous fibres and small vessels with spiral or annular thickening, from the stem.

## ***Calami rhizoma* – Calamus rhizome**

### **Definition**

The drug consists of the whole or cut rhizome of *Acorus calamus* L., from which the roots and leaves have been removed.

### **Macroscopic characters**

The pale brown rhizome is 20 to 50 cm long, 1-3 cm thick, spongy, slightly flattened cylindrical, with pittings on its surface, and farinuous, greyish-white fracture.



### **II.2**

#### ***Calami rhizoma* – Calamus rhizome**

### **Microscopic characters**

Aerenchima with large intercellular cavities; large, oil-containing idioblasts. The primary cortex comprises collateral closed bundles surrounded with sclerenchymatous fibres. The vascular cylinder holds leptocentric bundles.

### **Other characters**

The drug has a pleasant odour; its taste is spicy, bitter, pungent.



## ***Hippocastani semen* – Horse chestnut seed**

### Definition

The drug is the dried, ripe seed of *Aesculus hippocastanum* L.

### Macroscopic characters

The seed is 2 to 4 cm in diameter, irregularly spherical or dome-shaped; the larger part of the hard testa is dark-brown and glossy, the smaller, flat part bears a light yellow to greyish-brown hilum. Inside two dome-shaped, wedged, strongly thickened white cotyledons can be seen.



### **II.3**

*Hippocastani semen* – Horse chestnut seed

### Microscopic characters

The epidermal cells are relatively small with brown, straight, strongly thickened cell walls. The epidermis cells of the hilum are somewhat larger with thinner walls, and they are rather polygonal. The cells of the cotyledons are polygonal, their walls range from thin to slightly thickened. The cells contain oil and starch granules, the latter being simple, irregularly round to drop-shaped.

### Other characters

The drug has no characteristic odour and a scratchy, irritating taste.

## ***Agrimoniae herba* – Agrimony (Ph. Eur. 5.0)**

### Definition

The drug consists of the dried flowering tops of *Agrimonia eupatoria* L. It contains minimum 2.0% of tannins, expressed as pyrogallol, calculated with reference to the dried drug.

### Macroscopic characters

The stem is green or, more usually, reddish, cylindrical and infrequently branched. The leaves are odd pinnately compound with 3 or 6 opposite pairs of leaflets, with 2 or 3 smaller leaflets between and with an apical leaflet. The leaflets are deeply serrate, dark green on the upper surface, greyish and densely tomentose on the lower face. The flowers are small and form a terminal spike. They are pentamerous and borne in the axils of hairy bracts, the calyces closely surrounded by numerous terminal hooked spires, which occur on the rim of the hairy receptacle. The petals are free, yellow and deciduous. Fruit-bearing obconical receptacles, with deep furrows and hooked bristles, are usually present at the base of the inflorescence.



### II.4

*Agrimoniae herba* – Agrimony (Ph. Eur. 5.0)

### Microscopic characters

The powder is yellowish-green to grey. The powder shows numerous straight or bent, unicellular, long thick-walled trichomes finely warty and sometimes spirally marked; fragments of parenchyma with prisms and cluster crystals of calcium oxalate; fragments of leaf epidermis with sinuous walls, those of the lower epidermis with abundant

stomata, mostly anomocytic but occasionally anisocytic; ovoid to subspherical-pollen grains, fragments of glandular trichomes with a multicellular uniseriate stalk and a spherical unicellular or quadricellular head; groups of fibres and spiral and bordered-fitted vessels from the stem.

**Other characters**

The drug has a mild, spicy odour and bitterish, astringent taste.

***Graminis rhizoma* – Couch grass rhizome (Ph. Eur. 5.0)****Definition**

The drug consists of the whole or cut, washed and dried rhizome of *Agropyron repens* (L.) Beauv; the adventitious roots are removed.

**Macroscopic characters**

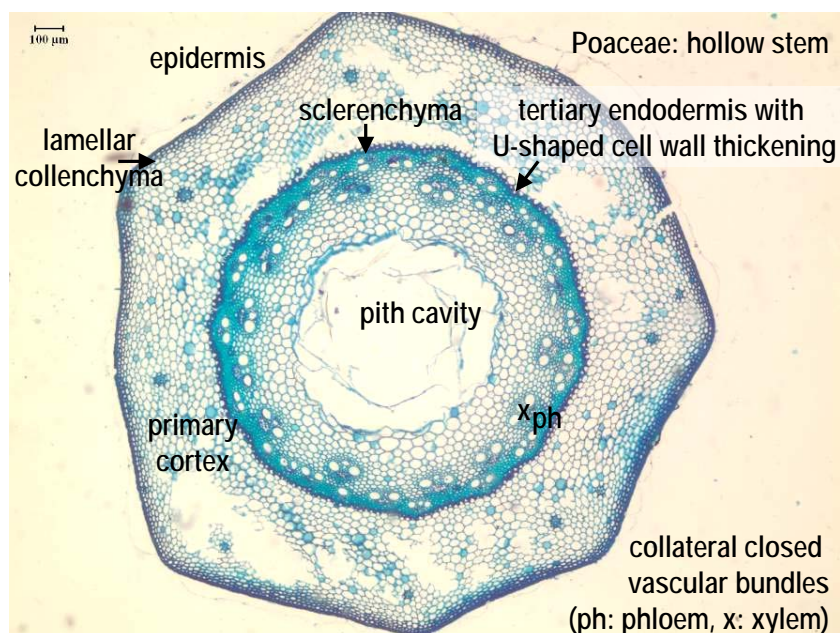
The shiny yellowish, light brown or yellowish-brown pieces of the rhizome are 2 mm to 3 mm thick and longitudinally furrowed. At the nodes are the remains of very thin, more or less branched roots and whitish or brownish scale-like leaves; the internodes, up to 6 cm long, are furrowed and hollow inside. The transverse section of the nodes shows a yellowish medulla.

**II.5**

*Graminis rhizoma* – Couch grass rhizome (Ph. Eur. 5.0)

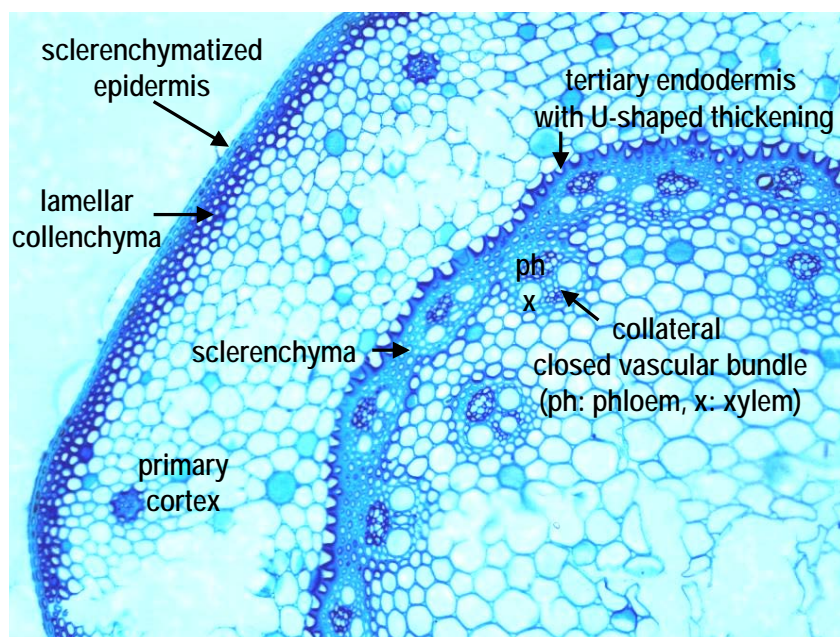


Microscopic characters



**II.6**

*Agropyron repens* rhizome c.s. 40x



**II.7**

*Agropyron repens* rhizome c.s. 100x

The powder shows the following diagnostic Characters

fragments of the epidermis covered with a thick cuticle and composed of rectangular and elongated thick-walled cells with pitted slightly wavy walls which alternate with small rounded to almost square cells; U-shaped thickened endodermic cells; numerous

fragments of moderately thickened fibres and groups of vessels with slit-shaped pits or with spiral and annular thickening.



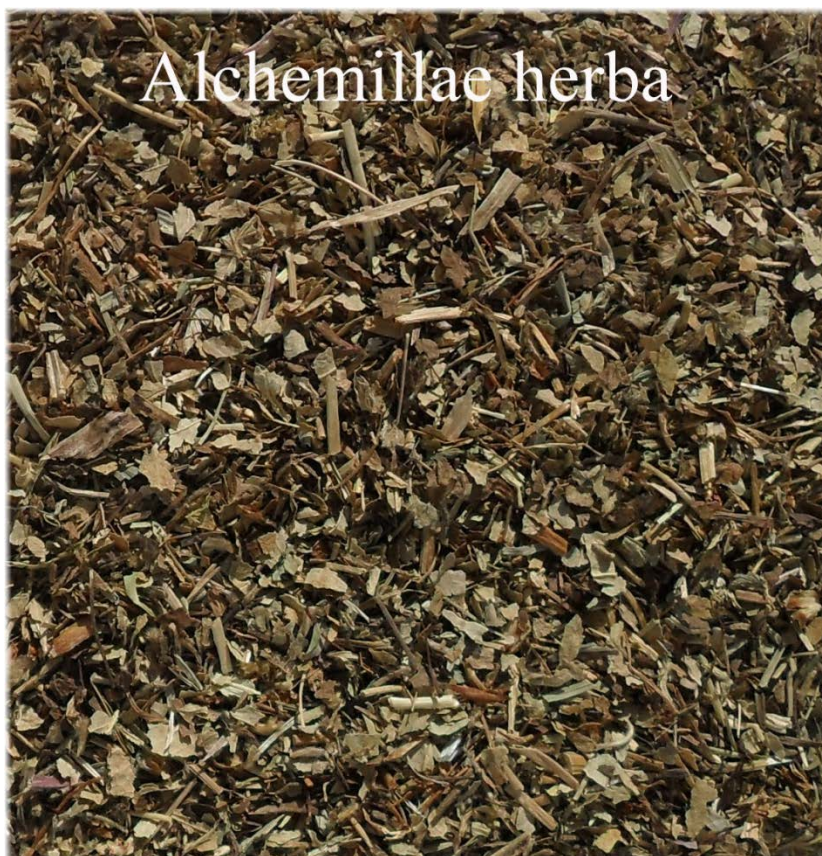
## ***Alchemillae herba* – Alchemilla (Ph. Eur. 5.0)**

### Definition

*Alchemilla* consists of the whole or cut, dried, flowering, aerial parts of *Alchemilla vulgaris* L. *sensu latiore*. It contains not less than 6.0% of tannins, expressed as pyrogallol, calculated with reference to the dried drug.

### Macroscopic characters

The greyish-green to yellowish-green stem is pubescent, more or less longitudinally wrinkled and hollow. The greyish-green, partly brownish-green, radical leaves which are the main part of the drug are reniform to slightly semicircular with a diameter generally up to 8 cm, seldom up to 11 cm and have 7 to 9, or 11 lobes and a long petiole. The smaller, cauline leaves, which have a pair of large stipules at the base, have 5 to 9 lobes and a shorter petiole or they are sessile. The leaves are densely pubescent especially on the lower surface. Young leaves are folded with a whitish-silvery pubescence; older leaves are slightly pubescent and have a finely meshed venation, prominent on the lower surface. The greyish-green to yellowish-green petiole is pubescent with an adaxial groove. The apetalous flowers are yellowish-green to light green. The calyx is double with 4 small segments of the epicalyx alternating with 4 larger sepals, subacute to triangular. There are 4 short stamens and a single carpel with a capitate stigma.



### II.8

*Alchemillae herba* – Alchemilla (Ph. Eur. 5.0)

**Microscopic characters**

The powder shows greyish-green colour with unicellular, narrow, partly tortuous trichomes. The fragments of leaves of palisade parenchyma have 2 layers, the upper layer of which is 2 to 3 times longer than the lower layer. The spongy parenchyma contains scattered cluster crystals of calcium oxalate. The leaf fragments in surface view have sinuous to wavy epidermal cells, the anticlinal walls unevenly thickened and beaded. Anomocytic stomata are present. In the powder we can see the groups of vascular tissue and lignified fibres from the petioles and stems, the vessels spirally thickened or with bordered pits; occasional thin-walled conical trichomes, thin-walled parenchyma containing cluster crystals of calcium oxalate; spherical pollen grains and fragments of the ovary wall.

## ***Allii ursini herba* – Wild garlic herb**

### Definition

The drug consists of the dried, flowering aerial parts of *Allium ursinum* L.

### Macroscopic characters

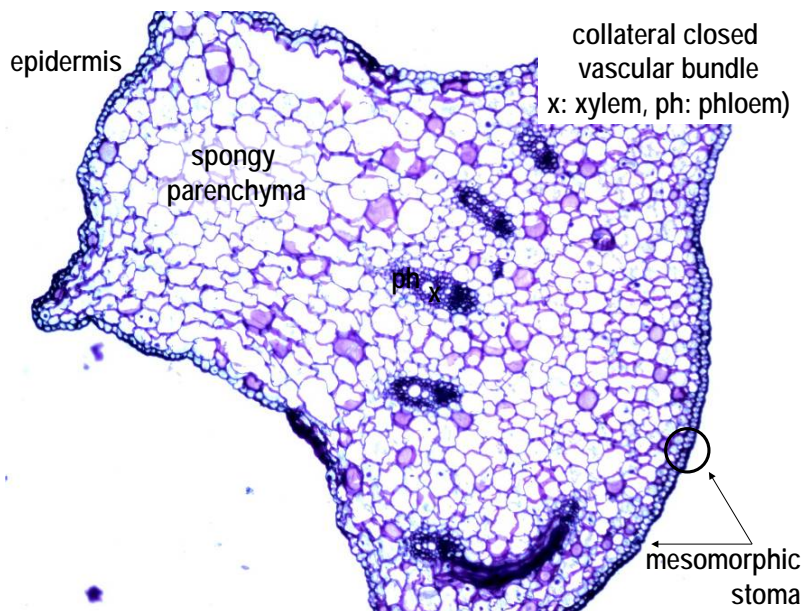
The leaves are large, flattened, ovate, with long petiole and acute apex. The radiate flowers are greenish- or yellowish-white.



### II.9

*Allii ursini herba* – Wild garlic herb

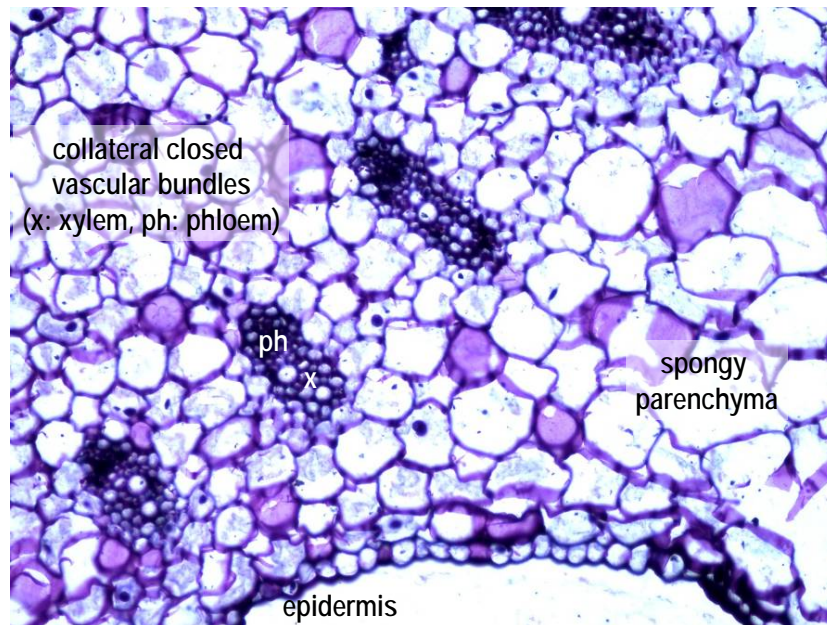
### Microscopic characters



### II.10

*Allium ursinum* leaf c.s. 40x





**II.11**

*Allium ursinum* leaf c.s. 100x

**Other characters**

The drug has a strong, characteristic odour, reminiscent of garlic.

## ***Aloe capensis* – Aloes, Cape (Ph. Eur. 5.0)**

### Definition

Cape aloes consists of the concentrated and dried juice of the leaves of various species of *Aloe*, mainly *Aloe ferox* Miller and its hybrids. It contains not less than 18.0% of hydroxyanthracene derivatives, expressed as barbaloin and calculated with reference to the dried drug.

### Characters

Dark brown masses tinged with green and having a shiny conchoidal fracture, or a greenish-brown powder, soluble in hot alcohol, partly soluble in boiling water.



### **II.12**

*Aloe capensis* – Aloes, Cape (Ph. Eur. 5.0)

### Other characters

The drug has characteristic smell and very bitter taste.

## ***Aloe barbadensis* – Aloes, Barbados (Ph. Eur. 5.0)**

### Definition

Barbados aloes consists of the concentrated and dried juice of the leaves of *Aloe barbadensis* Miller. It contains not less than 28.0% of hydroxyanthracene derivatives, expressed as barbaloin and calculated with reference to the dried drug.

### Characters

Dark brown masses tinged with green and having a shiny conchoidal fracture, or a greenish-brown powder, soluble in hot alcohol, partly soluble in boiling water.



## ***Althaeae folium* – Marshmallow leaf (Ph. Eur. 5.0)**

### Definition

The drug consists of the whole or cut dried leaf of *Althaea officinalis* L.

### Macroscopic characters

The leaves have long petioles and are about 7 cm to 10 cm long; the lamina is cordate to ovate with 3 to 5 shallow lobes and crenate or serrate margins; the venation is palmate. The petioles and both surfaces of the lamina are greyish-green and densely pubescent. Rarely, fragments of the flowers or immature fruits may be present.

### Microscopic characters

The powder shows numerous long, rigid, unicellular covering trichomes with thick walls, pointed at the apex, angular and pitted at the base where they are sometimes still united to form stellate structures with up to 8 components; few secretory trichomes with unicellular stalks and globular, multicellular heads; fragments of the leaf epidermis with anomocytic or paracytic stomata; cluster crystals of calcium oxalate, isolated or in the parenchyma of the mesophyll; fragments of veins with small, spiral or annular vessels.

### Other characters

The drug is odourless and tasteless.

## ***Althaeae radix* – Marshmallow root (Ph. Eur. 5.0)**

### Definition

Marshmallow root consists of the peeled or unpeeled, whole or cut, dried root of *Althaea officinalis* L.

### Macroscopic characters

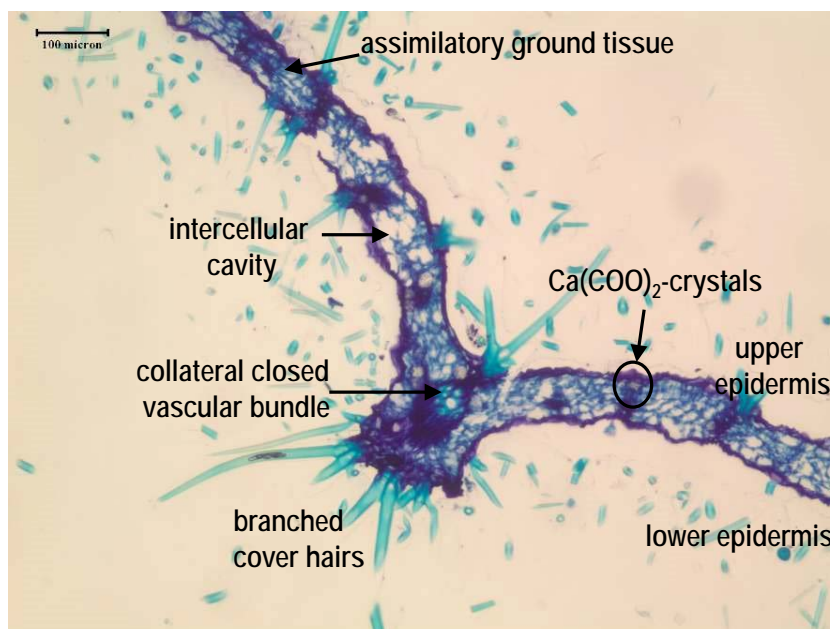
The unpeeled, non-fragmented drug consists of cylindrical, slightly twisted roots with deep longitudinal furrows. The outer surface is greyish-brown and bears numerous rootlet scars. The fracture is fibrous externally, rugged and granular internally. The section shows a more or less thick, whitish bark with brownish periderm, separated by the well-marked, brownish cambium from a white xylem. The stratified structure of the bark and the radiate structure of xylem become more distinct when moistened. The peeled drug has a greyish-white finely fibrous outer surface; cork and external cortical parenchyma are absent.



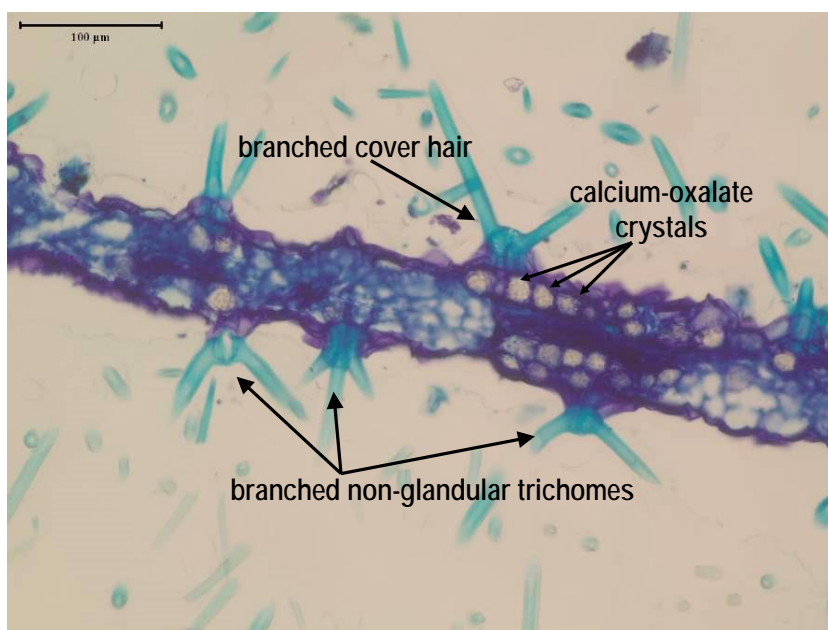
**II.13**  
*Althaea radix* – Marshmallow root (Ph. Eur. 5.0)

#### Microscopic characters

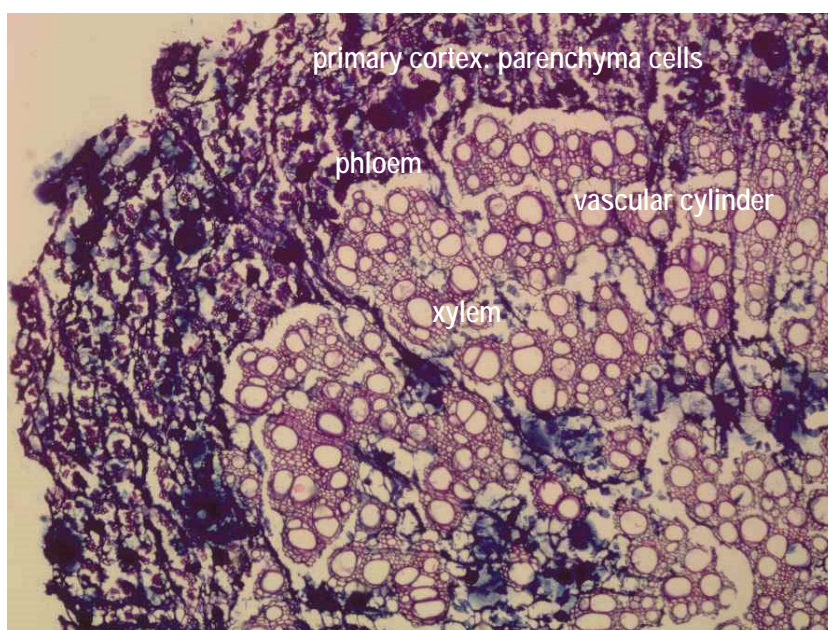
The powder is brownish-grey (unpeeled root) or whitish (peeled root). The powder shows the following diagnostic characters: fragments of colourless, mainly unligified, thick-walled fibres with pointed or split ends; fragments of bordered, pitted or scalariformly thickened vessels; cluster crystals of calcium oxalate; parenchymatous cells containing mucilage; fragments of cork with thin-walled, tabular cells in the unpeeled root. The powder shows numerous starch granules occasionally with a longitudinal hilum. The starch grains are mostly simple, a few being two to four compound.



**II.14**  
*Althaea officinalis* leaf c.s. 100x



**II.15**  
*Althaea officinalis* leaf c.s. 200x



**II.16**  
*Althaea officinalis* root c.s. 40x

**Other characters**

The drug is odourless with sweetish and mucilaginous taste.

## ***Anethi fructus* – Dill fruit**

### **Definition**

The drug consists of the dried fruits (mericarps) of *Anethum graveolens* L.

### **Macroscopic characters**

The fruits are dark brown, oval, compressed, 4-5 mm long, with 3 longitudinal ridges on the back and 3 lines of oil cells, and 2 ridges on the flat surface.



### **II.17**

*Anethi fructus* – Dill fruit

### **Microscopic characters**

Subepidermally schizogenous essential oil cavities can be observed; vascular bundles can be seen in the ridges.

### **Other characters**

The drug has a characteristic odour; taste is pungent and bitter.



## ***Angelicae radix* – Angelica root (Ph. Eur. 5.0)**

### Definition

The drug consists of the whole or cut, carefully dried rhizome and root of *Angelica archangelica* L. (*Archangelica officinalis* Hoffm.). Its essential oil content is minimum 2.0 ml/kg, calculated with reference to the dried drug.

### Macroscopic characters

The rhizome is greyish-brown or reddish-brown, transversely annulated. The base bears greyish-brown or reddish-brown, cylindrical, longitudinally furrowed, occasionally branched roots often with incompletely encircling, transverse ridges. The apex sometimes shows remnants of stem and leaf bases. The fracture is uneven. The transversely cut surface shows a greyish-white, spongy, distinctly radiate bark, in which the secretory channels are visible as brown spots, and a bright yellow to greyish-yellow wood which, in the rhizome, surrounds the greyish or brownish-white pith.



### **II.18**

*Angelicae radix* – Angelica root (Ph. Eur. 5.0)

### Microscopic characters

The powder is brownish-white. The powder shows: fragments of cork consisting of several layers of thin-walled greyish-brown or reddish-brown cells; fragments of large, yellowish-brown secretory channels; fragments of medullary rays 2 to 4 cells wide; fragments of xylem with medullary rays and radially arranged, lignified vessels with reticulate thickening. The powder shows numerous, simple starch granules.

### Other characters

The drug has bitter taste.



## ***Bardanae radix* – Burdock root**

### Definition

Burdock root consists of the dried roots of *Arctium lappa* L.

### Macroscopic characters

The root is 30 to 60 cm long, 1 to 4 cm thick, with few branches, the outer surface is greyish-brown to dark brown, the inner surface is white, longitudinally wrinkled, hard. First year roots are dense, fleshy; second year roots are spongy.



### **II.19**

#### *Bardanae radix* – Burdock root

### Microscopic characters

The rhizodermis bears root hairs. An endodermis can be observed between the cortical parenchyma and the central vascular cylinder. Vascular tissues are arranged in concentric rings of xylem and phloem. The central part comprises the pith parenchyma. The powder of the drug contains starch and inulin granules; medullary ray parenchyma, yellowish sclerenchymatous fibres, sometimes grouped in bundles; fragments of xylem fibres.

### Other characters

The drug has a mild odour; and a pungent, sweet, later bitter flavour.

## ***Uvae ursi folium* – Bearberry leaf (Ph. Eur. 5.0)**

### Definition

The drug consists of the whole or cut, dried leaf of *Arctostaphylos uva-ursi* (L.) Spreng. It contains minimum 7.0% of anhydrous arbutin, calculated with reference to the dried drug.

### Macroscopic characters

The leaf is shiny and dark green on the adaxial surface, lighter on the abaxial surface. The entire leaf is obovate with smooth margins, somewhat reflexed downwards, narrowing at the base into a short petiole. The leaf is obtuse or retuse at its apex. The lamina is thick and coriaceous. The venation, pinnate and finely reticulate, is clearly visible on both surfaces. The adaxial surface is marked with sunken veinlets, giving it a characteristic grainy appearance. Only the young leaf has ciliated margins. Old leaves are glabrous.

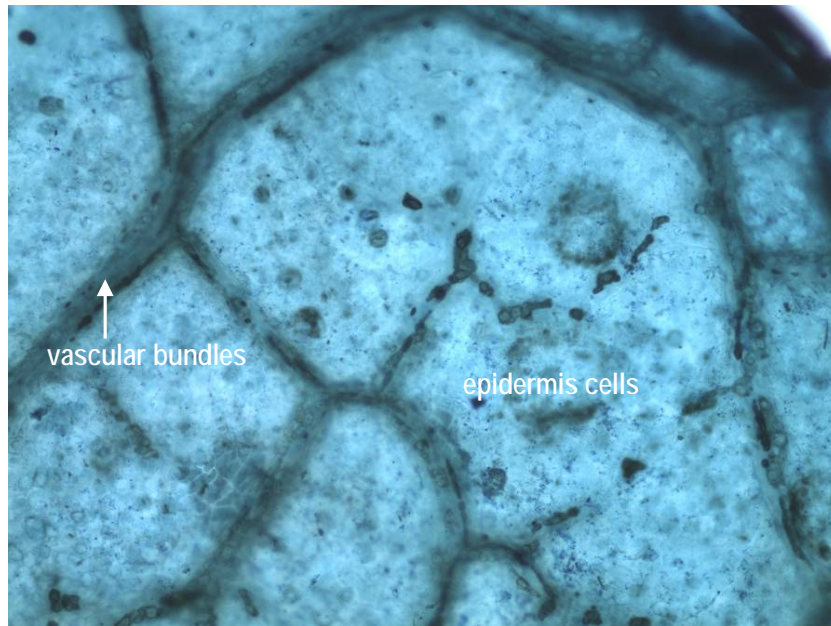


### **II.20**

*Uvae ursi folium* – Bearberry leaf (Ph. Eur. 5.0)

### Microscopic characters

The powder is green to greenish-grey or yellowish-green. The powder consists of fragments of epidermises which, seen in surface view, show polygonal cells covered by a thick smooth cuticle, and with straight, thick and irregularly pitted walls; anomocytic stomata, surrounded by 5 to 11 subsidiary cells and scars of hair bases only on the abaxial epidermis; fragments of palisade parenchyma, with 3 or 4 layers of cells of unequal lengths, and spongy parenchyma; groups of lignified fibres, with rows of cells containing prisms of calcium oxalate; occasional conical, unicellular covering trichomes.



**II.21**  
Arctostaphylos uva-ursi leaf cleared 100x



## ***Absinthii herba* – Wormwood (Ph. Eur. 5.0)**

### Definition

Wormwood consists of the basal leaves or slightly leafy, flowering tops, or of a mixture of these dried, whole or cut organs of *Artemisia absinthium* L. It contains not less than 2 ml/kg of essential oil, calculated with reference to the dried drug.

### Macroscopic characters

The leaves are greyish to greenish, densely tomentose on both surfaces. The basal leaves, with long petioles, have triangular to oval bipinnatisect to tripinnatisect lamina, with rounded to lanceolate segments. The cauline leaves are less segmented and the apical leaves are lanceolate. The stem of the flower-bearing region is greenish-grey, tomentose, and usually with five flattened longitudinal grooves. The capitula are arranged as loose, axillary panicles, inserted at the level of the lanceolate to slightly pinnatisect leaves. The capitula are spherical to flattened hemispherical, and consist of a grey, tomentose involucre. The outer bracts are linear, while the inner ones ovate, blunt at the apices with scarious margins. The receptacle bears paleae, numerous yellow, tubular, florets and few yellow, ray florets.

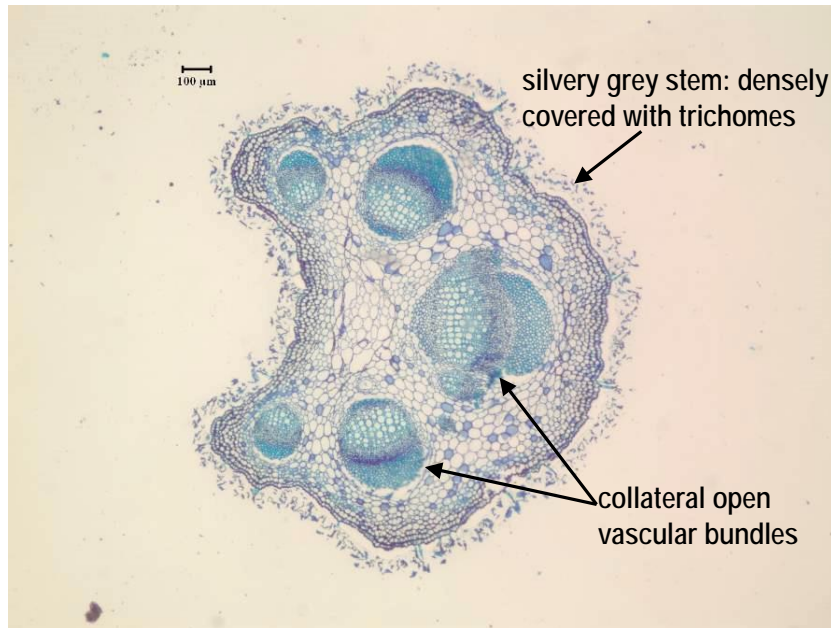


### **II.22**

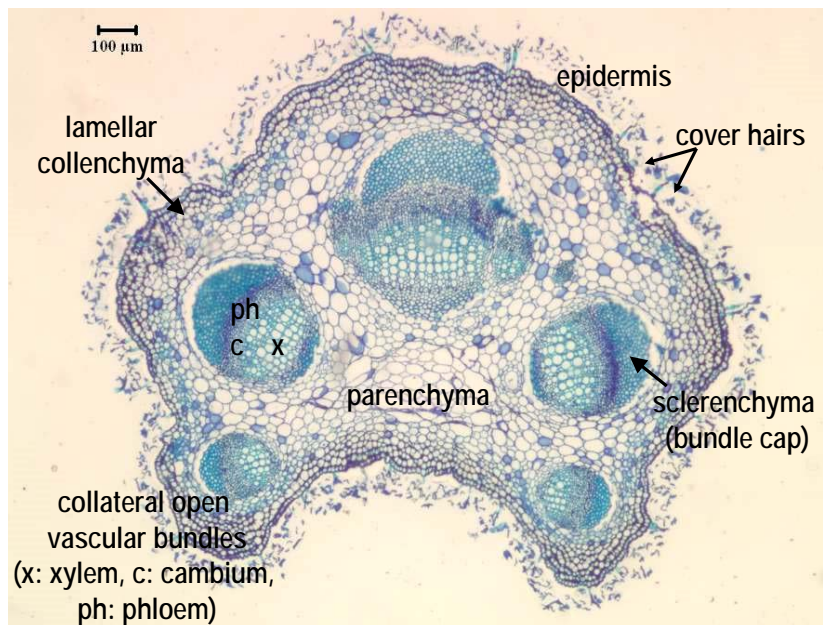
*Absinthii herba* – Wormwood (Ph. Eur. 5.0)

### Microscopic characters

The powder is greenish-grey. The powder shows many T-shaped trichomes with a short uniseriate stalk consisting of one to five small cells, perpendicularly capped by a long, undulating terminal cell tapering at the ends; fragments of epidermises with sinuous to wavy walls, anomocytic stomata and secretory trichomes, fragments of the tubular and ray florets, some containing small cluster crystals of calcium oxalate; numerous paleae each composed of a small cell forming a stalk and a very long, cylindrical and thin-walled terminal cell; spheroidal pollen grains with three pores and a finely warty exine; groups of fibres, small vessels with spiral and annular thickening, larger vessels with bordered pits and parenchyma with moderately thickened and pitted walls, from the stem.

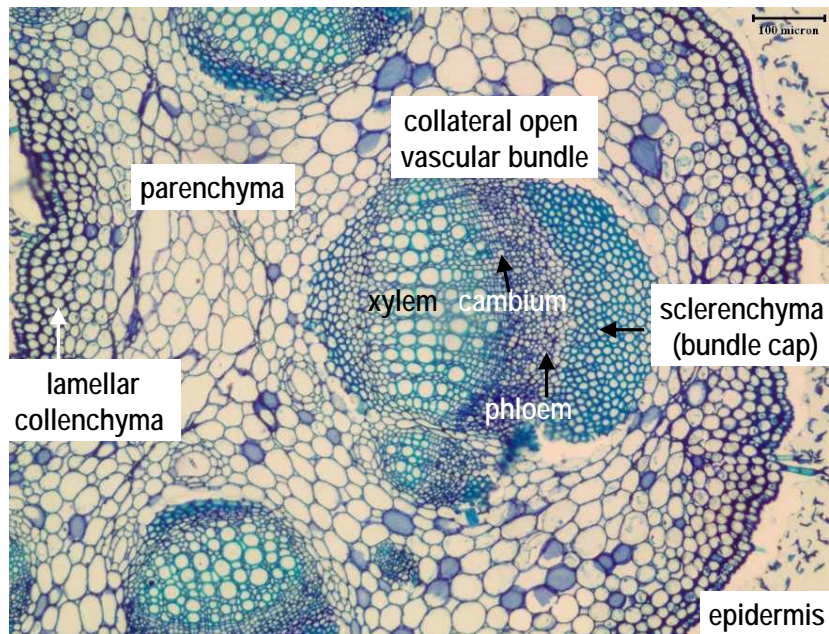


**II.23**  
*Artemisia absinthium* stem c.s. 40x



**II.24**  
*Artemisia absinthium* stem c.s. 40x





## II.25

*Artemisia absinthium* stem c.s. 100x

### Other characters

The smeared drug has spicy smell and bitter taste.

## ***Artemisiae vulgaris herba* – Common wormwood flowering shoot**

### Definition

Common wormwood flowering shoot consists of the upper half and branches of the flowering aerial parts of *Artemisia vulgaris* L.

### Macroscopic characters

The stem and its branches are dark purple in some places, the young branches are slightly tomentose. The leaves are lobed to pinnately segmented; the upper (adaxial) surface is dark green and glabrous, the lower (abaxial) surface is white, tomentose, the edges are slightly rolled up towards the abaxial surface. The basal leaves are petiolate, the cauline leaves are sessile. The small capitula are arranged in dense panicles, with narrow, linear bracts. The involucral bracts are greyish-white, tomentose; the main vein is green, with a broad membraneous fringe. The capitulum comprises tubular florets, yellow to reddish-brown; the inner ones bisexual, the outer ones pistillate. The receptacle is glabrous. The achene bears a colourful pappus.



### II.26

*Artemisiae vulgaris herba* – Common wormwood flowering shoot

### Microscopic characters

Vascular bundles are open collateral in the stem, and closed collateral in the leaves. The powder shows many T-shaped trichomes with a short uniseriate stalk and a very long, undulating terminal cell tapering at the ends; as well as glandular trichomes of the Asteraceae type.

**Other characters**

The drug is less bitter compared to *Absinthii herba*.

## ***Tragacantha* – Tragacanth (Ph. Eur. 5.0)**

### Definition

Tragacanth is the air-hardened, gummy exudate, flowing naturally or obtained by incision from the trunk and branches of *Astragalus gummifer* Labill. and certain other species of *Astragalus* from western Asia.

### Macroscopic characters

Tragacanth occurs in thin, flattened, ribbon-like, white or pale yellow, translucent strips, more or less curved; horny, fracture short; the surface is marked by fine longitudinal striae and concentric transverse ridges. It may also contain pieces similar in shape but somewhat thicker, more opaque and more difficult to fracture.



### **II.27**

*Tragacantha* – Tragacanth (Ph. Eur. 5.0)

### Microscopic characters

The powder is white or almost white and it forms a mucilaginous gel with about ten times its mass of water. The powder shows in the gummy mass numerous stratified cellular membranes turning slowly violet when treated with iodinated zinc chloride solution. The gummy mass includes starch grains, isolated or in small groups, usually rounded in shape and sometimes deformed, and a central hilum visible between crossed nicol prisms.

### Other characters

The drug has no characteristic smell and it has mucous taste.



## ***Belladonnae folium* – Belladonna leaf (Ph. Eur. 5.0)**

### Definition

Belladonna leaf consists of the dried leaf or of the dried leaf and flowering, and occasionally fruit-bearing, tops of *Atropa belladonna* L. It contains not less than 0.30% of total alkaloids, calculated as hyoscyamine with reference to the drug dried. The alkaloids consist mainly of hyoscyamine together with small quantities of hyoscyne (scopolamine).

### Macroscopic characters

The leaves are green to brownish-green, slightly darker on the upper surface, often crumpled and rolled and partly matted together in the drug. The leaf is petiolate and the base of the lamina is acute and decurrent and the margin entire. The flowering stems are flattened and bear at each node a pair of leaves unequal in size, in the axils of which occur singly the flowers or occasionally fruits. The flowers have a gamosepalous calyx and campanulate corolla. The fruits are globular berries, green to brownish-black and surrounded by the persistent calyx with widely spread lobes.



### **II.28**

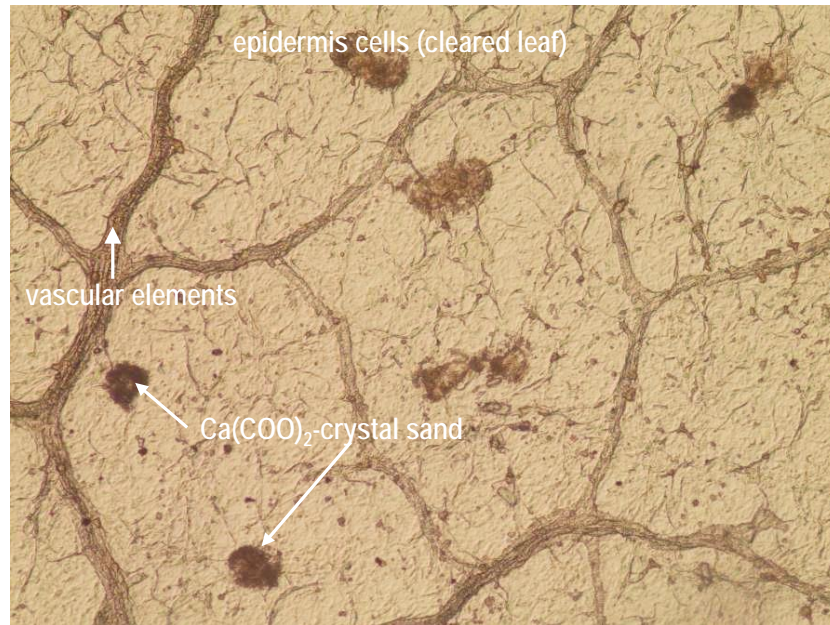
*Belladonnae folium* – Belladonna leaf (Ph. Eur. 5.0)

### Microscopic characters

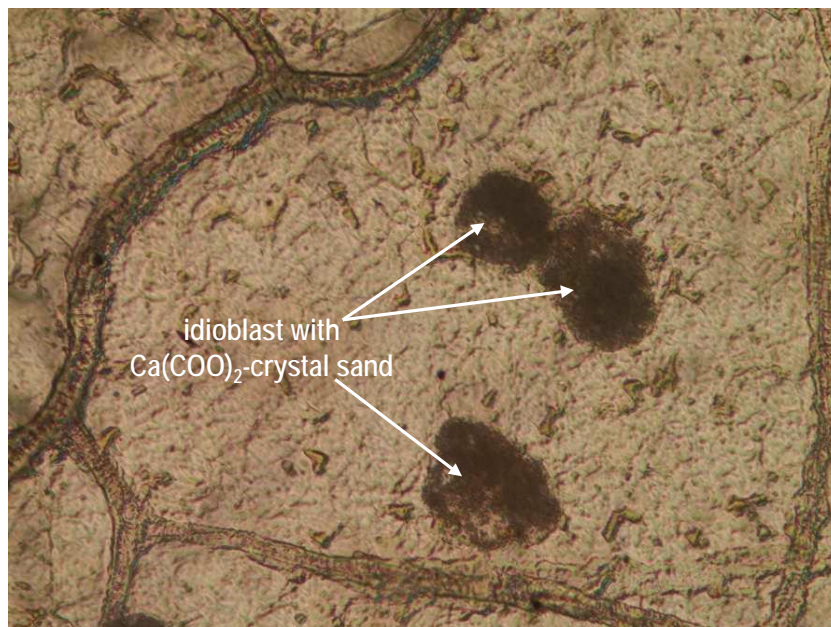
The powder is dark green. The powder shows the following diagnostic characters: fragments of leaf lamina showing sinuous-walled epidermal cells, a striated cuticle and numerous stomata predominantly present on the lower epidermis (anisocytic and also some anomocytic); multicellular uniseriate covering trichomes with smooth cuticle, glandular trichomes with unicellular heads and multicellular, uniseriate stalks or with multicellular heads and unicellular stalks; parenchyma cells including rounded cells containing microsphenoidal crystals of calcium oxalate; annular and spirally thickened vessels. The powdered drug may also show the following: fibres and reticulately thickened vessels from the stems; subspherical pollen grains with three germinal pores,



three furrows and an extensively pitted exine; fragments of the corolla, with a papillose epidermis or bearing numerous covering or glandular trichomes of the types previously described; brownish-yellow seed fragments containing irregularly sclerified and pitted cells of the testa.



**II.29**  
Atropa belladonna leaf cleared 100x



**II.30**  
Atropa belladonna leaf cleared 400x

**Other characters**

Belladonna leaf has a slightly nauseous odour.

## ***Belladonnae radix* – Belladonna root**

### Definition

The drug consists of the dried root of *Atropa belladonna* L.

### Macroscopic characters

The root is 40-50 cm long, its upper part is 4-5 cm thick. The external surface is yellowish-brown, and its internal surface is greyish-white. The dried drug is hard with farinuous fracture.



### **II.31**

#### *Belladonnae radix* – Belladonna root

### Microscopic characters

In the drug powder a huge amount of starch grains, crystals of calcium oxalate and parenchyma cells containing starch can be seen. Vessel fragments are frequent, with various thickenings. In transverse section the following characters are visible: the outermost part is the periderm, followed by the parenchymatous zone of dilatation. The contiguous, annular phloem comprises mainly sieve tubes and companion cells in

smaller groups. The cambium is multiseriate, followed by the annular xylem composed by uni- or biserial medullary rays and xylem rays with tracheas and tracheids. In the central part a group of primary xylem bundles is visible. In the phloem- and xylem-parenchyma, as well as in the cells of medullary rays, crystal sand of calcium oxalate can be frequently seen.

**Other characters**

The drug is odourless and has bitter taste.



## ***Avenae herba (recens) – Common oat herb (fresh)***

### Definition

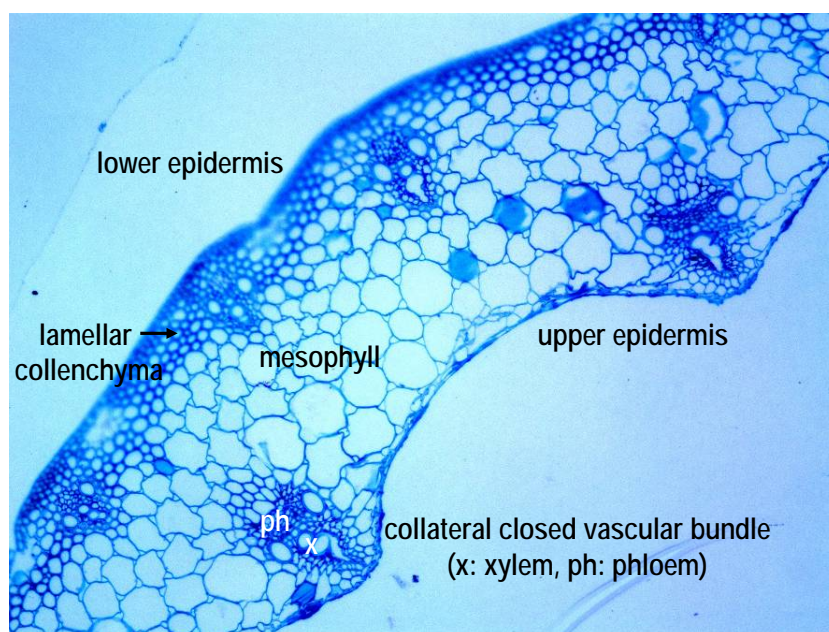
The drug consists of the flowering aerial parts of *Avena sativa* L., fresh, sometimes dried.

### Macroscopic characters

The stem is hollow; the leaves are linear to lanceolate, the lamina is rough, greyish-green, tapers into a pointed tip. The ligule is triangular. The leaf base modifies into a glabrous sheath, surrounding the culm, the auricle is missing. The inflorescence is a panicle. The bifid stigma is feathery, there are 3 stamens, the lemma has no awn, the glume is as long as the florets or longer. The fruit is a caryopsis.

### Microscopic characters

Among the rectangular epidermal cells there are paracytic stomata, with dumbbell-shaped guard cells and triangular subsidiary cells. The collateral closed vascular bundles are arranged in rings in the stem; in the leaves collateral closed bundles can be observed.



### II.32

*Avena sativa* stem c.s. 100x

## ***Ballota nigrae herba* – Black horehound herb (Ph. Eur. 5.0)**

### Definition

The drug consists of the dried flowering tops of *Ballota nigra* L. It contains minimum 1.5% of total *orthodihydroxycinnamic acid* derivatives, expressed as acteoside, calculated with reference to the dried drug.

### Macroscopic characters

Stems conspicuously four-angled, longitudinally striated, dark green or reddish-brown and more or less pubescent. Leaves are greyish-green, petiolate, lamina ovate to orbicular, margin irregularly crenate, cuneate to cordate at the base; both surfaces covered with abundant whitish hairs. Venation is pinnate, prominent on the lower surface, slightly depressed on the upper. Flowers are sessile or very shortly pedicellate, calyx infundibuliform, densely pubescent, with 10 prominent ribs and 5 subequal, broadly ovate teeth; the corolla is purple, tube slightly shorter than the calyx tube, bilabiate, the upper lip pubescent on the outer surface, the lower lip with 3 lobes, the middle lobe notched.



### II.33

*Ballota nigrae herba* – Black horehound herb (Ph. Eur. 5.0)

### Microscopic characters

The powder is greyish-green and slightly flocculent. The powder shows numerous long, uniseriate, multicellular covering trichomes consisting of 4 or more cells, thickened and swollen at the junctions, with slightly lignified and pitted walls; fewer glandular trichomes, some with a unicellular or multicellular stalk and a globose, uni- or bicellular head, others with a unicellular stalk and a multicellular head; fragments of the leaf epidermis with sinuous walls, those from the lower epidermis with numerous stomata,



some diacytic, but the majority anomocytic; epidermis of the corolla composed of polygonal cells, those of the inner epidermis papillose; pollen grains subspherical with 3 pores and a smooth exine; groups of collenchyma and lignified, spirally thickened and bordered pitted vessels, from the stem.

***Berberidis radix* – Barberry root**



**II.34**

*Berberidis radix* – Barberry root

## ***Betulae folium* – Birch leaf (Ph. Eur. 5.0)**

### Definition

Birch leaf consists of the whole or fragmented dried leaves of *Betula pendula* Roth and/or *Betula pubescens* Ehrh. as well as hybrids of both species. It contains not less than 1.5% of flavonoids, calculated as hyperoside with reference to the dried drug.

### Macroscopic characters

The leaves of both species are dark green on the adaxial surface and a lighter greenish-grey colour on the abaxial surface; they show a characteristic dense reticulate venation. The veins are light brown to almost white. The leaves of *Betula pendula* are glabrous and show closely spaced glandular pits on both surfaces. The petiole is long and the doubly serrate lamina is triangular to rhomboid and broadly cuneate or truncate at the base. The angle on each side is unrounded or slightly rounded, and the apex is long and acuminate. The leaves of *Betula pubescens* show few glandular trichomes and are slightly pubescent on both surfaces. The abaxial surface shows small bundles of yellowish-grey trichomes at the branch points of the veins. The leaves of *Betula pubescens* are slightly smaller than those of *B. pendula*, oval to rhomboid and more rounded. They are more roughly and more regularly serrate. The apex is neither long nor acuminate.



### II.35

*Betulae folium* – Birch leaf (Ph. Eur. 5.0)

#### Microscopic characters

The powder is greenish-grey. The powder shows numerous fragments of lamina with straight-walled epidermal cells and cells of the lower epidermis surrounding anomocytic stomata. Peltate large glands are found on the upper and lower epidermises. The mesophyll fragments contain calcium oxalate crystals. Fragments of radial vascular bundles and sclerenchyma fibres are accompanied by crystal sheaths. If *Betula pubescens* is present, the powder also contains unicellular covering trichomes with very thick walls.

#### Other characters

The drug is odourless with acrid and bitterish taste.



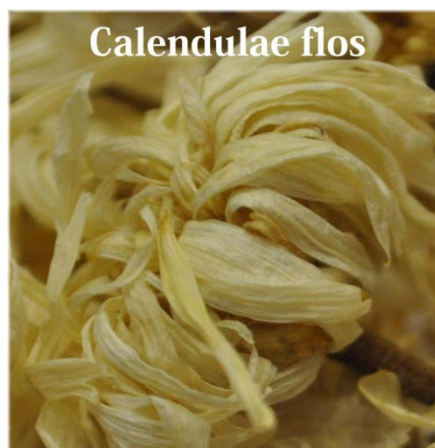
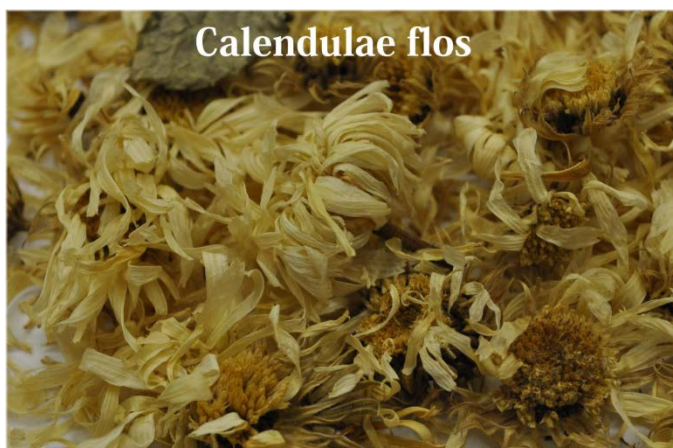
## ***Calendulae flos* – Calendula flower (Ph. Eur. 5.0)**

### Definition

Calendula flower consists of the whole or cut, dried, and fully opened flowers which have been detached from the receptacle of the cultivated, double-flowered varieties of *Calendula officinalis* L. It contains not less than 0.4% of flavonoids, calculated as hyperoside with reference to the dried drug.

### Macroscopic characters

The ligulate florets consist of a yellow or orange-yellow ligule with a three toothed apex and a hairy, partly sickle-shaped yellowish-brown to orange-brown tube with a projecting style and a bifid stigma occasionally with a partly bent yellowish-brown to orange-brown ovary. The tubular florets are present and consist of the yellow, orange-red or red-violet five lobed corolla and the yellowish-brown or orange-brown tube, hairy in its lower part, mostly with a partly bent yellowish-brown to orange-brown ovary.



### **II.36**

*Calendulae flos* – Calendula flower (Ph. Eur. 5.0)

### Microscopic characters

The powder is yellowish-brown. The powder shows fragments of the corollas containing light yellow oil droplets, some with fairly large anomocytic stomata, others containing prisms and very small cluster crystals of calcium oxalate; covering trichomes biseriate, multicellular and conical, glandular trichomes with a uniseriate or biseriate, multicellular biseriate stalk and a large, ovoid, biseriate and multicellular head; spherical pollen grains with a sharply spiny exine and three germinal pores; occasional fragments of the stigmas with short, bulbous papillae.



***Cannabis sativae fructus***



**II.37**  
*Cannabis sativae fructus*

## ***Capsici fructus* – Capsicum (Pepper fruit) (Ph. Eur. 5.0)**

### Definition

The drug consists of the dried ripe fruits of *Capsicum annum* L. var. *minimum*

(Miller) Heiser and small-fruited varieties of *Capsicum frutescens* L. It contains minimum 0.4% of total capsaicinoids expressed as capsaicin calculated with reference to the dried drug.

### Macroscopic characters

The fruit is yellowish-orange to reddish-brown, oblong conical with an obtuse apex, at the widest part occasionally attached to a 5-toothed inferior calyx and a straight pedicel. Pericarp somewhat shrivelled, glabrous, enclosing about 10 to 20 flat, reniform seeds 3 mm to 4 mm long, either loose or attached to a reddish dissepiment.

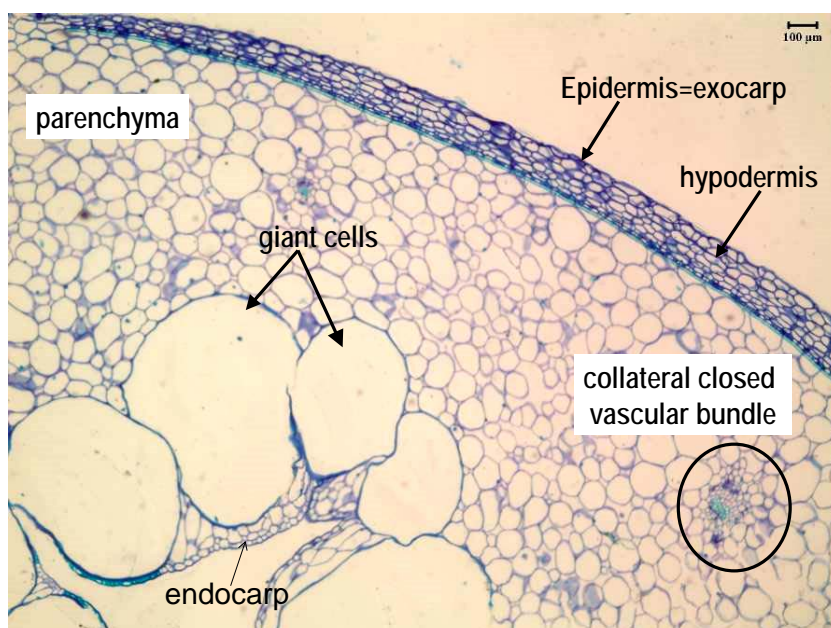


### II.38

*Capsici fructus* – Capsicum (Pepper fruit) (Ph. Eur. 5.0)

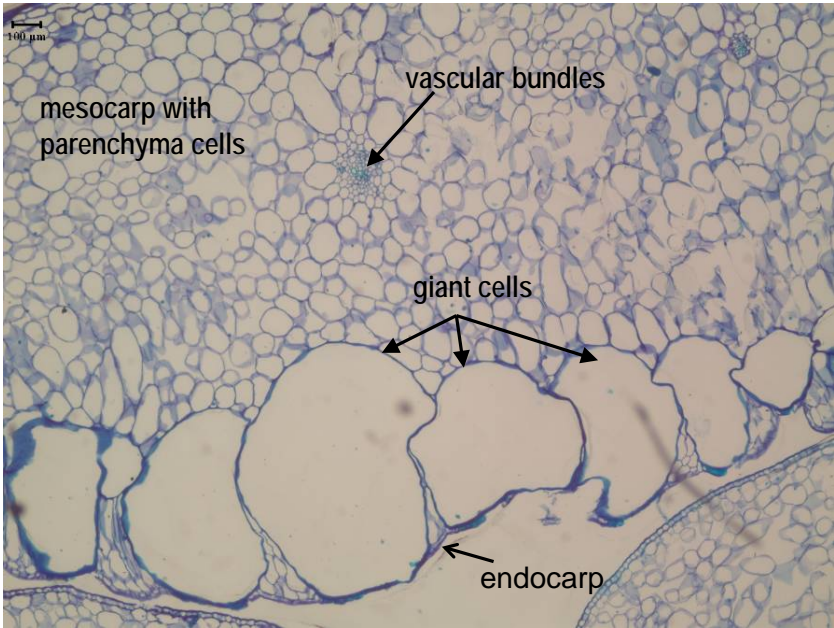
**Microscopic characters**

The orange powder shows the following diagnostic characters: fragments of the pericarp having an outer epicarp with cells often arranged in rows of 5 to 7, cuticle uniformly striated; parenchymatous cells frequently containing droplets of red oil, occasionally containing microsphenoidal (sandy) crystals of calcium oxalate; endocarp with characteristic island groups of sclerenchymatous cells, the groups being separated by thin-walled parenchymatous cells. Fragments of the seeds having an episperm composed of large, greenish-yellow, sinuous-walled sclereids with thin outer walls and strongly and unevenly thickened radial and inner walls which are conspicuously pitted; endosperm parenchymatous cells with drops of fixed oil and aleurone grains. Occasional fragments from the calyx having an outer epidermis with anisocytic stomata, inner epidermis with many trichomes but no stomata; trichomes glandular, with uniseriate stalks and multicellular heads; mesophyll with many idioblasts containing microsphenoidal crystals of calcium oxalate.

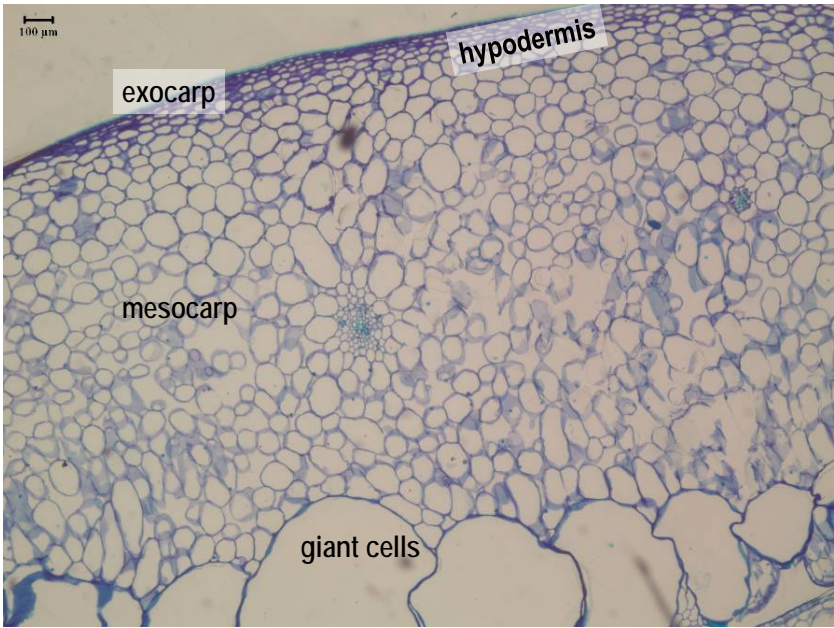


**IL.39**  
Capsicum annum fruit 40x





**II.40**  
Capsicum annum fruit 40x



**II.41**  
Capsicum annum fruit 40x

Other characters  
The drug has extremely pungent taste.

## ***Cichorii radix* – Chicory root**

### Definition

The drug consists of the dried roots of *Cichorium intybus* L.

### Macroscopic characters

The root is yellowish-white, stick-like, 20 to 30 cm long, 1 to 4 cm thick, branching, longitudinally wrinkled.



### **II.42**

*Cichorii radix* – Chicory root

### Microscopic characters

The vascular tissues are arranged in concentric rings of xylem and phloem.



## ***Aurantii amari epicarpium et mesocarpium* – Bitter orange epicarp and mesocarp (Ph. Eur 5.0)**

### Definition

The drug consists of the dried epicarp and mesocarp of the ripe fruit of *Citrus aurantium* L. ssp. *aurantium* (*C. aurantium* L. ssp. *amara* Engl.) partly freed from the white spongy tissue of the mesocarp and endocarp. It contains minimum 20 ml/kg of essential oil calculated with reference to the dried drug.

### Macroscopic characters

The drug consists of elliptical to irregular pieces 5 cm to 8 cm long, 3 cm to 5 cm broad and about 3mm thick. The outer surface is yellowish to reddish-brown and distinctly punctate, the inner surface is yellowish to brownish-white.

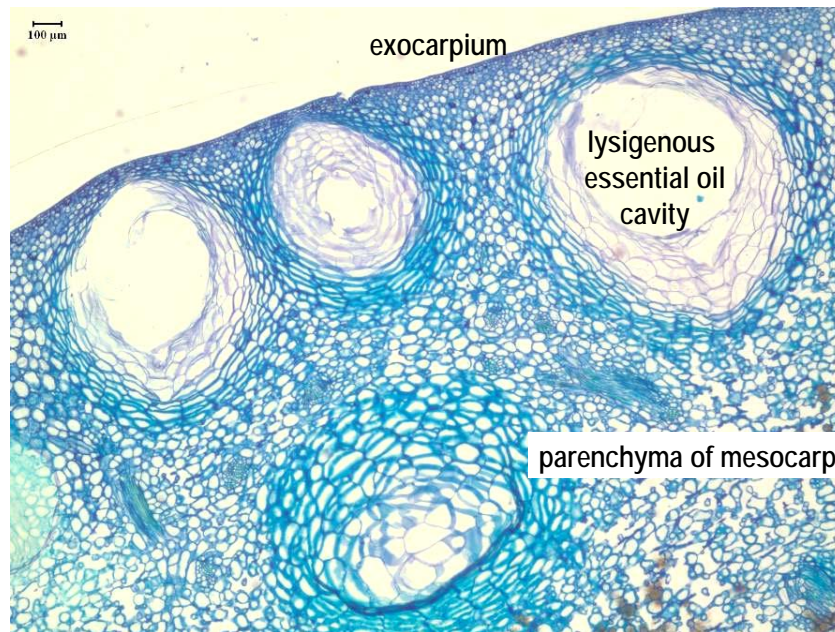


### **II.43**

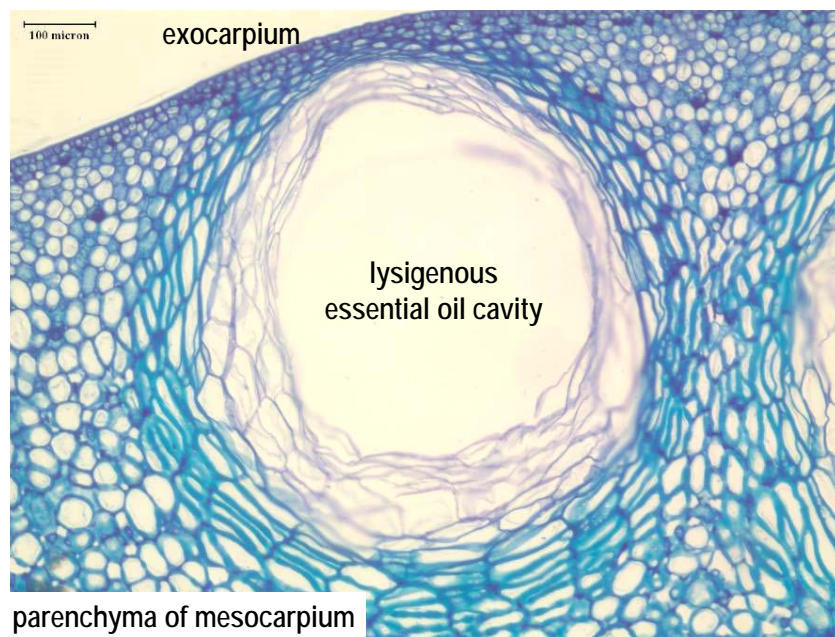
*Aurantii amari epicarpium et mesocarpium* – Bitter orange epicarp and mesocarp  
(Ph. Eur 5.0)

### Microscopic characters

The light brown powder shows small polygonal cells with slightly thickened anticlinal walls, filled with orange-red chromoplasts, and very occasional anomocytic stomata; fragments of the hypodermis showing collenchymatous thickening; groups of parenchyma with each cell containing a prism crystal of calcium oxalate; fragments of lysigenous oil glands; parenchyma containing crystals of hesperidin.



**II.44**  
Citrus aurantium fruit wall c.s. 40x



**II.45**  
Citrus aurantium fruit wall c.s. 100x

**Other characters**

The drug has aromatic odour and spicy bitter taste.

## ***Bursae pastoris herba* – Shepherd's purse flowering shoot**

### Definition

The drug consists of the dried, flowering aerial parts of *Capsella bursa pastoris* (L.) Medic.

### Macroscopic characters

The basal leaves are petiolate, lanceolar; the cauline leaves are lanceolate with sagittate base, more or less surrounding the stem, sessile. The basal leaves and the lower cauline leaves are unevenly segmented and dentate. Towards the apex the leaves become smaller and unevenly dentate to entire. The perianth consists of four free sepals and petals each. The sepals are green, ovate, the petals are white, 2 to 3 mm long. Two of the stamens are shorter, four longer, the anthers are yellow; there is a column-like nectary gland at the base of each short stamen. The silicle is heart-shaped or triangular, the seeds are small and brown.



### **II.46**

*Bursae pastoris herba* – Shepherd's purse flowering shoot



## ***Carthami flos* – Safflower florets**

### Definition

Safflower consists of the dried, tubular florets of *Carthamus tinctorius* L.

### Macroscopic characters

The capitulum comprises 30 to 90 bisexual, orange tubular florets. A capitulum is 2 to 4 cm in diameter, spherical; surrounded by rigid, leathery bracts with pointed, prickly tip. The corolla is fused, the tubular part is 4 cm long, with 5 small teeth. Its colour is first yellow, then orange, and finally turns flame-red after blooming. The white or grey, 8 mm long achenes develop from 2 carpels.



### **II.47**

#### *Carthami flos* – Safflower florets

### Microscopic characters

Club-shaped papillae can be observed on the tip of the corolla; unicellular covering hairs with thickened walls, or multicellular hairs with thin walls; as well as crystals of calcium oxalate. Glandular hairs consist of a biseriate stalk and a biseriate head comprising 4 cells. Irregularly shaped twin hairs with thick walls also occur. The anthers contain tricolpate pollen grains.

### Other characters

The drug has a mild odour, its taste is slightly bitter.

## ***Carvi fructus* – Caraway fruit (Ph. Eur. 5.0)**

### Definition

Caraway fruit consists of the whole, dry mericarps of *Carum carvi* L. It contains not less than 30 ml/kg of essential oil, calculated with reference to the anhydrous drug.

### Macroscopic characters

The fruit is a cremocarp of almost cylindrical shape. The mericarps (parts of these fruits) are usually free, greyish-brown to brown, glabrous, mostly sickle-shaped, with both ends sharply terminated. Each bears five prominent narrow ridges. When cut transversely the profile shows an almost regular pentagon and four vittae on the dorsal surface and two on the commissural surface may be seen with a lens.



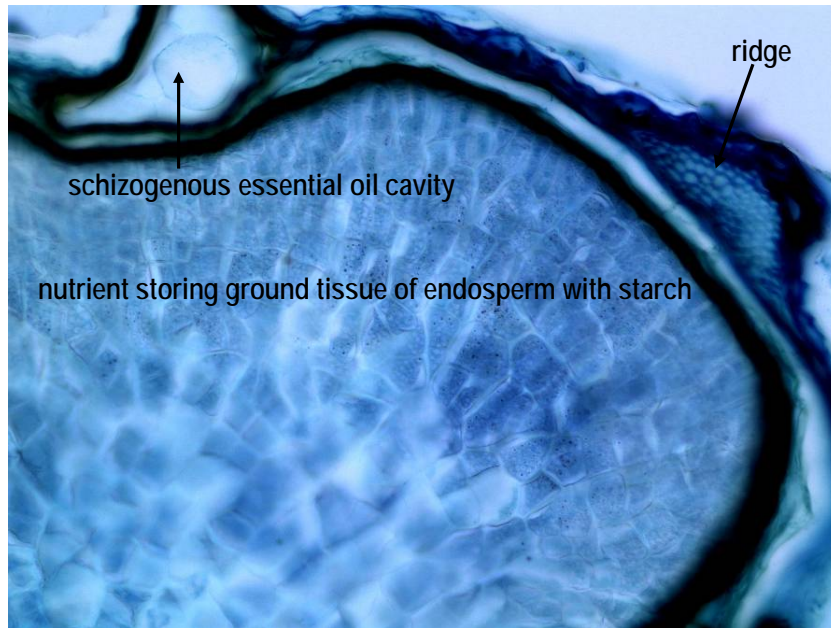
### **II.48**

*Carvi fructus* – Caraway fruit (Ph. Eur. 5.0)

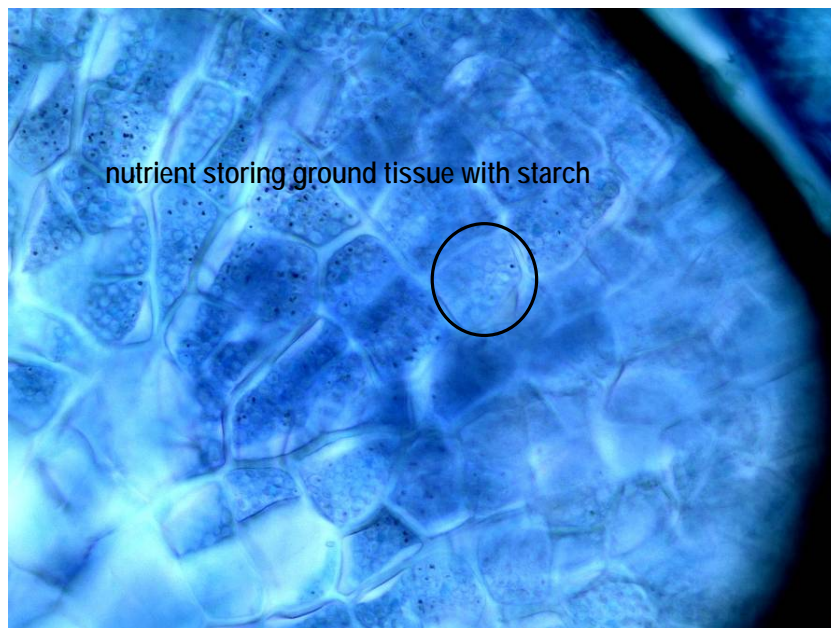
### Microscopic characters

The yellowish-brown powder shows the following diagnostic characters: fragments of the vittae composed of yellowish-brown to brown, thin-walled, polygonal secretory cells, frequently associated with a layer of thin-walled transversely elongated cells, fragments of the epicarp with thick-walled cells and occasional anomocytic stomata; numerous endosperm fragments containing aleurone grains, droplets of fatty oil and small rosette crystals of calcium oxalate; spiral vessels accompanied by sclerenchymatous fibres; rarely some fibre bundles from the carpophore; groups of rectangular to sub-rectangular sclereids from the mesocarp with moderately thickened and pitted walls may be present.





**II.49**  
Capsicum annum fruit 40x Carum carvi fruit c.s. 100x



**II.50**  
Carum carvi fruit c.s. 400x

**Other characters**

Caraway fruit has an odour reminiscent of carvone.

## ***Sennae fructus angustifoliae* – Senna pods, Tinnevely (Ph. Eur. 5.0)**

### Definition

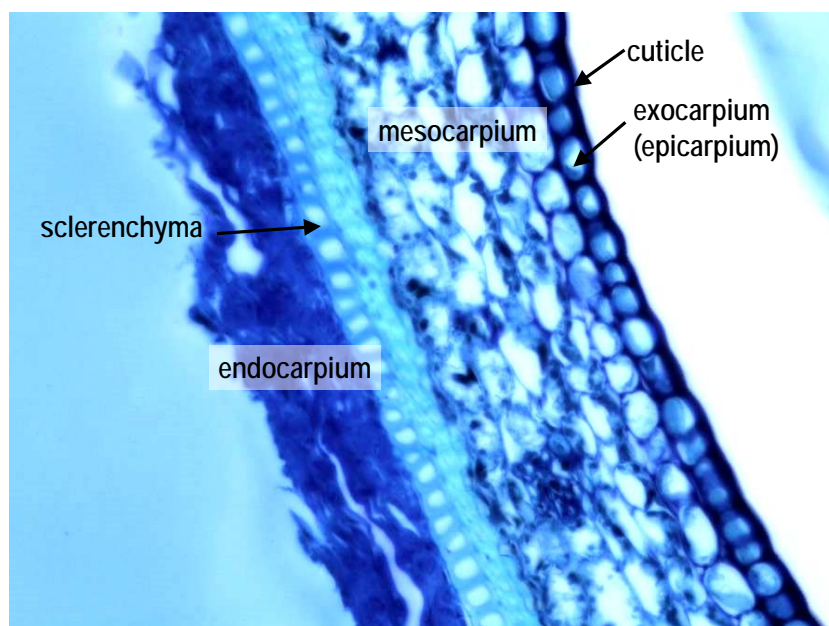
Tinnevely senna pods consist of the dried fruit of *Cassia angustifolia* Vahl. They contain not less than 2.2% of hydroxyanthracene glycosides, calculated as sennoside B with reference to the dried drug.

### Macroscopic characters

They occur as flattened, slightly reniform pods, yellowish-brown to brown with dark brown patches at the positions corresponding to the seeds. At one end is a styler point and at the other a short stalk. The pods contain five to eight flattened and obovate seeds, green to pale brown, with incomplete, wavy, transverse ridges on the testa.

### Microscopic characters

The brown powder shows the following diagnostic characters: epicarp with polygonal cells and a small number of conical warty trichomes and occasional anomocytic or paracytic stomata; fibres in two crossed layers containing prism crystals of calcium oxalate; characteristic palisade cells in the seed and stratified cells in the endosperm; clusters and prisms of calcium oxalate.



### II.51

Cassia fruit c.s. 200x

### Other characters

The drug has a slight odour.

## ***Sennae folium* – Senna leaf (Ph. Eur. 5.0)**

### Definition

Senna leaf consists of the dried leaflets of *Cassia senna* L. (*C. acutifolia* Delile), known as Alexandrian or Khartoum senna, or *Cassia angustifolia* Vahl, known as Tinnevelly senna, or a mixture of the two species. It contains not less than 2.5% of hydroxyanthracene glycosides, calculated as sennoside B with reference to the dried drug.

### Macroscopic characters

*C. senna* occurs as greyish-green to brownish-green, thin, fragile leaflets, lanceolate, mucronate, asymmetrical at the base, the maximum width being at a point slightly below the centre; the lamina is slightly undulant with both surfaces covered with fine, short trichomes. Pinnate venation is visible mainly on the lower surface, with lateral veins leaving the midrib at an angle of about 60° and anastomosing to form a ridge near the margin. *C. angustifolia* occurs as yellowish-green to brownish-green leaflets, elongated and lanceolate, slightly asymmetrical at the base. Both surfaces are smooth with a very small number of short trichomes and are frequently marked with transverse or oblique lines.



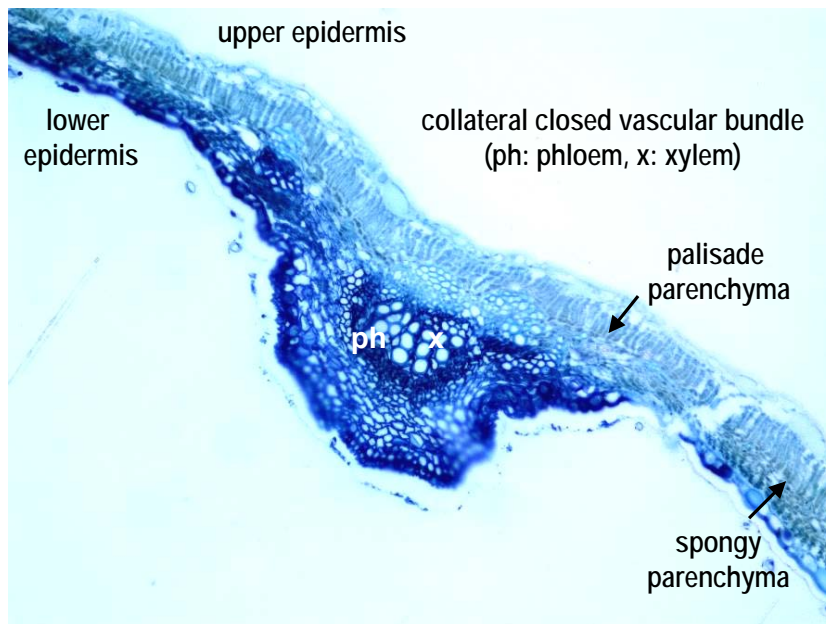
### II.52

*Sennae folium* – Senna leaf (Ph. Eur. 5.0)

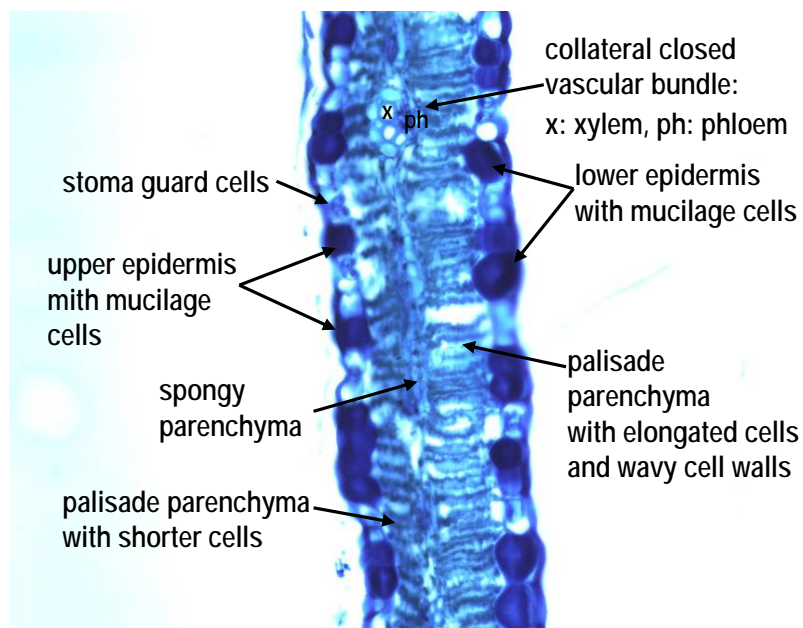
### Microscopic characters

The light green powder shows the following diagnostic characters: polygonal epidermal cells showing paracytic stomata; unicellular trichomes, conical in shape, with warty walls, isolated or attached to fragments of epidermis; fragments of vascular bundles with a crystal sheath of prismatic crystals of calcium oxalate; cluster crystals isolated or in fragments of parenchyma.





**II.53**  
Cassia leaf c.s. 100x



**II.54**  
Cassia leaf c.s. 200x

**Other characters**

Senna leaf has a slight characteristic odour.

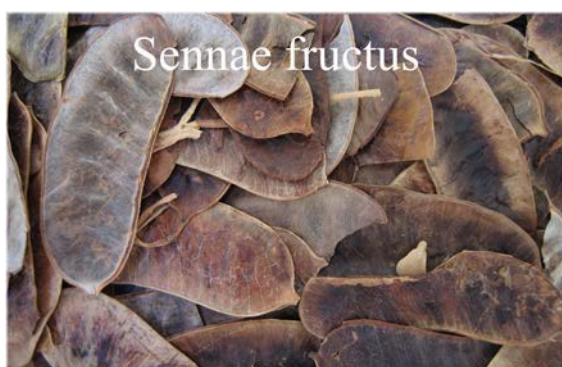
## ***Sennae fructus acutifoliae* – Senna pods, Alexandrian (Ph. Eur. 5.0)**

### Definition

Alexandrian senna pods consist of the dried fruit of *Cassia senna* L. (*C. acutifolia* Delile). They contain not less than 3.4% of hydroxyanthracene glycosides, calculated as sennoside B with reference to the dried drug.

### Macroscopic characters

They occur as flattened reniform pods, green to greenish-brown with brown patches at the positions corresponding to the seeds. At one end is a styler point and at the other a short stalk. The pods contain six or seven flattened and obovate seeds, green to pale brown, with a continuous network of prominent ridges on the testa.



### II.55

*Sennae fructus acutifoliae* – Senna pods, Alexandrian (Ph. Eur. 5.0)

### Microscopic characters

The brown powder shows the following diagnostic characters:

epicarp with polygonal cells and a small number of conical warty trichomes and occasional anomocytic or paracytic stomata; fibres in two crossed layers containing prism crystals of calcium oxalate; characteristic palisade cells in the seed and stratified cells in the endosperm; clusters and prisms of calcium oxalate.

### Other characters

Alexandrian senna pods have a slight odour.



## ***Centaurii herba* – Centaury (Ph. Eur. 5.0)**

### Definition

Centaury consists of the whole or cut dried flowering aerial parts of *Centaurium erythraea* Rafn (*C. minus* Moench, *C. umbellatum* Gilib., *Erythraea centaurium* (L.) Pers.).

### Macroscopic characters

The hollow cylindrical, light green to dark brown stem has longitudinal ridges, and is branched only in its upper part. The sessile leaves are entire, decussately arranged, and have an ovate to lanceolate lamina, up to about 3 cm long. Both surfaces are glabrous and green to brownish-green. The inflorescence is diaxially branched. The tubular calyx is green and has five lanceolate, acuminate teeth. The corolla consists of a whitish tube divided in five elongated lanceolate pink lobes. Five stamens are present attached to the corolla tube. The ovary is superior and has a short style, a broad bifid stigma and numerous ovules. Cylindrical capsules with small brown markedly rough seeds are frequently present.



### **II.56**

*Centaurii herba* – Centaury (Ph. Eur. 5.0)

### Microscopic characters

The powder is greenish-yellow to brownish. The powder shows numerous fragments of stem containing sclerenchymatous fibres and narrow vessels with bordered pits or with spiral or reticulate thickening, as well as rectangular pitted cells of the pith and medullary rays; fragments of leaves with sinuous epidermal cells and striated cuticle,

especially over the margins and surrounding the stomata, anisocytic stomata and cells of the mesophyll with crystals of calcium oxalate of various types; fragments of calyx and corolla, those of the calyx with straight-walled epidermal cells, epidermis of the corolla with obtuse papillae and radially striated cuticle; parts of the endothecium with reticulate or ridge-shaped wall thickenings; triangularly rounded to elliptical, yellow pollen grains with a finely grained exine and three germinal pores; fragments of the wall of the fruit capsule composed of crossed layers of fusiform cells; small yellowish-brown seeds with a raised reticulate, dark brown structure formed by the coarse lateral walls of their epidermis.

**Other characters**

Centaury has a very bitter taste.

## ***Ipecacuanhae radix* – Ipecacuanha root (Ph. Eur. 5.0)**

### Definition

Ipecacuanha root consists of the fragmented and dried underground organs of *Cephaëlis ipecacuanha* (Brot.) A. Rich., known as Matto Grosso ipecacuanha, or of *Cephaëlis acuminata* Karsten, known as Costa Rica ipecacuanha, or of a mixture of both species. It contains not less than 2.0% of total alkaloids, calculated as emetine with reference to the dried drug. The principal alkaloids are emetine and cephaëline.

### Macroscopic characters

*Cephaëlis ipecacuanha*: The root occurs as somewhat tortuous pieces, from dark reddish-brown to very dark brown, closely annulated externally, having rounded ridges completely encircling the root; the fracture is short in the bark and splintery in the wood. The transversely cut surface shows a wide greyish bark and a small uniformly dense wood. The rhizome occurs as short lengths usually attached to roots, cylindrical, up to 2 mm in diameter, finely wrinkled longitudinally and with pith occupying approximately one-sixth of the whole diameter.

*Cephaëlis acuminata*: The root in general resembles the root of *C. ipecacuanha*, but differs in the following particulars: it is often up to 9 mm thick; the external surface is greyish-brown or reddish-brown with transverse ridges at intervals, extending about half-way round the circumference and fading at the extremities into the general surface level.



### II.57

*Ipecacuanhae radix* – Ipecacuanha root (Ph. Eur. 5.0)

### Microscopic characters

The powder is light grey to yellowish-brown. The powder shows the following diagnostic characters: parenchymatous cells, raphides of calcium oxalate either in bundles or scattered throughout the powder; fragments of tracheids and vessels with bordered pits; larger vessels and sclereids from the rhizome. The powder shows simple or two- to eight-compound starch granules contained in parenchymatous cells.

### Other characters

Ipecacuanha root has a slight odour.

## ***Lichen islandicus* – Iceland moss (Ph. Eur. 5.0)**

### Definition

Iceland moss consists of the whole or cut dried thallus of *Cetraria islandica* (L.) Acharius s.l.

### Macroscopic characters

The thallus, up to 15 cm long, is irregularly dichotomous and consists of glabrous, groove-shaped or almost flat, stiff, brittle bands, sometimes serrated with the margin appearing ciliated (pycnidia). The upper surface is greenish to greenish-brown, the lower surface is greyish-white to light brownish and shows whitish, depressed spots (so-called respiratory cavities). On the apexes of the terminal lobes, very rarely, there are brown, discoid apothecia.



### II.58

*Lichen islandicus* – Iceland moss (Ph. Eur. 5.0)

### Microscopic characters

The greyish-brown powder shows numerous fragments of the pseudoparenchyma consisting of narrow-lumened, thick-walled hyphae from the marginal layer and wide-lumened hyphae from the adjacent layer consisting of loosely entwined hyphae, in which, in the medullary zone, greenish to brownish algae cells up to 15 µm in diameter, are embedded; occasionally marginal fragments of the thallus with tube-like or cylindrical spermogonia.

### Other characters

The drug has a bitter, mucilaginous taste.



## ***Chamomillae romanae flos* – Chamomile flower, Roman (Ph. Eur. 5.0)**

### Definition

Roman chamomile flower consists of the dried flower-heads of the cultivated double variety of *Chamaemelum nobile* (L.) All. (*Anthemis nobilis* L.). It contains not less than 7 ml/kg of essential oil.

### Macroscopic characters

The capitula have a diameter of 8 mm to 20 mm; the receptacle is solid; the base of the receptacle is surrounded by an involucre consisting of 2 or 3 rows of compact and imbricated bracts with scarious margins. Most florets are ligulate, but a few pale yellow tubular florets occur in the central region. Ligulate florets are white, dull, lanceolate and reflexed with a dark brown, inferior ovary, a filiform style and a bifid stigma; tubular florets have a five-toothed corolla tube, 5 syngenesious, epipetalous stamens and a gynoeceium similar to that of the ligulate florets.



### II.59

*Chamomillae romanae flos* – Chamomile flower, Roman (Ph. Eur. 5.0)

### Microscopic characters

All parts of the flower-heads are covered with numerous small yellow glistening glandular trichomes. The involucre bracts and paleae have epidermal cells in longitudinal rows, sclerified at the base and they are covered with conical trichomes, each composed of 3 or 4 very short base cells and a long, bent, terminal cell. The corolla of the ligulate flowers consists of papillary cells with cuticular striations. The ovaries of both kinds of florets have at their base a sclerous ring consisting of a single row of cells. The receptacle and the ovaries contain small clusters of calcium oxalate. The pollen grains are rounded and triangular.

### Other characters

It has a strong and characteristic odour.



## ***Chelidonii herba* – Greater celandine (Ph. Eur. 5.0)**

### Definition

The drug consists of the dried, whole or cut aerial parts of *Chelidonium majus* L. collected during flowering. It contains minimum 0.6% of total alkaloids, expressed as chelidoniumine calculated with reference to the dried drug.

### Macroscopic characters

The stems are rounded, ribbed, yellowish to greenish-brown, somewhat pubescent, about 3 mm to 7 mm in diameter, hollow and mostly collapsed. The leaves are thin, irregularly pinnate, the leaf segments ovate to oblong with coarsely crenate margins, the terminal leaflet often three-lobed; the adaxial surface is bluish-green and glabrous, the abaxial surface paler and pubescent, especially on the veins. The flowers have 2 deeply concavo-convex sepals, readily removed, and 4 yellow, broadly ovate, spreading petals; the stamens are numerous, yellow, and a short style arises from a superior ovary; long, capsular, immature fruits are rarely present.



### II.60

*Chelidonii herba* – Greater celandine (Ph. Eur. 5.0)

### Microscopic characters

The powder is dark greyish-green to brownish-green. The powder shows the following diagnostic characters: numerous fragments of leaves in surface view, the epidermal cells with sinuous walls; anomocytic stomata occur on the abaxial surface only; covering trichomes long, uniseriate, with thin walls and usually fragmented; vascular tissue from the leaves and stems with groups of fibres, pitted and spirally thickened vessels and associated latex tubes with yellowish-brown contents; occasional fragments of the

corolla with thin-walled, partly papillose cells containing numerous pale yellow droplets of oil. The pollen grains are spherical.

**Other characters**

The drug has characteristic smell, and bitterish, pungent, burning taste.

## ***Cinnamomi cortex* – Cinnamon (Ph. Eur. 5.0)**

### Definition

Cinnamon consists of the dried bark, freed from the outer cork and the underlying parenchyma, of the shoots grown on cut stock of *Cinnamomum zeylanicum* Nees. It contains not less than 12 ml/kg of essential oil.

### Macroscopic characters

The bark is about 0.2 mm to 0.8 mm thick and occurs in closely-packed compound quills made up of single or double quills. The outer surface is smooth, yellowish-brown with faint scars marking the position of leaves and axillary buds and has fine, whitish and wavy longitudinal striations. The inner surface is slightly darker and longitudinally striated. The fracture is short and fibrous.



### **II.61**

*Cinnamomi cortex* – Cinnamon (Ph. Eur. 5.0)

### Microscopic characters

The powder is yellowish to reddish-brown. The powder shows the following diagnostic characters: groups of rounded sclereids with pitted, channelled and moderately thickened walls; numerous colourless single fibres, often whole with narrow lumen and thickened, lignified walls and few pits; small needle crystals of calcium oxalate. The powder shows abundant starch granules. Cork fragments are absent or very rare.

### Other characters

Cinnamon has a characteristic, aromatic odour.

## ***Secale cornutum* – Ergot (the sclerotium itself)**

### Definition

Ergot is the overwintering form (sclerotium) of a fungus – *Claviceps purpurea* (Fries) Tulasne – that grows on the ears of rye and other related cereals.

### Macroscopic characters

The drug is 1.5 to 4 cm long, 2 to 5 mm thick, deep purple, sometimes slightly curved, spindle-shaped structure (sclerotium).



### **II.62**

*Secale cornutum* – Ergot (the sclerotium itself)

### Microscopic characters

At the edge of the pseudoparenchyma the cells are small, densely packed, and they are arranged more and more loosely towards the centre. The cells of the inner layer are lighter in colour, elongated, hypha-shaped, and contain globular oil droplets.

### Other characters

The drug is odourless or has a characteristic fungus odour; its taste is first sweetish, later pungent.

## ***Cardui benedicti herba* – St. Benedict's thistle flowering shoot**

### Definition

The drug consists of the dried, flowering aerial parts of *Cnicus benedictus* L.

### Macroscopic characters

The stem is greenish or brownish-red, sticky-hirsute, pentangular, ribbed. The leaves are alternately arranged, sessile, long-lanceolate, the lamina is lobed or segmented, tapering into the petiole, woolly. The leaf edge is dentate, the prickly teeth ending in a sharply pointed tip. On the lower leaf surface the veins are protruding, with lighter shades. The ovate capitulum is apical, the involucre bracts are overlapping, dome-shaped, membranous, their outer surface is shiny. The outer bracts are ovate, ending in long, woolly edged prickles. The middle and inner ones are long-lanceolate, bending outwards, branching, ending in purplish spines. The capitulum comprises yellow, tubular florets; 4 to 6 florets on the edge of the capitulum are zygomorphic, with 3 teeth, sterile, with no stamens or style. The florets bear a pappus of tri(di)seriate hairs; the anthers fuse into a 5-mm-long tube. The fruit is an achene (cypsela) bearing a pappus.



### II.63

*Cardui benedicti herba* – St. Benedict's thistle flowering shoot

### Microscopic characters

In transverse section the vascular tissue can be observed in collateral open bundles in the stem, and in collateral closed bundles in the leaves. Covering trichomes consist of a 4-celled stalk and a very long end cell, or of 10 to 30 rectangular cells. Uniseriate glandular trichomes can be observed with multicellular stalk. Asteraceae-type glandular hairs are biseriate, multilevel. Sclerenchymatous fibres of the involucre bracts can be observed. Stomata are anisocytic.



**Other characters**

The drug has a mild, characteristic odour; and tastes bitter.

## **Myrrha – Myrrh (Ph. Eur. 5.0)**

### Definition

Myrrh consists of a gum-resin, hardened in air, obtained by incision or produced by spontaneous exudation from the stem and branches of *Commiphora molmol* Engler and/or

other species of *Commiphora*.

### Macroscopic characters

The light or dark orange-brown, irregular or roundish grains or pieces of different size show components of various colours. Their surface is mostly covered with grey to yellowish-brown dust.



### **II.64**

*Myrrha – Myrrh (Ph. Eur. 5.0)*

### Microscopic characters

The powder is brownish-yellow to reddish-brown. The powder shows only a few tissue fragments from the original plants including the following: reddish-brown cork fragments; single or grouped polyhedral to elongated stone cells with partly strongly thickened, pitted and lignified walls with a brownish content; fragments of thin-walled parenchyma and sclerenchymatous fibres ; irregular prismatic to polyhedral crystals of calcium oxalate.

### Other characters

Myrrh has a bitter taste.

## ***Coriandri fructus* – Coriander (Ph. Eur. 5.0)**

### Definition

Coriander consists of the dried cremocarp of *Coriandrum sativum* L. It contains not less than 3 ml/kg of essential oil, calculated with reference to the dried drug.

### Macroscopic characters

The cremocarp is yellowish brown or light brown and is more or less spherical, about 1.5 mm to 5 mm in diameter, or oval from 2 mm to 6 mm long. The mericarps (parts of the fruits) are usually tightly connected. The cremocarp is glabrous and has ten wavy, slightly raised primary ridges and eight straight, more prominent secondary ridges. The stylopod crowns the apex. The mericarps are concave on the internal surface. A small fragment of the pedicel may be present.

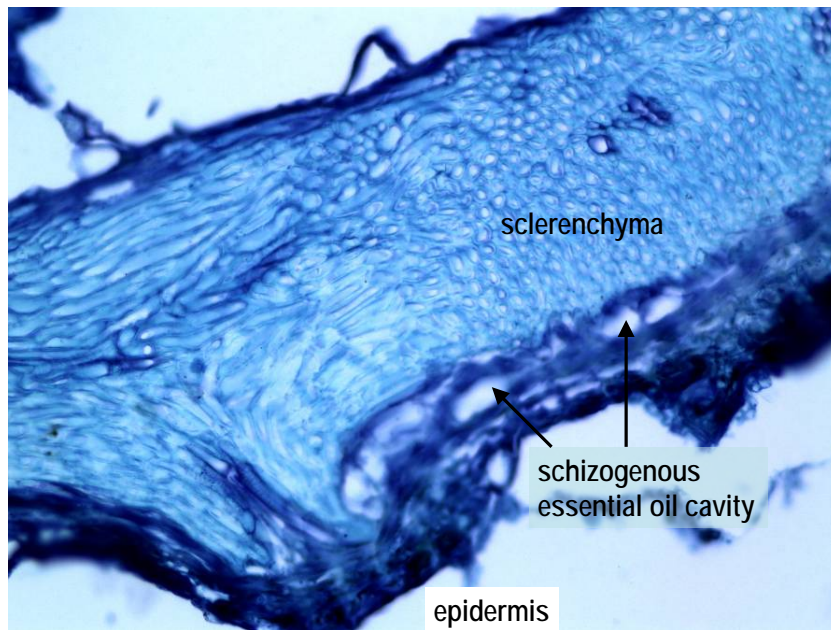


### **II.65**

*Coriandri fructus* – Coriander (Ph. Eur. 5.0)

### Microscopic characters

The brown powder shows numerous oil droplets; fragments of endosperm with small thick-walled regular cells containing microcrystals and microrosettes of calcium oxalate and oil droplets; fragments of endocarp with very narrow cells having a parquetry arrangement and usually associated with a layer of thin-walled rectangular sclereids of the mesocarp; fragments from the sclerenchymatous layer of the mesocarp with short, strongly thickened, pitted, fusiform cells occurring in layers with the cells of adjacent layers approximately at right angles to one another; fragments of parenchyma with small, thick-walled cells ; occasional fragments of vascular bundles.



**II.66**  
Coriandrum sativum fruit c.s. 200x

**Other characters**

The drug has a characteristic smell. It has a spicy taste.

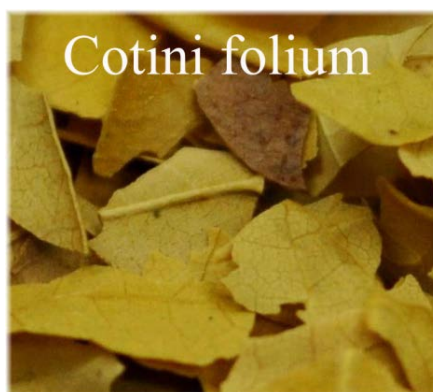
## ***Cotini folium* – Smoke tree leaf**

### Definition

The drug consists of the green summer leaves of the bush or small tree *Cotinus coggygia* (Scop.).

### Macroscopic characters

The spirally arranged leaves have a rigid petiole, are long, broad oval or obovate, with entire edge, obtuse tip, glabrous, sometimes with fluffy hairs on the lower leaf surface. They turn red, purple to golden in autumn.



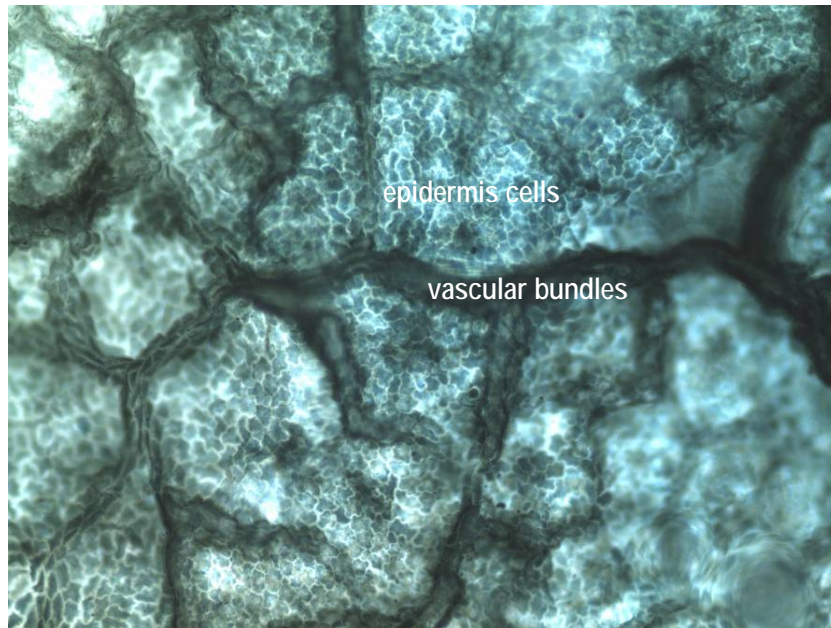
### **II.67**

*Cotini folium* – Smoke tree leaf

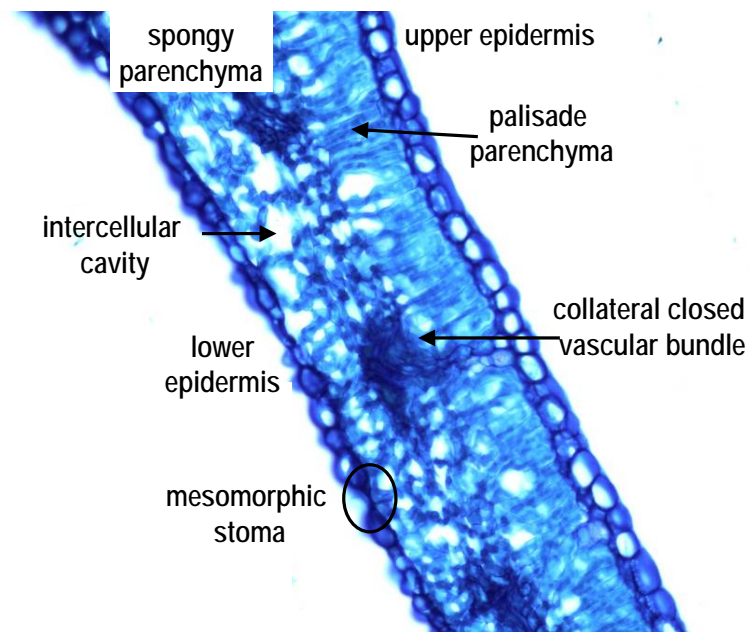
### Microscopic characters

Epidermis is uniseriate, comprising rectangular cells on both the upper and lower leaf surface. Mesomorphic stomata can be observed on the abaxial surface in the transverse section of the leaf. The mesophyll consists of palisade and spongy parenchyma, functioning as chlorenchyma, and intercellular cavities. The vascular bundles are closed collateral.





**II.68**  
Cotinus coggygia leaf cleared 100x



**II.69**  
Cotinus coggygia leaf c.s. 200x

**Other characters**

The drug has no characteristic odour, its taste is characteristic, adstringent.

## ***Crataegi folium cum flore* – Hawthorn leaf and flower (Ph. Eur. 5.0)**

### Definition

Whole or cut, dried flower bearing branches of *Crataegus monogyna* Jacq. (Lindm.), *C. laevigata* (Poiret) D.C. (*C. oxyacanthoides* Thuill.) or their hybrids or, more rarely, other European *Crataegus* species including *C. pentagyna* Waldst. et Kit. ex Willd., *C. nigra* Waldst. et Kit., *C. azarolus* L.

*Content*: minimum 1.5 per cent of flavonoids expressed as hyperoside (C<sub>21</sub>H<sub>20</sub>O<sub>12</sub>; Mr 464.4) (dried drug).

### Macroscopic characters

The stems are dark brown, woody, 1-2.5 mm in diameter, bearing alternate, petiolate leaves with small, often deciduous stipules and corymb-like inflorescences of numerous small white flowers. The leaves are more or less deeply lobed with slightly serrate or almost entire margins; those of *C. laevigata* are pinnately lobed or pinnatifid with 3, 5 or 7 obtuse lobes, those of *C. monogyna* pinnatisect with 3 or 5 acute lobes; the adaxial surface is dark green to brownish-green, the abaxial surface is lighter greyish-green and shows a prominent, dense, reticulate venation. The leaves of *C. laevigata*, *C. monogyna* and *C. pentagyna* are glabrous or bear only isolated trichomes, those of *C. azarolus* and *C. nigra* are densely pubescent. The flowers have a brownish-green calyx composed of 5 free, reflexed sepals, a corolla composed of 5 free, yellowish-white to brownish, rounded or broadly ovate and shortly unguiculate petals and numerous stamens. The ovary consists of 1 to 5 carpels, each with a long style and containing a single ovule; in *C. monogyna* there is 1 carpel, in *C. laevigata* 2 or 3, in *C. azarolus* 2 or 3, or sometimes only 1, in *C. pentagyna* 5 or, rarely, 4.



### II.70

*Crataegi folium cum flore* – Hawthorn leaf and flower (Ph. Eur. 5.0)

**Microscopic characters**

The powder is yellowish-green, and shows unicellular covering trichomes, usually with a thick wall and wide lumen, almost straight to slightly curved, pitted at the base; fragments of leaf epidermis with cells which have sinuous to polygonal anticlinal walls and with large stomata surrounded by 4 to 7 subsidiary cells; parenchymatous cells of the mesophyll containing calcium oxalate clusters, usually measuring 10-20  $\mu\text{m}$ , solitary pyramidal crystals of calcium oxalate associated with the veins; fragments of petals showing rounded polygonal epidermal cells, strongly papillose, with thick walls, the cuticle of which clearly shows wavy striations; fragments of anthers showing endothecium with an arched and regularly thickened margin; fragments of stems containing collenchymatous cells, bordered pitted vessels and groups of lignified sclerenchymatous fibres with narrow lumina; numerous spherical to elliptical or triangular pollen grains up to 45  $\mu\text{m}$  in diameter, with 3 germinal pores and a faintly granular exine.

**Other characters**

The drug has a mild odour; its taste is slightly bitter and astringent.

### ***Crataegi folii cum flore extractum siccum* – Hawthorn leaf and flower dry extract (Ph. Eur. 5.0)**

**Definition**

Extract produced from *Hawthorn leaf and flower*.

**Content:**

— for aqueous extracts: minimum 2.5 per cent of flavonoids, expressed as hyperoside ( $\text{C}_{21}\text{H}_{20}\text{O}_{12}$ ; *Mr* 464.4) (dried extract);

— for hydroalcoholic extracts: minimum 6.0 per cent of flavonoids, expressed as hyperoside ( $\text{C}_{21}\text{H}_{20}\text{O}_{12}$ ; *Mr* 464.4) (dried extract).

The extract is produced from the drug by a suitable procedure using either water or a hydroalcoholic solvent equivalent in strength to a minimum of 45 per cent *V/V* ethanol.

**Other characters**

light brown or greenish-brown powder.

### ***Crataegi fructus* – Hawthorn berries (Ph. Eur. 5.0)**

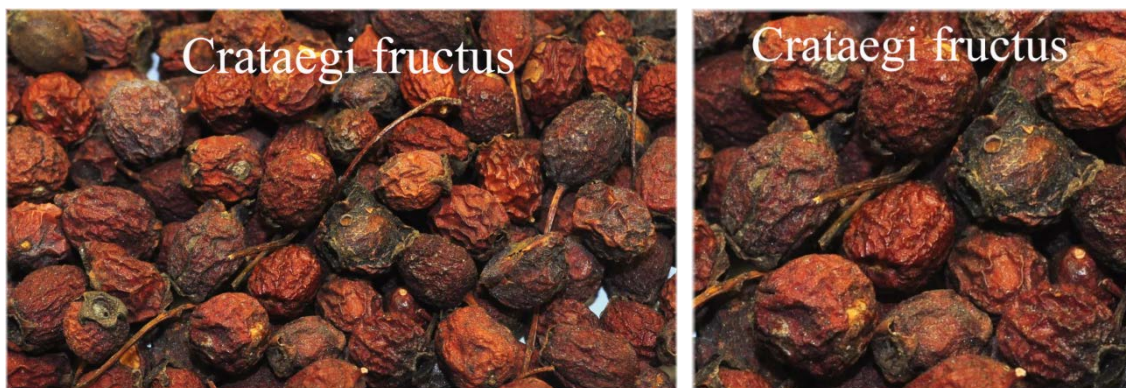
**Definition**

Hawthorn berries consist of the dried false fruits of *Crataegus monogyna* Jacq. (Lindm.), or *Crataegus laevigata* (Poir.) D.C. or their hybrids or a mixture of these false fruits. They contain not less than 1.0% of procyanidins, calculated as cyanidin chloride with reference to the dried drug.

**Macroscopic characters**

The false fruit of *Crataegus monogyna* is obovate to globular. It is generally reddish-brown to dark red. The surface is pitted or, more rarely, reticulated. The upper end of the fruit is crowned by the remains of five reflexed sepals surrounding a small sunken disc with a shallow, raised rim. The remains of the style occur in the centre of the disc

with tufts of stiff, colourless hairs at the base. At the lower end of the fruit there is a short length of pedicel or, more frequently, a small pale circular scar where the pedicel was attached. The receptacle is fleshy and encloses a yellowish-brown, ovoid fruit with a hard, thick wall containing a single, elongated, pale brown, smooth and shiny seed. The false fruit of *Crataegus laevigata* contains two to three stony fruits, ventrally flattened, with short hairs at the top. Frequently, in the centre of the disc of the false fruit occur the remains of the two styles.



## II.71

*Crataegi fructus* – Hawthorn berries (Ph. Eur. 5.0)

### Microscopic characters

The greyish-red powder shows covering trichomes from inside the disc which are long, unicellular, frequently bent, tapering to a point, with smooth, much thickened and lignified walls, parenchymatous receptacle fragments, the outer layer with red colouring matter, some cells of the inner layers containing small cluster crystals of calcium oxalate; occasional fragments including groups of sclereids and vascular strands with associated files of cells containing prisms of calcium oxalate; pericarp fragments consisting of large thick-walled sclereids with numerous pits, some of which are conspicuously branched; a few fragments of the testa having an epidermal layer composed of hexagonal, mucilaginous cells beneath which is a yellowish-brown pigment layer containing numerous elongated prisms of calcium oxalate; thin-walled parenchyma of the endosperm and cotyledons containing aleurone grains and globules of fixed oil.

### Other characters

The drug has a sweet mucilaginous taste.



## ***Croci stigma* – Saffron**

### Definition

The drug consists of the dried stigmata of the flowers of *Crocus sativus* L.

### Macroscopic characters

The 2 to 5 cm stigma is conspicuous, with deep red colour, divided into 3 lobes.



### **II.72**

*Croci stigma* – Saffron



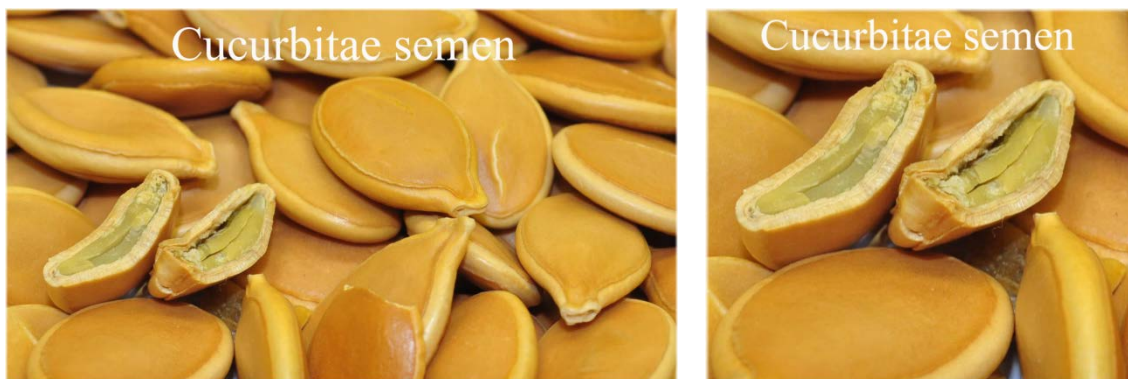
## ***Cucurbitae semen* – Pumpkin seed**

### Definition

The drug consists of the seeds of *Cucurbita pepo* L.

### Macroscopic characters

The seeds are white or yellowish-white, approx. 18 to 20 mm long, 9 to 11 mm wide, flattened, but somewhat thicker at the middle, ovate, with an acute tip at one end and a 1-mm-wide margin running around the edge of the seed.



### **II.73**

*Cucurbitae semen* – Pumpkin seed

### Microscopic characters

When examined under a microscope, the following parts can be observed in from outside to inside: cuticle, layers of the seed coat: epidermis, hypodermis, sclerenchyma and spongy parenchyma. The cells of the hypodermis are small, round, reticulately dotted, similarly to the cells of the spongy tissue, but the latter cells are larger, with intercellular cavities among them. The sclerenchymatous layer is uniseriate, with strongly thickened cell walls, yellowish, dotted, 2 to 4 times as long as wide in surface view, with sinuous anticlinal cell walls.

### Other characters

The drug tastes mucilaginous-sweet, oily.

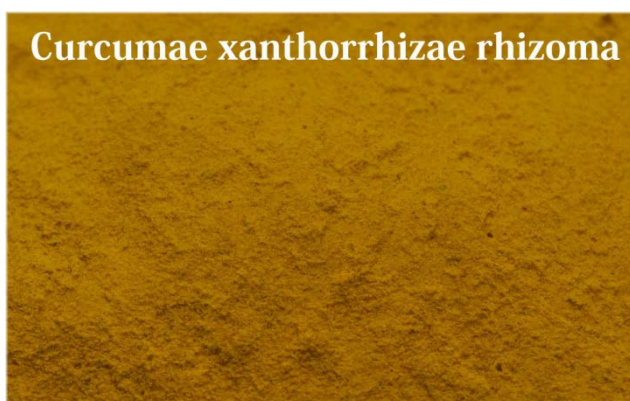
## ***Curcumae xanthorrhizae rhizoma* – Turmeric, Javanese (Ph. Eur. 5.0)**

### Definition

Javanese turmeric consists of the dried rhizome, cut in slices, of *Curcuma xanthorrhiza* Roxb. It contains not less than 50 ml/kg of essential oil and not less than 1.0% of dicinnamoyl methane derivatives expressed as curcumin, both calculated with reference to the anhydrous drug.

### Macroscopic characters

The drug consists of orange-yellow to yellowish-brown or greyish-brown slices, mostly peeled. Fragments of the brownish-grey cork are sporadically present. The transverse surface is yellow with dark spots in the paler centre. The fracture is short and finely grained.



### II.74

*Curcumae xanthorrhizae rhizoma* – Turmeric, Javanese (Ph. Eur. 5.0)

### Microscopic characters

The reddish-brown powder shows fragments of colourless parenchyma with orange-yellow to yellowish-brown secretory cells; fragments of reticulate and other vessels; rare fragments of cork and epidermis and fragments of thick-walled unicellular acute trichomes. The powder shows numerous stratified, ovoid to irregular starch granules with an eccentric hilum and marked, concentric striations.

### Other characters

Javanese turmeric has an aromatic odour.

## ***Citronellae aetheroleum* – Citronella oil (Ph. Eur. 5.0)**

### Definition

Oil obtained by steam distillation from the fresh or partially dried aerial parts of *Cymbopogon winterianus* Jowitt.

### Character

Pale yellow to brown-yellow liquid, with a very strong odour of citronellal.



### **II.75**

*Citronellae aetheroleum* – Citronella oil (Ph. Eur. 5.0)



## ***Stramonii folium* – Stramonium leaf (Ph. Eur. 5.0)**

### Definition

Stramonium leaf consists of the dried leaf or of the dried leaf, flowering tops and occasionally, fruit-bearing tops of *Datura stramonium* L. and its varieties. It contains not less than 0.25% of total alkaloids, calculated as hyoscyamine with reference to the drug dried at 100 °C to 105 °C. The alkaloids consist mainly of hyoscyamine with varying proportions of hyoscyne (scopolamine).

### Macroscopic characters

The leaves are dark brownish-green to dark greyish-green, often much twisted and shrunken during drying, thin and brittle, ovate or triangular-ovate, dentately lobed with an acuminate apex and often unequal at the base. Young leaves are pubescent on the veins, older leaves are nearly glabrous. Stems are green or purplish-green, slender, curved and twisted, wrinkled longitudinally and sometimes wrinkled transversely, branched dichasially, with a single flower or an immature fruit in the fork. Flowers, on short pedicels, have a gamosepalous calyx with 5 lobes and trumpet-shaped brownish-white or purplish corolla. The fruit is a capsule, usually covered with numerous short, stiff emergences; seeds are brown to black with a minutely pitted testa.

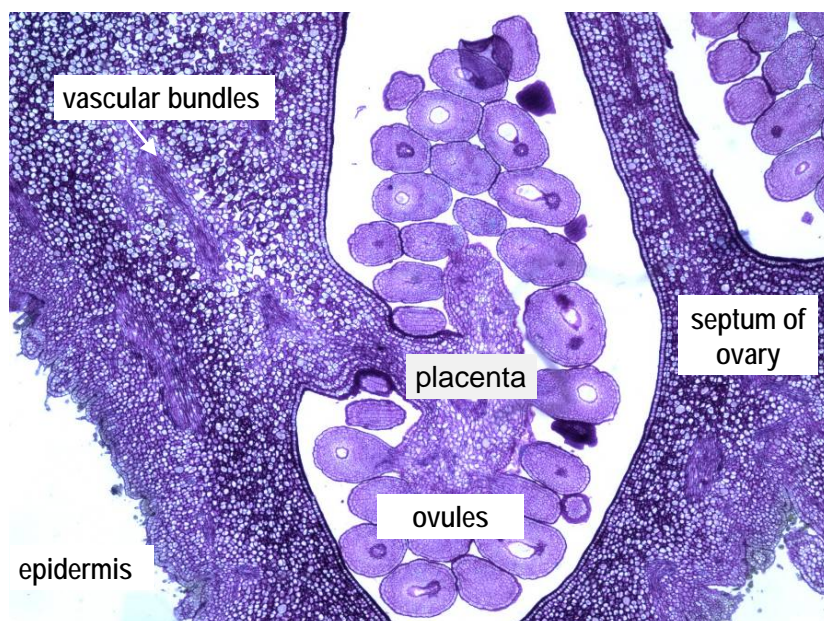


### II.76

*Stramonii folium* – Stramonium leaf (Ph. Eur. 5.0)

### Microscopic characters

The greyish-green powder shows the following diagnostic characters: fragments of leaf lamina showing epidermal cells with slightly wavy anticlinal walls and smooth cuticle; stomata are more frequent on the lower epidermis (anisocytic and anomocytic); covering trichomes are conical, uniseriate with 3 to 5 cells and warty walls; glandular trichomes are short and clavate with heads formed by 2 to 7 cells; dorsiventral mesophyll, with a single layer of palisade cells and a spongy parenchyma containing cluster crystals of calcium oxalate; annularly and spirally thickened vessels. The powdered drug may also show the following: fibres and reticulately thickened vessels from the stem; subspherical pollen grains; fragments of the corolla with papillose epidermis; seed fragments containing yellowish-brown, sinuous, thick-walled sclereids of testa; occasional solitary prisms and microsphenoidal (sandy) crystals of calcium oxalate.



**II.77**

*Datura stramonium* ovary c.s. 40x

**Other characters**

Stramonium leaf has an unpleasant odour.



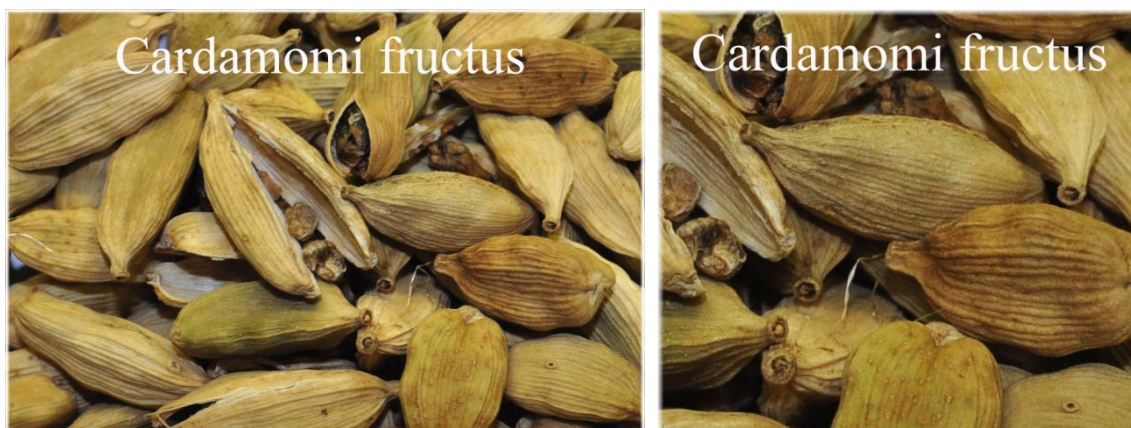
## ***Cardamomi fructus* – Cardamom**

### **Definition**

The drug consists of the mature, dried fruits of *Elettaria cardamomum* White et Maton.

### **Macroscopic characters**

The many-seeded, trilocular capsule is 1 to 2 cm long, 0.6 to 0.8 cm wide, greenish-grey, with pointed tip at both ends and bearing a peduncle at one end, in cross section resembling a three-pointed star. The seeds are reddish-brown, 2 to 3 mm in diameter, polygonal.



### **II.78**

#### *Cardamomi fructus* – Cardamom

### **Microscopic characters**

The powder of the drug shows fragments of the seed coat with fibre-like epidermis cells; thin-walled cells of the diagonal cell layer; large oil cells; fragments of the endosperm with calcium oxalate crystals; and fragments of the perisperm filled with starch, with grooves on the cell walls and wart-shaped bulging parts.

### **Other characters**

The seeds have a pleasant odour.

## ***Epilobii herba* – Willowherb**

### Definition

Willowherb consists of the dried, flowering aerial parts of various *Epilobium* species (*Epilobium parviflorum* Schreb., *E. roseum* Schreb.), whole or fragmented.

### Macroscopic characters

The shoot is 20 to 50 cm long, branching, 3 to 4 mm thick. The leaves are decussate, sessile, hirsute or glabrous, narrow ovate, with densely dentate edge, acute tip. The flowers are 4-merous. The sepals are obtuse, ovate to lanceolate; the petals are truncate, 4 to 9 mm long, cordate, free, pink to red. There are 8 stamens arranged in two whorls; the stigma has 4 lobes, the ovary is hypogynous, a few cm long, slender. The fruit is a silique-like capsule, dehiscent along 4 sutures. The seeds are brown to black, covered with hairs.

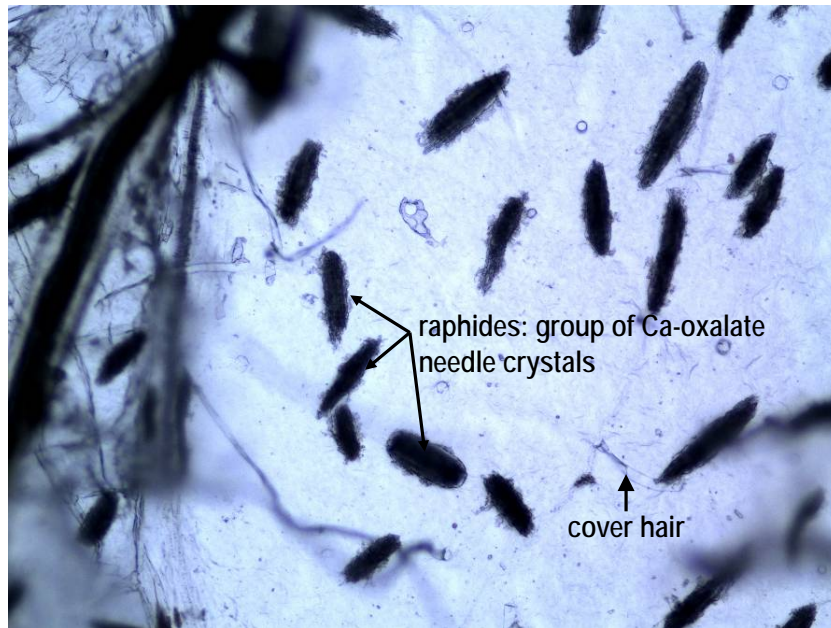


### **II.79**

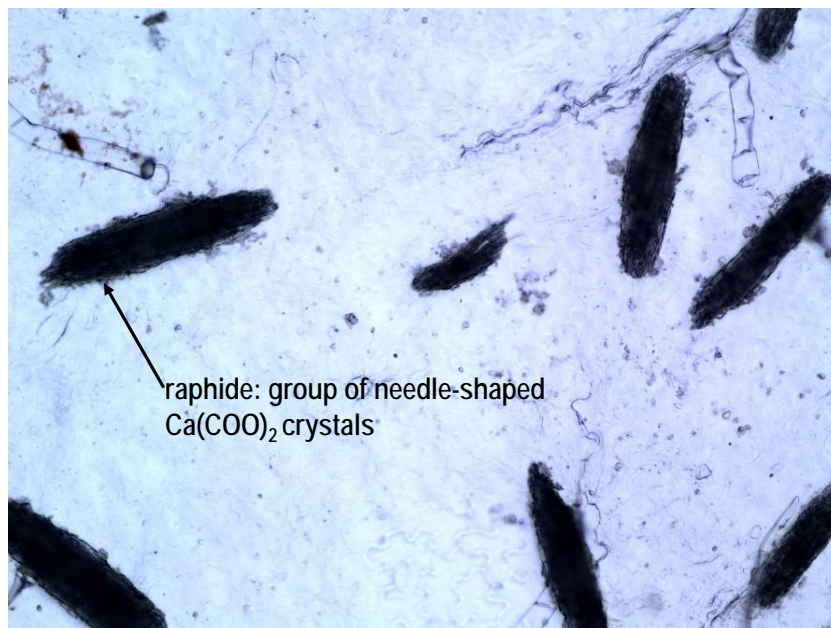
*Epilobii herba* – Willowherb

### Microscopic characters

The cleared preparations show numerous raphide crystals of calcium oxalate – depending on the source species the raphides are scattered, or arranged along the veins.



**II.80**  
Epilobium leaf cleared 100x



**II.81**  
Epilobium leaf cleared 200x



## ***Ephedrae herba* – Ephedra**

### Definition

The drug consists of the dried aerial parts of *Ephedra distachya* L.

### Macroscopic characters

The shoot branches are stick-like, decussate, 2 to 3 mm thick, articulated, cylindrical, finely striped. The leaves are decussate, scale-like, with a white membranous edge, forming a greenish sheath at the base. Staminate flowers cluster into catkin-like inflorescences on the apical part of the shoot branches, occasionally in the leaf axils. Pistillate flowers are covered with scaly bracts. These bracts surrounding the developing seed become fleshy and red showing a berry-like appearance.



### **II.82**

*Ephedrae herba* – Ephedra

### Microscopic characters

The powder of the drug shows fragments of the stem with cuticular warts on the epidermis; guard cells of the stomata are dumbbell-shaped, sunken; the cuticle is finely dotted. Subepidermally fragments of phloem fibre bundles can be observed, together with cortical parenchyma, containing crystals of calcium oxalate. Orange to brown pigment can be observed in the fragments of the pith parenchyma.

### Other characters

The drug has a mild odour; its taste is slightly bitter, adstringent.

## ***Equiseti herba* –Equisetum stem (Ph. Eur. 5.0)**

### Definition

The drug consists of the whole or cut, dried sterile aerial parts of *Equisetum arvense* L. It contains minimum 0.3% of total flavonoids expressed as isoquercitroside calculated with reference to the dried drug.

### Macroscopic characters

It consists of light green to greenish-grey fragments of grooved stems and scale-like, narrow leaves. They are rough to the touch, brittle and crunchy when crushed. The main stems are hollow, jointed at the nodes which occur at intervals of about 1.5 cm to 4.5 cm; distinct vertical grooves are present on the internodes, ranging in number from 4 to 14 or more. Verticils of widely spaced and erect branches, usually simple, each about 1 mm thick with 2 to 4 longitudinal grooves, occur at the nodes. The leaves are small, narrow, verticillate at each node, concrescent at the base, they form a toothed sheath around the stem; with the number of teeth corresponding to the number of grooves on the stem. Each tooth, often brown, is lanceolate-triangular. The lowest internode of each branch is longer than the sheath of the stem it belongs to.



### II.83

#### *Equiseti herba* –Equisetum stem (Ph. Eur. 5.0)

### Microscopic characters

The greenish-grey powder shows the following diagnostic characters: fragments of the epidermis in surface view, composed of rectangular cells with wavy walls and paracytic stomata with the 2 subsidiary cells covering the guard cells and having conspicuous radial ridges; in transverse sectional view the epidermis is crenate, with the protuberances formed from the contiguous walls of 2 adjacent, U-shaped cells. Fragments of large-celled parenchyma and groups of long, non-lignified fibres with narrow lumens; scattered small, lignified vessels with spiral or annular thickening.

### Other characters

The drug has no characteristic smell and taste, it cracks during chewing because of the silicic acid content.



## ***Eucalypti folium* – Eucalyptus leaf (Ph. Eur. 5.0)**

### Definition

Eucalyptus leaf consists of the whole or cut dried leaves of older branches of *Eucalyptus globulus* Labill. The whole drug contains not less than 20 ml/kg of essential oil and the cut drug not less than 15 ml/kg of essential oil, both calculated with reference to the anhydrous drug.

### Macroscopic characters

The leaves which are mainly greyish-green and relatively thick are elongated, elliptical and slightly sickle-shaped. The petiole is twisted, strongly wrinkled and is

2 cm to 3 cm, rarely 5 cm, in length. The coriaceous, stiff leaves are entire and glabrous and have a yellowish-green mid-rib. Lateral veins anastomose near the margin to a continuous line. The margin is even and somewhat thickened. On both surfaces are minute, irregularly distributed, warty dark brown spots. Small oil glands (cavities) may be seen in transmitted light.

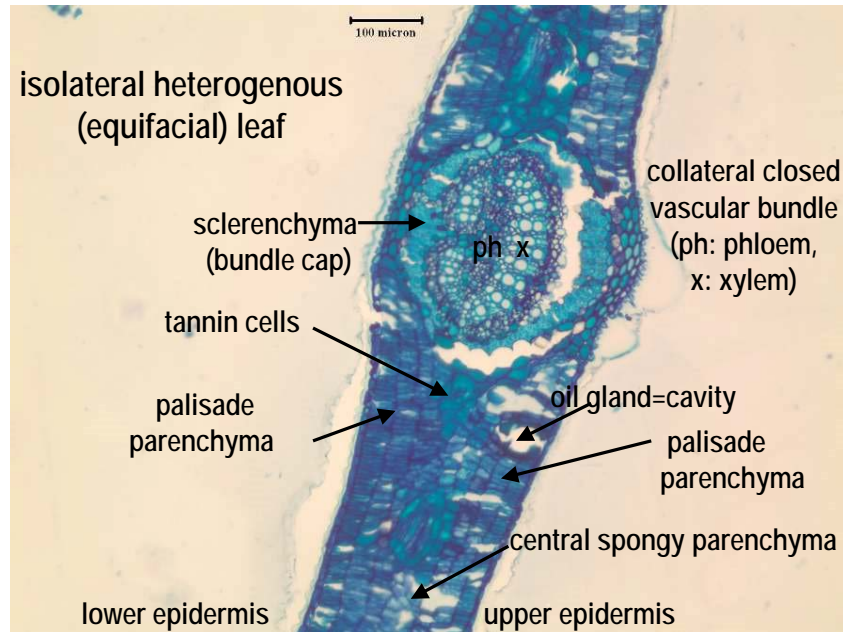


### **II.84**

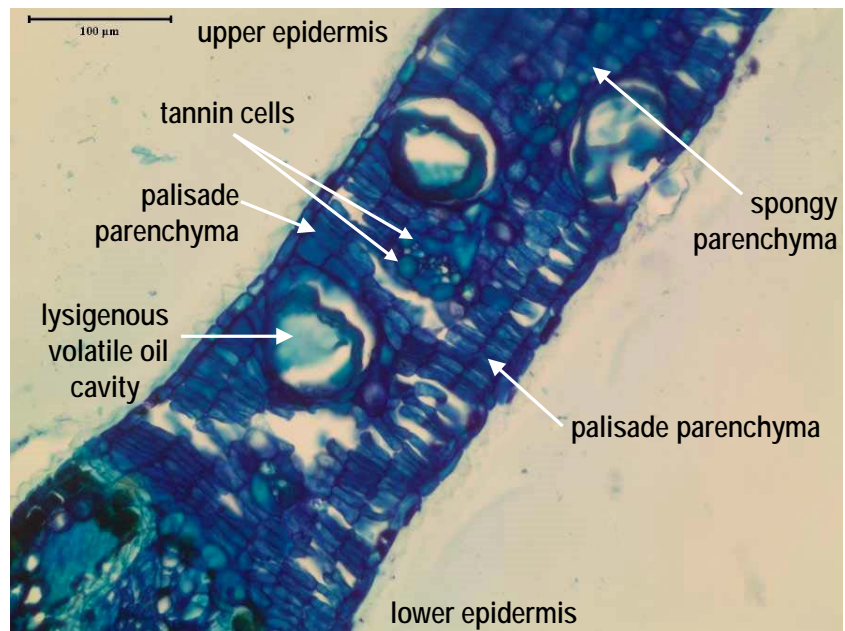
*Eucalypti folium* – Eucalyptus leaf (Ph. Eur. 5.0)

### Microscopic characters

The greyish-green powder shows fragments of glabrous lamina with small thick-walled epidermal cells bearing a thick cuticle, numerous anomocytic stomata, and occasionally groups of brown cork cells and brownish-black in their centre; fragments of equifacial mesophyll with two or three layers of palisade parenchyma on each side and in the centre several layers of spongy mesophyll with elongated cells with the same orientation as the palisade cells and containing prisms and cluster crystals of calcium oxalate; fragments of mesophyll containing large schizogenous oil glands (cavities).



**II.85**  
Eucalyptus leaf c.s. 100x



**II.86**  
Eucalyptus leaf c.s. 200x

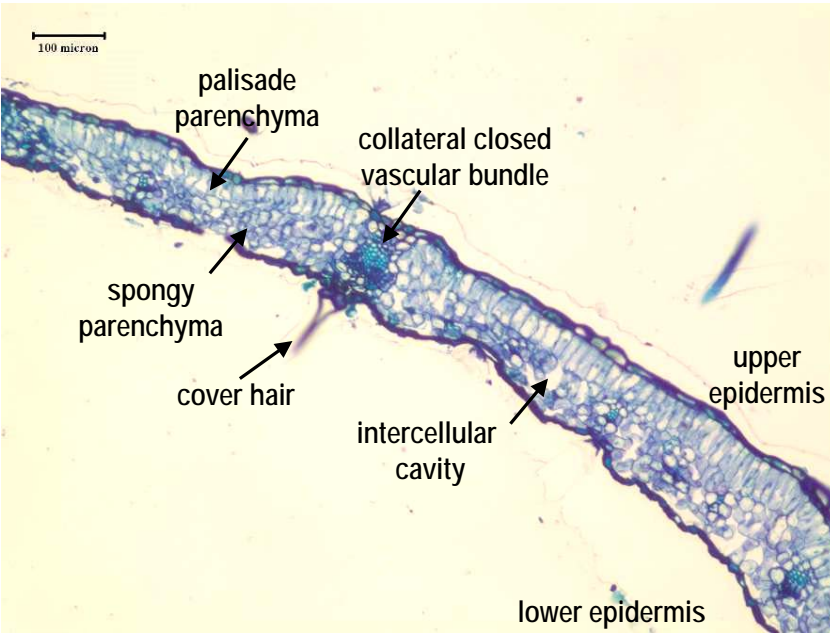
**Other characters**

The drug has an aromatic odour of cineole.

***Euphrasiae herba***



**II.87**  
*Euphrasiae herba*

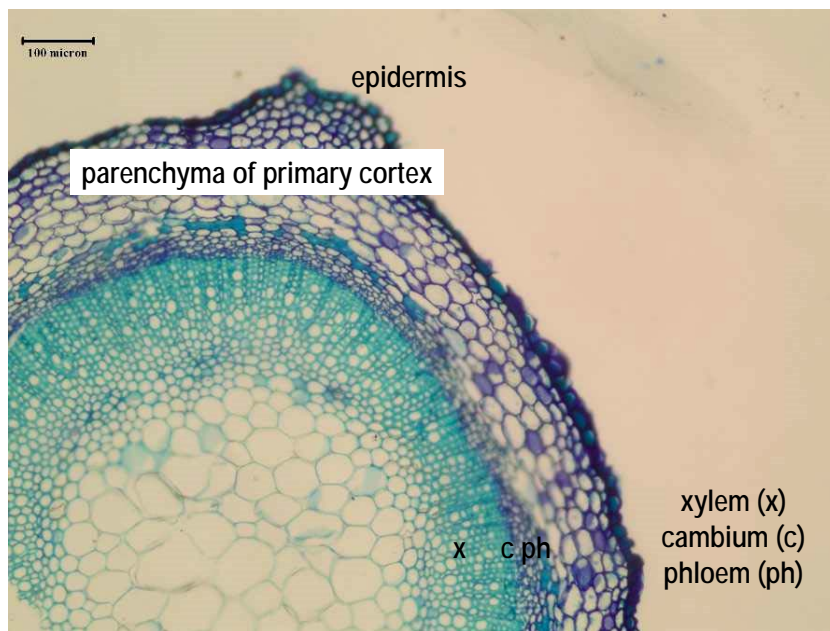


**II.88**  
*Euphrasia rostkoviana* leaf c.s. 100x





**II.89**  
*Euphrasia rostkoviana* leaf c.s. 400x



**II.90**  
*Euphrasia rostkoviana* stem c.s. 100x

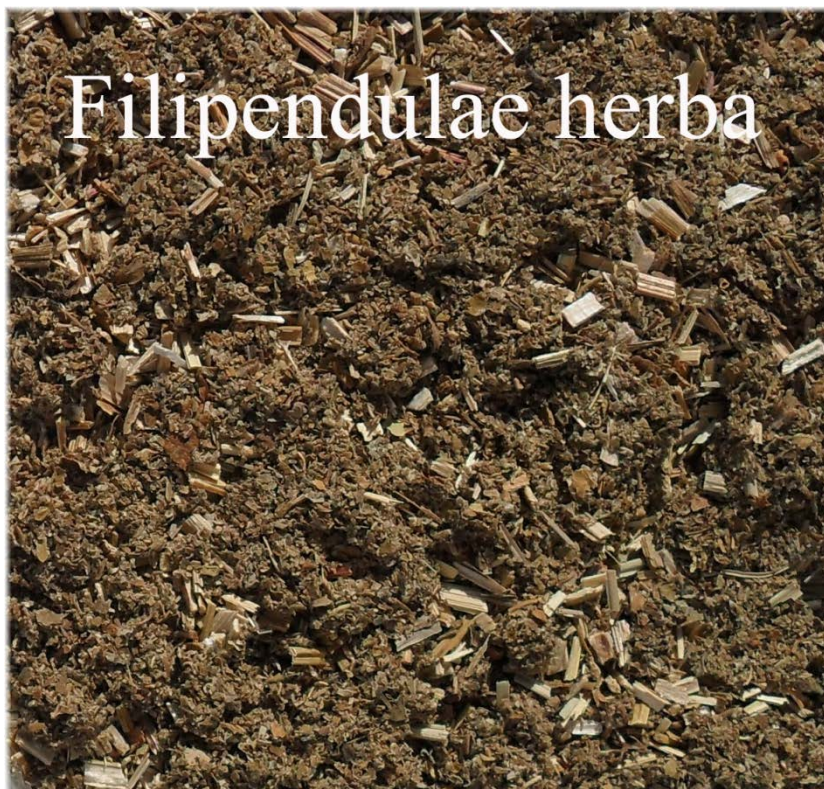
## ***Filipendulae ulmariae herba* – Meadowsweet (Ph. Eur. 5.0)**

### **Definition**

The drug consists of the whole or cut, dried flowering tops of *Filipendula ulmaria* (L.) Maxim. It contains minimum 1 ml/kg of steam-volatile substances calculated with reference to the dried drug.

### **Macroscopic characters**

The stem is greenish-brown, stiff, angular, hollow except at the apex, and has regular, straight, longitudinal furrows. The petiolate leaf, compound imparipinnate, has 2 reddish-brown angular stipules. It consists of 3 to 9 pairs of leaflets, unevenly serrate, some of which are small and fan-shaped. The leaflets are dark green and glabrous on the upper surface, tomentose and lighter, sometimes silvery on the lower surface. The veins are prominent and brown on the lower surface. The inflorescence is complex and composed of very numerous flowers arranged in irregular cymose panicles. The flowers are creamish-white; the calyx consists of 5 dark green, reflexed and hairy sepals fused at the base to a concave receptacle; the 5 free petals, which are readily detached, are pale yellow, obovate and distinctly narrowed at the base; the stamens are numerous with rounded anthers and they extend beyond the petals; the apocarpous gynoecium consists of about 4 to 6 carpels, each with a short style and a globular stigma; the carpels become twisted together spirally to form yellowish-brown fruits with a helicoidal twist. Unopened flower buds are frequently present. If the fruit is present, it has a helicoidal twist and contains brownish seeds.



### **II.91**

*Filipendulae ulmariae herba* – Meadowsweet (Ph. Eur. 5.0)



**Microscopic characters**

The yellowish-green powder shows unicellular covering trichomes, some thin-walled, very long and flexuous, with pointed ends, others shorter, thick-walled, conical and thickened at the base; occasional clavate glandular trichomes with a 1- to 3-celled, uniseriate stalk and a multicellular head containing dense brown contents; fragments of the leaves and sepals with sinuous to wavy epidermal cells, anomocytic stomata on the lower surface only and cluster crystals of calcium oxalate in the mesophyll; thin-walled epidermal cells of the petals, some showing rounded papillae; numerous spherical pollen grains; fragments of the fibrous layer of the anthers with stellate thickenings; groups of small-celled parenchyma from the ovaries containing prism crystals of calcium oxalate; fragments of vascular tissue with spiral and annular vessels from the leaves and stems.

**Other characters**

The drug has an aromatic odour of methyl salicylate, after crushing.

## ***Foeniculi dulcis fructus* – Fennel, sweet (Ph. Eur. 5.0)**

### Definition

Sweet fennel consists of the dry mericarps of *Foeniculum vulgare* Miller sp. *vulgare* var. *dulce* (Miller) Thellung. It contains not less than 20 ml/kg of essential oil, calculated with reference to the anhydrous drug. The oil contains not less than 80.0% of anethole.

### Macroscopic characters

The fruit of sweet fennel is a cremocarp of almost cylindrical shape with a rounded base and a narrowed summit crowned with a large stylopod. It is generally 3 mm to 12 mm long and 3 mm to 4 mm wide. The glabrous mericarps (parts of the fruits) bear five prominent, slightly crenated ridges. When cut transversely, four vittae on the dorsal surface and two on the commissural surface may be seen with a lens.

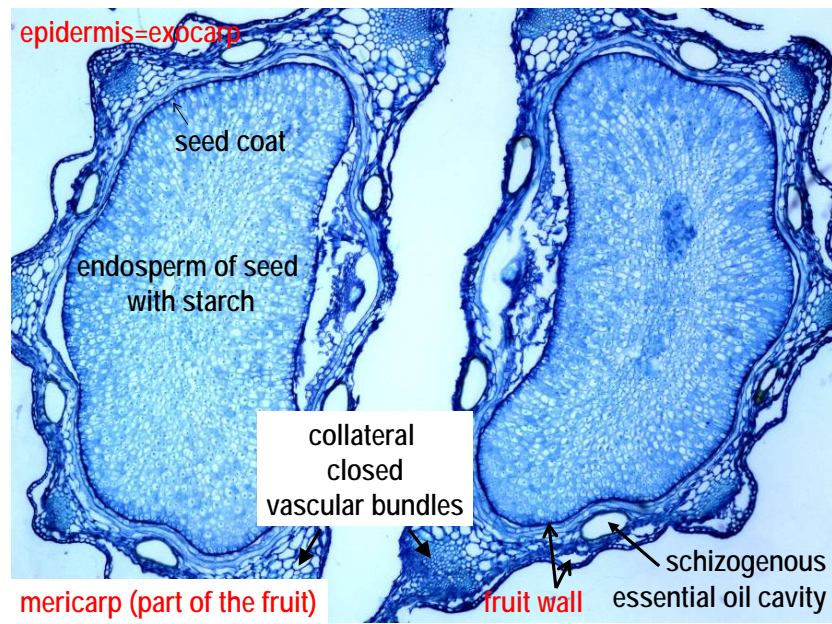


### II.92

*Foeniculi dulcis fructus* – Fennel, sweet (Ph. Eur. 5.0)

### Microscopic characters

The greyish-brown powder shows the following diagnostic characters: yellow fragments of wide secretory canals, often made up of yellowish-brown-walled polygonal secretory cells, frequently associated with a layer of thin-walled transversely elongated cells having a parquetry arrangement; reticulate parenchyma of the mesocarp; numerous fibre bundles from the ridges, often accompanied by narrow spiral vessels; very numerous endosperm fragments containing aleurone grains and very small calcium oxalate rosette crystals, as well as some fibre bundles from the carpophore.



**II.93**

Foeniculum vulgare fruit c.s. 40x

**Other characters**

Sweet fennel is pale green or pale yellowish-brown.

## ***Frangulae cortex* – Frangula bark (Ph. Eur. 5.0)**

### Definition

Frangula bark consists of the dried, whole or fragmented bark of the stems and branches of *Rhamnus frangula* L. (*Frangula alnus* Miller). It contains not less than 7.0 per cent of glucofrangulins, expressed as glucofrangulin A ( $C_{27}H_{30}O_{14}$  ; Mr 578.5) and calculated with reference to the dried drug.

### Macroscopic characters

The bark occurs in curved, almost flat or rolled fragments or in single or double quilled pieces usually 0.5 mm to 2 mm thick and variable in length and width. The greyish-brown or dark brown outer surface is wrinkled longitudinally and covered with numerous greyish, transversely elongated lenticels; when the outer layers are removed, a dark red layer is exposed. The orange-brown to reddish-brown inner surface is smooth and bears fine longitudinal striations; it becomes red when treated with alkali. The fracture is short, fibrous in the inner part.



### **II.94**

*Frangulae cortex* – Frangula bark (Ph. Eur. 5.0)

### Microscopic characters

The bark has three layers: periderm, outer and inner cortex. The inner or secondary cortex contains multiseriate medullary rays. Phloem fibres are tangentially oriented. Crystals of calcium oxalate are visible in both the outer and the inner cortex. The powder is yellowish or reddish-brown, and shows: numerous phloem fibres, partially lignified, accompanied with cell layers containing crystals of calcium oxalate prisms; reddish-brown fragments of cork; fragments of parenchyma containing calcium oxalate cluster crystals. Sclereids are absent.

**Other characters**

The drug is conspicuously light, odourless and tastes bitter.

***Frangulae corticis extractum siccum normatum* –  
Frangula bark dry extract, standardized (Ph. Eur. 5.0)****Definition**

Standardised frangula bark dry extract is produced from *Frangula bark*. The extract is produced from the drug and ethanol (50 to 80 per cent V/V) by an appropriate procedure. It contains not less than 15.0 per cent and not more than 30.0 per cent of glucofrangulins, expressed as glucofrangulin A ( $C_{27}H_{30}O_{14}$ ;  $Mr$  578.5) and calculated with reference to the dried extract. The measured content does not deviate from that stated on the label by more than  $\pm 10$  per cent.

**Other characters**

A yellowish-brown, fine powder.



## **Manna – Manna**

### Definition

The drug is the dried, sweet sap of *Fraxinus ornus* L., obtained by making an incision on the trunk of the tree.

### Macroscopic characters

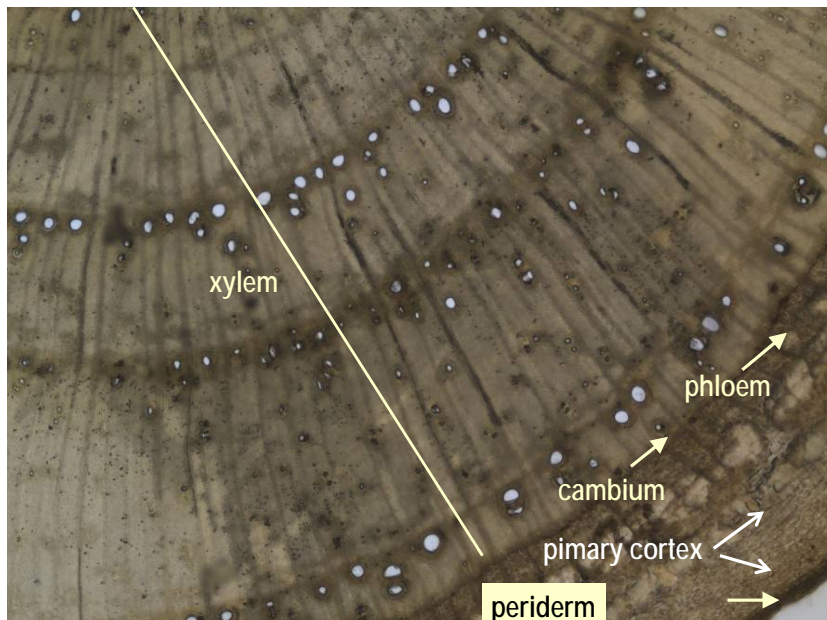
The drug has a creamy white colour.



### **II.95**

*Manna – Manna*

### Microscopic characters



### **II.96**

*Fraxinus* tree branch c.s. 40x

**Other characters**

The drug has a sweet taste.

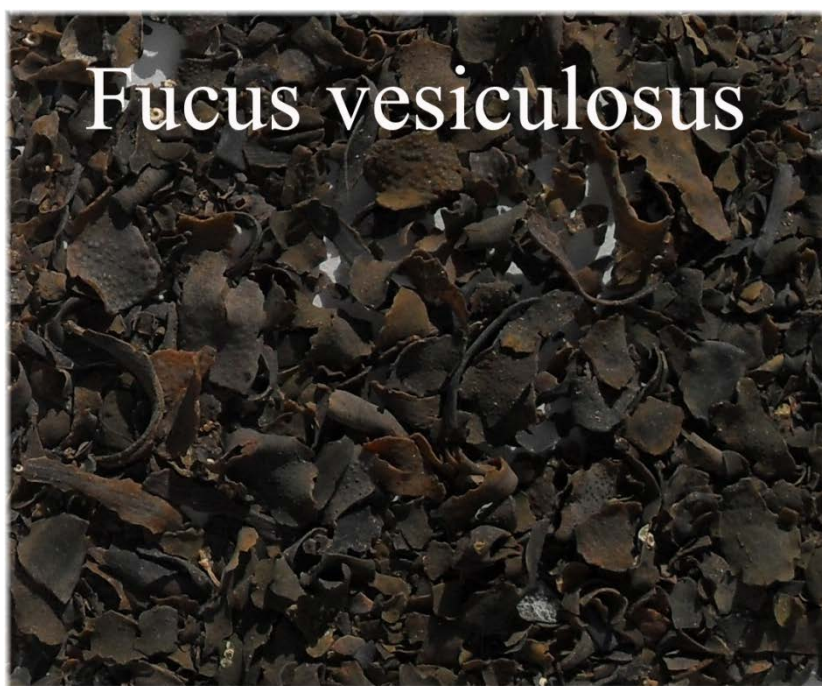
## ***Fucus vel Ascophyllum* – Kelp (Ph. Eur. 5.0)**

### Definition

The drug consists of the fragmented dried thallus of *Fucus vesiculosus* L. or *F. serratus* L. or *Ascophyllum nodosum* Le Jolis. It contains minimum 0.03% and maximum 0.2% of total iodine calculated with reference to the drug.

### Macroscopic characters

The drug consists of fragments with a corneous consistency, blackish-brown to greenish-brown, sometimes covered with whitish efflorescence. The thallus consists of a ribbon-like blade, branching dichotomously with prominent central ribs (pseudoveins). *F. vesiculosus* typically shows a foliose blade with smooth edges and bears occasional ovoid, single or paired, air vesicles. The ends of certain branches are of ovoid shape and a little widened. They bear numerous reproductive organs (conceptacles). *F. serratus* has a foliose blade with a serrate margin and no vesicles, the branches bearing conceptacles are less swollen. The thallus of *A. nodosum* is irregularly branched, without pseudo-midrib. It shows single ovoid air vesicles; the falciform conceptacles are located at the end of small branches.



### II.97

*Fucus vel Ascophyllum* – Kelp (Ph. Eur. 5.0)

### Microscopic characters

The greenish-brown powder shows fragments of surface tissue with regular isodiametric cells with brown contents, and fragments of deep tissue with colourless, elongated cells arranged in long filaments with large mucilaginous spaces between them. Thick-walled cells in files and in closely packed groups, from the pseudovein, are sometimes visible.

### Other characters

The drug has a salty and mucilaginous taste, unpleasant marine odour.



## ***Fumariae herba* – Fumitory (Ph. Eur 6.8)**

### Definition

The drug consists of the whole or cut flowering shoots (aerial parts) of *Fumaria officinalis* L., collected in full bloom. It contains not less than 0.40% total alkaloid, expressed as protopin with reference to the dried drug.

### Macroscopic characters

The narrow, rectangular stem is light green to greenish brown. The alternately arranged leaves are bipinnately compound, with 2-3 leaflets. The leaflets are lanceolate or obovate, greenish-blue, glabrous on both sides. The small, short pedunculate, pink to purple-red flowers arise from the bract axils, and compose a loose raceme. The tip of the flowers is dark purple or brown. The calyx is short, consisting of two, petal-like sepals. The tubular corolla is formed by four petals, the upper one bearing a spur. There are 6 stamens, the filaments fuse into two groups of three. The greenish-brown fruit is indehiscent, round or vessel-shaped, with a slightly rounded or sunken apex. Each fruit holds a small, brown seed.



### II.98

*Fumariae herba* – Fumitory (Ph. Eur 6.8)

### Microscopic characters

The powdered drug is green and shows the following diagnostic features: the upper epidermis of leaf fragments consists of irregularly polygonal cells in surface view, some of them containing small sand crystals. The wall of the lower epidermis cells is more wavy. Anomocytic stomata can be seen on both epidermal surfaces. The apical cells of the leaf edge are elongated, forming obtuse papillae. The stem fragments contain groups of woody fibers and pitted vessels. The epidermal fragments of the petals have wavy or sinuous anticlinal walls, but lack papillae. The pollen grains are round, 30 µm in

diameter, hexaporate, with pitted exine. The fruit epicarpium cells are polygonal, covered with a thick, warty cuticle.



***Galegae herba***



**II.99**  
*Galegae herba*

## **Agar – agar (Ph. Eur. 5.0)**

### Definition

Agar consists of the polysaccharides from various species of Rhodophyceae mainly belonging to the genus *Gelidium*. It is prepared by treating the algae with boiling water; the extract is filtered whilst hot, concentrated and dried.



### **II.100**

*Agar – agar* (Ph. Eur. 5.0)

### Microscopic characters

When mounted in *iodine solution*, the strips or flakes are partly stained brownish-violet. Magnified 100 times, they show numerous minute, colourless, ovoid or rounded grains on an amorphous background; occasional brown, round to ovoid spores with a reticulated surface. The powder is yellowish-white. The powder presents angular fragments with numerous grains similar to those seen in the strips and flakes; some of the fragments are stained brownish-violet.

### Other characters

Agar has a mucilaginous taste. It occurs in the form of a powder or in crumpled strips 2 mm to 5 mm wide or sometimes in flakes, colourless to pale yellow, translucent, somewhat tough and difficult to break, becoming more brittle on drying.

## ***Gentianae radix* – Gentian root (Ph. Eur. 5.0)**

### Definition

The drug consists of the dried, fragmented underground organs of *Gentiana lutea* L. Gentian root occurs as single or branched subcylindrical pieces.

### Macroscopic characters

The surface is brownish-grey, and the colour of a transverse section is yellowish to reddish-yellow, but not reddish-brown. The root is longitudinally wrinkled and bears occasional rootlet scars. The branches of the rhizome frequently bear a terminal bud and are always encircled by closely arranged leaf scars. The rhizome and root are brittle when dry and break with a short fracture but they absorb moisture readily to become flexible. The smoothed, transversely cut surface shows a bark, occupying about one-third of the radius, separated by the well-marked cambium from an indistinctly radiate and mainly parenchymatous xylem.



*Gentianae radix et rhizoma*



*Gentianae radix et rhizoma*



*Gentianae radix*



*Gentianae radix et rhizoma*

### **II.101**

*Gentianae radix* – Gentian root (Ph. Eur. 5.0)

### Microscopic characters

The powder is light brown or yellowish-brown. The powder shows the following diagnostic characters: fragments of the subero-phellodermic layer, consisting of thin-walled yellowish-brown cork cells and thick-walled collenchyma (phello-derm); parenchymatous cells of cortex and xylem fragments with moderately thickened walls

containing droplets of oil and small prisms and minute needles of calcium oxalate; fragments of lignified vessels with spiral or reticulate thickening.

**Other characters**

The drug has characteristic odour and strong and persistent bitter taste.



## ***Gei urbani rhizoma et radix* – Colewort root and rhizome**

### Definition

The drug consists of the below-ground parts of *Geum urbanum* L.

### Macroscopic characters

The purplish red rhizome is ca. 2 cm thick, 3 to 7 cm long, cylindrical, rarely branching, at the bottom tapering into the tap root, bearing several root branches. The brown root branches are 1-2 mm thick.



### **II.102**

*Gei urbani rhizoma et radix* – Colewort root and rhizome

### Microscopic characters

In transverse section of the root we can see the rhizodermis, followed by the cortex parenchyma. The vascular cylinder is surrounded by the endodermis. The vascular tissues form concentric rings of xylem and phloem. The central part is filled by pith parenchyma.

### Other characters

The drug has characteristic, pleasant odour reminiscent of cloves.



## ***Ginkgo folium* – Ginkgo leaf (Ph. Eur. 5.0)**

### Definition

The drug consists of the whole or fragmented, dried leaf of *Ginkgo biloba* L. It contains not less than 0.5% of flavonoids, calculated as flavone glycosides with reference to the dried drug.

### Macroscopic characters

The upper surface of ginkgo leaf is slightly darker than the lower surface. The petioles of the leaf are about 4 cm to 9 cm long; the lamina is about 4 cm to 10 cm wide, fan-shaped, usually bilobate or sometimes undivided. Both surfaces are smooth, and the venation dichotomous, the veins appearing to radiate from the base; they are equally prominent on both surfaces. The distal margin is incised, irregularly and to different degrees, and irregularly lobate or emarginate. The lateral margins are entire and taper towards the base.



### II.103

*Ginkgo folium* – Ginkgo leaf (Ph. Eur. 5.0)

### Microscopic characters

The powder is greyish or yellowish-green or yellowish-brown. The powder shows irregularly-shaped fragments of the lamina in surface view, the upper epidermis consisting of elongated cells with irregularly sinuous walls, the lower epidermal cells smaller, with a finely striated cuticle and each cell shortly papillose; large stomata, deeply sunken with 6 to 8 subsidiary cells, are more numerous in the lower epidermis; abundant large cluster crystals of calcium oxalate of various sizes in the mesophyll; fragments of fibro-vascular tissue from the petiole and veins.

### Other characters

Ginkgo leaf is greyish or yellowish-green or yellowish-brown.

## ***Liquiritiae radix* – Liquorice root (Ph. Eur. 5.0)**

### **Definition**

Liquorice root consists of the dried unpeeled or peeled, whole or cut root and stolons of *Glycyrrhiza glabra* L. It contains not less than 4.0% of glycyrrhizic acid, calculated with reference to the dried drug.

### **Macroscopic characters**

The root has few branches. Its bark is brownish-grey to brown with longitudinal striations and bears traces of lateral roots. The external appearance of the cylindrical stolons is similar to that of the root but there are occasional small buds. The fracture of the root and the stolon is granular and fibrous. The cork layer is thin; the secondary phloem region is thick and light yellow with radial striations. The yellow xylem cylinder is compact, with a radiate structure. The stolon has a central pith, which is absent from the root. The external part of the bark is absent from the peeled root.



### **II.104**

*Liquiritiae radix* – Liquorice root (Ph. Eur. 5.0)

### **Microscopic characters**

The powder is light yellow to faintly greyish. The powder shows fragments of yellow thick-walled fibres, often accompanied by crystal sheaths containing prisms of calcium oxalate. The walls of the large vessels are yellow, lignified and have numerous bordered pits with a slit-shaped aperture; fragments of cork consisting of thin-walled cells and isolated prisms of calcium oxalate occur as well as fragments of parenchymatous tissue. Fragments of cork are absent from the peeled root. The powder shows simple, round or oval starch granules.

## ***Saponariae albae radix* – Common soapwort root**

### Definition

The drug consists of the dried roots of *Gypsophila paniculata* L.

### Macroscopic characters

The root is 2-6 cm thick and 1.5-2 m long, its outer surface is greyish-brown, the inner part is white, it is plicated longitudinally, sometimes is campylotropous. Internally the cortex is white, the cambium is brownish and the xylem is light yellow. The thicker roots are peeled and cut into tilted discs before marketing.



### **II.105**

*Saponariae albae radix* – Common soapwort root

### Microscopic characters

Root with secondary thickening. The cortex below the periderm is parenchymatous, with cluster crystals of calcium oxalate. The pith rays of phloem and xylem contain cluster crystals of calcium oxalate. The phloem consists of soft phloem elements, whereas hard phloem elements are missing. The cambium comprises multiple cell layers. Xylem consists of tracheas, tracheids, xylem parenchyma, while xylem fibers occur only in older roots. Vessel fragments are characteristic, mainly with reticulate thickening. The unpeeled drug may contain cork, as well.

### Other characters

The drug has no characteristic smell, it has pungent taste.

## ***Harpagophyti radix* – Devil’s claw root (Ph. Eur. 5.0)**

### Definition

Devil’s claw root consists of the cut and dried tuberous, secondary roots of *Harpagophytum procumbens* D.C. and/or *H. zeyheri* L. Decne. It contains not less than 1.2% of harpagoside, calculated with reference to the dried drug.

### Macroscopic characters

It consists of thick, fan-shaped or rounded slices or of roughly crushed discs. The darker outer surface is traversed by tortuous longitudinal wrinkles. The paler cut surface shows a dark cambial zone and vessel bundles distinctly aligned in radial rows. The central cylinder shows fine concentric striations. Seen under a lens, the cut surface presents yellow to brownish-red granules.



### **II.106**

*Harpagophyti radix* – Devil’s claw root (Ph. Eur. 5.0)

### Microscopic characters

The brownish-yellow powder shows the following diagnostic characters: fragments of cork layer consisting of yellowish-brown, thin-walled cells; fragments of cortical parenchyma consisting of large, thin-walled cells, sometimes containing reddish-brown granular inclusions and isolated yellow droplets; fragments of reticulately thickened vessels and tracheidal vessels with associated lignified parenchyma from the central cylinder; small needles of calcium oxalate are present in the parenchyma. The powder may show rectangular or polygonal pitted sclereids with dark reddish-brown contents.

### Other characters

Devil’s claw root is greyish-brown to dark brown and it has a bitter taste.



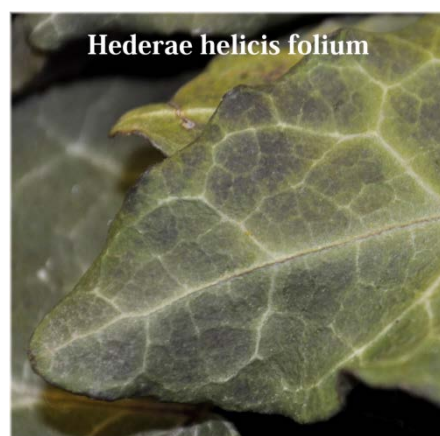
## ***Hederae folium* – Common ivy leaves (Ph. Eur. 6.8)**

### Definition

The drug consists of the cut or whole evergreen leaves of *Hedera helix* L., collected in spring. It contains at least 3% hederacosid-C, calculated with reference to the dried drug.

### Macroscopic characters

The leaves are glossy and leathery. The sun leaves are entire, ovate or rectangular ovate. The shade leaves are divided, triangular to pentangular, palmately lobed. The upper leaf surface is dark green, around the radially branching veins with a lighter shade; the lower leaf surface is greyish green with conspicuous veins. The petiole is long, cylindrical, 2 mm in diameter, with a longitudinal furrow. The petiole and younger leaves are scarcely covered with white trichomes, the older leaves are glabrous.



### **II.107**

*Hederae folium* – Common ivy leaves (Ph. Eur. 6.8)

### Microscopic characters

The lower (abaxial) epidermis consists of densely packed cells with wavy walls and numerous anomocytic stomata. The upper (adaxial) epidermis has no stomata, the cell walls are wavy. The leaves are bifacial, the palisade cells are arranged in one to three dense rows above the spongy parenchyma. Crystals of calcium oxalate (40 µm) can be observed in the mesophyll, as well as stellate covering hairs on the young leaves.

### Other characters

The drug has no characteristic odour; and a bitterish, scratchy taste.



## ***Helianthi oleum raffinatum* – Sunflower oil, refined (Ph. Eur. 5.0)**

### Definition

Sunflower oil is the fatty oil obtained from the seeds of *Helianthus annuus* L. by mechanical expression or by extraction. It is then refined. A suitable antioxidant may be added.

### Characters

A clear, light yellow liquid, practically insoluble in water and in alcohol, miscible with light petroleum (bp: 40 °C to 60 °C).



### II.108

*Helianthi oleum raffinatum* – Sunflower oil, refined (Ph. Eur. 5.0)

## ***Herniariae herba* – Rupturewort flowering shoot**

### Definition

The drug consists of the dried, flowering aerial parts of *Herniaria glabra* L. and/or *Herniaria hirsuta* L., whole or cut.

### Macroscopic characters

The stem is slender, cylindrical, branching, greyish-green and hirsute in *H. hirsuta*; bright green and smooth in *H. glabra*. The leaves are decussate, but seem to be alternate in the upper third of the shoot, due to reduction; the petiole is very short. In *H. glabra* the leaves and the sepals are glabrous, the leaves are elliptic or obovate; the tiny flowers are arranged in clusters in the leaf axil; the sepals are fused at their bottom third; the corolla consists of five, white petals that are shorter than the sepals; there are 5 stamens. In *H. hirsuta* the leaves are ovate to lanceolate; the calyx is hirsute; the sepals are 1.0 to 1.5 mm long. The fruit is an ovate, indehiscent capsule.



### **II.109**

*Herniariae herba* – Rupturewort flowering shoot

### Microscopic characters

The powder of the drug shows leaf fragments; the upper epidermis with anomocytic stomata and trichomes with granulous cuticle; palisade parenchyma and cluster crystals of calcium oxalate. The fragments of phloem and xylem fibres from the stem can be observed; cell walls of the tracheas with reticulate, annular or spiral thickening. The pollen grains are tri- or tetracolpate; occasionally the fragments of the endothecium and the fruit wall can be observed.

### Other characters

The drug has an odour reminiscent of coumarin; its taste is slightly scratchy.

## ***Hibisci sabdariffae flos* – Roselle (Ph. Eur. 5.0)**

### Definition

The drug consists of the whole or cut dried calyces and epicalyces of *Hibiscus sabdariffa* L. collected during fruiting. It contains minimum 13.5% of acids, expressed as citric acid, calculated with reference to the dried drug.

### Macroscopic characters

The calyx and epicalyx are fleshy, dry, easily fragmented and coloured bright-red to deep-purple, somewhat lighter at the base of the inner side. The calyx is joined in the lower half to form an urceolate structure, the upper half dividing to form 5 long acuminate recurved tips. The tips have a prominent, slightly protruding midrib and a large, thick nectary gland. The epicalyx consists of 8 to 12 small, obovate leaflets which are adnate to the base of the calyx.



### II.110

*Hibisci sabdariffae flos* – Roselle (Ph. Eur. 5.0)

### Microscopic characters

The powder is red to purplish-red. The powder shows predominantly red coloured fragments of the parenchyma containing numerous cluster crystals of calcium oxalate and, sporadically, mucilage filled cavities, sometimes associated with polygonal epidermal cells and anisocytic stomata; numerous fragments of vascular bundles with spiral and reticulate vessels; sclerenchymatous fibres with a wide lumen; rarely, rectangular, pitted parenchymatous cells; fragments of unicellular, smooth, bent covering trichomes and occasional glandular trichomes; rounded pollen grains.

### Other characters

The drug has an acidic taste.



## ***Lupuli flos* – Hop strobile (Ph. Eur. 5.0)**

### Definition

Hop strobile consists of the dried, generally whole, female inflorescences of *Humulus lupulus* L.

### Macroscopic characters

Hop strobiles are generally isolated and 2 cm to 5 cm long, petiolate, ovoid, made up of many oval, greenish-yellow, sessile, membranous, overlapping bracts. The external bracts are flattened and symmetrical. The internal bracts (bracteoles) are longer and asymmetrical at the base because of a fold generally encircling an induviate fruit (nut). The ovary or rarely the fruit, the base of the bracts and especially the internal bracts are covered with small orange-yellow glands.



### **II.111**

*Lupuli flos* – Hop strobile (Ph. Eur. 5.0)

### Microscopic characters

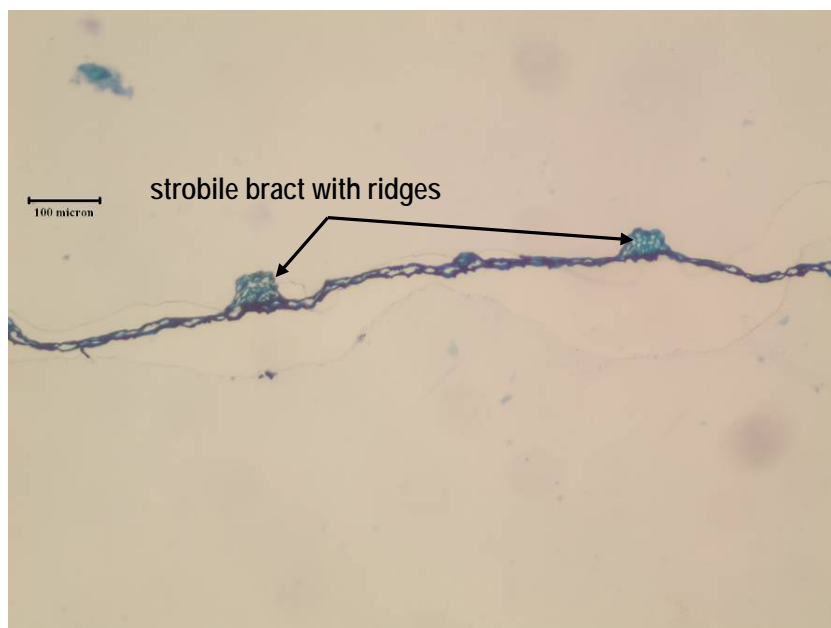
The greenish-yellow powder shows the following diagnostic characters: fragments of bracts and bracteoles covered by polygonal, irregular epidermal cells with wavy walls; unicellular, conical, straight or curved covering trichomes with thin, smooth walls; rare anomocytic stomata; fragments of mesophyll containing small cluster crystals of calcium oxalate; many characteristic orange-yellow glandular trichomes with short, bicellular biseriate stalks, bearing a part widening into a cup, made up of a hemispherical layer of secretory cells with a cuticle that has been detached and distended by the accumulation of oleoresinous secretions; fragments of elongated sclerenchymatous cells of the testa with thick walls showing striations and numerous pits.



bifid non-glandular hair in  
an emergentia

**II.112**

*Humulus lupulus* bifid hair 200x



strobile bract with ridges

100 micron

**II.113**

*Humulus lupulus* bract c.s. 100x

**Other characters**

It has a characteristic, aromatic odour and bitter taste.



## ***Hyperici herba* – St. John's wort (Ph. Eur. 5.0)**

### Definition

St. John's wort consists of the whole or cut, dried flowering tops of *Hypericum perforatum* L., harvested during flowering time. It contains not less than 0.08% of total hypericins expressed as hypericin, calculated with reference to the dried drug.

### Macroscopic characters

The branched and bare stem shows 2 more-or-less prominent longitudinal ridges. The leaves are opposite, sessile, exstipulate, oblong-oval and 15 mm to 30 mm long; on the leaf margins there are glands which appear as black dots and over all the surface of the leaves many small, strongly translucent excretory glands which are visible in transmitted light. The flowers are regular and form a cymose corymb at the apex of the stem. They have 5 green, acute sepals, with black secretory glands on the margins; 5 orange-yellow petals, also with black secretory glands on the margins; 3 staminal blades, each divided into many orange-yellow stamens and 3 carpels surmounted by red styles.

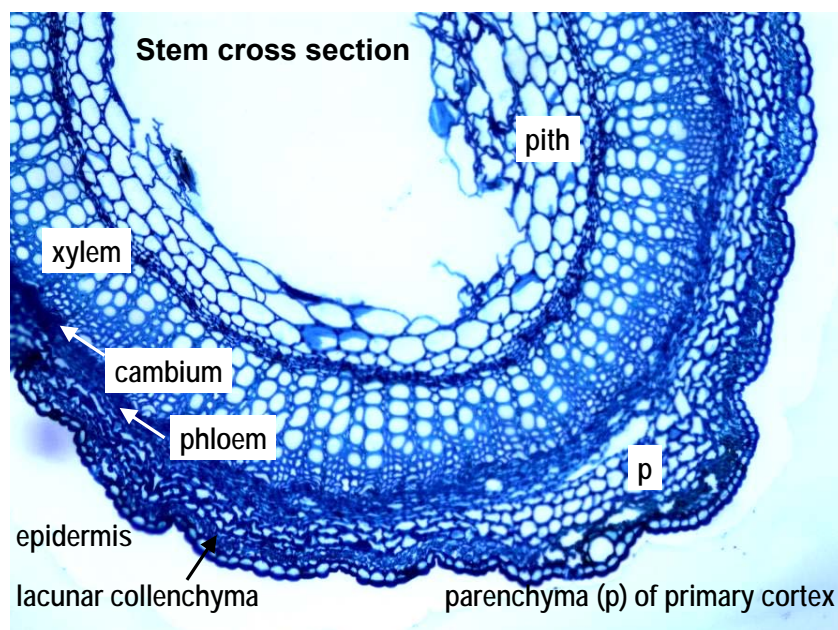


### **II.114**

*Hyperici herba* – St. John's wort (Ph. Eur. 5.0)

### Microscopic characters

The greenish-yellow powder shows the following diagnostic characters: fragments of polygonal cells of the epidermis with thickened and beaded walls and paracytic or anomocytic stomata; fragments of the leaf and sepal with large oil glands and red pigment cells; thin-walled, elongated cells of the petal epidermis with straight or wavy anticlinal walls; tracheids and tracheidal vessels with pitted walls and groups of thick walled fibres; fragments of rectangular, lignified and pitted parenchyma; fibrous layer of the anther and elongated, thin-walled cells of the filament with a striated cuticle; numerous pollen grains with a smooth exine, occur singly or in dense groups, and cluster crystals of calcium oxalate.



### II.115

*Hypericum perforatum* stem c.s. 100x

## ***Hypericum perforatum ad praeparationes homoeopathicas* – Hypericum for homoeopathic preparations (Ph. Eur. 7.0)**

### Definition

Whole, fresh plant of *Hypericum perforatum* L., at the beginning of the flowering period. The mother tincture of *H. perforatum* L. is prepared by maceration using alcohol of a suitable concentration.

### Macroscopic characters

The perennial plant consists of a spindle-shaped root and a branched rhizome, giving rise to long, decumbent runners. The cylindrical, erect stem is woody at the base, 0.2 m to 1 m long, branched in the upper part. The leaves are opposite, sessile, exstipulate, oblong-oval. The leaf margins show black glandular dots, and many small translucent oil glands are present on the entire surface and are visible by transmitted light. The flowers have 5 green, lanceolate sepals with acuminate apices, and black oil glands near the entire margins; 5 orange-yellow petals, much longer than the sepals, with black oil glands near the terminal margins only; 3 staminal blades, each divided into many orange-yellow stamens and 3 carpels surmounted by red styles. Each petal is asymmetrically linear-ovate in shape, with one of the margin entire and the other dentate.

### Other characters

The mother tincture complies with the requirements of the general monograph on *Mother tinctures for homoeopathic preparations*. Dark red to brownish red liquid.

## ***Hyssopi herba* – Hyssop flowering shoot**

### **Definition**

The drug consists of the dried aerial parts of *Hyssopus officinalis* L.

### **Macroscopic characters**

The narrow, lanceolate leaves are decussate, 2 to 4 cm long and 5 to 8 mm wide. The inflorescence is arranged in one-sided pseudowhorls, comprising 7 to 9 blue, pink or white flowers. The funnel-like, bilabiate corolla consists of a flat upper lip with two lobes, and a lower lip with 3 lobes, the middle one (from these three) being longer than the lateral ones. The stamens protrude out of the corolla. The nutlet fruits are ovate.



### **II.116**

*Hyssopi herba* – Hyssop flowering shoot

### **Microscopic characters**

Subepidermally the shoot contains parenchymatous cells. The vascular tissue is formed by circular xylem and phloem in the bottom part of the shoot.



## ***Mate folium* – Mate leaf**

### Definition

The drug consists of the dried leaves of *Ilex paraguariensis* St. Hill.

### Macroscopic characters

It has oval, 10-16 cm long, evergreen leaves without trichomes; the leaf margin is lacerate or dentate.



### **II.117**

*Mate folium* – Mate leaf

### Microscopic characters

The epidermal cells are polygonal with anomocytic stomata. In the mesophyllum columnal and sclerenchyma cells, cluster crystals of calcium oxalate and oil drops can be seen.

### Other characters

It has a strongly aromatic and smoky odour.

## ***Anisi stellati fructus* – Star anise (Ph. Eur. 5.0)**

### Definition

The drug is the dried composite fruit (composed of follicles) of *Illicium verum* Hooker. It contains minimum 70 ml/kg of essential oil (anhydrous drug).

### Macroscopic characters

The fruit consists of 6 to 11, often unequally developed, boat-shaped follicles, each 12 mm to 20 mm long and 6 mm to 11 mm thick, radially arranged around a short, central, blunt-ending columella. The follicles are bluntly peaked at the apex, flat at the base and the outer surface is greyish-brown, roughly wrinkled. The ventral suture is frequently open exposing a single, hard, ovoid, laterally compressed, shiny, reddish-brown seed about 8 mm long. The pedicel, if present, is distinctly curved and thickened at the apex. Separated follicles and seeds may be present.



### II.118

*Anisi stellati fructus* – Star anise (Ph. Eur. 5.0)

### Microscopic characters

The reddish-brown powder shows the following diagnostic characters: brown epicarpal cells, polygonal in surface view, with strongly striated cuticles and occasional anomocytic stomata; fragments of the endocarp with palisade-like cells up to about 600 µm long; fragments of the mesocarp with large parenchymatous cells, vessels, oil-containing cells and groups of large very elongated stone cells with thickened and pitted walls; fragments of the testa with palisade-like, yellow stone cells up to 200 µm long,



with strongly pitted walls; fragments of the endosperm containing droplets of oil and aleurone grains; fragments of the columella and the fruit stalk with strongly thickened irregular stone cells up to 400  $\mu\text{m}$  long and about 150  $\mu\text{m}$  wide, with pointed, star-shaped projections (astroclereids); rhomboidal or rectangular crystals of calcium oxalate.

**Other characters**

The fruit carpels are brown. The drug has an odour of anethole.

***Anisi stellati aetheroleum* – Star anise oil (Ph. Eur. 5.0)**

**Definition**

Essential oil obtained by steam distillation from the dry ripe fruits of *Illicium verum* Hook.

**Characters**

It is a clear, colourless or pale yellow liquid.

## ***Inulae radix* – Elecampane root**

### Definition

The drug consists of the dried root of *Inula helenium* L.

### Macroscopic characters

A thick rhizome develops below-ground, bearing the previous year's pittings (remains of the leaf bases from the previous year). The roots are well-developed, ca. 1 cm wide.



### **II.119**

*Inulae radix* – Elecampane root

## ***Juglandis folium* – Walnut leaf**

### Definition

The drug consists of the dried leaves of *Juglans regia* L.

### Macroscopic characters

The leaves are petiolate, alternate and odd pinnately compound with 5 to 9 leaflets. The ovate, entire leaflets have a short petiole, cuneate leaf base and acute tip. The venation is pinnate, the veins are protruding on the lower (abaxial) leaf surface.



### **II.120**

*Inulae radix* – Elecampane root

### Microscopic characters

The epidermal cells are polygonal, with wavy radial walls. The stomata are anomocytic. The glandular trichomes consist of a 1-4-celled stalk and a 2-4-celled head. The non-glandular hairs are unicellular, 500 µm long.

### Other characters

The drug has a strongly aromatic odour and bitter taste, especially if crushed.

## ***Juniperi pseudo-fructus* – Juniper (Ph. Eur. 5.0)**

### Definition

Juniper consists of the dried ripe cone berry of *Juniperus communis* L. It contains not less than 10 ml/kg of essential oil, calculated with reference to the anhydrous drug.

### Macroscopic characters

The berry-shaped cone is globular up to 10 mm in diameter, violet-brown to blackish-brown, frequently with a bluish bloom. It consists of three fleshy scales. The apex has a three-rayed closed cleft and three not very clearly defined projections. A remnant of peduncle is frequently attached at the base. The fleshy part is crumbly and brownish. It contains three, seldom two, small, elongated, extremely hard seeds that have three sharp edges and are slightly rounded at the back, acuminate at the apex. The seeds are fused with the fleshy part of the cone berry in the lower part on the outside of their bases. Very large, oval oil glands containing sticky resin lie at the outer surface of the seeds.



### II.121

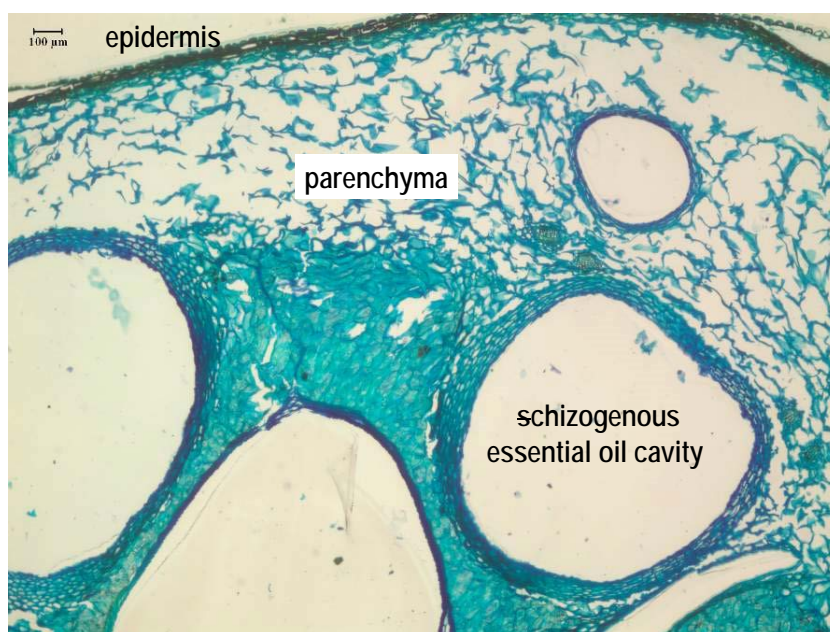
*Juniperi pseudo-fructus* – Juniper (Ph. Eur. 5.0)

### Microscopic characters

The brown powder shows fragments of epidermis of the cone berry wall containing cells with thick, pitted colourless walls and brown glandular content, occasionally with anomocytic stomata; fragments of the three-rayed apical cleft of the cone berry with spaces and epidermal cells interlocked by papillous outgrowths; fragments of the hypodermis with collenchymatous thickened cells; fragments of the mesocarp consisting of large thin-walled parenchymatous cells, usually rounded, with large



intercellular spaces and irregular, large, usually scarcely pitted, yellow idioblasts (barrel cells); fragments of schizogenous oil cavities; fragments of the testa with thick-walled, pitted colourless sclereids containing one or several prism crystals of calcium oxalate ; fragments of the endosperm and embryonic tissue with thin-walled cells containing fatty oil and aleurone grains



### II.122

*Juniperus communis* pseudofruit c.s. 40x

#### Other characters

Juniper has a strongly aromatic odour, especially if crushed.

### ***Juniperi aetheroleum* – Juniper oil (Ph. Eur. 5.0)**

#### Definition

Essential oil obtained by steam distillation from the ripe, non-fermented berry cones of *Juniperus communis* L.

#### Characters

It is a colourless to yellowish liquid, with a characteristic odour. A suitable antioxidant may be added.



## ***Lavandulae flos* – Lavender flower (Ph. Eur. 5.0)**

### Definition

Lavender flower consists of the dried flower of *Lavandula angustifolia* P. Mill. (*L. officinalis* Chaix). It contains not less than 13 ml/kg of essential oil, calculated with reference to the anhydrous drug.

### Macroscopic characters

The flower has a short peduncle and consists of a bluish-grey tubular calyx divided distally into four very short teeth and a small rounded lobe, a blue bilabial corolla with the upper lip bifid and the lower lip trilobate, four didynamous stamens with ovoid anthers.

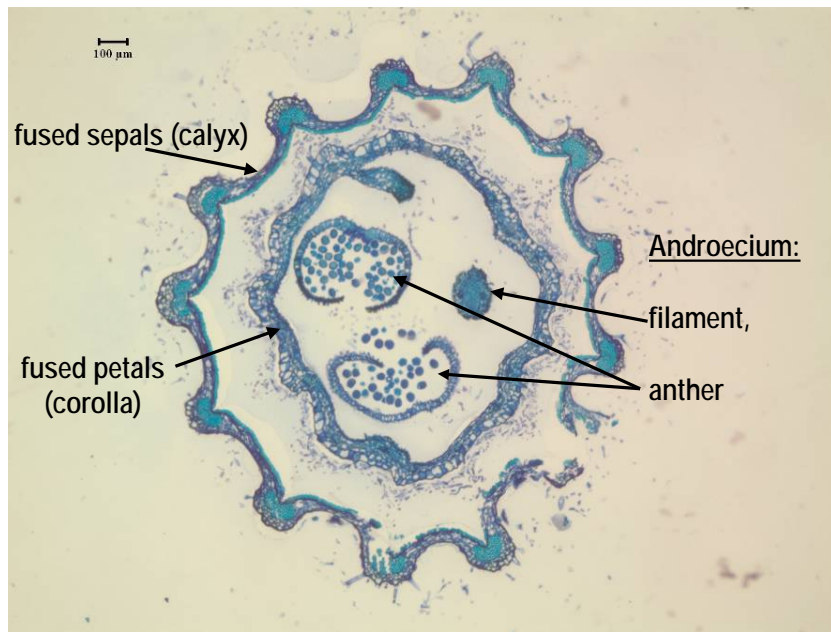


### **II.123**

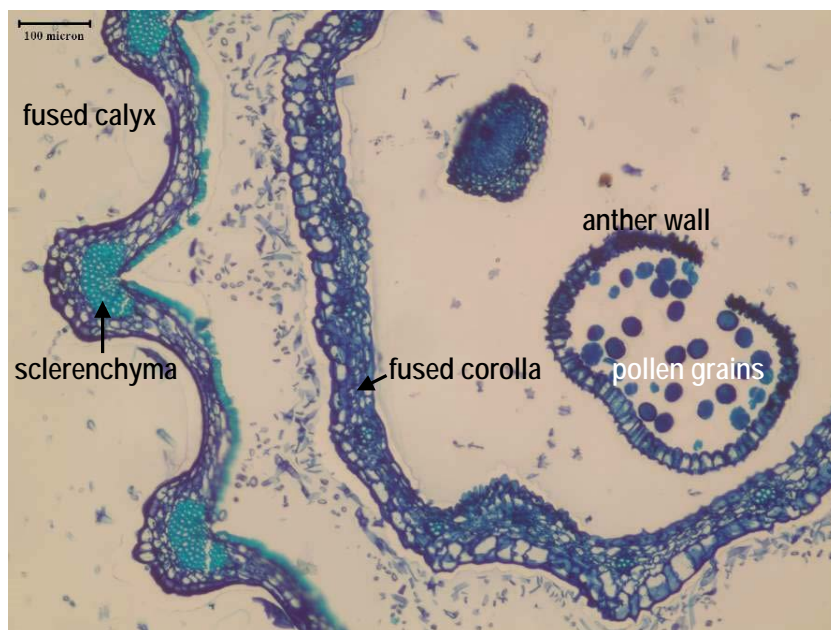
*Lavandulae flos* – Lavender flower (Ph. Eur. 5.0)

### Microscopic characters

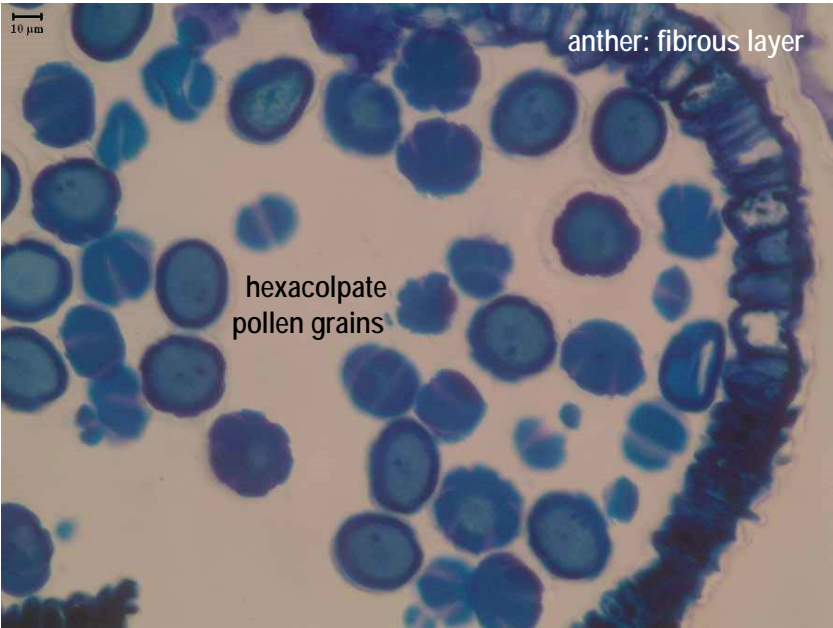
The bluish-grey powder shows covering trichomes bifurcating at one or more levels; secretory trichomes with short stalks and eight-celled heads of the *Labiatae* type; secretory trichomes with unicellular or multicellular stalks and unicellular heads; secretory trichomes with long uneven stalks and unicellular heads, separated from the peduncle by an intermediary cell with a smooth cuticle; certain such trichomes show a crown of small spheroid cells just below the insertion point of the intermediary cell on the peduncle; fragments of warty epidermis from the inner surface of the petals; fragments of calyx epidermis with sinuous-walled cells and containing pyramid crystals of calcium oxalate; spherical pollen grains which have a diameter of about 45 µm and an exine with six slit-like germinal pores and six ribbon-like groins radiating from the poles.



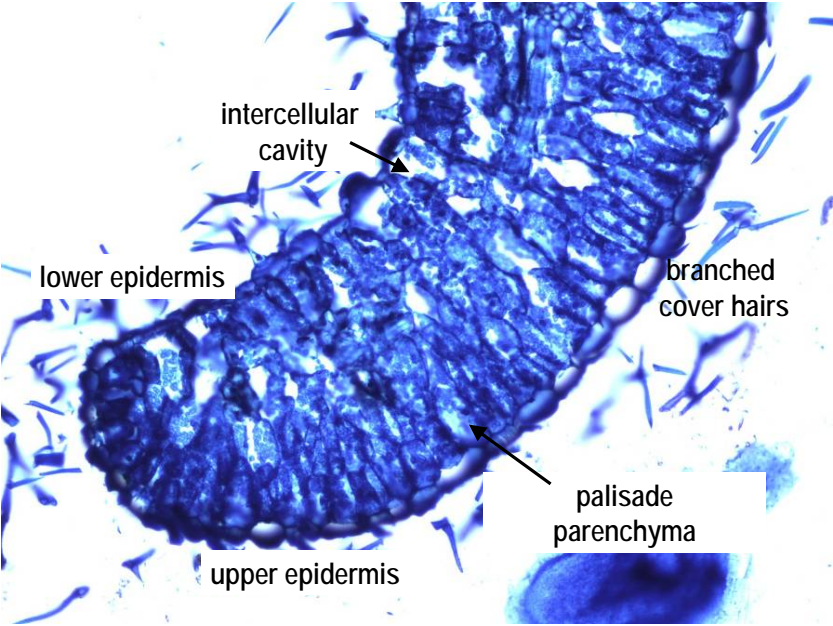
**II.124**  
Lavandula flower c.s. 40x



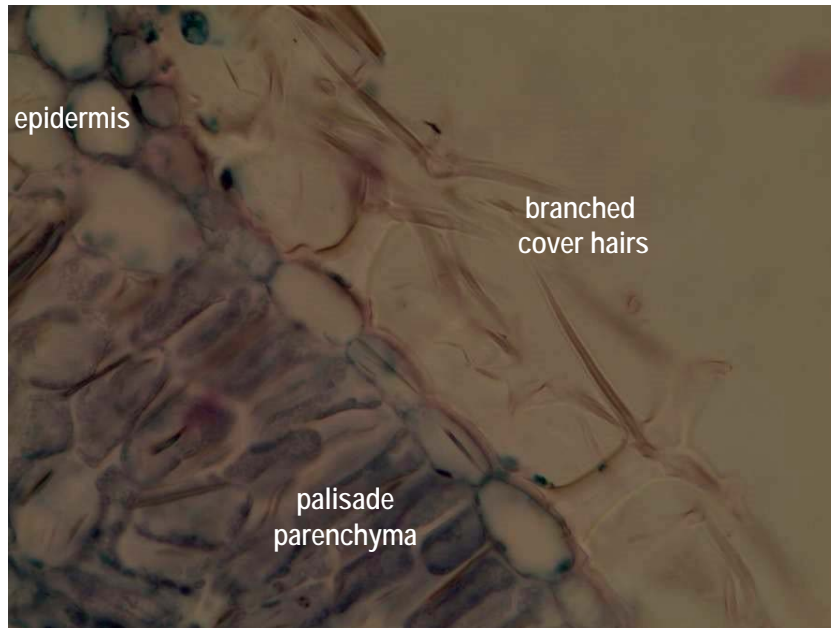
**II.125**  
Lavandula flower c.s. 100x



**II.126**  
Lavandula pollen 400x



**II.127**  
Lavandula leaf c.s. 200x



**II.128**  
Lavandula leaf c.s. 400x

**Other characters**

Lavender flower has a strongly aromatic odour.

***Lavandulae aetheroleum* – Lavander oil (Ph. Eur. 5.0)**

**Definition**

Essential oil obtained by steam distillation from the flowering tops of *Lavandula angustifolia* Miller (*Lavandula officinalis* Chaix).

**Characters**

It is a colourless or pale yellow, clear liquid. It has a characteristic odour.



## ***Leonuri cardiaca* herba – Motherwort (Ph. Eur. 5.0)**

### Definition

The drug consists of the whole or cut, dried flowering aerial parts of *Leonurus cardiaca* L. It contains minimum 0.2% of flavonoids, expressed as hyperoside, calculated with reference to the dried drug.

### Macroscopic characters

The stem pieces are hairy, longitudinally striated, quadrangular, hollow; they bear decussate, petiolate leaves and, in the axils of the upper leaves, about 6 to 12 small flowers, arranged in sessile whorls forming a long leafy spike. The lower leaves are ovate-orbicular, palmately 3 to 5-lobed, rarely 7-lobed, the lobes irregularly serrate. The upper leaves are entire or slightly trifid, lanceolate with a serrate margin and cuneate at the base. The upper surface of the leaves is green with scattered hairs, the lower surface is paler green, densely pubescent and shows a prominent palmate and reticulate venation. The flowers have a funnel-shaped calyx, 3 mm to 5 mm long with 5 stiff, recurved teeth; the corolla is 2-lipped, the upper lip pink and pubescent on the outer surface, the lower lip white with purplish spots; stamens 4, densely pubescent.



### II.129

*Leonuri cardiaca* herba – Motherwort (Ph. Eur. 5.0)

### Microscopic characters

The green powder shows the following diagnostic characters: fragments of the leaf lamina with a one-layered palisade mesophyll reaching almost to the centre and a loosely arranged spongy parenchyma; fragments of leaf epidermis; upper epidermal cells with straight anticlinal walls and a striated cuticle; lower epidermal cells with sinuous anticlinal walls; stomata of the diacytic type more numerous on the lower surface; glandular trichomes with a short unicellular stalk and a globular head composed of 8, sometimes up to 16 cells or with a unicellular head; covering trichomes conical, uniseriate, up to about 300 µm long, occasionally up to 1500 µm, composed of 2 to 8 cells with slight swellings at the junctions and a warty or striated cuticle; fragments of the calyx containing small, cluster crystals of calcium oxalate; spherical pollen grains, about 25 µm to 30 µm in diameter, with 3 pores and 3 furrows and a



smooth exine; thick-walled, lignified fibres and spirally and annularly thickened vessels from the stem; occasional brown fragments of pericarp with single crystals of calcium oxalate.

## ***Lini semen* – Linseed (Ph. Eur. 5.0)**

### Definition

Linseed consists of the dried ripe seeds of *Linum usitatissimum* L.

### Macroscopic characters

The seeds have a flattened, elongated ovoid shape and are 4 mm to 6 mm long, 2 mm to 3 mm wide and 1.5 mm to 2 mm thick; one end is rounded and the other end forms an oblique point near which the hilum appears as a slight depression. The testa is dark reddish-brown, smooth and glossy but when viewed with a lens the surface is seen to be minutely pitted. The interior of the testa has a narrow, whitish endosperm and an embryo composed of 2 large, flattened, yellowish and oily cotyledons; the radicle points towards the hilum.

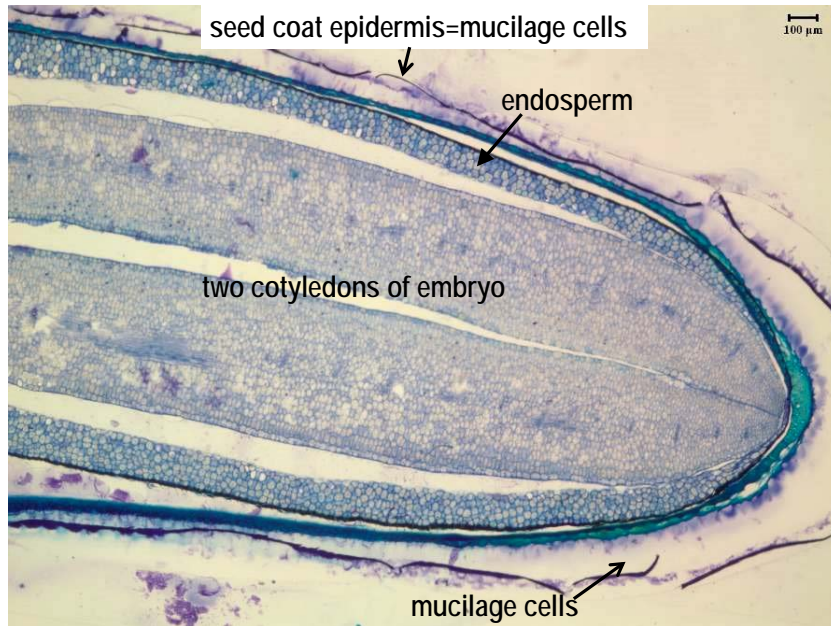


### **II.130**

*Lini semen* – Linseed (Ph. Eur. 5.0)

### Microscopic characters

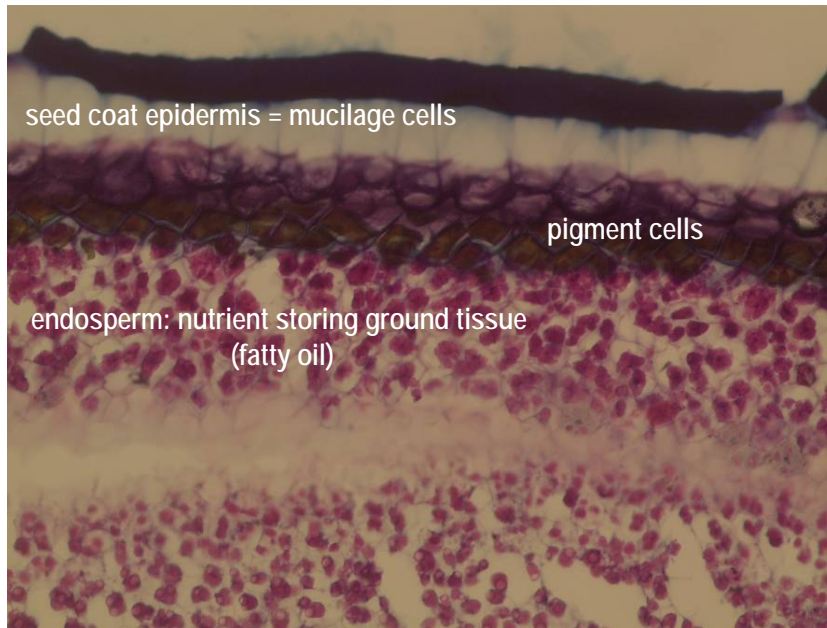
The testa is composed of an epidermis of isodiametric cells with mucilaginous outer walls and suberised inner walls; within this is an area of collenchymatous cells followed by a single layer of longitudinally elongated sclereids, each 120 µm to 190 µm long and 12 µm to 15 µm wide, with thickened and pitted walls; the testa has a hyaline layer composed of thin-walled parenchyma and the inner epidermis formed of a layer of flattened polygonal cells each containing a mass of orange-brown pigment. The endosperm and cotyledons are composed of polygonal parenchymatous cells with slightly thickened walls, containing aleurone grains up to 20 µm in diameter and globules of fatty oil; starch granules are absent.



**II.131**  
Linum usitatissimum seed l.s. 40x



**II.132**  
Linum usitatissimum seed l.s. 200x



**II.133**

*Linum usitatissimum* seed l.s. 200x

***Lini oleum virginale* – Linseed oil, virgin (Ph. Eur. 5.0)**

**Definition**

Virgin oil obtained by cold expression from ripe seeds of *Linum usitatissimum* L. A suitable antioxidant may be added.

**Characters**

It is a clear, yellow or brownish-yellow liquid, on exposure to air turning dark and gradually thickening. When cooled, it becomes a soft mass at about  $-20\text{ }^{\circ}\text{C}$ .

## ***Lycopodii herba* – Wolf's-foot clubmoss**

### Definition

The drug consists of the dried aerial parts of *Lycopodium clavatum* L.

### Macroscopic characters

The prostrate, branching shoots can reach 30 to 70 cm or sometimes even 2 m in length. The small leaves (microphylls) cover the stem in a scale-like fashion; their shape is lanceolate and taper to a fine hair-like white point. The erect shoots bear the sporophyllums arranged in spikes, the sporangia hold pale yellow spores.



### II.134

*Lycopodii herba et spora* – Wolf's-foot clubmoss and its spore

## ***Lycopodii spora* – Wolf's-foot clubmoss spore**

### Definition

The drug consists of the dried spores of *Lycopodium clavatum* L.

### Macroscopic characters

The spores are pale yellow-greenish.

### Microscopic characters

The spores are tetrahedron-shaped, their margin is tunicated; their diameter is 20-40  $\mu\text{m}$ .

### Other characters

The drug has no characteristic odour and taste.



## ***Lythri herba* – Loosestrife (Ph. Eur. 5.0)**

### Definition

Loosestrife consists of the dried flowering tops, whole or cut, of *Lythrum salicaria* L. It contains not less than 5.0% of tannins, expressed as pyrogallol and calculated with reference to the dried drug.

### Macroscopic characters

The stems are rigid, four-angled, branching at the top, brownish-green, longitudinally wrinkled and pubescent. The leaves are opposite, decussate, rarely verticillate in threes. The inflorescence forms a long terminal spike. The leaves are sessile, lanceolate and cordate at the base, 5 cm to 15 cm long and 1 cm to 2.5 cm wide, pubescent on the lower surface; the subsidiary veins form arcs that anastomose near the leaf margin. The flowers have a pubescent, tubular, persistent gamosepalous calyx, 4 mm to 8 mm long, consisting of 6 sepals bearing 6 small, triangular teeth alternating with 6 large acute teeth at least half as long as the tube; a polypetalous corolla consisting of 6 violet-pink petals, each expanded at the top with a wavy outline and narrowing at the base. The androecium consists of 2 verticils of 6 stamens (one verticil with short, barely emerging stamens, the other with long stamens extending well out of the corolla). The fruit, if formed, is a small capsule included in the persistent calyx.

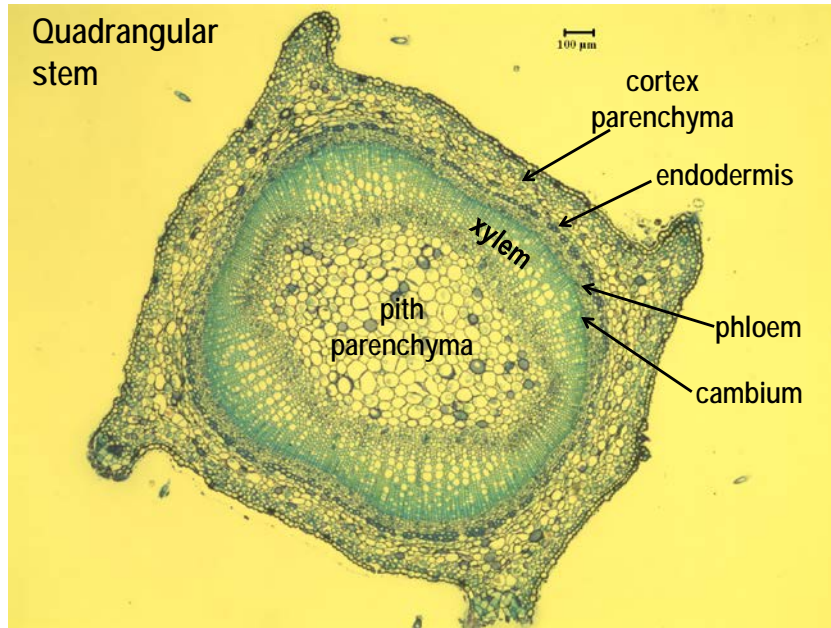


### II.135

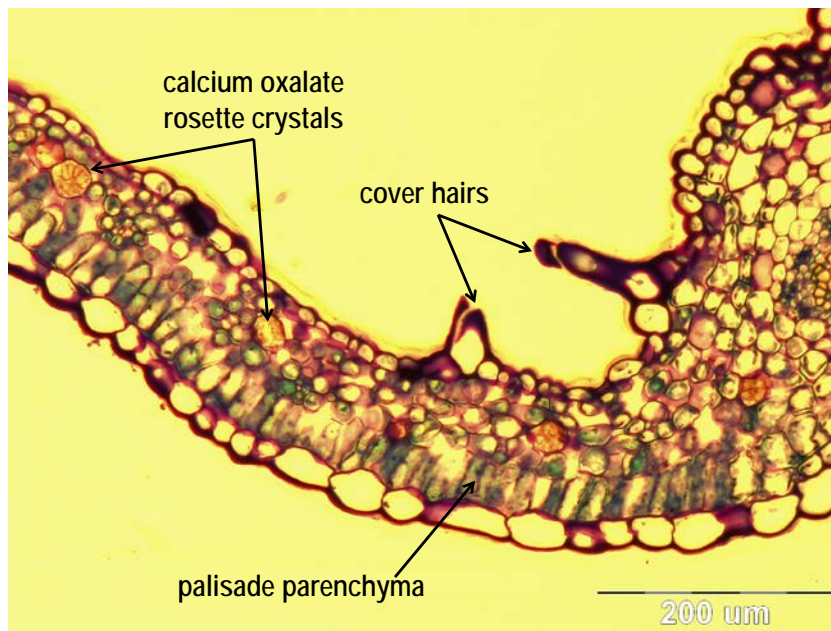
*Lythri herba* – Loosestrife (Ph. Eur. 5.0)

### Microscopic characters

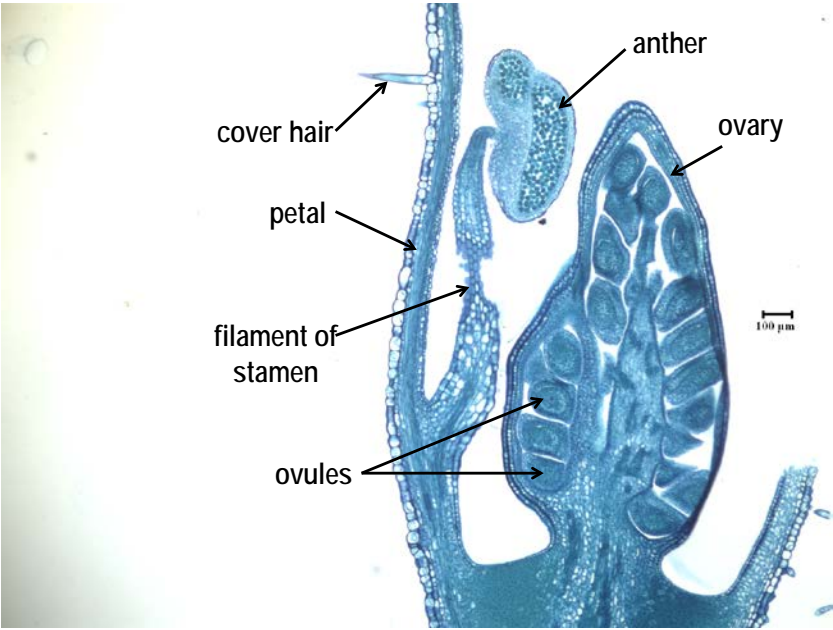
The greenish-yellow powder shows unicellular or bicellular, uniseriate, thick-walled, finely pitted covering trichomes from the lower epidermis of the stem and leaf; numerous uniseriate, unicellular or bicellular, thin-walled, finely pitted covering trichomes from the calyx; transparent violet-pink fragments from the petals; numerous cluster crystals of calcium oxalate; pollen grains with 3 pores and a thin and slightly granular exine; fragments of the upper epidermis with large polygonal cells and sinuous walls; fragments of the lower epidermis with smaller polygonal cells and anomocytic stomata.



**II.136**  
Lythrum salicaria stem c.s. 40x



**II.137**  
Lythrum salicaria leaf c.s. 200x



**II.138**  
Lythrum salicaria flower l.s. 40x

## ***Majoranae herba* – Marjoram flowering shoot**

### Definition

The drug consists of the dried aerial parts of *Majorana hortensis* L. (syn.: *Origanum majorana* L.).

### Macroscopic characters

The tomentose, greyish shoots are 30-40 cm long. The opposite leaves are oval, 5-20 mm long. The leaves are opposite, round to ovate. The branches bear dense terminal pseudowhirls of flowers. The small, hairy, whitish or purplish flowers emerge slightly from the obtuse bracts. The fruits are dark brown nutlets, from which only 1 or 2 mericarps become mature.



### **II.139**

*Majoranae herba* – Marjoram flowering shoot

### Microscopic characters

In the shoot parenchymatic cells can be seen under the epidermal cells. The vascular tissues form collateral open bundles.



## ***Malvae sylvestris flos* – Mallow flower (Ph. Eur. 5.0)**

### Definition

Mallow flower consists of the whole or fragmented dried flower of *Malva sylvestris* L. or its cultivated varieties

### Macroscopic characters

The flower consists of an epicalyx with three oblong or elliptical-lanceolate parts that are shorter than those of the calyx and situated immediately below it; a calyx with five pubescent triangular lobes, gamosepalous at the base; a corolla three to four times longer than the calyx with five wedge-shaped, notched petals fused to the staminal tube at their base; numerous stamens, the filaments of which fuse into a staminal tube covered by small star-shaped trichomes and occasional simple trichomes visible using a lens; numerous wrinkled carpels, glabrous or sometimes pubescent, enclosed in the staminal tube and arranged into a circle around a central style ending with numerous filiform stigmas. In cultivated varieties, the epicalyx is 3 to 7 partite, the calyx 5 to 8 partite and the corolla 5 to 10 partite.



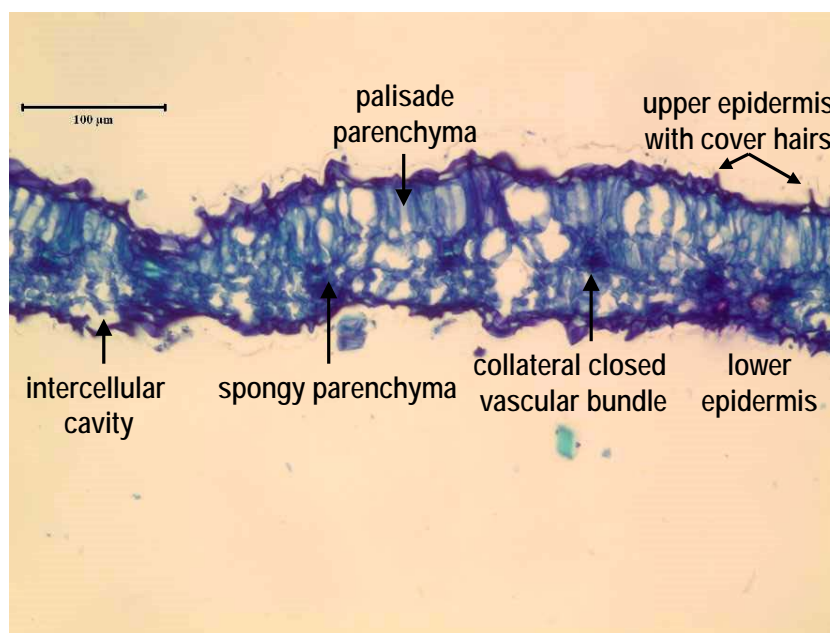
### **II.140**

*Malvae sylvestris flos* – Mallow flower (Ph. Eur. 5.0)

### Microscopic characters

The powdered drug, examined under a microscope using *chloral hydrate solution R*, shows unicellular, thick-walled, stiff trichomes, up to 2 mm in length; small unicellular covering trichomes, somewhat curved, either isolated or in small star-shaped groups of 2 to 6; capitate glandular trichomes with multicellular heads; mesophyll fragments with vessels accompanied by cluster crystals of calcium oxalate; spherical pollen grains, about 150 µm in diameter, with a roughly spiny exine. When mounted with *alcohol R*, numerous elongated cells containing mucilage are seen in the petal fragments.





### II.141

Malva neglecta leaf c.s. 200x

#### Other characters

The drug has no characteristic odour, and a mucilaginous taste.

## **Malvae folium – Mallow leaf**

#### Definition

Mallow leaf consists of the dried foliage leaves of *Malva neglecta* Wallr. and *M. sylvestris* L.

#### Macroscopic characters

The leaves are orbicular (round) or reniform (kidney-shaped), lobed, cordate, with an obtuse tip and palmate venation. The leaves of *M. neglecta* are 8 cm wide and 8 cm long; the upper (adaxial) leaf surface is slightly pubescent or glabrous, the lower (abaxial) surface is tomentose. The leaves of *M. sylvestris* are 5 to 10 cm wide, slightly pubescent, with dark green upper and light green lower surface.



*Malvae neglectae folium*



*Malvae neglectae folium*

*Malvae folium* – Mallow leaf

#### Microscopic characters

The epidermal cells have straight walls. The stomata are anisocytic, with 3 subsidiary cells. Unicellular covering hairs and stellate hairs are characteristic, as well as glandular hairs with a short stalk and a 4-10-celled head. The mesophyll consists of palisade and spongy parenchyma, with mucilage cells and cluster crystals of calcium oxalate.

#### Other characters

The drug has no characteristic odour, and a mucilaginous taste.

## ***Marrubii herba* – White horehound (Ph. Eur. 5.1)**

### Definition

White horehound consists of the flowering shoot of *Marrubium vulgare* L., whole or fragmented. It contains not less than 0.7% marrubiin, calculated with reference to the dry drug.

### Macroscopic characters

The stems are up to 50 cm long, quadrangular, up to 7 mm wide, young stems are densely covered with whitish downy hairs, older stems are greenish-grey and less hairy. The lower leaves are broadly ovate to almost orbicular, upper leaves less broadly ovate, both petiolate; lamina 1.5-4 cm long, 1-3.5 cm wide, apex sub-acute, base tapering or somewhat cordate, margin crenate, petiole up to 3 cm long; venation pinnate, prominent on the lower surface, distinctly depressed on the upper surface. Both leaf surfaces are densely covered with fine, white, woolly hairs, older leaves having fewer hairs on the dark greyish-green upper surface. The flowers are small, sessile in dense axillary clusters. The calyx is 5 mm long, persistent, with 5 long and 5 short, alternating, hooked, recurved fringing spines; throat of calyx with an internal ring of long silky hairs; corolla 7 mm long, white, 5-lobed, upper lobe 2-lipped, lower-lobe 3-lipped; 4 short stamens; style with bifid stigma.



### II.143

#### *Malvae folium* – Mallow leaf

### Microscopic characters

The powder is greyish-green, and shows the following diagnostic characters: fragments of leaves with sinuous, polygonal epidermal cells, diacytic stomata, more numerous on the lower surface and cells of the mesophyll with small needles and cluster crystals of calcium oxalate; covering trichomes very numerous, twisted or coiled, 100-200  $\mu\text{m}$  long, unicellular or multicellular and uniseriate with 2-6 cells, enlarged at the joints; stellate trichomes of 2 types, one with 15-20 branches arising from a short unicellular stalk and the other with fewer branches arising from a sessile base; 8-celled secretory trichomes of lamiaceous type; glandular trichomes with 1 or 2 celled stalk and 1 to 4 celled head; the covering trichomes on the inner surface of the calyx are up to 1000  $\mu\text{m}$  long with 2 to 3 cells, strongly thickened at the swollen joint and with the upper cell elongated; pollen grains spherical, about 25  $\mu\text{m}$  in diameter with smooth exine; fragments of vascular tissue from the stems and veins.

**Other characters**

The drug has a bitter taste.

***Matricariae flos* – Matricaria flower (Ph. Eur. 5.0)****Definition**

Dried capitula of *Matricaria recutita* L. (*Chamomilla recutita* (L.) Rauschert). The drug yields a minimum of 4 ml/kg (dried drug) blue essential oil, and has not less than 0.25 per cent (dried drug) total apigenin 7-glucoside (C<sub>21</sub>H<sub>20</sub>O<sub>10</sub>).

**Macroscopic characters**

Capitula, when spread out, consisting of an involucre made up of many bracts arranged in 1 to 3 rows; an elongated-conical receptacle, occasionally hemispherical (young capitula); 12 to 20 marginal ligulate florets with a white ligule; several dozen yellow central tubular florets. The involucre bracts are ovate to lanceolate, with a brownish-grey scarious margin. The receptacle is hollow, without paleae. The corolla of the ligulate florets has a brownish-yellow tube at the base extending to form a white, elongated-oval ligule. The inferior ovary is dark brown, ovoid to spherical, and has a long style and bifid stigma. The tubular florets are yellow and have a five-toothed corolla tube, 5 syngenesious, epipetalous stamens and a gynoeceium similar to that of the ligulate florets.

**II.144**

*Matricariae flos* – Matricaria flower (Ph. Eur. 5.0)



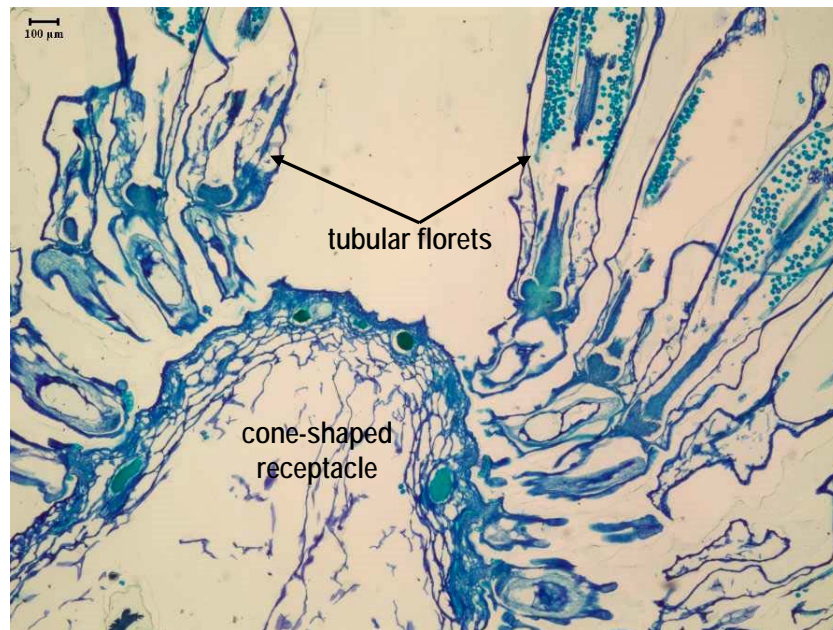


**II.145**

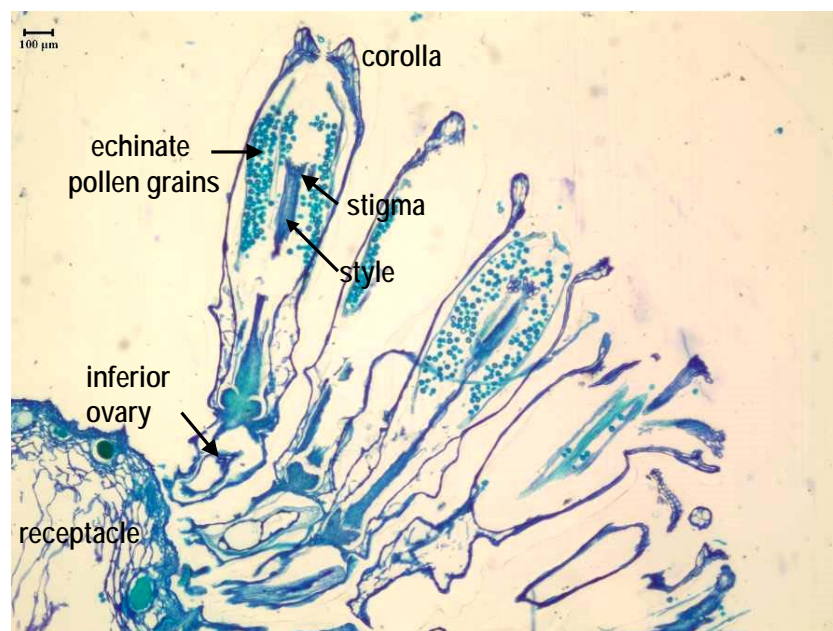
*Matricariae cribratum*

**Microscopic characters**

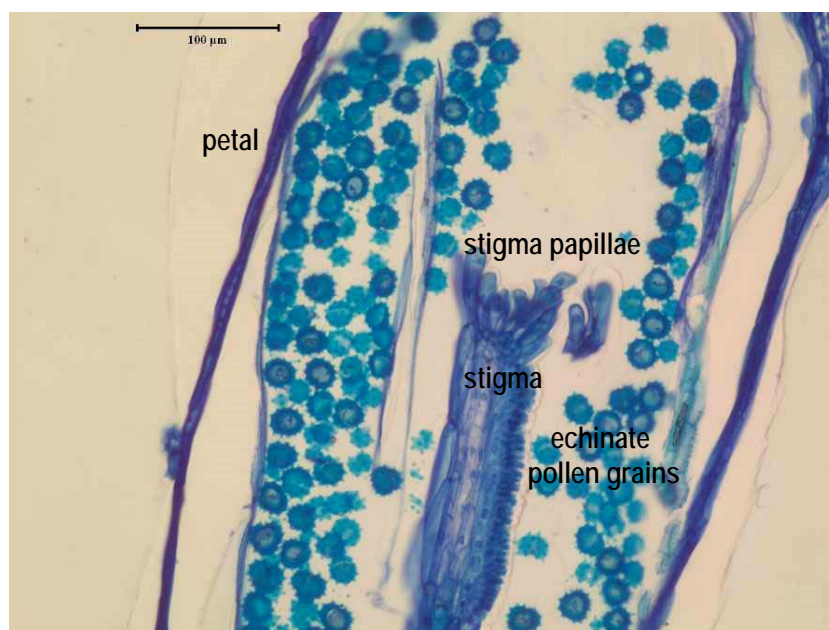
The bracts have a margin composed of thin-walled cells and a central region composed of elongated sclereids with occasional stomata. The inner epidermis of the corolla of the ligulate florets, in surface view, consists of thin-walled, polygonal cells, slightly papillose, those of the outer epidermis markedly sinuous and strongly striated; corolla of the tubular florets with longitudinally elongated epidermal cells, and with small groups of papillae near the apex of the lobes. Glandular trichomes, each consisting of a short stalk and a head of 2 to 3 tiers of 2 cells, each occur on the outer surfaces of the bracts and on the corollas of both types of florets. The ovaries have a sclerous ring at the base and the wall is composed of vertical bands of thin-walled, longitudinally elongated cells with numerous glandular trichomes, alternating with fusiform groups of small, radially elongated cells containing mucilage. The cells at the apex of the stigmas show papillae. Numerous small, cluster crystals of calcium oxalate occur in the inner tissues of the ovaries and the anther lobes. Pollen grains spherical to triangular, about 30  $\mu\text{m}$  in diameter with 3 pores and a spiny exine.



**II.146**  
Matricaria recutita inflorescence l.s. 40x



**II.147**  
Matricaria recutita inflorescence l.s. 40x



### II.148

*Matricaria recutita* flower l.s. 200x

#### Other characters

The drug has an intense, characteristic odour, and a bitter, mucilaginous taste.

### ***Matricariae aetheroleum* – Matricaria oil (Ph. Eur. 5.0)**

#### Definition

Blue essential oil obtained by steam distillation from the fresh or dried flower-heads or flowering tops of *Matricaria recutita* L. (*Chamomilla recutita* L. Rauschert). There are 2 types of matricaria oil which are characterised as rich in bisabolol oxides, or rich in levomenol.

#### Characters

A clear, intensely blue, viscous liquid. It has an intense characteristic odour.

### ***Matricariae extractum fluidum* – Matricaria liquid extract (Ph. Eur. 5.0)**

#### Definition

Matricaria liquid extract is produced from *Matricaria flower*. It contains not less than 0.30 per cent of blue residual oil.

#### Other characters

A brownish, clear liquid with an intense characteristic odour and characteristic bitter taste; miscible with water and with alcohol with development of turbidity, soluble in alcohol (50 per cent V/V).



***Melissae folium* – Melissa leaf (Ph. Eur. 5.0)****Definition**

Melissa leaf consists of the dried leaf of *Melissa officinalis* L. It contains not less than 4.0% of total hydroxycinnamic derivatives expressed as rosmarinic acid, calculated with reference to the dried drug.

**Macroscopic characters**

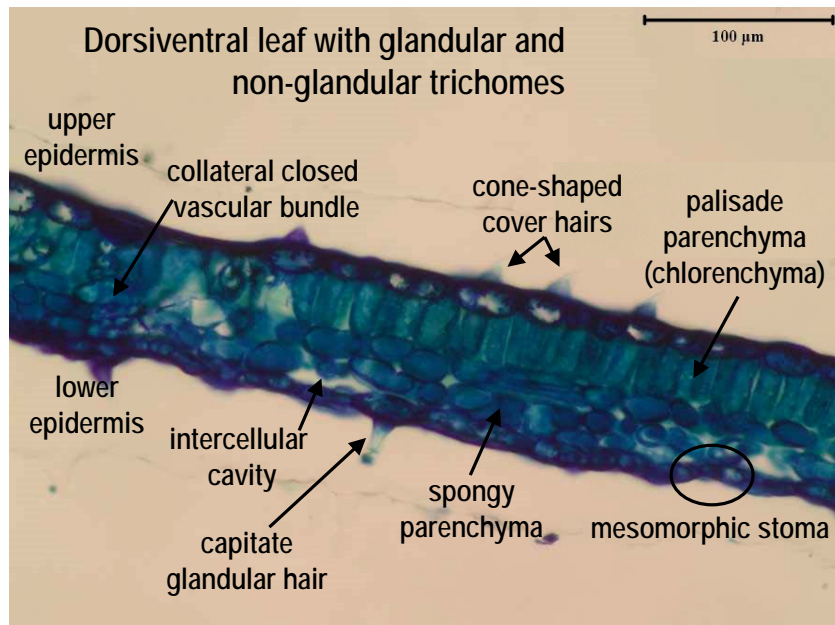
Melissa leaf has a petiole of varying length, the lamina is oval, cordate and up to about 8 cm long and 5 cm wide. The lamina is thin and the lower surface has a conspicuous, raised, reticulate venation; the margins are roughly serrate-crenate. The upper surface is bright green, the lower surface is lighter in colour.

**II.149**

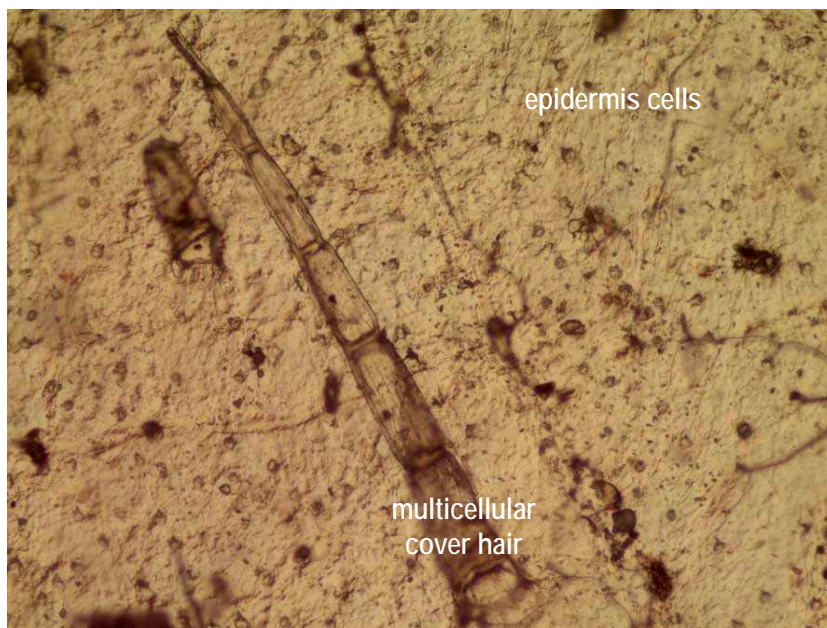
*Melissae folium* – Melissa leaf (Ph. Eur. 5.0)

**Microscopic characters**

The powder shows fragments of the leaf epidermis with sinuous walls; short, straight, unicellular, conical covering trichomes with a finely striated cuticle; multicellular, uniseriate covering trichomes with pointed ends and thick, warty cuticles; eight-celled secretory trichomes of lamiaceous type; secretory trichomes with unicellular to tricellular stalks and unicellular or, more rarely bicellular, heads; diacytic stomata, on the lower surface only.



**II.150**  
*Melissa officinalis* leaf c.s. 200x



**II.151**  
*Melissa officinalis* leaf cleared 200x

#### Other characters

*Melissa* leaf has an odour reminiscent of lemon.



## ***Menthae crispae folium* – Spearmint leaf**

### Definition

The drug consists of the dried foliage leaves of *Mentha spicata* L. var. *crispa* (Benth.) Mansf.

### Macroscopic characters

The ovate or cordate leaves are 5 to 9 cm long and 1.5 to 3 cm wide, with a wavy surface, serrate edge, rounded leaf base and acuminate leaf tip.

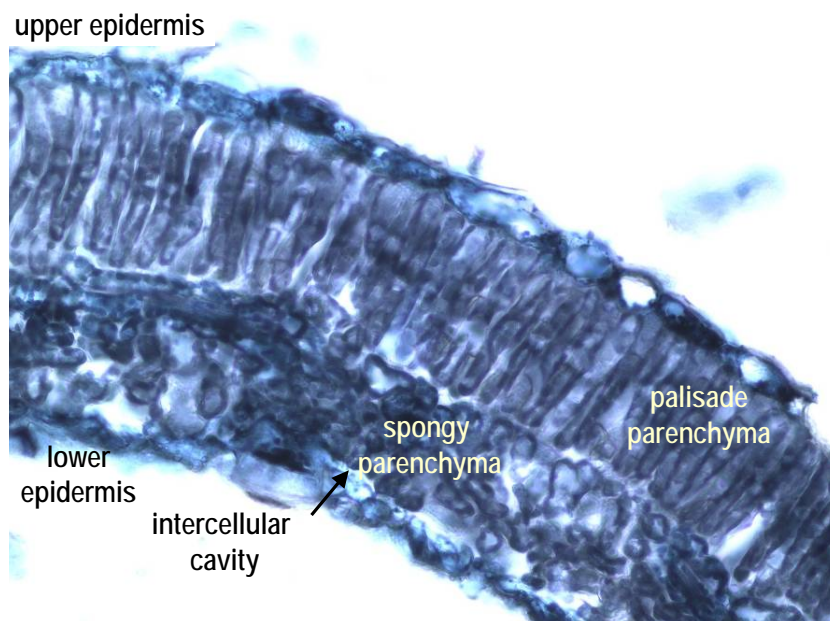


### **II.152**

*Menthae crispae folium* – Spearmint leaf

### Microscopic characters

In transverse section of the leaf, heterogenous mesophyll can be observed, with palisade parenchyma below the upper epidermis and spongy parenchyma with intercellular cavities below the lower epidermis.



**II.153**

Mentha sp. leaf c.s. 200x

**Other characters**

When crushed, the drug has a characteristic odour reminiscent of caraway; its taste is pungent.

## ***Menthae piperitae folium* – Peppermint leaf (Ph. Eur. 5.0)**

### Definition

Peppermint leaf consists of the whole or cut dried leaves of *Mentha × piperita* L. The whole drug contains not less than 12 ml/kg of essential oil. The cut drug contains not less than 9 ml/kg of essential oil.

### Macroscopic characters

it is green to brownish-green, with brownish-violet veins in some varieties. The leaf is entire, broken or cut, thin, fragile; the whole leaf is 3 cm to 9 cm long and 1 cm to 3 cm wide and often crumpled. The lamina is oval or lanceolate, the apex acuminate, the margin sharply serrate and the base asymmetrical. Venation is pinnate, prominent on the lower surface, with lateral veins leaving the midrib at about 45°. The lower surface is slightly pubescent and secretory trichomes are visible under a lens (6×) as bright yellowish points. The petioles are green to brownish-violet; grooved, usually up to 1 mm in diameter and 0.5 cm to 1 cm long.



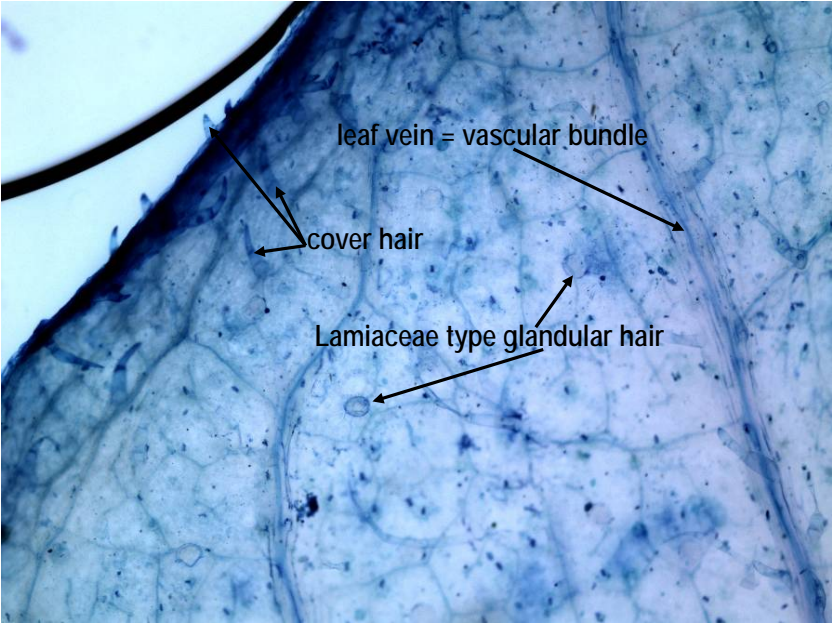
### II.154

*Menthae piperitae folium* – Peppermint leaf (Ph. Eur. 5.0)

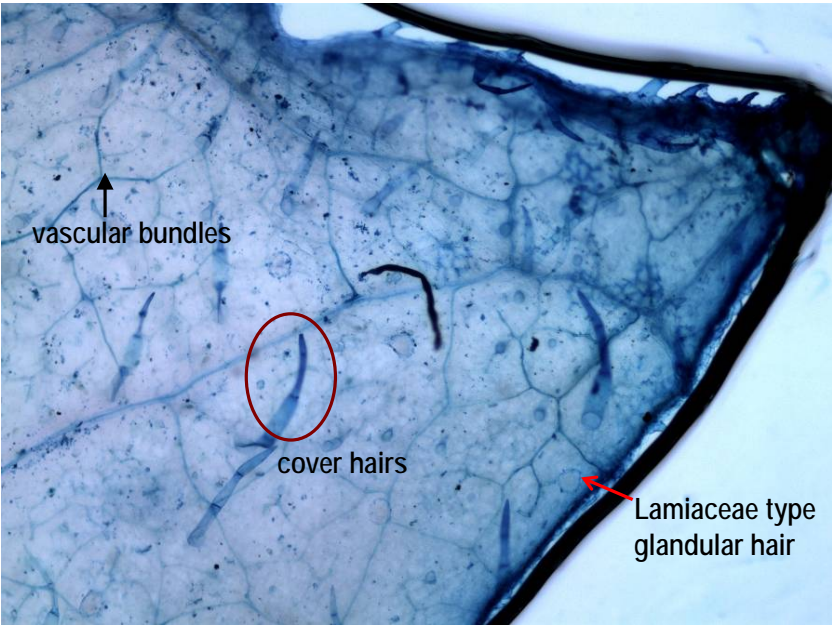
### Microscopic characters

The powder is brownish-green, and shows the following diagnostic characteristics: leaf-tissue fragments with cells of the epidermis having sinuous-wavy walls and the cuticle striated over the veins and diacytic stomata predominantly present on the lower epidermis; epidermis fragments from near the leaf margin with straight-walled isodiametric cells, showing distinct beading and pitting in anticlinal walls; covering trichomes short, conical, unicellular or bicellular, or elongated, uniseriate with three to eight cells with striated cuticle; glandular trichomes of two types: (a) unicellular base with small, rounded unicellular head 15 µm to 25 µm in diameter; (b) unicellular base with enlarged oval head 55 µm to 70 µm in diameter composed of eight radiating cells (glandular trichomes of lamiaceous type); dorsiventral mesophyll fragment with a single palisade layer and four to six layers of spongy parenchyma; yellowish crystals of menthol under the cuticle of secretory cells. Calcium oxalate crystals are absent.

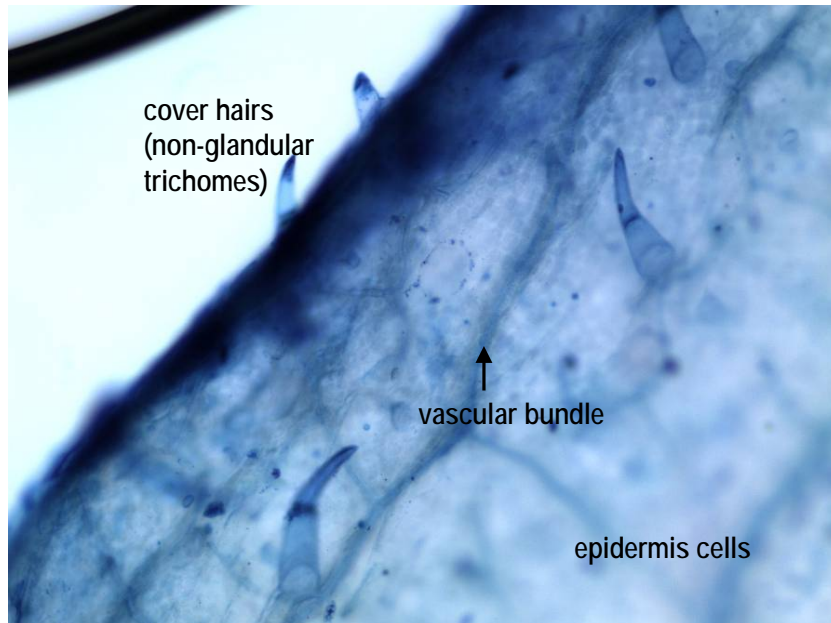




**II.155**  
Mentha piperita leaf cleared 40x



**II.156**  
Mentha piperita leaf cleared 40x



**II.157**

Mentha piperita leaf cleared 100x

**Other characters**

Peppermint leaf has a characteristic and penetrating odour and a characteristic aromatic taste.

***Menthae piperitae aetheroleum* – Peppermint oil  
(Ph. Eur. 5.0)**

**Definition**

Essential oil obtained by steam distillation from the fresh aerial parts of the flowering plant of *Mentha × piperita* L.

**Characters**

a colourless, pale yellow or pale greenish-yellow liquid. It has a characteristic odour and taste followed by a sensation of cold. Miscible with alcohol and with methylene chloride.



## ***Menyanthis trifoliatae folium* – Bogbean leaf (Ph. Eur. 5.0)**

### Definition

Dried, entire or fragmented leaf of *Menyanthes trifoliata* L.

### Macroscopic characters

The leaf is long-petiolated, trifoliate, with long sheaths from the base; the petiole is up to 5 mm in diameter and strongly striated longitudinally. The lamina is divided into equal leaflets, sessile, obovate up to 10 cm long and up to 5 cm wide, with an entire, occasionally sinuous margin with brownish or reddish hydathodes and a spatulate base; it is glabrous, dark green on the upper surface and paler green on the lower surface, with a wide, whitish, finely striated prominent midrib.

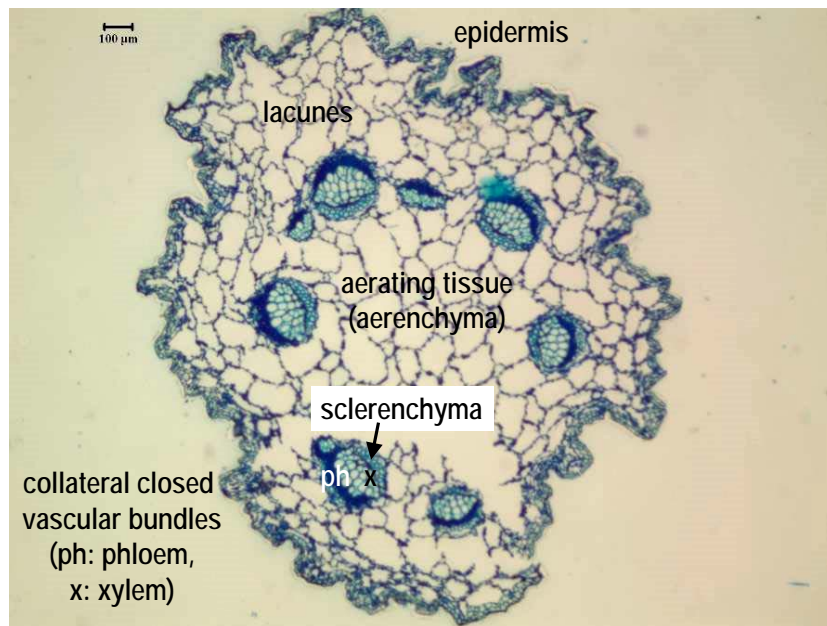


### **II.158**

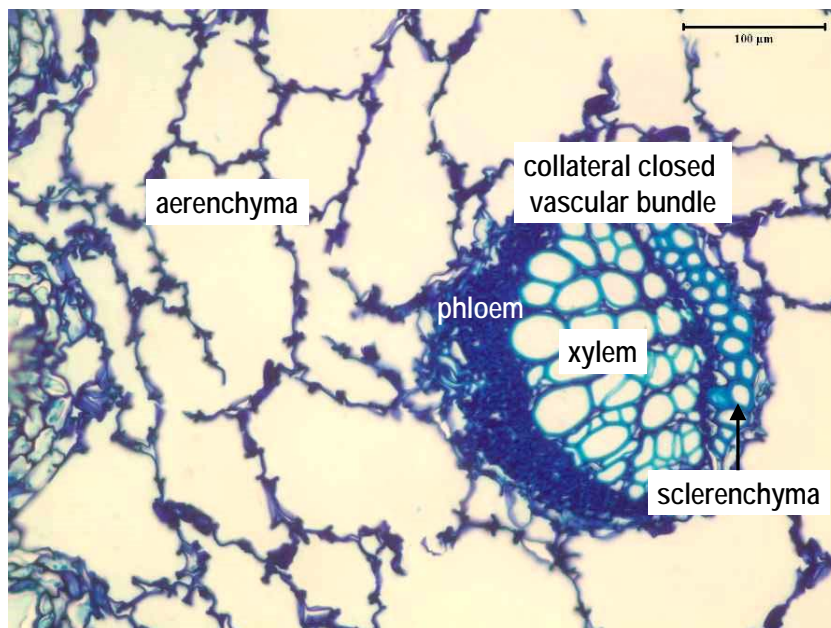
*Menyanthis trifoliatae folium* – Bogbean leaf (Ph. Eur. 5.0)

### Microscopic characters

The powder is yellowish-green and shows fragments of upper epidermis with polyhedral cells and thin wavy walls; fragments of lower epidermis with sinuous walls; anomocytic stomata on both surfaces, with the subsidiary cells showing radiating striations; epidermal cells from the veins straight walled and papillose; fragments of mesophyll parenchyma with large intercellular spaces (aerenchyma); irregular cells with rare sclereids; fragments of spiral or annular vessels.



**II.159**  
Menyanthes trifoliata leaf petiole c.s. 40x



**II.160**  
Menyanthes trifoliata leaf petiole c.s. 200x

Other characters  
Very bitter and persistent taste.

## ***Basilici herba* – Basil herb**

### Definition

The drug consists of the whole or fragmented, dried flowering aerial parts of *Ocimum basilicum* L.

### Macroscopic characters

The shoot is quadrangular, approx. 40 to 60 cm long. The leaves are decussate, petiolate, ovate, glossy, with a green or purple shade, the edge is slightly serrate. The bracts subtending the pseudowhorls of flowers widen plate-like. The lower lip of the calyx has 4 lobes, the upper lip is entire. The yellowish-white corolla has a 4-lobed upper lip and an entire lower lip. The fruits are dark brown nutlets.



### **II.161**

*Basilici herba* – Basil herb

### Microscopic characters

The epidermal cells have wavy anticlinal cell walls in surface view, the stomata are diacytic. Glandular hairs of the Lamiaceae type consist of 4 to 8 cells; the covering hairs are unicellular, covered by a cuticle. Trichomes with thick walls, comprising 2 to 4 cells, holding raphide crystals of calcium oxalate can be observed, too. Pollen grains are hexacolpate, with reticulate ornamentation.

### Other characters

The drug has an aromatic, spicy odour and a mild salty taste.



## ***Ononidis radix* – Restharrow root (Ph. Eur. 5.0)**

### Definition

Whole or cut, dried root of *Ononis spinosa* L.

### Macroscopic characters

The root is more or less flattened, twisted and branched, deeply wrinkled, brown in colour and grooved longitudinally. The transversely cut surface shows a thin bark and a xylem cylinder with a conspicuously radiate structure. The fracture of the root is short and fibrous.



### **II.162**

*Ononidis radix* – Restharrow root (Ph. Eur. 5.0)

### Microscopic characters

The powder is light brown or brown, and shows brown fragments of cork composed of thin-walled polygonal cells; groups of thick-walled narrow fibres, often accompanied by a parenchymatous crystal sheath containing prisms of calcium oxalate; fragments of vessels with numerous small bordered pits; parenchymatous cells with single prisms of calcium oxalate. When examined under a microscope using a mixture of equal volumes of *glycerol R* and *water R*, the powder shows numerous simple, round starch granules, 5 µm to 10 µm in diameter.

### Other characters

The drug has a characteristic odour, and a scraping, tartish taste.

## ***Origani herba* – Oregano (Ph. Eur. 5.0)**

### Definition

Dried leaves and flowers separated from the stems of *Origanum onites* L. or *Origanum vulgare* L. subsp. *hirtum* (Link) Ietsw., or a mixture of both species. It contains minimum 25 ml/kg of essential oil and minimum 1.5 per cent of carvacrol and thymol (both C<sub>10</sub>H<sub>14</sub>O; Mr 150.2) (anhydrous drug).

### Macroscopic characters

*O. onites*: The leaf is yellowish-green, usually 4 mm to 22 mm long and 3 mm to 14 mm wide. It has long or short petiole or is sessile. The lamina is ovate, elliptic or ovate-lanceolate. Margins are entire or serrate, apex is acute or obtuse. The veins are yellowish and conspicuous on the adaxial surface. Flowers are solitary or seen as broken parts of the corymb. The calyx is bract-like and inconspicuous. The corolla is white, on top of inflorescences or single flowers, or inconspicuous. The bract is imbricate and green like the leaves. The drug contains yellowish or yellowish-brown stem parts. *O. vulgare* (subsp. *hirtum*): The leaf is green and usually 3 mm to 28 mm long and 2.5 mm to 19 mm wide. It is petiolate or sessile. The lamina is ovate or ovate-elliptic. The margins are entire or serrate, the apex is acute or obtuse. Flowers are rare, found as broken parts of the corymbs. Bracts are greenish-yellow and imbricate. Calyx is corolla-like and inconspicuous. Corolla is white on top of inflorescences, slightly conspicuous or inconspicuous.



### II.163

*Origani herba* – Oregano (Ph. Eur. 5.0)

### Microscopic characters

The powder is green (*O. vulgare*) to yellowish-green (*O. onites*). The glandular trichomes are of lamiaceous type or short, unicellular and rarely conical; conical trichomes shaped as pointed teeth are more abundant in *O. vulgare*. Covering trichomes are thick-walled in *O. vulgare*. Covering trichomes contain prismatic crystals in *O. onites*, minute needles in *O. vulgare*. Cuticle on covering trichomes is smooth; warty in *O. vulgare*. The epidermises of the leaves have cells with walls which are sinuous and the stomata are of diacytic type; in *O. vulgare* cells of the upper epidermis are beaded; secretory trichomes with 8-16 cells (12 in *O. vulgare*); glandular trichomes are numerous in *O. onites*; rare in *O. vulgare*. They have unicellular head and unicellular,



bicellular or tricellular (bicellular or tricellular in *O. vulgare*) stalk; pollen grains are smooth, spherical and more abundant in *O. onites*.

## ***Ginseng radix* – Ginseng (Ph. Eur. 5.0)**

### Definition

Ginseng consists of the whole or cut dried root of *Panax ginseng* C. A. Meyer. It contains not less than 0.40 per cent of combined ginsenosides Rg1 ( $C_{42}H_{72}O_{14}, 2H_2O$ ; *Mr* 837) and Rb1 ( $C_{54}H_{92}O_{23}, 3H_2O$ ; *Mr* 1163), calculated with reference to the dried drug.

### Macroscopic characters

The principal root is fusiform or cylindrical, sometimes branched, up to about 20 cm long and 2.5 cm in diameter, and may be curved or markedly re-curved. The surface is pale yellow to cream and shows longitudinal ridges; stem scars may be seen at the crown. The fracture is short. The transversely-cut surface shows a wide outer zone with scattered orange-red resin canals and a finely radiate inner region. The rootlets, numerous in the lower part, are fine with a small diameter.



### **II.164**

*Ginseng radix* – Ginseng (Ph. Eur. 5.0)

### Microscopic characters

The light yellow powder shows abundant fragments of thin-walled parenchymatous cells and fragments of large secretory canals containing yellowish-brown resin. The powder occasionally shows non-lignified tracheids and partially-lignified vessels with spiral or reticulate thickening, occurring singly or in small groups, and scattered cluster crystals of calcium oxalate. Examined under a microscope using a mixture of equal volumes of *glycerol R* and *water R*, the starch granules are very abundant, simple or two or three compound, and range from 1  $\mu\text{m}$  to 10  $\mu\text{m}$  in diameter.

### Other characters

The drug has a spicy odour and taste.

## ***Papaveris rhoeados flos* – Red poppy petals (Ph. Eur. 5.0)**

### Definition

Dried, whole or fragmented petals of *Papaver rhoeas* L.

### Macroscopic characters

The petal is dark red to dark violet-brown, very thin, floppy, wrinkled, often crumpled into a ball and velvety to the touch. It is broadly ovate with an entire margin, about 6 cm long and 4 cm to 6 cm wide, narrowing at the base where there is a black spot. The vascular bundles radiate from the base and they anastomose in a continuous arc, all at the same short distance from the margin.

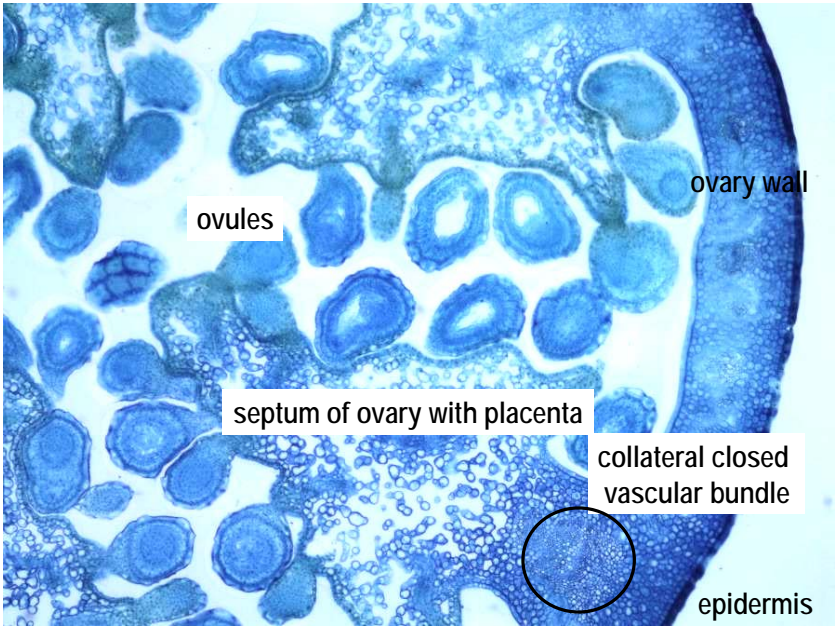


### **II.165**

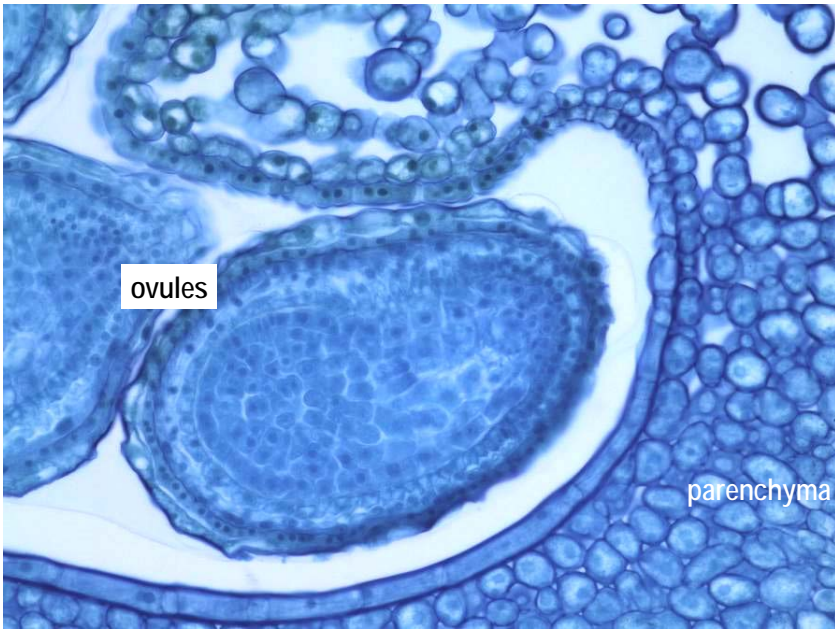
*Papaveris rhoeados flos* – Red poppy petals (Ph. Eur. 5.0)

### Microscopic characters

The powder is an intense reddish-pink and shows fragments of epidermis composed of elongated, sinuous-walled cells with small, rounded, anomocytic stomata, numerous vascular bundles with spiral vessels embedded in the parenchyma; occasional fragments of the fibrous layer of the anthers; rounded pollen grains, about 30 µm in diameter, with 3 pores and a finely verrucose exine.



**II.166**  
Papaver rhoeas ovary c.s. 40x



**II.167**  
Papaver rhoeas ovary c.s. 200x



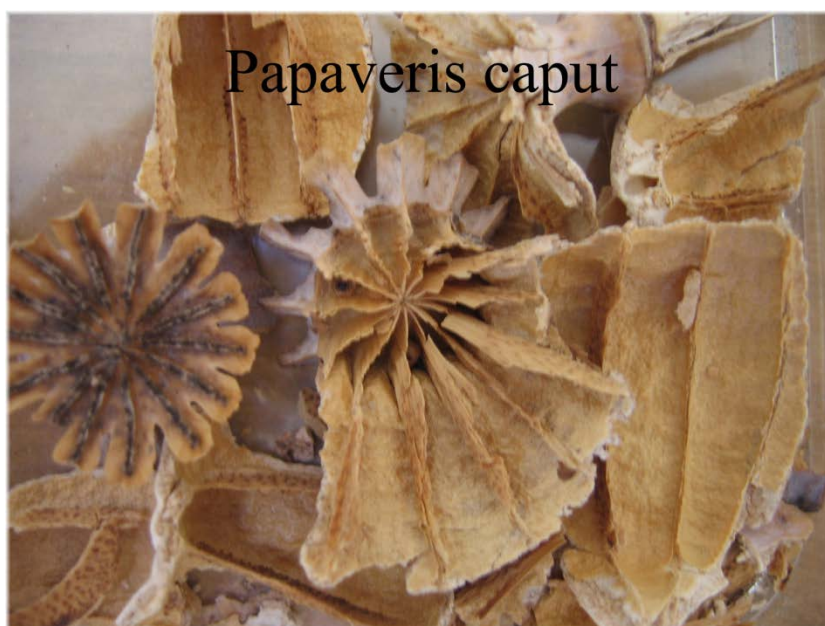
## ***Opium crudum* – Opium, raw (Ph. Eur. 5.0)**

### Definition

Raw opium is intended only as starting material for the manufacture of galenical preparations. It is not dispensed as such. Raw opium is the air-dried latex obtained by incision from the unripe capsules of *Papaver somniferum* L. It contains not less than 10.0 per cent of morphine ( $C_{17}H_{19}NO_3$  ; Mr 285.3) and not less than 2.0 per cent of codeine ( $C_{18}H_{21}NO_3$  ; Mr 299.4), both calculated with reference to the drug dried at 100 °C to 105 °C.

### Macroscopic characters

It consists of masses of various sizes, which tend to be soft and shiny and, after drying, become hard and brittle.



**II.168**  
*Opium caput*





**II.169**

*Papaveris semen*

**Microscopic characters**

a suspension of raw opium in a 20 g/l solution of *potassium hydroxide R* is seen to consist of granules of latex agglomerated in irregular masses, and of light-brown elongated filaments. Some fragments of vessels and rather elongated, refringent crystals are also visible, as well as a smaller number of round pollen grains and fragments of elongated fibres. Hairs of various lengths with sharp points and a few grains of starch introduced during the handling of the latex may be present. Fragments of epicarp consisting of polygonal cells with thick walls defining a stellate lumen may also be present.

**Other characters**

Raw opium has a characteristic odour and a blackish-brown colour.

***Opii pulvis normatus* – Opium, prepared (Ph. Eur. 5.0)**

**Definition**

Raw opium powdered, and dried at a temperature not exceeding 70 °C.

*Content:*

— morphine ( $C_{17}H_{19}NO_3$ ; *Mr* 285.3): 9.8 per cent to 10.2 per cent (drug dried at 100-105 °C for 4 h),

— codeine ( $C_{18}H_{21}NO_3$ ; *Mr* 299.4): minimum 1.0 per cent (drug dried at 100-105 °C for 4 h).

Content adjusted if necessary by adding a suitable excipient or raw opium powder.

**Macroscopic characters**

yellowish-brown or dark brown powder

**Microscopic characters**

When examined under a microscope using a 20 g/l solution of *potassium hydroxide R*, it is seen to consist of granules of latex agglomerated in irregular masses, and of light brown elongated filaments. Some fragments of vessels and rather elongated, refringent crystals are also visible, as well as a smaller number of round pollen grains and fragments of elongated fibres. Hairs of various lengths with sharp points and fragments of epicarp consisting of polygonal cells with thick walls defining a stellate lumen may be present. When examined under a microscope using *glycerol (85 per cent) R*, particles of excipient and a few grains of starch introduced during the handling of the latex may be seen.

**Other characters**

The fracture is granulous, the fracture surface has an oily shine. The drug has a characteristic odour and a bitter taste.

## ***Passiflorae herba* – Passion flower (Ph. Eur. 5.0)**

### Definition

Passion flower consists of the fragmented or cut, dried aerial parts of *Passiflora incarnata* L. It may also contain flowers and/or fruits. It contains not less than 1.5 per cent of total flavonoids expressed as vitexin (C<sub>21</sub>H<sub>20</sub>O<sub>10</sub>; Mr 432.4), calculated with reference to the dried drug.

### Macroscopic characters

The green to greenish-grey or brownish stem is ligneous, hollow, longitudinally striated, glabrous or very slightly pubescent, with a diameter that is generally less than 8 mm. The green or greenish-brown leaves are alternate, finely dentate and pubescent, deeply divided into three acute lobes of which the central lobe is the largest. The midrib is much more prominent on the lower surface. The petiole is pubescent and bears two dark-coloured nectaries near the lamina. The tendrils are very numerous and grow from the axils of the leaves; they are fine, smooth, round and terminated in cylindrical spirals. The radiate flowers, if present, have three small bracts and a corolla consisting of five white, elongated petals with several rows of filiform, petaloid appendices. If present, the greenish to brownish fruit is flattened and oval; it contains several flattened, brownish-yellow, pitted seeds.



### II.170

*Passiflorae herba* – Passion flower (Ph. Eur. 5.0)

### Microscopic characters

The powder is light green, and shows fragments of the leaf epidermis with sinuous walls and anomocytic stomata; numerous cluster crystals of calcium oxalate isolated or aligned along the veins; many isolated or grouped fibres from the stems associated with pitted vessels and tracheids; uniseriate trichomes with one to three thin-walled cells, straight or slightly curved, ending in a point or sometimes a hook. In addition the powder shows, if flowers are present, papillose epidermises of the petals and appendages and pollen grains with a reticulate exine; and if mature fruits are present, scattered brown tannin cells and brownish-yellow, pitted fragments of the testa.

## ***Boldi folium* – Boldo leaf (Ph. Eur. 6.0)**

### Definition

Boldo leaf consists of the whole or fragmented dried leaf of *Peumus boldus* Molina. The whole drug contains not less than 20.0 ml/kg and not more than 40.0 ml/kg and the fragmented drug not less than 15.0 ml/kg of essential oil. It contains not less than 0.1 per cent of total alkaloids, expressed as boldine, ( $C_{19}H_{21}NO_4$ ;  $Mr$  327.4), calculated with reference to the anhydrous drug.

### Macroscopic characters

The leaf is oval or elliptical, usually 5 cm long with a short petiole, an obtuse or slightly emarginate or mucronate apex and an equal and rounded base; the margin is entire and slightly undulate and the thickened edges are more or less revolute. The lamina is greyish-green, thick, tough and brittle. The upper surface is rough with numerous prominent small protuberances and a depressed venation. The lower surface is finely pubescent, with the protuberances less well-marked, and a prominent, pinnate venation.



### II.171

*Boldi folium* – Boldo leaf (Ph. Eur. 6.0)

### Microscopic characters

The powder is greyish-green, and shows fragments of the upper epidermis with straight or slightly sinuous thickened and beaded walls and underlying hypodermis, the lower epidermis has numerous stomata surrounded by four to seven subsidiary cells; solitary, bifurcated or stellate clustered unicellular covering trichomes with more or less thickened and lignified wall; fragments of the lamina showing a two-layered palisade parenchyma; debris of the spongy mesophyll including numerous, large rounded oil cells and parenchyma containing fine needle-shaped crystals; thick walled fibres and lignified, pitted parenchymatous cells associated with vascular tissue from the veins.

### Other characters

Boldo leaf has an aromatic odour especially when rubbed.



## ***Phaseoli pericarpium* (legumen) – Bean fruit wall (Bean pod)**

### Definition

Bean pod is the dried legume of *Phaseolus vulgaris* L.

### Macroscopic characters

The pod (legume) is 8 to 15 cm long and 10 to 15 mm wide, flattened, protruding where the seeds are. When ripe, the legume is yellow, the inside is white, pergamen-like and brittle.



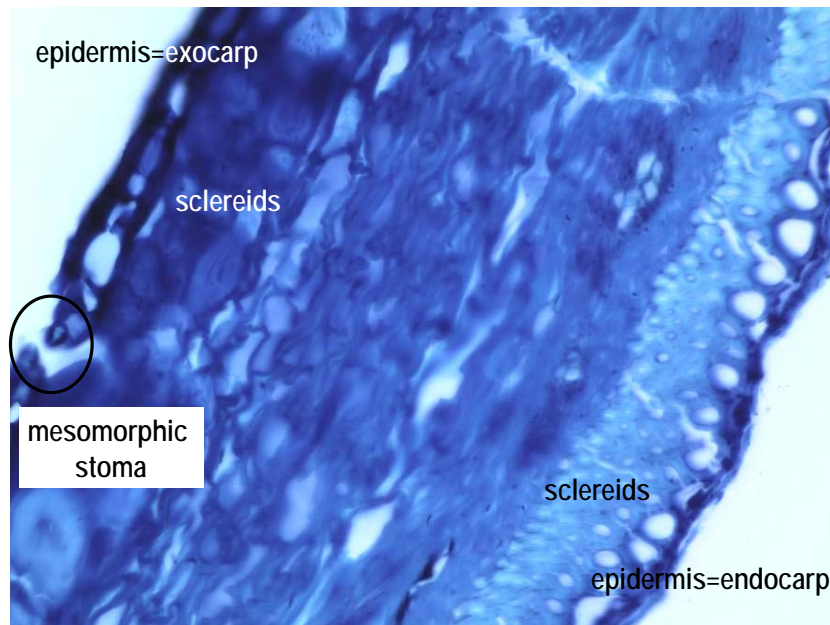
### **II.172**

*Phaseoli pericarpium* (legumen) – Bean fruit wall (Bean pod)

### Microscopic characters

The cells of the exocarp are polygonal, not lignified. The cells of the inner side become woody; crystals of calcium oxalate are visible here, as well. The meso- and endocarp consists of compressed cells and crystals of calcium oxalate. The 1-2-celled covering hairs have thick walls and pointed tips. The glandular hairs are multicellular, with an oval head.





**II.173**

Phaseolus vulgaris fruit wall c.s. 200x

**Other characters**

The drug has a slightly mucilaginous taste.

## ***Anisi fructus* – Aniseed (Ph. Eur. 5.0)**

### Definition

Aniseed consists of the whole dry cremocarp of *Pimpinella anisum* L. It contains not less than 20 ml/kg of essential oil.

### Macroscopic characters

The fruit is a cremocarp and generally entire; a small fragment of the thin, rigid, slightly curved pedicel is frequently attached. The cremocarp is ovoid or pyriform and slightly compressed laterally, yellowish-green or greenish-grey, 3 mm to 5 mm long and up to 3 mm wide, surmounted by a stylopod with 2 short, reflexed stylar points. The mericarps are attached by their tops to the carpophore with a plane commissural surface and a convex dorsal surface, the latter being covered with short, warty trichomes visible using a lens; the fruit-part (mericarp) shows 5 primary ridges, running longitudinally, comprising 3 dorsal ridges and 2 lateral ridges, non-prominent, and lighter in colour.



### II.174

*Anisi fructus* – Aniseed (Ph. Eur. 5.0)

### Microscopic characters

The powder is greenish-yellow to brownish-green, and shows the following diagnostic characters: whole or broken trichomes, mostly unicellular, sometimes curved, with blunt apex and warty cuticle; fragments of epidermis (exocarpium) with striated cuticle, occasional anomocytic stomata; fragments of numerous narrow, branched vittae, fragments of endosperm containing aleurone grains and micro-rosettes of calcium oxalate; oblong sclereids from the commissural zone and bundles of sclerenchymatous fibres from the carpophore and the pedicel. Starch is absent.

### Other characters

Aniseed has an odour reminiscent of anethole.

## ***Plantaginis lanceolatae folium* – Ribwort plantain (Ph. Eur. 5.0)**

### Definition

Whole or fragmented, dried leaf of *Plantago lanceolata* L. s. 1.

*Content* : minimum 1.5 per cent of total *orthodihydroxycinnamic acid* derivatives expressed as acteoside ( $C_{29}H_{36}O_{15}$  ; *Mr* 624.6) (dried drug).

### Macroscopic characters

The leaf is up to 30 cm long and 4 cm wide, yellowish-green to brownish-green, with a prominent, whitish-green, almost parallel venation on the abaxial surface. It consists of a lanceolate lamina narrowing at the base into a channelled petiole. The margin is indistinctly dentate and often undulate. It has 3, 5 or 7 primary veins, nearly equal in length and running almost parallel. Hairs may be almost absent, sparsely scattered or sometimes abundant, especially on the lower surface and over the veins. The scape is brownish-green, longer than the leaves, 3 mm to 4 mm in diameter and is deeply grooved longitudinally, with 5 to 7 conspicuous ribs. The surface is usually covered with fine hairs.



### II.175

*Plantaginis lanceolatae folium* – Ribwort plantain (Ph. Eur. 5.0)

### Microscopic characters

The powder is yellowish-green, showing the following diagnostic characters: fragments of epidermis, composed of cells with irregularly sinuous anticlinal walls, the fragments from the scape with thickened outer walls and a coarsely ridged cuticle; stomata mostly of the diacytic type and sometimes anomocytic; the multicellular, uniseriate, conical covering trichomes are highly characteristic, with a basal cell larger than the other epidermal cells followed by a short cell supporting 2 or more elongated cells with the lumen narrow and variable, occluded at intervals corresponding to slight swellings in the trichome and giving a jointed appearance; the terminal cell has an acute apex and a filiform lumen; the glandular trichomes have a unicellular cylindrical stalk and a multicellular, elongated, conical head consisting of several rows of small cells and a

single terminal cell; dense groups of lignified fibro-vascular tissue with narrow, spirally and annularly thickened vessels and slender, moderately thickened fibres.

## ***Podophylli rhizoma* – Mayapple rhizome**

### Definition

The drug consists of the dried rhizomes of *Podophyllum peltatum* L.

### Macroscopic characters

The reddish-brown rhizome is 0.5 to 1 cm thick, divided by nodes. The inner surface is whitish-yellowish.



### **II.176**

#### *Podophylli rhizoma* – Mayapple rhizome

### Microscopic characters

The cortex has 1 to 3 cell layers, showing the following characters: cells of collenchyma with thickened walls; starch-containing storage parenchyma cells; starch granules 12 to 15  $\mu\text{m}$  in diameter, simple or compound. The vascular cylinder contains four vascular bundles with sclerenchymatous bundle cap; there is no interfascicular cambium. The cluster crystals of calcium oxalate are 60 to 100  $\mu\text{m}$ .

### Other characters

The drug has no characteristic odour; its taste is first sweet, then becomes bitter and pungent.



## ***Polygoni avicularis herba* – Knotgrass (Ph. Eur. 5.0)**

### Definition

Whole or cut dried flowering aerial parts of *Polygonum aviculare* L. *s.l.*

*Content*: minimum 0.30 per cent of flavonoids, expressed as hyperoside (C<sub>21</sub>H<sub>20</sub>O<sub>12</sub>; Mr 464.4) (dried drug).

### Macroscopic characters

The stem is 0.5 mm to 2 mm thick, branched, with nodes, cylindrical or slightly angular and longitudinally striated. It bears sessile or shortly petiolate, glabrous entire leaves, which differ widely in shape and size. The sheath-like stipules (ochrea) are lacerate and silvery. The small axillary flowers have 5 greenish-white perianth segments, the tips of which are often coloured red. The fruits are 2 mm to 4 mm, brown to black triangular nuts, usually punctate or striate.



### II.177

*Polygoni avicularis herba* – Knotgrass (Ph. Eur. 5.0)

### Microscopic characters

The powder is greenish-brown. When examined under a microscope using *chloral hydrate solution R*, the powder shows the following diagnostic characters: fragments of the leaf epidermis with polygonal to sinuous cell walls with a striated cuticle and with numerous anisocytic stomata; fragments of leaves and stems containing numerous calcium oxalate clusters, some of them very large; groups of thick-walled fibres from the hypodermis of the stem; globular pollen grains with smooth exine and 3 germinal pores; occasional brown fragments of the exocarp composed of cells with thick sinuous walls. When examined under a microscope using a 675 g/l solution of *potassium hydroxide R*, and heated gently, the epidermis of the leaves and a few cells of the mesophyll stain red to reddish-violet. When examined under a microscope using a 0.1 g/l solution of *ferric chloride R*, the leaf fragments are stained almost black.

## ***Populi gemma* – Poplar bud**

### Definition

Poplar bud is the dried bud of *Populus nigra* L.

### Macroscopic characters

The buds are 1.5 to 2 cm long, spindle-shaped, glossy brown, covered with sticky bud scales.



**II.178**

*Populi gemma* – Poplar bud

## ***Primulae radix* – Primula root (Ph. Eur. 5.0)**

### Definition

Primula root consists of the whole or cut, dried rhizome and root of *Primula veris* L. or *P. elatior* (L.) Hill.

### Macroscopic characters

The coarsely torose, greyish-brown rhizome is straight or slightly curved, about 1 cm to 5 cm long and about 2 mm to 4 mm thick. The rhizome crown often bears the remains of stems and leaves. Attached to the rhizome are numerous brittle roots, about 1 mm thick and usually 6 cm to 8 cm long. The root of *P. elatior* is light brown to reddish-brown, that of *P. veris* light yellow to yellowish-white. The fracture is smooth.



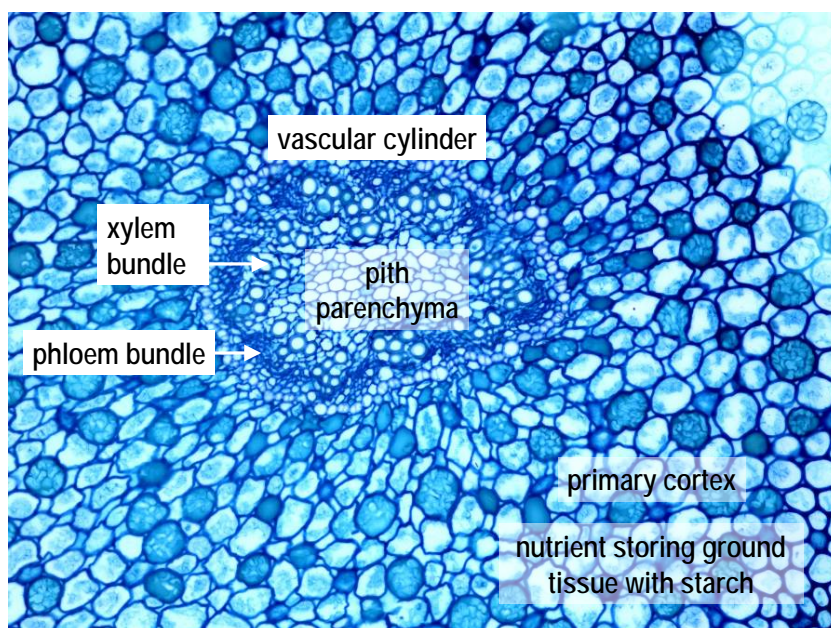
### II.179

*Primulae radix* – Primula root (Ph. Eur. 5.0)

### Microscopic characters

The powder is greyish-brown. When examined under a microscope, using *chloral hydrate solution R*, the powder shows fragments of parenchyma from the root bark, medulla and bark of the rhizome consisting of rounded cells with thickened and pitted walls; brownish fragments from the surface tissue showing root hairs; vessels with reticulate thickening. Yellowish-green groups of strongly pitted stone cells are characteristic of the presence of *P. elatior*. When examined under a microscope using a 50 per cent V/V solution of *glycerol R*, the powder shows single or compound starch grains of various size and shape. The transverse section of the root reveals the following characters: the root is tetrarch; the cells of the cortex parenchyma are filled with starch; the cell walls of the endodermis around the vascular cylinder contain suberin. The vascular tissue is organised into xylem bundles and phloem bundles in younger roots, whereas concentric rings of xylem and phloem can be observed in older roots. The central part of the root is occupied by the parenchymatous pith tissue.





**II.180**  
Primula root c.s. 100x

**Other characters**

Primula root has a bitter taste.

***Primulae flos* – Primula flower**

**Definition**

Primula flower consists of the dried flowers of *Primula veris* Huds. and *P. elatior* (L.) Hill.

**Macroscopic characters**

The inflorescence composed of yellow flowers has a long scape. In *P. veris* the corolla is 20 to 25 mm long, the calyx is 9 to 20 mm long, with 2-3-mm-long calyx lobes. The calyx of *P. elatior* is 8 to 14 mm long, with 4-mm-long calyx lobes.

**Microscopic characters**

The polygonal epidermal cells are covered with cuticle, their cell walls are sinuous and thick, with anomocytic stomata among them. Covering hairs are nearly 200 µm long, comprising 3 cells. Pollen grains are spherical, octacolpate, with finely granulate exine.

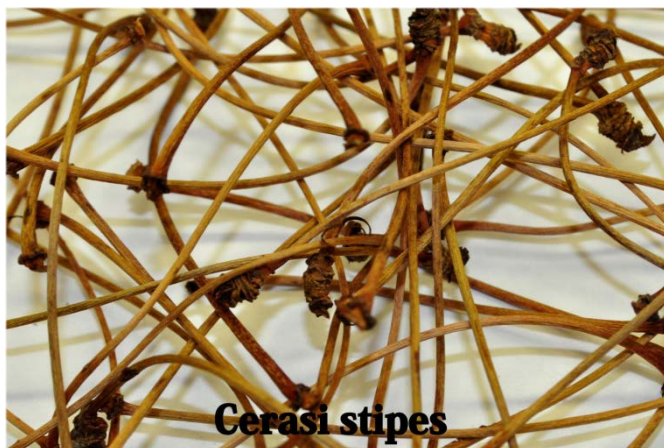
**Other characters**

The drug has an odour reminiscent of honey; its taste is first sweet, then bitter.

## ***Cerasi stipes* – Cherry peduncle**

### Definition

The drug consists of the dried fruit peduncles of *Prunus avium* L. (*Cerasus avium* (L.) Moench).



**II.181**

*Cerasi stipes* – Cherry peduncle



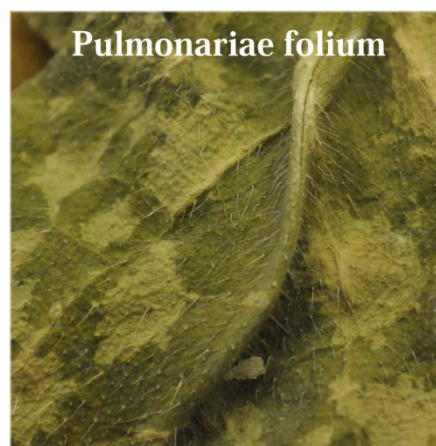
## ***Pulmonariae folium* – Lungwort leaf**

### Definition

Lungwort leaf consists of the dried foliage leaves of *Pulmonaria officinalis* L., whole or cut.

### Macroscopic characters

The basal leaves are oval or obovate, petiolate, 10 to 15 cm long, with entire edge. The leaf surface is hirsute, bearing several Boraginaceae-type bristles; the upper surface is dotted with white spots; the lower leaf surface is greyish-green. The cauline leaves are sessile, lanceolate, smaller than the basal leaves.



### **II.182**

#### *Pulmonariae folium* – Lungwort leaf

### Microscopic characters

In surface view the epidermal cells are rectangular, with wavy anticlinal cell walls. The bristles consist of 1 to 2 cells, their base is surrounded by radially arranged cells. The heterogenous mesophyll contains palisade and spongy cells. The vascular bundles are open collateral.

### Other characters

The leaf is coarse; odourless; its taste is tarty, mucilaginous.

## ***Quercus cortex* – Oak bark (Ph. Eur. 5.0)**

### Definition

Cut and dried bark from the fresh young branches of *Quercus robur* L., *Q. petraea* (Matt.) Liebl. and *Q. pubescens* Willd.

*Content*: minimum 3.0 per cent of tannins, expressed as pyrogallol (C<sub>6</sub>H<sub>6</sub>O<sub>3</sub>; Mr 126.1) (dried drug).

### Macroscopic characters

The bark occurs in channelled or quilled pieces, not more than 3 mm thick. The outer surface is light grey or greenish-grey, rather smooth, with occasional lenticels. The inner surface is dull brown or reddish-brown and has slightly raised longitudinal striations about 0.5 mm to 1 mm wide. The fracture is splintery and fibrous.



### II.183

*Quercus cortex* – Oak bark (Ph. Eur. 5.0)

### Microscopic characters

The powder is light brown to reddish-brown and fibrous, and shows groups of thick-walled fibres surrounded by a moderately thickened parenchymatous sheath containing prism crystals of calcium oxalate; fragments of cork composed of thin-walled tabular cells filled with brownish or reddish contents; abundant sclereids, isolated and in groups, some large with thick, stratified walls and branching pits, others smaller and thinner-walled with simple pits, often with dense brown contents; fragments of parenchyma containing cluster crystals of calcium oxalate; occasional fragments of sieve tissue, thin-walled, some showing sieve areas on the oblique end-walls.

### Other characters

The drug is odourless; its taste is astringent and tarty.

## ***Robiniae pseudoacaciae flos* – Robinia flower**

### Definition

The drug consists of the dried flowers of *Robinia pseudoacacia* L.

### Macroscopic characters

The flowers are white, papilionaceous, fragrant.



**II.184**

*Robiniae pseudoacaciae flos* – Robinia flower



## ***Rosae pseudofructus* – Dog rose (Ph. Eur. 5.0)**

### Definition

Dog rose consists of the rose hips made up by the receptacle and the remains of the dried sepals of *Rosa canina* L., *R. pendulina* L. and other *Rosa* species, with the achenes

removed. It contains not less than 0.3 per cent of ascorbic acid ( $C_6H_8O_6$ ; Mr 176.1), calculated with reference to the dried drug.

### Macroscopic characters

It consists of fragments of the fleshy, hollow, urceolate receptacle, bearing the remains of the sepals, light pink to orange-pink, the convex outer surface shiny and strongly wrinkled; bearing on its lighter inner surface abundant bristle-like hairs.

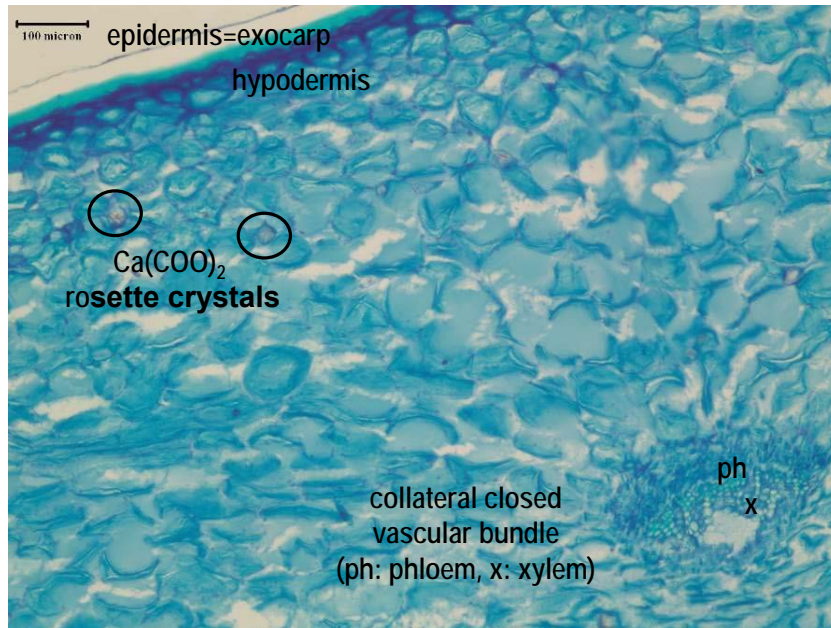


### II.185

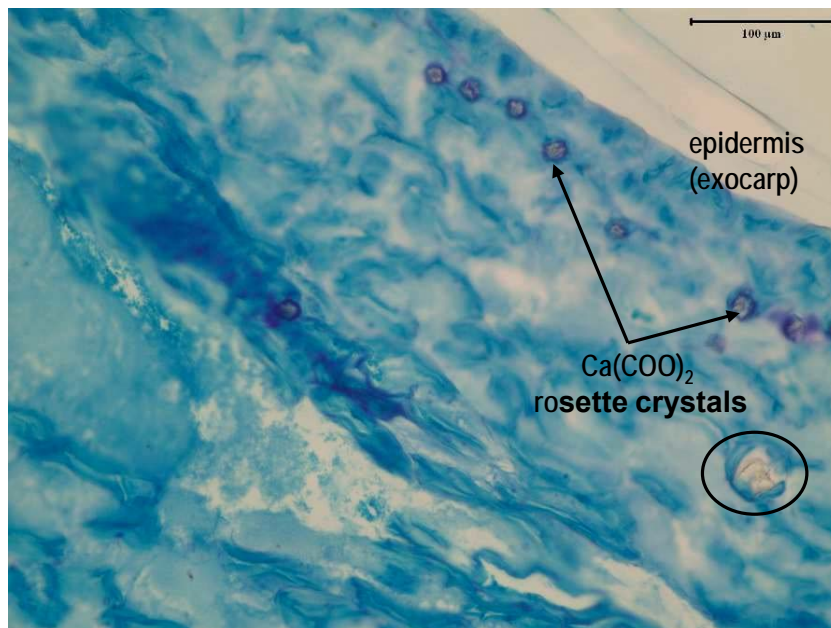
#### *Rosae pseudofructus* – Dog rose (Ph. Eur. 5.0)

### Microscopic characters

In transverse section the following characters can be seen: the epidermis is covered with cuticle; subepidermally 1 to 2 layers of hypodermis are visible. The parenchyma comprises thin-walled cells, collateral closed vascular bundles and cluster crystals of calcium oxalate, whereas the inner epidermis holds prisms of calcium oxalate. The thick-walled cells of the inner epidermis bear bristles with sclereid-like base sunken into the epidermis and slender upper part. The powder is orange-yellow, and shows numerous fragments of receptacle, the outer epidermis with orange-yellow contents and a thick cuticle, the inner epidermis composed of thin-walled cells containing cluster crystals and occasional prisms of calcium oxalate; scattered lignified cells, isodiametric, with thickened and pitted walls forming the trichome bases; abundant long, unicellular trichomes, up to 2 mm long and 30  $\mu$ m to 45  $\mu$ m thick, tapering towards each end, walls heavily thickened and with a waxy cuticle which may show fissures in a spiral arrangement; numerous oily orange-yellow globules.



**II.186**  
Rosa canina pseudofruit c.s. 100x



**II.187**  
Rosa canina pseudofruit c.s. 200x

**Other characters**

The drug is odourless, and tastes slightly sour, slightly sweet



## ***Rosmarini folium* – Rosemary leaf (Ph. Eur. 5.0)**

### Definition

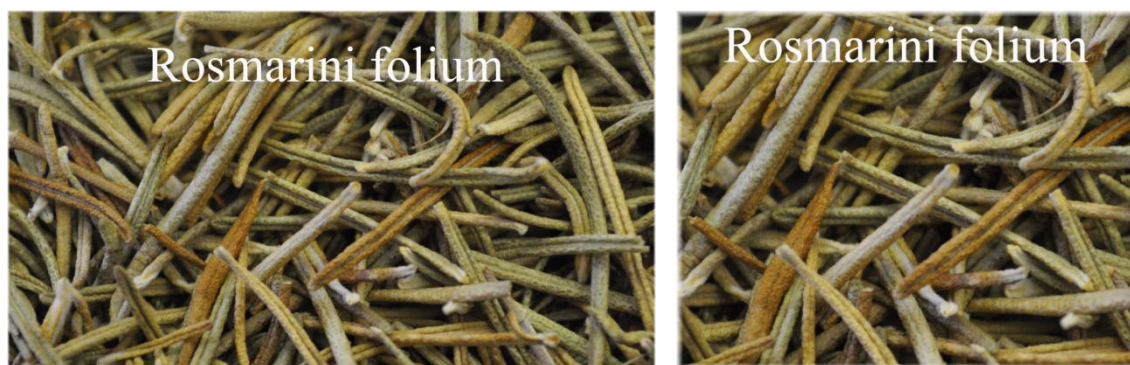
Whole, dried leaf of *Rosmarinus officinalis* L.

### Content:

- minimum 12 ml/kg of essential oil (anhydrous drug),
- minimum 3 per cent of total hydroxycinnamic derivatives, expressed as rosmarinic acid ( $C_{18}H_{16}O_8$  ; *Mr* 360) (anhydrous drug).

### Macroscopic characters

The leaves are sessile, tough, linear to linear-lanceolate, 1 cm to 4 cm long and 2 mm to 4 mm wide, with recurved edges. The upper surface is dark green, glabrous and grainy, the lower surface is greyish-green and densely tomentose with a prominent midrib.

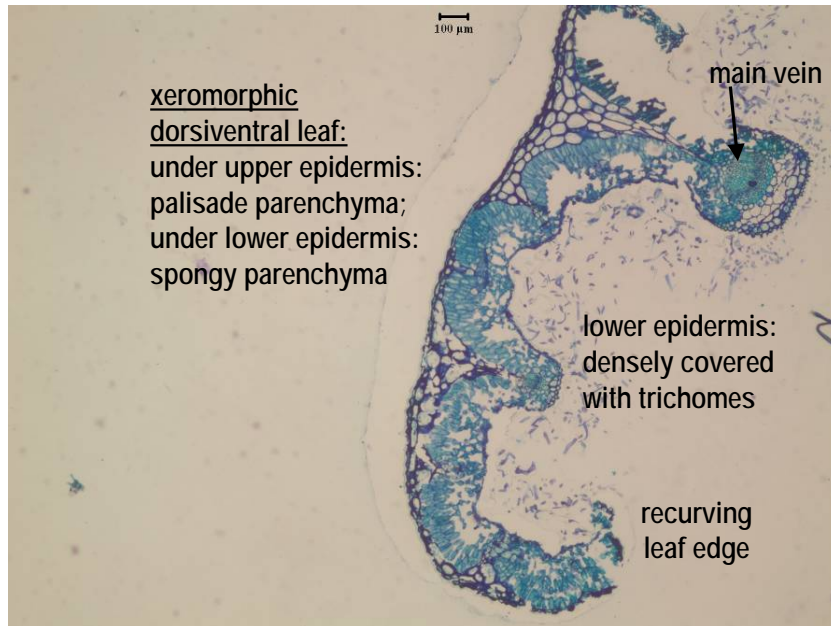


### II.188

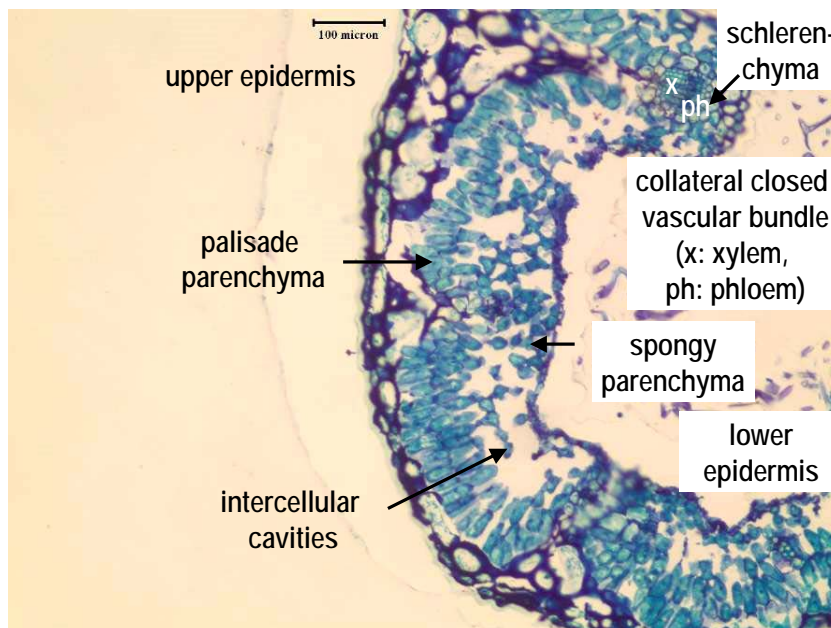
*Rosmarini folium* – Rosemary leaf (Ph. Eur. 5.0)

### Microscopic characters

The powder is greyish-green to yellowish-green, and shows fragments of lower epidermis with straight to sinuous-walled cells and numerous diacytic stomata; fragments of the upper epidermis with straight-walled cells, slightly thickened and pitted, and an underlying hypodermis composed of large, irregular cells with thickened and beaded anticlinal walls; fragments in sectional view showing the hypodermal cells extending across the lamina at intervals, separating the one or two-layered palisade into large, crescent-shaped areas; numerous multicellular, extensively branched, covering trichomes of the lower epidermis and rare conical covering trichomes of the upper epidermis; glandular trichomes of 2 types, the majority with a short, unicellular stalk and a radiate head composed of 8 cells, others, less abundant, with a unicellular stalk and a spherical, unicellular or bicellular head.



**II.189**  
 Rosmarinus officinalis leaf c.s. 40x



**II.190**  
 Rosmarinus officinalis leaf c.s. 100x

Other characters  
 Strongly aromatic odour.

## ***Rosmarini aetheroleum* – Rosemary oil**

### Definition

Essential oil obtained by steam distillation from the flowering aerial parts of *Rosmarinus officinalis* L.

### Characters

clear, mobile, colourless to pale yellow liquid with a characteristic odour.

## ***Salicis cortex* – Willow bark (Ph. Eur. 5.0)**

### Definition

Willow bark consists of the whole or fragmented dried bark of young branches or whole dried pieces of current year twigs of various species of genus *Salix* including *S. purpurea* L., *S. daphnoides* Vill. and *S. fragilis* L. The drug contains not less than 1.5 per cent of total salicylic derivatives, expressed as salicin ( $C_{13}H_{18}O_7$ ; *Mr* 286.3), calculated with reference to the dried drug.

### Macroscopic characters

The bark is 1 mm to 2 mm thick and occurs in flexible, elongated, quilled or curved pieces. The outer surface is smooth or slightly wrinkled longitudinally and greenish-yellow to brownish-grey. The inner surface is smooth or finely striated longitudinally and white, pale yellow or reddish-brown, depending on the species. The fracture is short in the outer part and coarsely fibrous in the inner region. The diameter of current year twigs is not more than 10 mm. The wood is white or pale yellow.



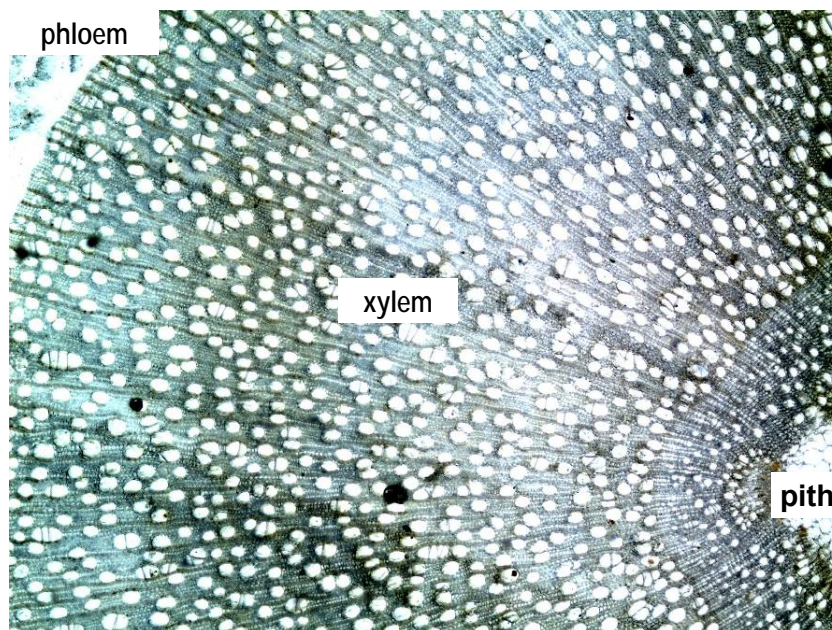
### II.191

*Salicis cortex* – Willow bark (Ph. Eur. 5.0)

### Microscopic characters

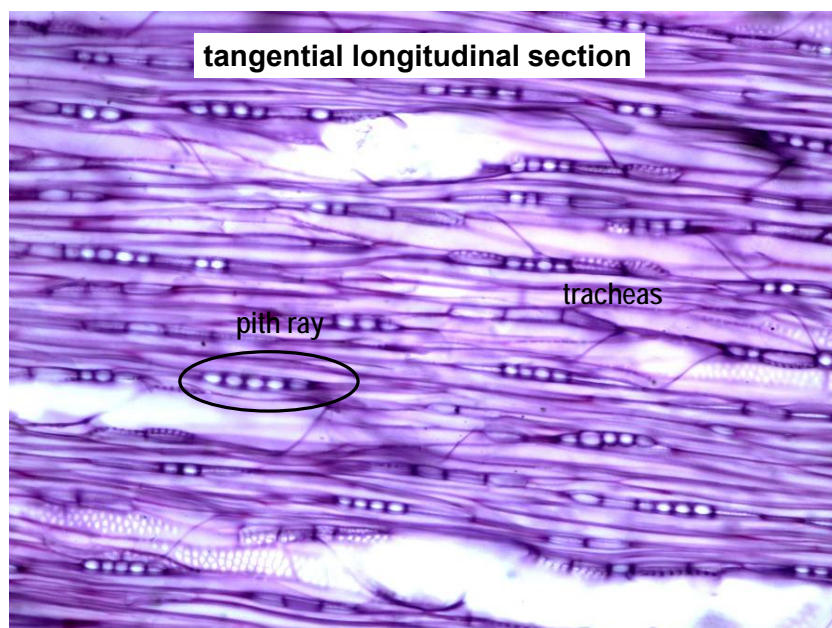
The powder is pale yellow, greenish-yellow or light brown, and shows: bundles of narrow fibres, up to about 600  $\mu\text{m}$  long, with very thick walls and surrounded by a sheath containing pyramid crystals of calcium oxalate; parenchyma of the cortex with thick, pitted and deeply beaded walls, and containing large cluster crystals of calcium oxalate; uniseriate medullary rays; thickened and suberised cork cells. Groups of brownish collenchyma from the bud may be present. Twigs show, additionally, fragments of lignified fibres and vessels from the xylem.





**II.192**

Salix alba tree branch c.s. 40x



**II.193**

Salix alba tree branch l.s. 200x

Other characters

Willow bark is markedly bitter.



## ***Salviae officinalis folium* – Sage leaf (Ph. Eur. 5.0)**

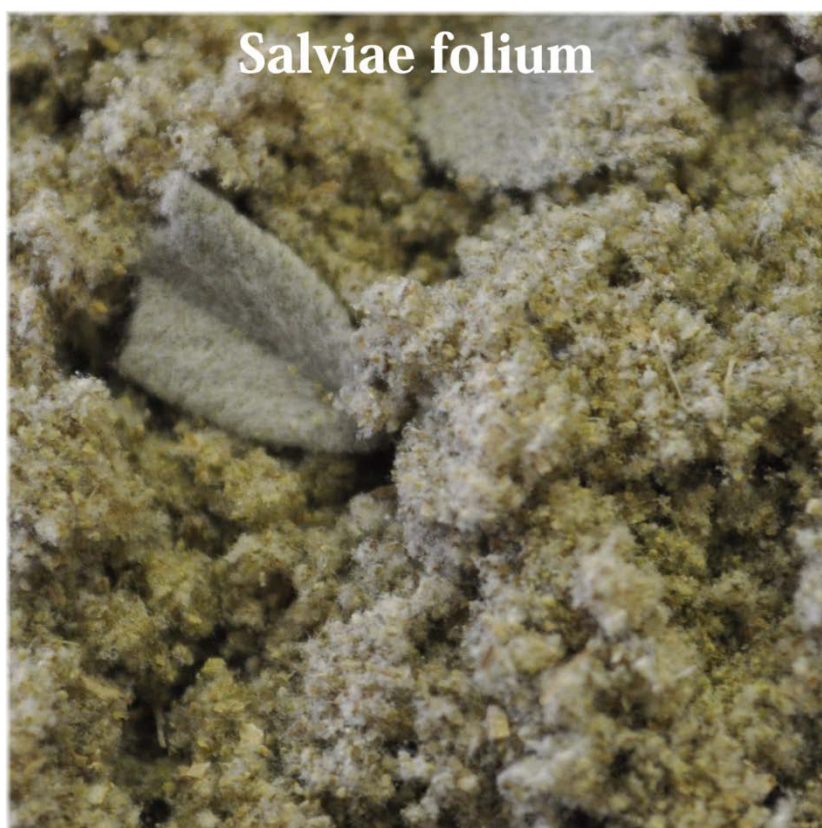
### Definition

Whole or cut dried leaves of *Salvia officinalis* L.

*Content*: minimum 15 ml/kg of essential oil for the whole drug and minimum 10 ml/kg of essential oil for the cut drug (anhydrous drug).

### Macroscopic characters

The lamina of whole sage leaf (*Salvia officinalis*) is about 2 cm to 10 cm long and 1 cm to 2 cm wide, oblong-ovate, elliptical. The margin is finely crenate to smooth. The apex is rounded or subacute and the base is shrunken at the petiole and rounded or cordate. The upper surface is greenish-grey and finely granular; the lower surface is white and pubescent and shows a dense network of raised veinlets.



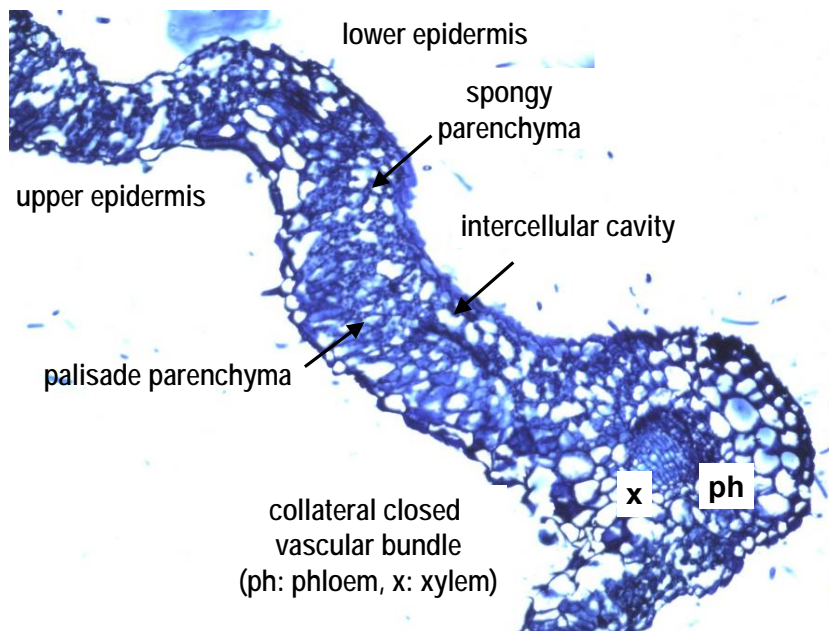
### II.194

*Salviae officinalis folium* – Sage leaf (Ph. Eur. 5.0)

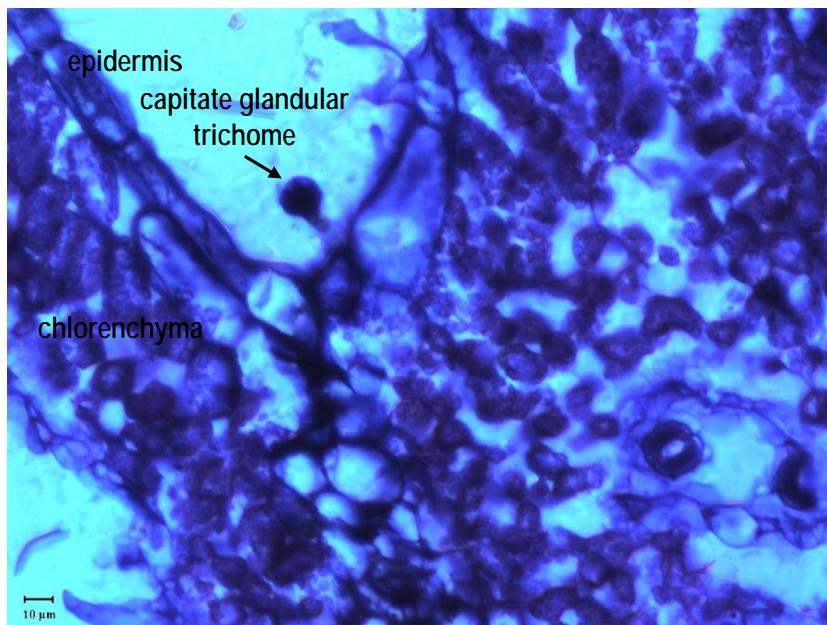
### Microscopic characters

The powder is light grey to brownish-green, and shows the following diagnostic characters: very numerous articulated and bent trichomes with narrow elongated cells and a very thick cell at the base as well as fragments of these trichomes; fragments of the upper epidermis with pitted, somewhat polygonal cells; fragments of the lower epidermis with sinuous cells and numerous diacytic stomata; rare single glandular trichomes with a uni- or bicellular head and a stalk consisting of 1 to 4 cells; abundant glandular trichomes with a unicellular stalk and a head composed of 8 radiating cells with a raised common cuticle. In transversal section the following characters can be

observed: mesomorphic stomata among the epidermal cells; hairs as above described. The mesophyll consists of palisade parenchyma (chlorenchyma) on the adaxial side, and spongy parenchyma with numerous intercellular cavities on the abaxial side. The wall of xylem elements has spiral or reticulate thickening. The vascular bundles are closed collateral.

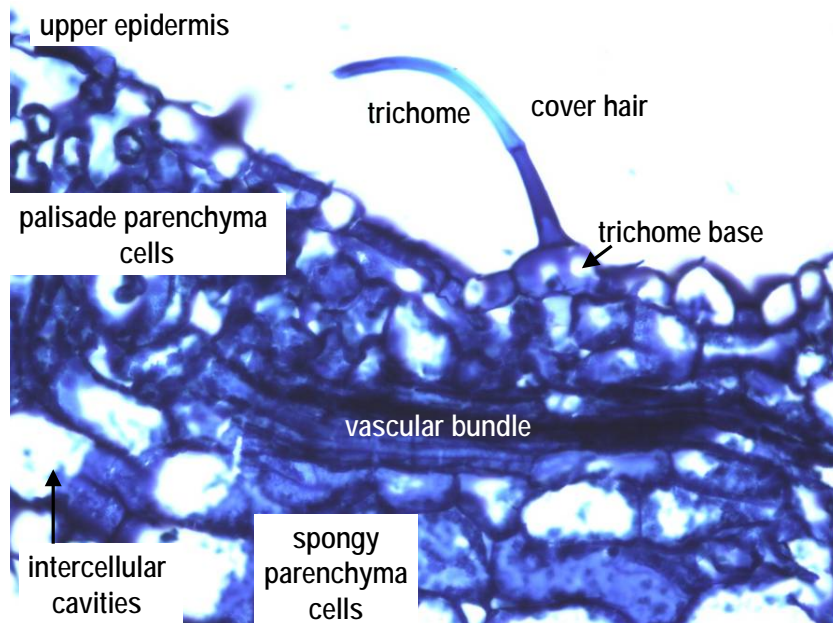


**II.195**  
Salvia leaf c.s. 100x

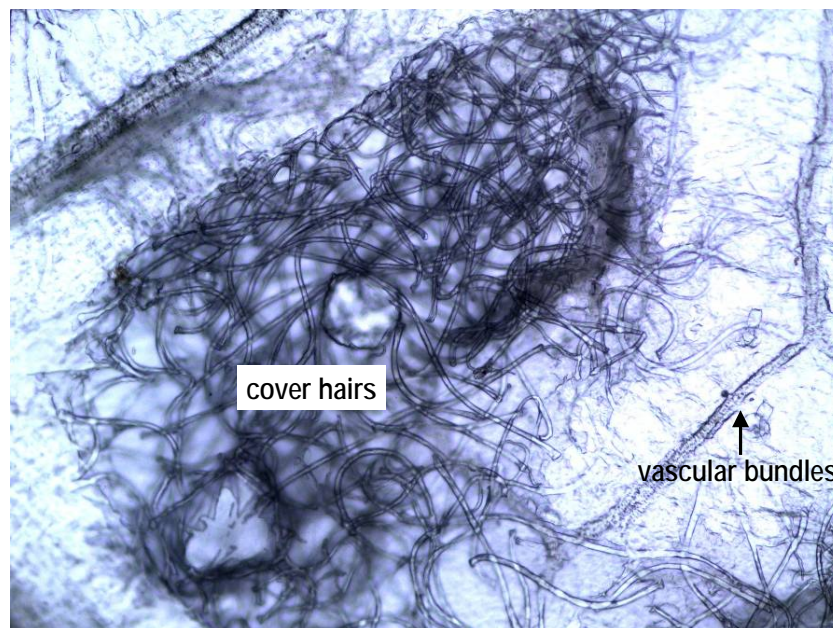


**II.196**  
Salvia leaf c.s. 400x

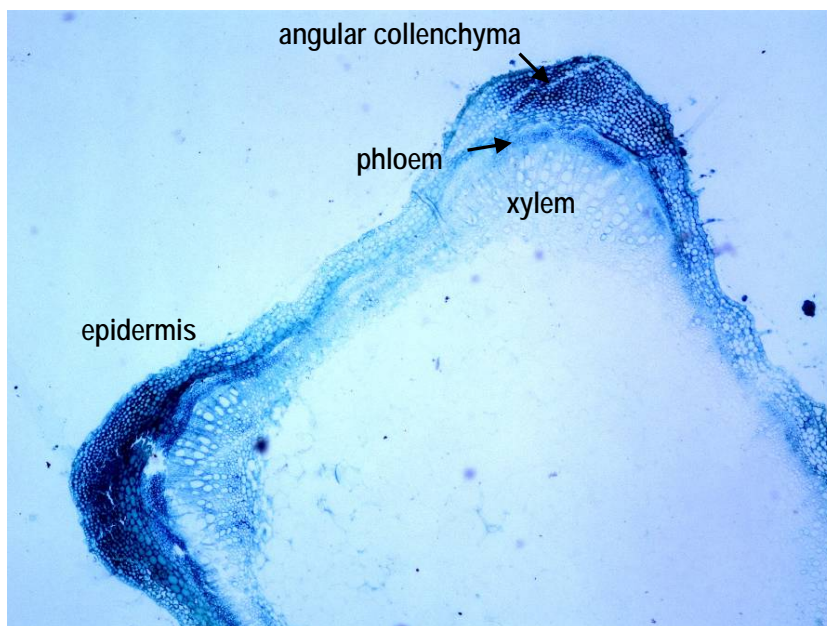




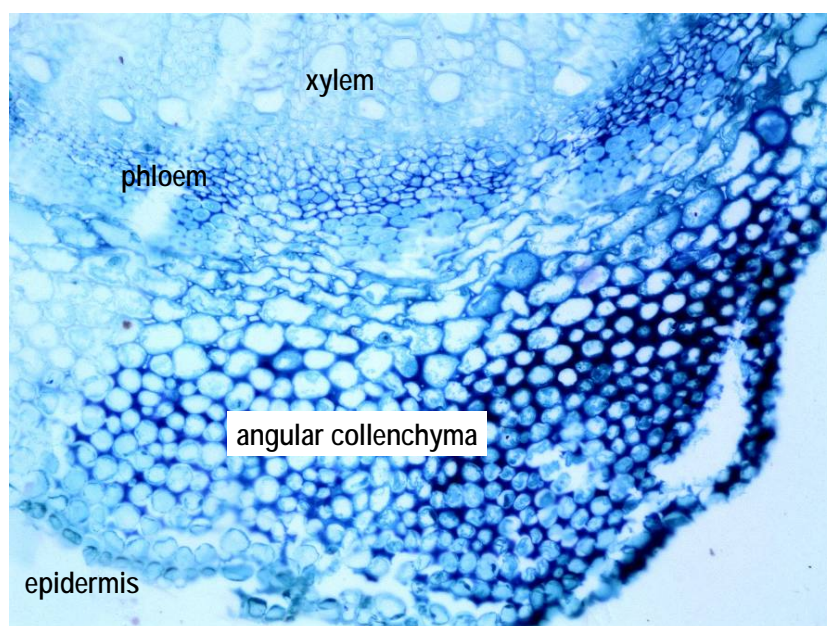
**II.197**  
Salvia leaf c.s. 400x



**II.198**  
Salvia leaf cleared 200x



**II.199**  
Salvia stem c.s. 40x



**II.200**  
Salvia stem c.s. 100x

#### Other characters

When rubbed, the drug has a characteristic odour, its taste is bitter, spicy and astringent. Sage leaf (*Salvia officinalis*) oil is rich in thujone.

## ***Salviae tinctura* – Sage tincture (Ph. Eur. 5.0)**

### Definition

Tincture produced from *Sage leaf* (*Salvia officinalis*). The tincture is produced from 1 part of comminuted drug and 10 parts of ethanol (70 per cent V/V) by a suitable procedure.

*Content*: minimum 0.1 per cent *m/m* of essential oil.

### Other characters

brownish liquid with a characteristic odour.



## ***Salviae sclareae herba* – Clary sage**

### Definition

The drug consists of the dried flowering shoot of *Salvia sclarea* L.

### Macroscopic characters

The shoot is quadrangular. The leaves are broad ovate, with strongly ridged surface and obtuse apex. The bilabiate flowers are whitish-pink. The fruits are nutlets.



### **II.201**

*Salviae sclareae herba* – Clary sage

## ***Salviae sclareae aetheroleum* – Clary sage oil (Ph. Eur. 5.0)**

### Definition

Essential oil obtained by steam distillation from the fresh or dried flowering stems of *Salvia sclarea* L.

### Characters

colourless to brownish-yellow liquid, usually pale yellow, with a characteristic odour.

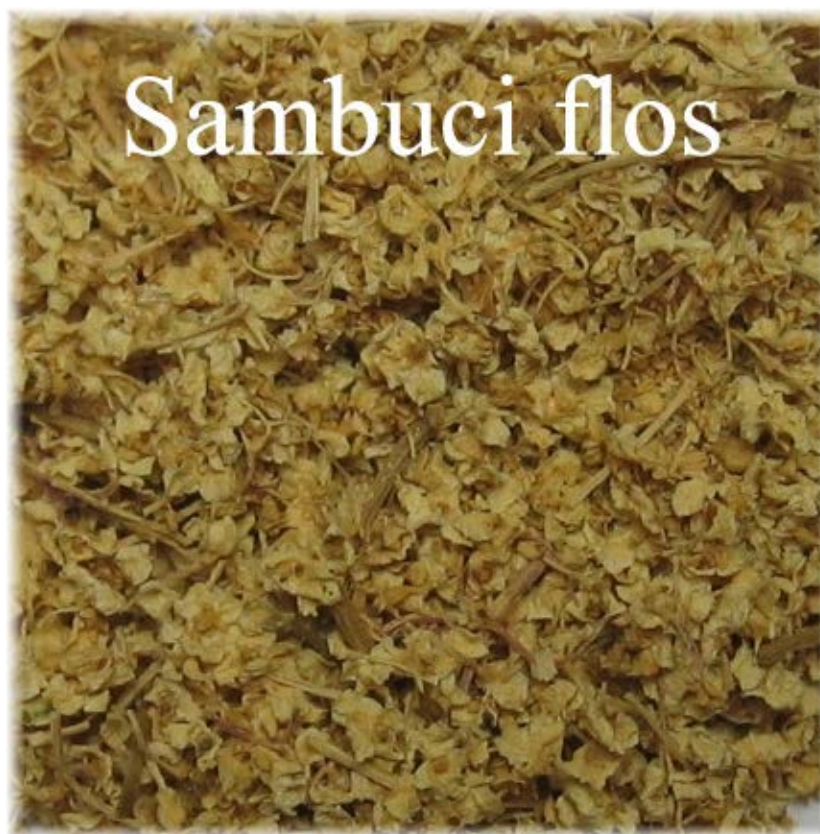
## ***Sambuci flos* – Elder flower (Ph. Eur. 5.0)**

### Definition

Elder flower consists of the dried flowers of *Sambucus nigra* L. It contains not less than 0.80 per cent of flavonoids, calculated as isoquercitroside ( $C_{21}H_{20}O_{12}$ ; Mr 464.4) with reference to the dried drug.

### Macroscopic characters

The flower, about 5 mm in diameter, has three small bracts (hand lens) and may have a peduncle. The five-toothed calyx is small; the corolla is light yellow, with five broadly oval petals fused at their bases into a tube. The filaments of the five yellow stamens alternate with the petals. The corolla is often isolated or attached to the stamens, to which it is fused at the base. The ovary is inferior with three locules and it bears a short style with three obtuse stigmata.



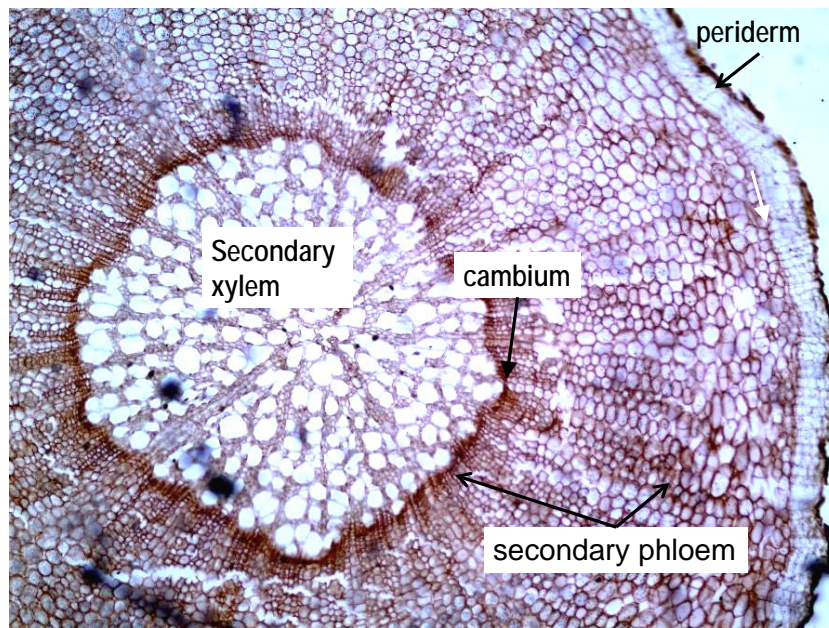
### II.202

*Sambuci flos* – Elder flower (Ph. Eur. 5.0)

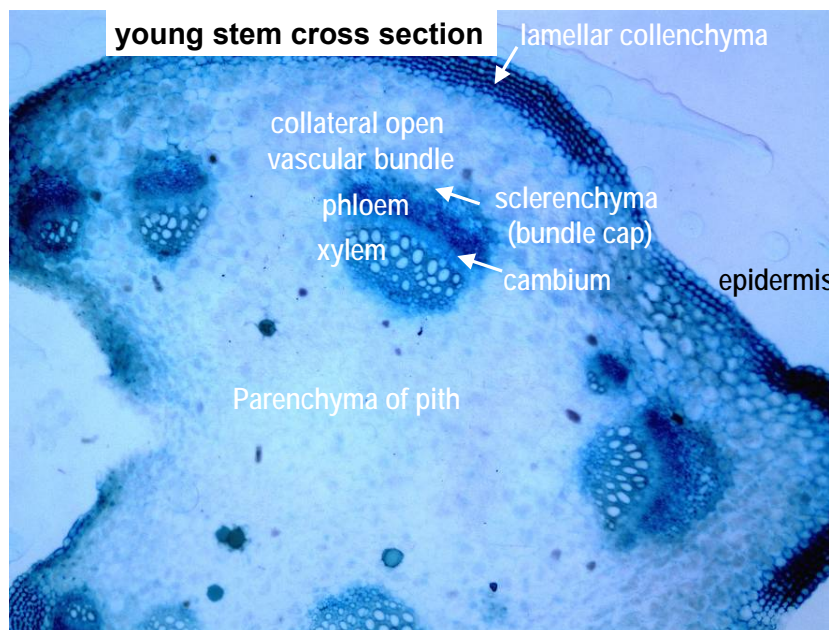
### Microscopic characters

The powder is greenish-yellow, and shows numerous spherical, sometimes ellipsoidal, pollen grains about 30  $\mu\text{m}$  in diameter, with three germinal pores and very finely pitted exine; calyx epidermal cells with a striated cuticle and occasional unicellular marginal hairs from the basal region; corolla fragments with numerous small globules of volatile oil, those of the upper epidermis with slightly thickened and beaded walls and a striated cuticle; mesophyll cells of petals and sepals with idioblasts containing numerous sandy crystals of calcium oxalate.





**II.203**  
Sambucus root c.s. 40x



**II.204**  
Sambucus stem c.s. 40x

**Other characters**

When fresh, the drug has a characteristic, strong odour, which later becomes weaker; its taste is mucilaginous and sweet, later scratchy, irritating.

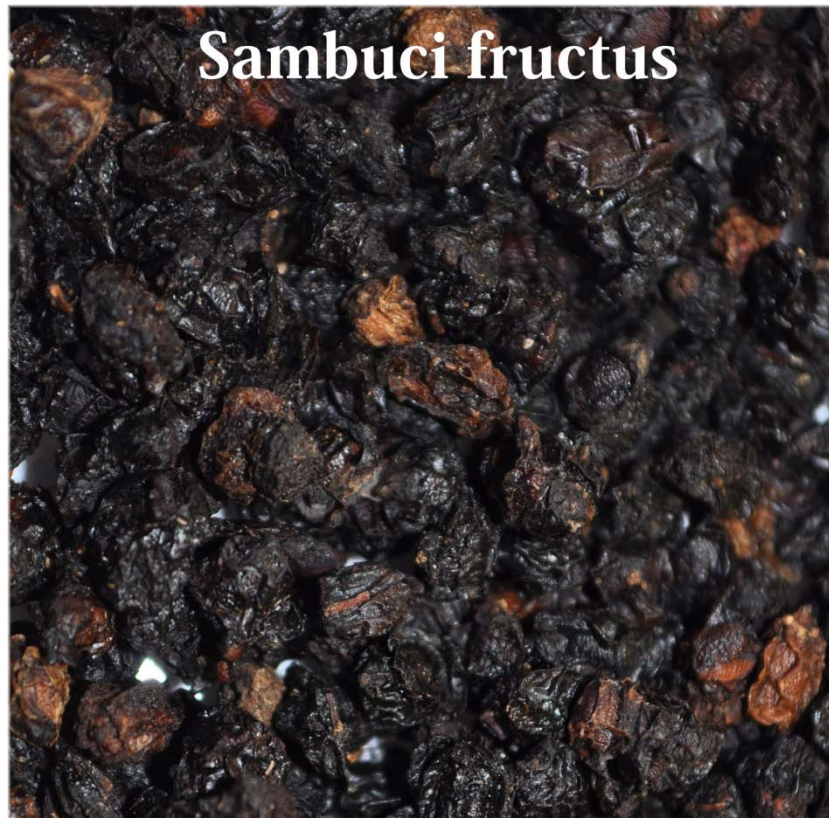
## ***Sambuci fructus* – Elder fruit**

### Definition

The drug is the dried fruit of *Sambucus nigra* L.

### Macroscopic characters

The fruit is a bluish black berry, 3 to 4 mm in diameter.



**II.205**

*Sambuci fructus* – Elder fruit

## ***Satureja herba* – Savory flowering shoot**

### Definition

The drug is the dried flowering shoot of *Satureja hortensis* L., whole or cut.

### Macroscopic characters

The shoot is quadrangular. The leaves are decussate, narrow lanceolate, entire, 3 to 4 cm long and 2 to 4 mm wide. The small flowers arise from the leaf axils. The corolla is white or purplish-pink, 5 to 7 mm long, the throat bearing red dots. The stamens are located below the upper lip. The fruits are nutlets.



**II.206**

*Saturejae herba* – Savory flowering shoot



## ***Silybi mariani fructus* – Milk-thistle fruit (Ph. Eur. 5.0)**

### Definition

Mature fruit, devoid of the pappus, of *Silybum marianum* L. Gaertner.

*Content*: minimum 1.5 per cent of silymarin expressed as silibinin ( $C_{25}H_{22}O_{10}$ ; *Mr* 482.4) (dried drug).

### Macroscopic characters

Strongly compressed, elongate-obovate achenes, about 6 mm to 8 mm long, 3 mm broad and 1.5 mm thick; outer surface smooth and shiny with a grey to pale brown ground colour variably streaked dark brown longitudinally to give an overall pale greyish to brown colour; tapering at the base and crowned at the apex with a glistening, pale yellow extension forming a collar about 1 mm high surrounding the remains of the style. Cut transversely, the fruit shows a narrow, brown outer area and 2 large, dense, white oily cotyledons.



### II.207

*Silybi mariani fructus* – Milk-thistle fruit (Ph. Eur. 5.0)

### Microscopic characters

The powder is brownish-yellow with darker specks. The powder shows: fragments of the epicarp composed of colourless cells, polygonal in surface view, the lumen appearing fairly large or as a small slit, depending on their orientation; groups of parenchymatous cells from the pigment layer, some of them containing colouring matter which appears bright red; very abundant groups of large sclereids from the testa with bright yellow pitted walls and a narrow lumen; occasionally fragments of small-celled parenchyma with pitted and beaded walls; abundant thin-walled parenchymatous cells from the cotyledons containing oil globules and scattered cluster crystals of calcium oxalate; a few larger, prismatic crystals of calcium oxalate.

### Other characters

The drug should be odourless, no rancid odour; the taste is bitter.

## ***Sinapis albae semen* – White mustard seed**

### Definition

The drug consists of the dried, ripe seeds of *Sinapis alba* L.

### Macroscopic characters

The seeds are yellow, glossy, 2.5 mm in diameter, with a dotted surface.

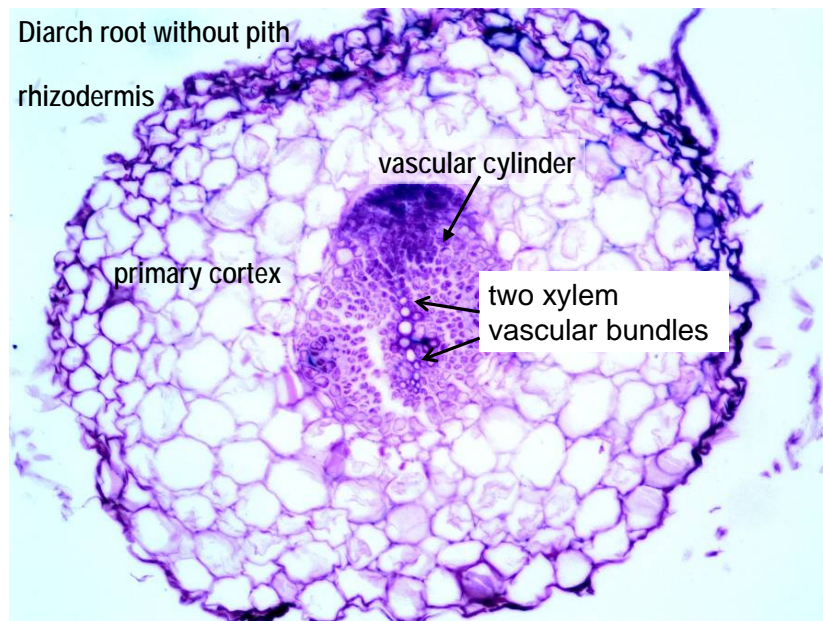


### **II.208**

*Sinapis albae semen* – White mustard seedt

### Microscopic characters

The epidermal cells are hexagonal. Subepidermally parenchymatous cells can be observed, as well as elongated sclerenchymatous cells (stone cells). The cells of the endosperm contain polygonal aleurone granules. The cells of the cotyledons have thin walls, and they are filled with fatty oil and aleurone.



**II.209**  
Sinapis alba root c.s. 100x

**Other characters**

The drug has no characteristic odour.

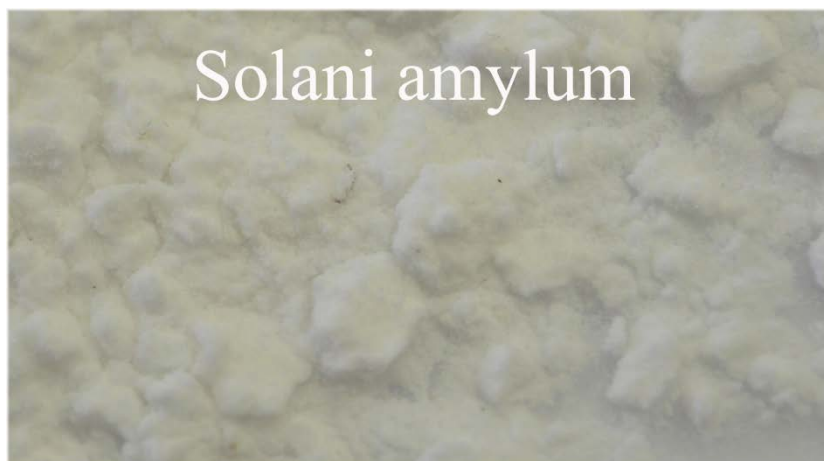
## ***Solani amyllum* – Potato starch (Ph. Eur. 5.0)**

### Definition

Potato starch is obtained from the tuber of *Solanum tuberosum* L.

### Macroscopic characters

very fine, white powder which creaks when pressed between the fingers.



### **II.210**

*Solani amyllum* – Potato starch (Ph. Eur. 5.0)

### Microscopic characters

Examined under a microscope using a mixture of equal volumes of *glycerol R* and *water R*, it presents granules, either irregularly shaped, ovoid or pear-shaped, usually 30  $\mu\text{m}$  to 100  $\mu\text{m}$  in size but occasionally exceeding 100  $\mu\text{m}$ , or rounded, 10  $\mu\text{m}$  to 35  $\mu\text{m}$  in size. There are occasional compound granules having 2 to 4 components. The ovoid and pear-shaped granules have an excentric hilum and the rounded granules show acentric or slightly excentric hilum. All granules show clearly visible excentric striations. Between crossed nicol prisms, the granules show a distinct black cross intersecting at the hilum.

### Other characters

Practically insoluble in cold water and in alcohol. Potato starch does not contain starch grains of any other origin. It may contain a minute quantity, if any, of tissue fragments of the original plant.



## ***Solidaginis herba* – Goldenrod (Ph. Eur. 5.0)**

### Definition

Whole or cut, dried, flowering aerial parts of *Solidago gigantea* Ait or *S. canadensis* L., their varieties or hybrids and/or mixtures of these.

*Content*: minimum 2.5 per cent of flavonoids, expressed as hyperoside (C<sub>21</sub>H<sub>20</sub>O<sub>12</sub>; Mr 464.4) (dried drug).

### Macroscopic characters

The stems are greenish-yellow or greenish-brown, partly tinted reddish, roundish, more or less conspicuously grooved, glabrous and smooth in the lower part, slightly or densely pubescent in the upper part. They are solid with a whitish pith. The leaves are green, sessile, lanceolate, with a serrate margin, 8 cm to 12 cm long and about 1 cm to 3 cm wide, the upper surface is green and more or less glabrous, the lower surface is greyish-green and pubescent, especially on the veins. The inflorescence consists of a number of unilateral, curved racemes which together form a pyramidal panicle at the end of the stems. Each capitulum has an involucre composed of linear-lanceolate, imbricated yellowish-green bracts, surrounding a single row of yellow ligulate florets about the same length as the involucre; yellow, radially arranged tubular florets, as long as, or slightly shorter than the ligulate florets; a brownish inferior ovary surmounted by a white pappus of silky hairs.



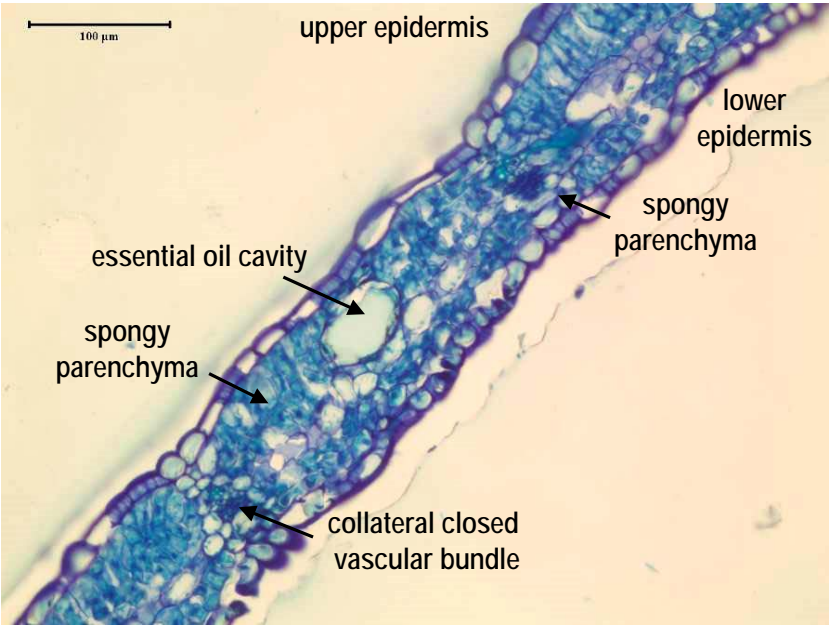
### II.211

*Solidaginis herba* – Goldenrod (Ph. Eur. 5.0)

### Microscopic characters

The powder is greyish-green, and shows pappus bristles and their fragments, consisting of multiseriate trichomes composed of elongated cells with the tips free from the surface and forming pointed projections over the entire length; fragments of the leaf mesophyll with vascular bundles accompanied by secretory glands; fragments of the leaf epidermis with sinuous to wavy-walled cells and stomata of the anomocytic type; uniseriate covering trichomes with up to 5 or 6 cells, some whip-like with a thicker-walled terminal cell; fragments of the style with long, slender papillae; fragments of the stem with reticulate and spiral vessels; pollen grains, with 3 germinal pores and a spiny exine; numerous whisk-shaped hairs, a few isolated twin-hairs from the ovary, absence of multicellular trichomes with a terminal cell bent at a right angle.





**II.212**  
Solidago gigantea leaf c.s. 200x

## ***Solidaginis virgaureae herba* – Goldenrod, European (Ph. Eur. 5.0)**

### Definition

Whole or cut, dried, flowering aerial parts of *Solidago virgaurea* L.

*Content*: minimum 1.0 per cent of flavonoids, expressed as hyperoside (C<sub>21</sub>H<sub>20</sub>O<sub>12</sub>; Mr 464.4) (dried drug).

### Macroscopic characters

The stem is cylindrical, striated, the lower part often reddish-violet, sometimes entirely glabrous or pubescent with short, bent, apically directed hairs. The basal leaves are obovate to oblanceolate, with a serrate margin, and taper at the base into a long, winged petiole; the cauline leaves are alternate, smaller than the basal leaves and more elliptical in outline, with an entire or slightly serrated margin; they are sessile or with only a short petiole. Both surfaces of the leaves are glabrous or only slightly pubescent with a prominent reticulate venation on the lower surface. The capitula form a tightly packed panicle. The involucre consists of 2 to 4 rows of loosely-arranged, imbricate bracts, each bract greenish-yellow with a smooth and shiny inner surface, the outer surface hairy or glabrous, with a scarios margin. Each capitulum contains 6 to 12 female ray florets, and about 10 to 30 hermaphrodite, tubular florets. All florets are yellow and about twice as long as the bracts. At the base of these florets there are 2, small, linear bracts with scarios margins. The brown, inferior ovary tapers towards the base and has a ribbed surface, covered with scattered hairs; it is surmounted by a whitish pappus composed of smooth or rough, bristly hairs.



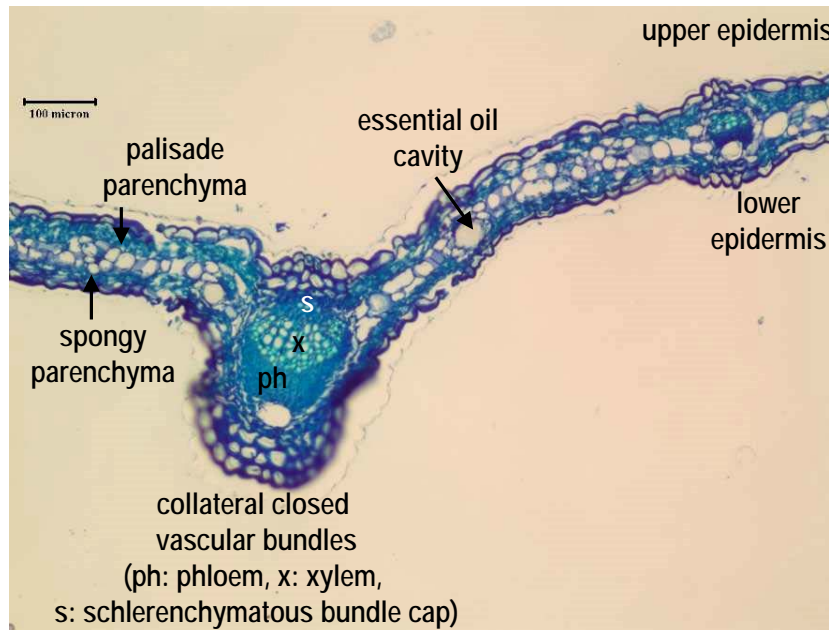
### II.213

*Solidaginis virgaureae herba* – Goldenrod, European (Ph. Eur. 5.0)

### Microscopic characters

The powder is light green, and shows fragments of the leaf in surface view, those of the upper epidermis composed of polygonal cells with straight, beaded walls and distinct cuticular striations, those of the lower epidermis more sinuous with fewer striations and numerous anomocytic stomata; occasional leaf fragments showing cells containing small, isolated cluster crystals of calcium oxalate; uniseriate, conical covering trichomes from the leaves and the bracts with up to about 10 cells, some of the shorter trichomes

showing a terminal cell extended and pennant-like; occasional glandular trichomes with a 1 or 2 celled stalk and a unicellular, elongated head; rare paired, covering trichomes from the ovary with a distinctly pitted central wall and a bifid apex; abundant pappus hairs and their fragments, multiseriate with the marginal cells overlapping outwards; groups of fibres and vascular tissue from the stems; fragments of the epidermis of the petals with striated cuticle and occasional long, biseriate glandular trichomes; pollen grains spherical, with 3 pores and a spiny exine.



**II.214**

*Solidago virgaureae* leaf c.s. 100x

## ***Sophorae flos* – Pagoda tree flower**

### Definition

Pagoda tree flower consists of the flower buds of *Sophora japonica* L.

### Macroscopic characters

The flower buds are greenish-white, papilionaceous.



**II.215**

*Sophorae flos* – Pagoda tree flower

## ***Symphyti radix* – Comfrey root**

### Definition

Comfrey root is the dried root (and rhizome) of *Symphytum officinale* L.

### Macroscopic characters

The root is ca. 1 cm thick, cylindrical or spindle-shaped, branching. The outer surface of the dried root is black, longitudinally furrowed, wrinkled; the cut surface is creamy white. The interior contains slimy mucilage.



### **II.216**

*Symphyti radix* – Comfrey root

### Microscopic characters

Under the rhizodermis primary cortex parenchyma; the stele contains contiguous xylem and phloem.



## ***Caryophylli flos* – Clove (Ph. Eur. 5.0)**

### Definition

Clove consists of the whole flower buds of *Syzygium aromaticum* (L.) Merrill et L. M. Perry (*Eugenia caryophyllus* (C. Spreng.) Bull. et Harr.) dried until they become reddish-brown. It contains not less than 150 ml/kg of essential oil.

### Macroscopic characters

The flower bud is reddish-brown and consists of a quadrangular stalked receptacle, which is 10 mm to 12 mm long and 2 mm to 3 mm in diameter. It bears four divergent lobes of sepals which surround a globular head 4 mm to 6 mm in diameter. A bilocular ovary containing numerous ovules is situated in the upper part of the receptacle. The head is globular and dome-shaped, composed of four imbricated petals that enclose numerous incurved stamens and a short, erect style with a nectary disc at the base. The receptacle exudes essential oil when indented with the finger-nail.



### II.217

#### *Caryophylli flos* – Clove (Ph. Eur. 5.0)

### Microscopic characters

The powder is dark brown and has the odour and taste of the unground drug. The powder shows the following diagnostic characters: fragments of the receptacle showing the epidermis and underlying parenchyma containing large oil glands; short fibres occurring singly or in small groups, with thickened, lignified walls and few pits; abundant fragments of parenchyma containing cluster crystals of calcium oxalate; numerous triangular pollen grains about 15  $\mu\text{m}$  in diameter with three pores in the angles. Starch granules are absent.

### Other characters

Clove has a characteristic, aromatic odour, and spicy taste.

## ***Caryophylli floris aetheroleum* – Clove oil (Ph. Eur. 5.0)**

### Definition

Clove oil is obtained by steam distillation from the dried flower buds of *Syzygium aromaticum* (L.) Merrill et L. M. Perry (*Eugenia caryophyllus* C. Spreng. Bull. et Harr.).

### Characters

A clear, yellow liquid which becomes brown when exposed to air, miscible with methylene chloride, toluene and fatty oils.

## ***Tanacetum parthenii* herba – Feverfew (Ph. Eur. 5.0)**

### Definition

Feverfew consists of the dried, whole or fragmented aerial parts of *Tanacetum parthenium* (L.) Schultz Bip. It contains not less than 0.20 per cent of parthenolide ( $C_{15}H_{20}O_3$ ; Mr 248.3), calculated with reference to the dried drug.

### Macroscopic characters

The leafy, more or less branched stem has a diameter of up to 5 mm; it is almost quadrangular, channelled longitudinally and slightly pubescent. The leaves are ovate, 2 cm to 5 cm long, sometimes up to 10 cm, yellowish-green, petiolate and alternate. They are pinnate or bipinnate, deeply divided into five to nine segments, each with a coarsely crenate margin and an obtuse apex. Both surfaces are somewhat pubescent and the midrib is prominent on the lower surface. When present, the flowering heads are 12 mm to 22 mm in diameter with long pedicels; they are clustered into broad corymbs consisting of five to thirty flower-heads. The hemispherical involucre is 6 mm to 8 mm wide and consists of many overlapping bracts, which are rather narrow, are obtuse and scarious and have membranous margins. The central flowers are yellow, hermaphrodite, tube-shaped with five teeth and have five stamens inserted in the corolla; the filaments of the stamens are separate from each other but the anthers are fused into a tube through which passes the style, bearing two stigmatic branches. The peripheral flowers are female and have a white three-toothed ligule, 2 mm to 7 mm long. The fruit is an achene, 1.2 mm to 1.5 mm long, brown when ripe, with five to ten white longitudinal ribs. It is glandular and bears a short, crenate, membranous crown.



### II.218

*Tanacetum parthenii* herba – Feverfew (Ph. Eur. 5.0)

### Microscopic characters

The powder is yellowish-green, and shows numerous large, multicellular, uniseriate covering trichomes consisting of a rhomboidal basal cell, three to five smaller, thick-walled rectangular cells and a very long, flat, slender terminal cell, often curved at a right angle to the axis of the basal cell; glandular trichomes with a short, biseriate, two to four celled stalk and a biseriate head of four cells around which the cuticle forms a bladder-like covering; epidermal cells with very sinuous anticlinal walls, a striated cuticle and anomocytic stomata; numerous spirally and annularly thickened vessels; stratified parenchyma and collenchyma. Fragments of disc florets containing pale

yellow amorphous masses and small rosette crystals of calcium oxalate may be present; spherical pollen grains about 25  $\mu\text{m}$  in diameter, with three pores and a spiny exine may be present.

**Other characters**

Fewerfew has a camphoraceous odour.

## ***Taraxaci radix* – Dandelion root**

### Definition

Dandelion root consists of the dried roots (and rhizomes) of *Taraxacum officinale* Weber ex Wiggers.

### Macroscopic characters

The root is dark brown to black, longitudinally furrowed. The cut surface shows a broad, whitish grey to brown cortex, with concentric circles and laticifers. The cambium layer is dark brown, the xylem ring is yellow.

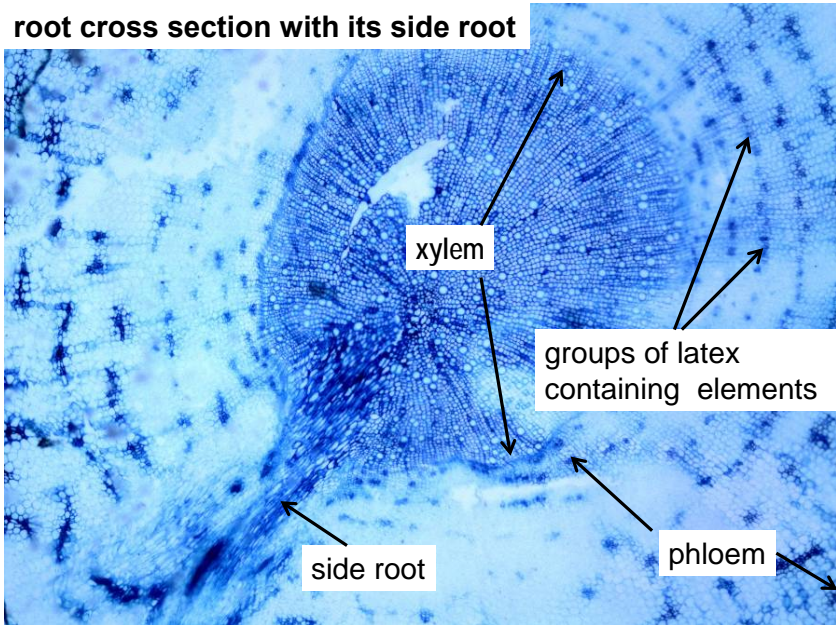


### II.219

*Taraxaci radix* – Dandelion root



Microscopic characters



**II.220**  
Taraxacum root cross section 40x

## ***Serpylli herba* – Wild thyme (Ph. Eur. 5.0)**

### Definition

Whole or cut, dried, flowering aerial parts of *Thymus serpyllum* L.s.1.

*Content*: minimum 3.0 ml/kg of essential oil (dried drug).

### Macroscopic characters

The stem is much branched, up to about 1.5 mm in diameter, cylindrical or indistinctly quadrangular, green, reddish or purplish, the older stems brown and woody, the younger stems pubescent. The leaves are opposite, 3 mm to 12 mm long and up to 4 mm wide, elliptical to ovate-lanceolate with an obtuse apex, cuneate and shortly petiolate at the base; the margin is entire and markedly ciliate, especially near the base; both surfaces are more or less glabrous but distinctly punctate. The inflorescence is composed of about 6 to 12 flowers in rounded to ovoid, terminal heads. The calyx is tubular, two-lipped with the upper lip dividing to form 3 teeth, the lower lip with 2 teeth, edged with long hairs; inner surfaces strongly pubescent, the hairs forming a closed tube after flowering. The corolla is purplish-violet to red, two-lipped, the lower lip with 3 lobes, upper lip notched, inner surface strongly pubescent; stamens 4, epipetalous, projecting from the corolla tube.



### **II.221**

*Serpylli herba* – Wild thyme (Ph. Eur. 5.0)

### Microscopic characters

The powder is greyish-green to brownish-green, and shows the following diagnostic characters: fragments of the leaf epidermises with sinuous, slightly thickened anticlinal walls and stomata of the diacytic type; numerous covering trichomes on both epidermises and along the leaf margins, the majority short, conical, unicellular, with thickened and warty walls, fewer long, uniseriate, composed of up to 8 cells, slightly swollen at the joints, with moderately thickened walls; abundant glandular trichomes (of Lamiaceae-type), mostly multicellular with a small, rounded, unicellular stalk and a large globular head composed of a number of indistinct, radiating cells containing brown secretion, others smaller, capitate, with unicellular stalk and a unicellular, globoid or ovoid head; purplish-violet fragments of the corolla, the outer epidermis with numerous covering and glandular trichomes, inner epidermis papillose;

pollen grains spherical to elliptical, 30  $\mu\text{m}$  to 40  $\mu\text{m}$  in diameter, with a finely grained exine and 6 germinal pores.

## ***Thymi herba* – Thyme (Ph. Eur. 5.0)**

### Definition

Whole leaves and flowers separated from the previously dried stems of *Thymus vulgaris* L. or *Thymus zygis* L. or a mixture of both species.

*Content*: minimum 12 ml/kg of essential oil of which a minimum of 40 per cent is thymol and carvacrol (both C<sub>10</sub>H<sub>14</sub>O; Mr 150.2) (anhydrous drug).

### Macroscopic characters

The leaf of *Thymus vulgaris* is usually 4 mm to 12 mm long and up to 3 mm wide, sessile or with a very short petiole. The lamina is tough, entire, lanceolate to ovate, covered on both surfaces by a grey or greenish-grey indumentum; the edges are markedly rolled up towards the abaxial surface. The midrib is depressed on the adaxial surface and is very prominent on the abaxial surface. The calyx is green, often with violet spots and is tubular; at the end are 2 lips of which the upper one is bent back and has 3 lobes, the lower is longer and has 2 hairy teeth. After flowering, the calyx tube is closed by a crown of long, stiff hairs. The corolla, about twice as long as the calyx, is usually brownish in the dry state and is slightly bilabiate. The leaf of *Thymus zygis* is usually 1.7 mm to 6.5 mm long and 0.4 mm to 1.2 mm wide; it is acicular to linear-lanceolate and the edges are markedly rolled towards the abaxial surface. Both surfaces of the lamina are green to greenish-grey and the midrib is sometimes violet; the edges, in particular at the base, have long, white hairs. The dried flowers are very similar to those of *Thymus vulgaris*.



### II.222

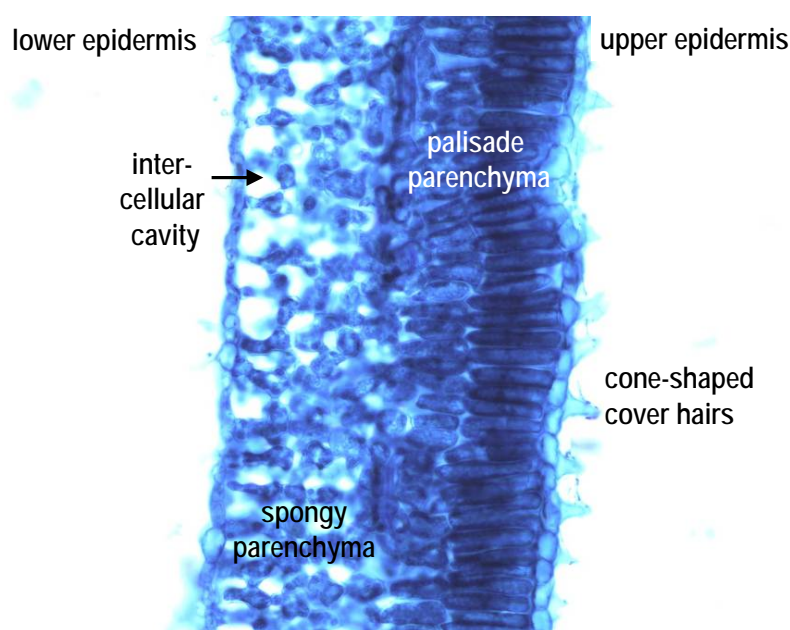
*Thymi herba* – Thyme (Ph. Eur. 5.0)

### Microscopic characters

The powder of both species is greyish-green or greenish-brown. The epidermises of the leaves have cells with anticlinal walls which are sinuous and beaded and the stomata are diacytic; numerous secretory trichomes made up of 12 secretory cells, the cuticle of



which is generally raised by the secretion to form a globular to ovoid bladder-like covering; the glandular trichomes have a unicellular stalk and a globular to ovoid head; the covering trichomes of the adaxial surface are common to both species; they have warty walls and are shaped as pointed teeth; the warty covering trichomes of the abaxial surface are of many types: unicellular, straight, and bicellular or tricellular, slightly curved or often elbow-shaped (*Thymus vulgaris*); bicellular or tricellular, more or less straight (*Thymus zygis*). Fragments of calyx are covered by numerous, uniseriate trichomes with 5 or 6 cells and with a weakly striated cuticle. Fragments of the corolla have numerous uniseriate covering trichomes, often collapsed, and secretory trichomes generally with 12 cells. Pollen grains are relatively rare, spherical and smooth with 6 germinal slit-like pores, measuring about 35 µm in diameter. The powder of *Thymus zygis* also contains numerous thick bundles of fibres from the main veins and from fragments of stems.



**II.223**

*Thymus vulgaris* leaf c.s. 200x

**Other characters**

Strong aromatic odour reminiscent of thymol.

***Thymi aetheroleum* – Thyme oil (Ph. Eur. 5.0)**

**Definition**

Essential oil obtained by steam distillation from the fresh flowering aerial parts of *Thymus vulgaris* L., *T. zygis* Loebl. ex L. or a mixture of both species.

**Characters**

*Appearance*: clear, yellow or very dark reddish-brown, mobile liquid with a characteristic, aromatic, spicy odour, reminiscent of thymol. *Solubility*: miscible with ethanol and with light petroleum.



## ***Tiliae flos* – Lime flower (Ph. Eur. 5.0)**

### Definition

Lime flower consists of the whole, dried inflorescence of *Tilia cordata* Miller, of *Tilia platyphyllos* Scop., of *Tilia* × *vulgaris* Heyne or a mixture of these.

### Macroscopic characters

The inflorescence is yellowish-green. The main axis of the inflorescence bears a linguiform bract, membranous, yellowish-green, practically glabrous, the central vein of which is joined for up to about half of its length with the peduncle. The inflorescence usually consists of two to seven flowers, occasionally up to sixteen. The sepals are detached easily from the perianth; they are up to 6 mm long, their abaxial surface is usually glabrous, their adaxial surface and their borders are strongly pubescent. The five spatulate, thin petals are yellowish-white, up to 8 mm long. They show fine venation and their borders only are sometimes covered with isolated trichomes. The numerous stamens are free and usually constitute five groups. The superior ovary has a pistil with a somewhat 5-lobate stigma.



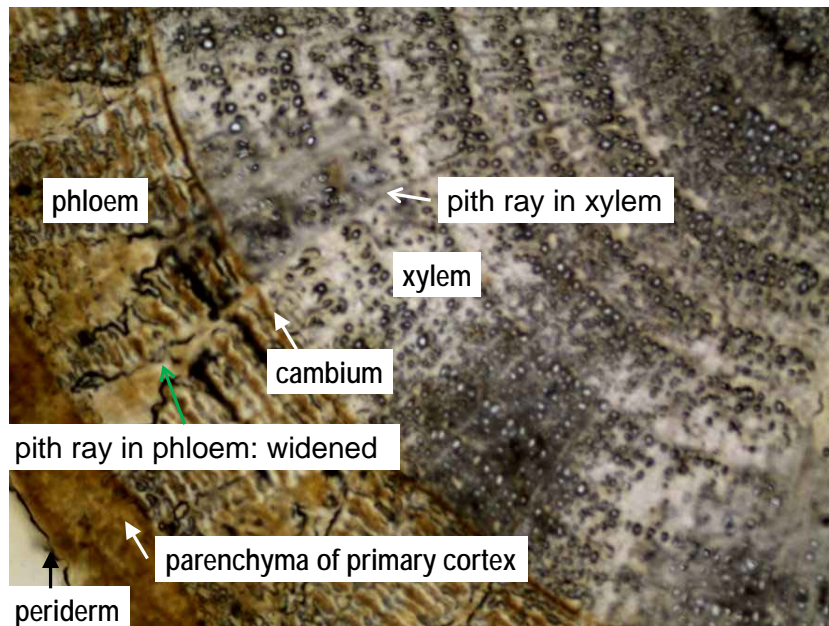
### II.224

*Tiliae flos* – Lime flower (Ph. Eur. 5.0)

### Microscopic characters

The adaxial epidermis of the bract shows cells with straight or slightly sinuous anticlinal walls; the abaxial epidermis shows cells with wavy-sinuous anticlinal walls and anomocytic stomata. Isolated cells in the mesophyll contain small calcium oxalate cluster crystals. The parenchyma of the sepals shows, particularly near the veins, numerous mucilaginous chambers and cells containing small calcium oxalate clusters.

The adaxial epidermis of sepals bears bent, thick-walled covering trichomes, unicellular or stellate with up to five cells. The epidermal cells of the petals show straight anticlinal walls with a striated cuticle without stomata. The parenchyma of the petals shows small calcium oxalate clusters and especially in its acuminate part mucilaginous chambers. The pollen grains have a diameter of about 30  $\mu\text{m}$  to 40  $\mu\text{m}$  and are oval or slightly triangular with three germinal pores and a finely granulated exine. The ovary is glabrous or densely covered with trichomes, often very twisted, unicellular or stellate with two to four branches.



**II.225**

*Tilia cordata* tree branch c.s. 40x

**Other characters**

Lime flower has a faint aromatic odour and a faint, sweet and mucilaginous taste.

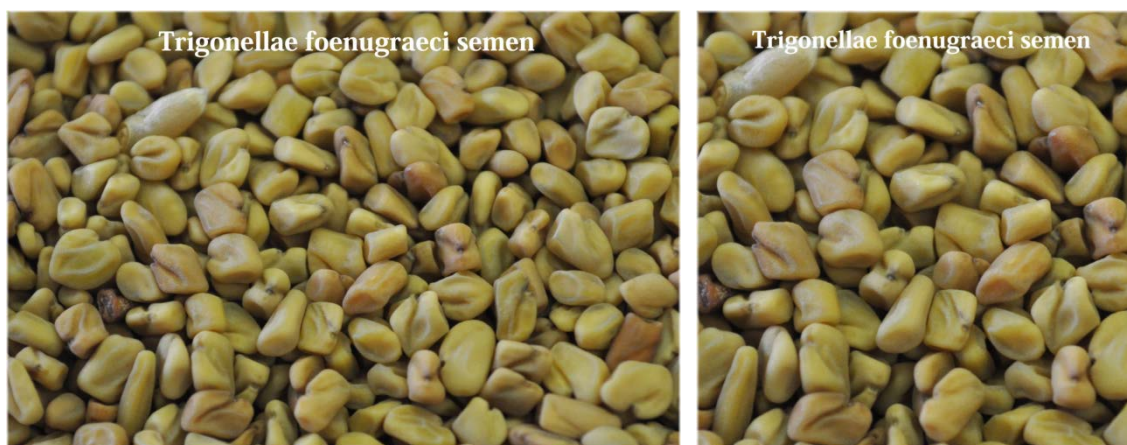
## ***Trigonellae foenugraeci semen* – Fenugreek (Ph. Eur. 5.0)**

### Definition

Fenugreek consists of the dried, ripe seeds of *Trigonella foenum-graecum* L.

### Macroscopic characters

The seed is hard, flattened, brown to reddish-brown and more or less rhomboidal with rounded edges. It is 3 mm to 5 mm long, 2 mm to 3 mm wide and 1.5 mm to 2 mm thick. The widest surfaces are marked by a groove that divides the seed into two unequal parts. The smaller part contains the radicle; the larger part contains the cotyledons.



### II.226

*Trigonellae foenugraeci semen* – Fenugreek (Ph. Eur. 5.0)

### Microscopic characters

The powder is yellowish-brown, and shows fragments of the testa; in sectional view lageniform epidermal cells are visible, covered with thick cuticle. The large cells of underlying hypodermis are narrower at the upper end and constricted in the middle, with bar-like thickenings of the radial walls. In surface view yellowish-brown fragments of the epidermis, composed of small, polygonal cells with thickened and pitted walls, frequently associated with the hypodermal cells, circular in outline with thickened and closely beaded walls; fragments of the hypodermis viewed from below, composed of polygonal cells whose bar-like thickenings extend to the upper and lower walls; parenchyma of the testa with elongated, rectangular cells with slightly thickened and beaded walls; fragments of endosperm with irregularly thickened, sometimes elongated cells, containing mucilage.

### Other characters

Fenugreek has a strong characteristic aromatic odour.



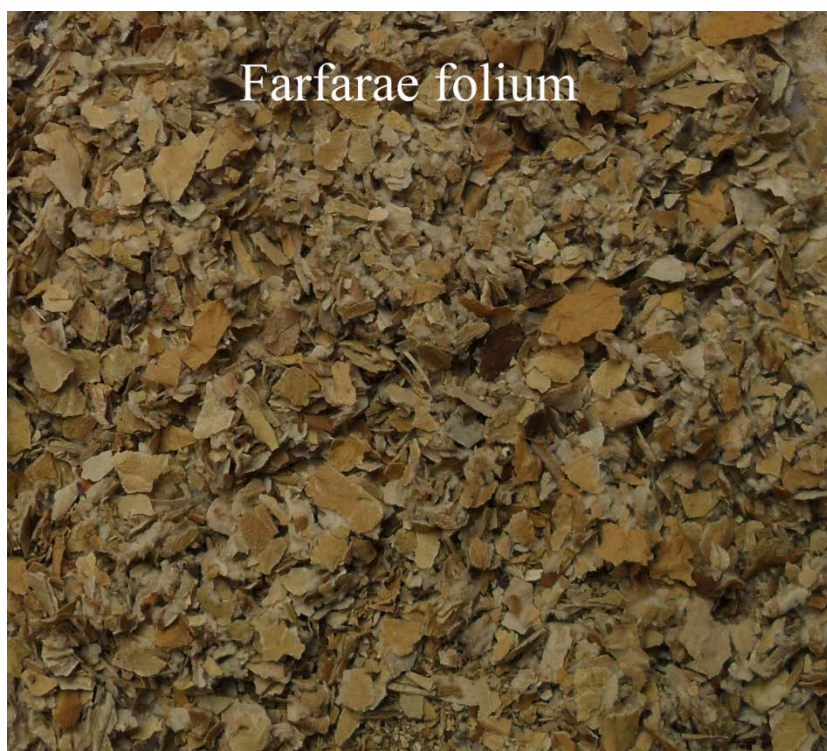
## ***Farfarae folium* – Coltsfoot leaf**

### Definition

The drug is the whole or cut, dried foliage leaf of *Tussilago farfara* L.

### Macroscopic characters

The leaves are up to 20 cm in diameter, reniform, lobate, with sinuous edge. The lower leaf surface is white or greyish pubescent, due to the presence of numerous covering hairs; the upper surface is dark green, with purplish venation. The petiole is 10 to 15 cm long.

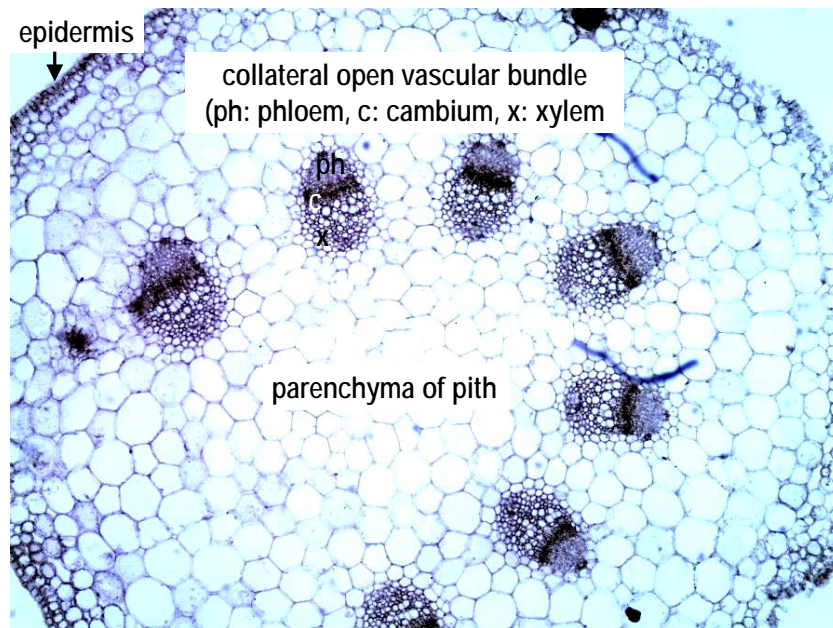


### **II.227**

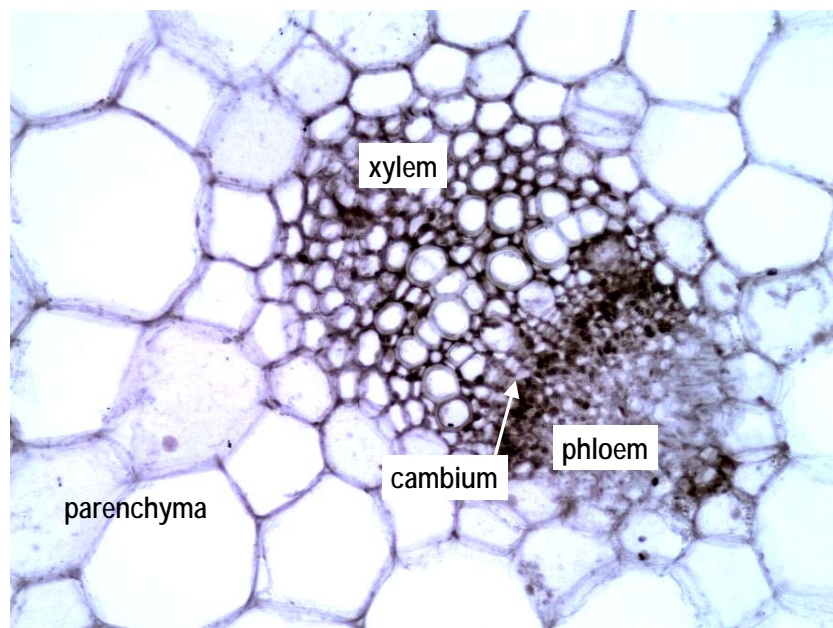
*Farfarae folium* – Coltsfoot leaf

### Microscopic characters

The epidermal cells are covered by cuticle both on the upper and lower leaf surface; polygonal, with anomocytic stomata. The covering hairs on the lower surface are 100 to 250 µm, comprising 6 short, thin-walled cells. The mesophyll consists of palisade and spongy parenchyma, with intercellular cavities. The palisade cells are arranged in 3 to 4 rows, and contain inulin.

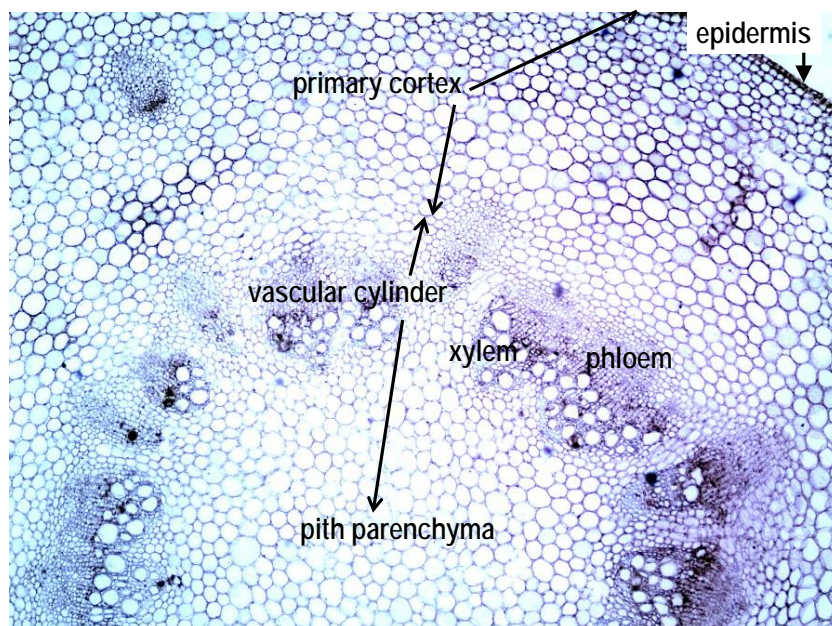


**II.228**  
Tussilago leaf petiole c.s. 40x



**II.229**  
Tussilago leaf petiole c.s 200x





**II.230**

Tussilago rhizome c.s. 40x

**Other characters**

The drug has no characteristic odour or taste.

## ***Urticae folium* – Stinging nettle leaf**

### Definition

The drug consists of the whole or cut, dried foliage leaves of *Urtica dioica* L. and *U. urens* L.

### Macroscopic characters

The leaves are decussate, ovate, with serrate margin and acuminate tip. The length of the teeth on the leaf edge cannot exceed twice their width. The dark green leaves are densely covered with stinging hairs. The leaves are 3 to 15 cm long and 2 to 8 cm long in *U. dioica*. The petiole is also hairy.



### II.231

*Urticae folium* – Stinging nettle leaf



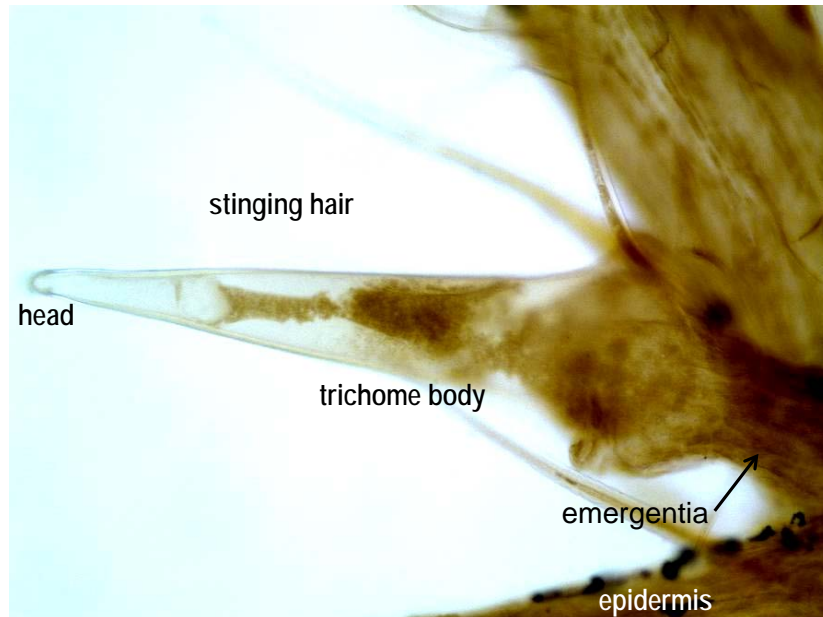
**II.232**

*Urticae fructus*

**Microscopic characters**

The upper epidermis has no stomata; the cells contain cystolith crystals of calcium carbonate. The anticlinal walls of the lower epidermis cells are wavy, with anomocytic and anisocytic stomata among them. Cystolith crystals are present also in the mesophyll, which comprises palisade and spongy parenchyma. Besides the stinging hairs, glandular hairs with bicellular head and unicellular stalk are also present.





**II.233**  
Urtica stinging hair 200x

### ***Urticae radix* – Stinging nettle root**

#### Definition

The drug consists of the dried roots of *Urtica dioica* L. and/or *U. urens* L., whole or cut.

#### Macroscopic characters

The taproot is accompanied by stolons, with quadrangular cross section, giving rise to adventitious roots, 0.5 to 3 mm thick.



**II.234**  
*Urticae radix* – Stinging nettle root

#### Microscopic characters

The periderm is followed by secondary cortex, containing cluster crystals of calcium oxalate. The vascular tissue is arranged in concentric rings of primary and secondary xylem, cambium and phloem.

## ***Urtica dioica ad praeparationes homoeopathicas* – Stinging nettle for homeopathic preparations (Ph. Eur. 6.0)**

#### Definition

Whole, fresh flowering plant of *Urtica dioica* L.

#### Macroscopic characters

Common stinging nettle is perennial. The taproot sends out creeping subterranean rhizomes, more or less 4-angled in transverse section, from which extend adventitious secondary roots and very numerous brownish hairy rootlets. The stems are erect, generally unbranched, 3 mm to 5 mm in diameter and 0.3 m to 1.5 m high, rarely up to 2.5 m high, 4-angled, greyish-green and covered in short hairs and stinging hairs. The decussate leaves are 30 mm to 150 mm long and 20 mm to 80 mm wide. The petiole is hispid and usually slightly less than one-third the length of the lamina. The leaf blade is ovate, acuminate, cordate or rounded at the base, and coarsely serrate; the apical tooth is distinctly larger than the lateral teeth. The upper side of the leaves is dark green and usually matt, both sides bear short serrated hairs intermingled with long stinging hairs. The 2 stipules are linear-subulate and free. The inflorescences growing from the leaf axils are complex, the flowers unisexual, and, particularly in male plants, generally distinctly longer than the petiole. After shedding their pollen, male inflorescences are erect at an oblique angle or horizontal; female inflorescences are pendent when the fruit is ripe. The perianth of the male flowers is divided half-way down into equal green lobes, widest at their base, with short bristles and stinging hairs at the margins. The stamens are equal and opposite to the perianth segments, each with a long, whitish filament that curves inwards before pollen is shed and spreads out afterwards. The ovary is rudimentary, button or cup-shaped. The perianth of the female flowers is downy or bristly on the outside and consists of 2 outer, and 2 inner segments; the inner segments are about twice the length of the outer ones. The hypogynous, ovate, unilocular ovary bears a large capitate stigma with a brush-like shock of hair. As the one-seeded fruit grows ripe, the 2 inner segments of the perianth fold around it like wings.

#### Other characters

The plant causes an itching, burning sensation on the skin.

The mother tincture of *Urtica dioica* L. is prepared by maceration using alcohol of a suitable concentration. *Appearance*: greenish-brown or orange-brown liquid.



## ***Valerianae radix* – Valerian root (Ph. Eur. 5.0)**

### Definition

Valerian root consists of the dried, whole or fragmented underground parts of *Valeriana officinalis* L. *s.l.*, including the rhizome surrounded by the roots and stolons. It contains not less than 5 ml/kg of essential oil for the whole drug and not less than 3 ml/kg of essential oil for the cut drug, both calculated with reference to the dried drug and not less than 0.17 per cent of sesquiterpenic acids expressed as valerenic acid ( $C_{15}H_{22}O_2$ ; *Mr* 234), calculated with reference to the dried drug.

### Macroscopic characters

The rhizome is yellowish-grey to pale brownish-grey, obconical to cylindrical, up to about 50 mm long and 30 mm in diameter; the base is elongated or compressed, usually entirely covered by numerous roots. The apex usually exhibits a cup-shaped scar from the aerial parts; stem bases are rarely present. When cut longitudinally, the pith exhibits a central cavity transversed by septa. The roots are numerous, almost cylindrical, of the same colour as the rhizome, 1 mm to 3 mm in diameter and sometimes more than 100 mm long. A few filiform fragile secondary roots are present. The fracture is short. The stolons show prominent nodes separated by longitudinally striated internodes, each 20 mm to 50 mm long, with a fibrous fracture.

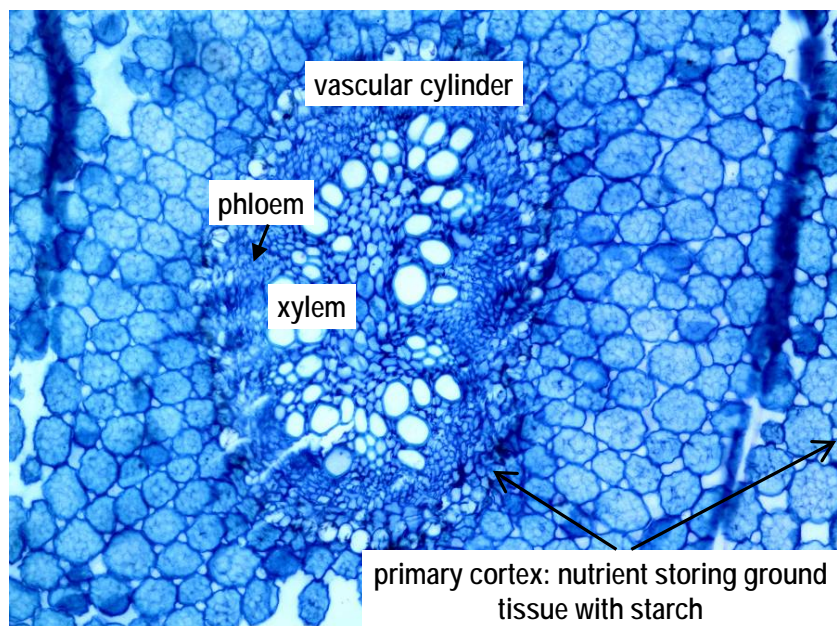


### II.235

#### *Valerianae radix* – Valerian root (Ph. Eur. 5.0)

### Microscopic characters

The powder is pale yellowish-grey to pale greyish-brown. When examined under a microscope using *chloral hydrate solution R*, the powder shows cells containing a pale brown resin or droplets of essential oil; isolated rectangular sclereids with pitted walls 5  $\mu$ m to 15  $\mu$ m thick; reticulately-thickened xylem vessels; occasional fragments of cortex cells and epidermal cells, some with root hairs. When examined under a microscope using a 50 per cent *V/V* solution of *glycerol R*, the powder shows numerous fragments of parenchyma with cells, containing single or compound starch granules; the single granules are rounded or elongated, 5  $\mu$ m to 15  $\mu$ m in diameter and have sometimes a cleft or radiate hilum; the compound granules have two to six components with an overall diameter of up to 20  $\mu$ m.



**II.236**  
Valeriana root c.s. 100x

**Other characters**

Valerian root has a characteristic, strong, unpleasant odour; its taste is sweet-bitter.

## ***Verbasci flos* – Mullein flower (Ph. Eur. 5.0)**

### Definition

Dried flower, reduced to the corolla and the androecium, of *Verbascum thapsus* L., *V. densiflorum* Bertol. (*V. thapsiforme* Schrad), and *V. phlomoides* L.

### Macroscopic characters

The corolla of *V. thapsus* is about 20 mm in diameter, pale yellow, yellow to brown, funnel-shaped with 5 slightly unequal and spreading lobes. The corolla lobes are densely hairy on the outer surface, glabrous on the inner surface, with a fine network of light brown veins. There are 5 stamens, alternating with the petal lobes, 2 of these are long, with glabrous filaments, the other 3 shorter, with densely tomentose filaments. The anthers are attached transversely. In *V. phlomoides* the corolla is up to about 30 mm in diameter, bright yellow to orange, and the anthers are obliquely attached to the filaments. The corolla of *V. densiflorum*, about 30 mm in diameter, is almost flat and deeply divided into 5 slightly unequal lobes, with rounded apices.



### II.237

*Verbasci flos* – Mullein flower (Ph. Eur. 5.0)

### Microscopic characters

The powder is yellow or yellowish-brown, and shows many covering trichomes from the corolla, whole and fragmented; they are multicellular, of the candelabra type with a central uniseriate axis from which whorls of branch cells arise at the position of the cross walls and at the apex. The covering trichomes from the stamen filaments are unicellular, long, thin-walled and tubular, sometimes with a club-shaped tip; they have a distinctly granular or striated surface. Numerous pollen grains, ovoid with a finely granular exine with 3 pores. Fragments of the fibrous layer of the anther with thickened walls giving a characteristic star-shaped appearance. Yellow fragments of the petals in the surface view, the epidermal cells polygonal and isodiametric; fragments of the mesophyll consisting of irregular parenchymatous cells and scattered spiral vessels.





**II.238**

Verbascum cover hairs 200x

**Other characters**

The drug has a strong, pleasant odour, reminiscent of honey; its taste is mucilaginous, sweetish.

## ***Veronicae herba* – Veronica flowering shoot**

### Definition

The drug consists of the dried, flowering aerial parts of *Veronica officinalis* L.

### Macroscopic characters

The prostrate stem is 15 to 40 cm long and 1 to 2 cm thick. The leaves are decussate, ovate, tapering into the petiole, with finely serrate edge, acute tip. The light or deep purple flowers cluster into a spike. The peduncle is 1 to 3 mm long, the calyx is 2 to 3 mm long, both the calyx and the corolla has 4 lobes. There are 2 stamens which fuse with the corolla. The fruits are cordate capsules.



### **II.239**

*Veronicae herba* – Veronica flowering shoot

### Microscopic characters

The cells of the upper epidermis are rectangular, those of the lower epidermis have wavy anticlinal walls. Anomocytic stomata can be observed on the lower surface. The covering hairs consist of 4 to 5 cells, the glandular hairs consist of a unicellular stalk and bicellular head. The mesophyll consists of palisade cells in 2 rows and spongy parenchyma. The flowers are covered by similar hairs. The stigma is papillar, covered with unicellular hairs. The spherical pollen grains are 35 µm in diameter, glossy.

### Other characters

The drug has a characteristic aromatic odour; its taste is slightly bitter, astringent.



## ***Vincae minoris herba* – Periwinkle flowering shoot**

### Definition

Periwinkle flowering shoot consists of the whole or cut, dried flowering aerial parts of *Vinca minor* L.

### Macroscopic characters

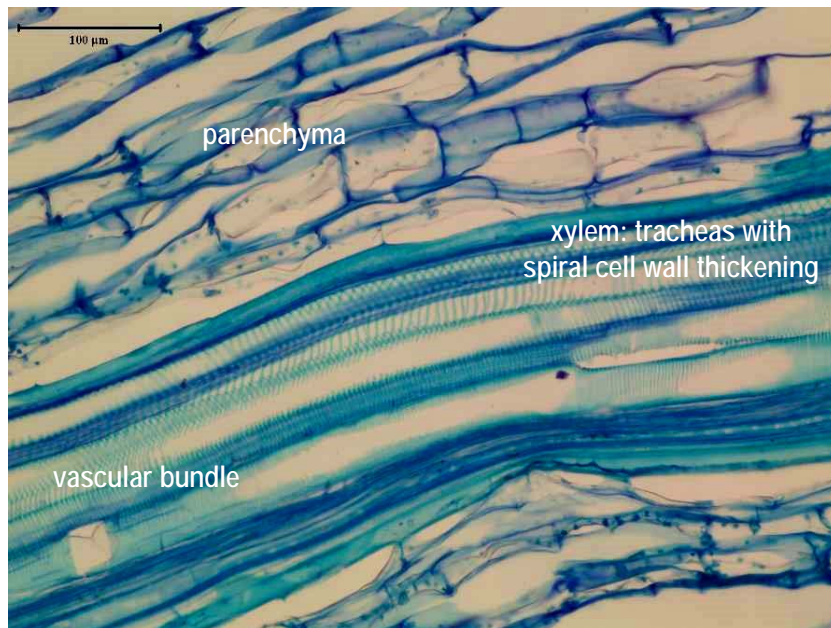
The lower part of the shoot is woody, the inside is hollow. The leaves are decussate, shiny dark green, leathery, glabrous, with a waxy surface, oval, entire, with pointed apex. The lower leaf surface has a lighter shade. The axillary flowers are purple or light blue, there are five petals with a white spot at the base of each petal. There are five stamens.



**II.240**

*Vincae minoris herba* – Periwinkle flowering shoot

Microscopic characters



**II.241**

Vinca minor stem l.s. 200x

Other characters

The drug is odourless, and has a bitter taste.

## ***Visci stipes* – Mistletoe**

### Definition

The drug consists of the dried upper twigs of *Viscum album* L., bearing leaves and flowers.

### Macroscopic characters

The leaves are borne on the top of dichotomously branched twigs, they are ovate, with entire margin, obtuse tip and parallel venation. The perianth is a 4-merous perigonium; the flowers are arranged in a tight cymose umbel.



### **II.242**

*Visci stipes* – Mistletoe

### Microscopic characters

The epidermis of young, yellowish twigs bears papillae. The epidermis cells of the leaves are polygonal, with paracytic stomata among them. The mesophyll contains cluster crystals of calcium oxalate, palisade and spongy parenchyma. The pollen grains are 8 to 15  $\mu\text{m}$ , tricolporate, with 2 stripes on the exine.

### Other characters

The drug has an aromatic odour; its taste is slightly bitter.



## ***Maydis stigma* – Maize stigma**

### Definition

The drug consists of the dried style and stigma of *Zea mays* L..

### Macroscopic characters

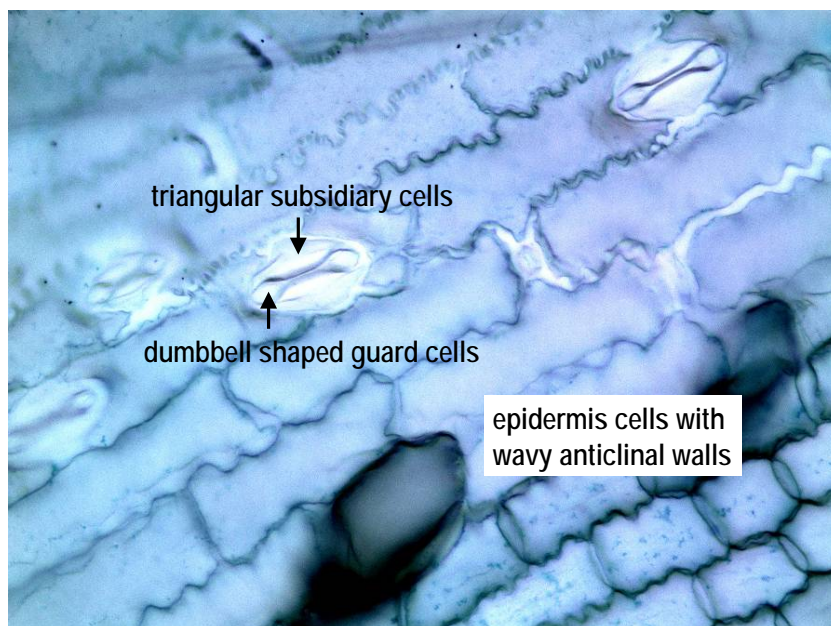
The styles are 10 to 40 cm long, reddish brown and silky.



**II.243**

*Maydis stigma* – Maize stigma

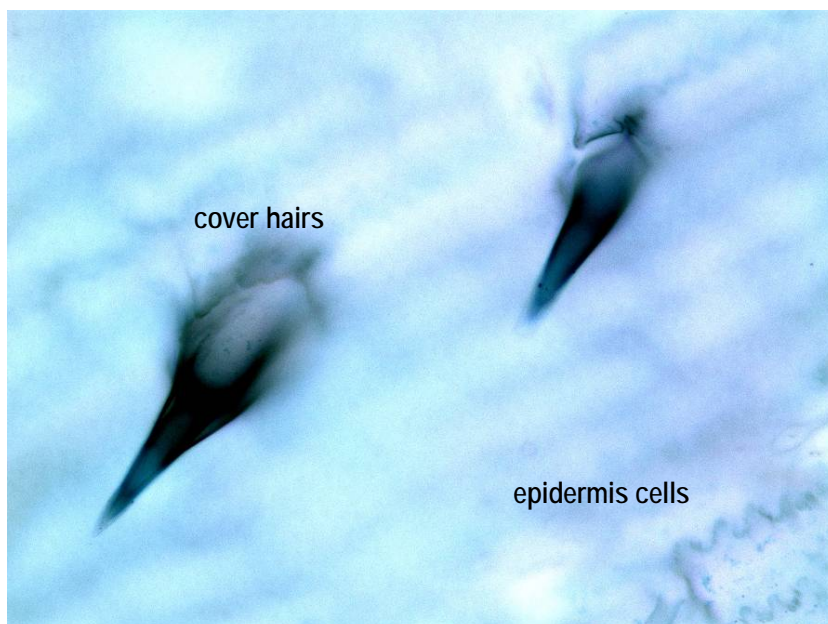
### Microscopic characters



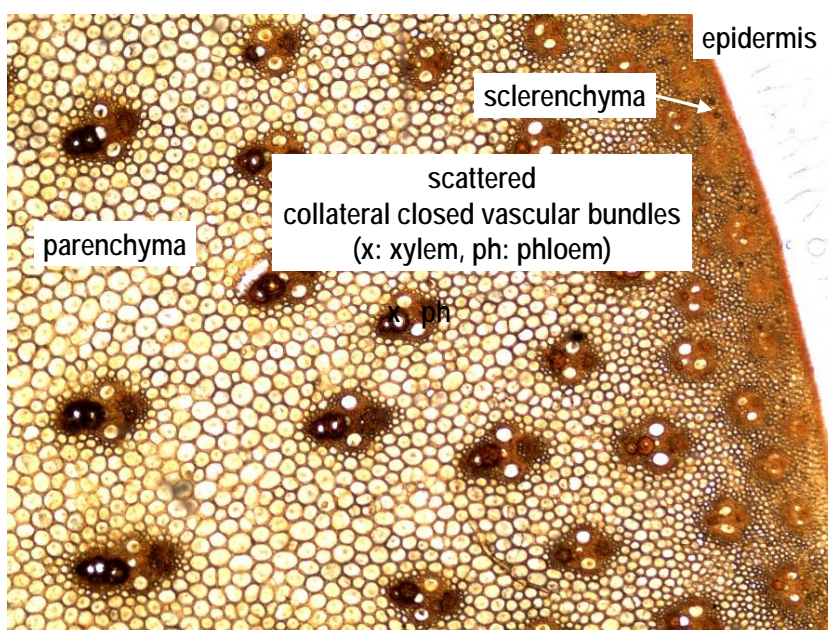
**II.244**

*Zea mays* epidermis 400x

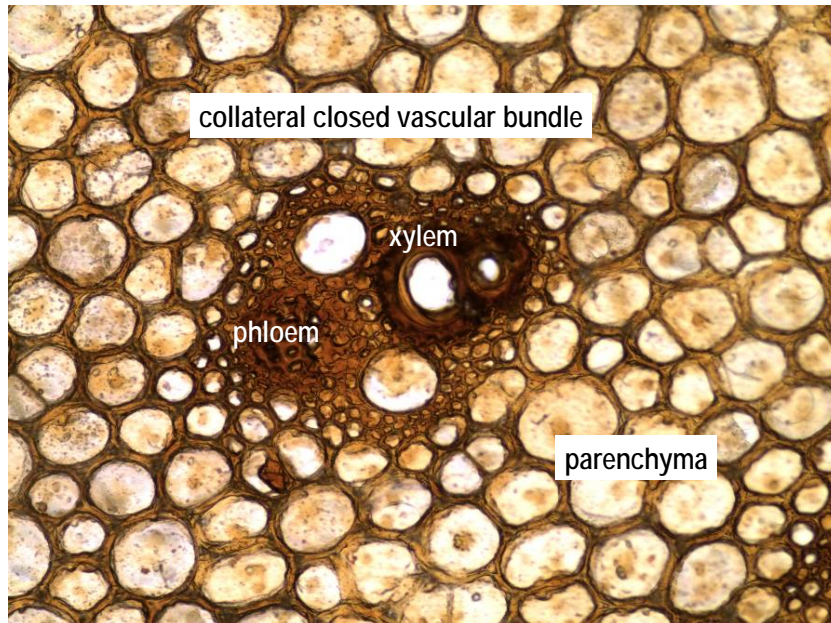




**II.245**  
Zea mays epidermis cover hairs 400x



**II.246**  
Zea mays stem c.s. 40x



**II.247**  
Zea mays stem c.s. 200x

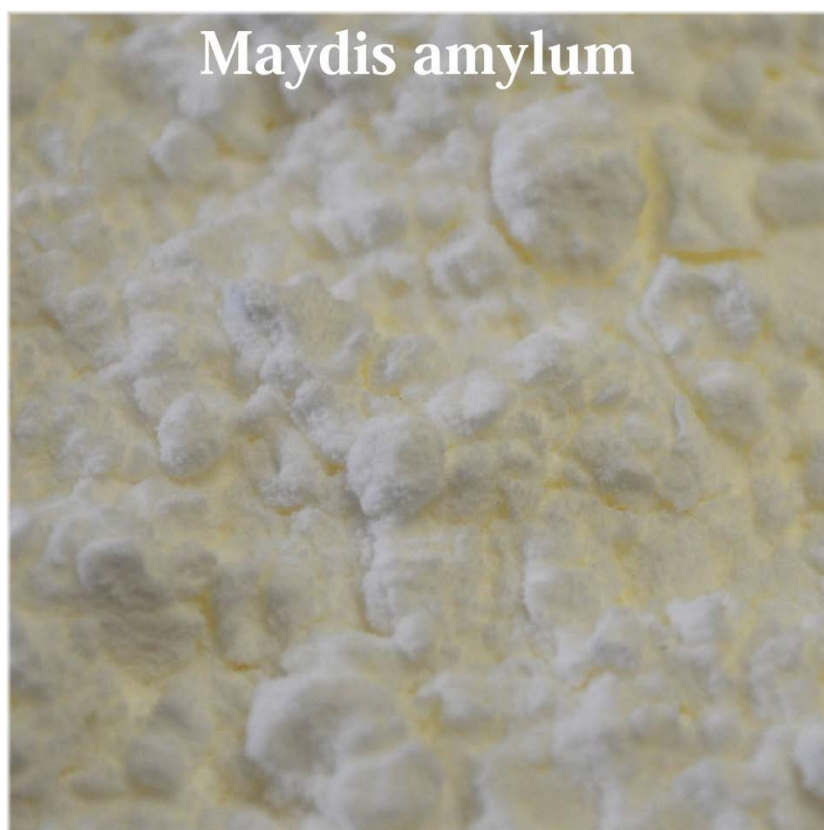
### ***Maydis amyllum* – Maize starch (Ph. Eur. 5.0)**

#### Definition

Maize starch is obtained from the caryopsis of *Zea mays* L.

#### Macroscopic characters

Matt, white to slightly yellowish, very fine powder which creaks when pressed between the fingers.



**II.248**

*Maydis amyllum* – Maize starch (Ph. Eur. 5.0)

**Microscopic characters**

The round or polygonal starch grains are concentric, 10-20  $\mu\text{m}$  in diameter. The presence of granules with cracks or irregularities on the edge is exceptional.

**Other characters**

It is tasteless and odourless.

*Solubility*: practically insoluble in cold water and in alcohol.

***Maydis oleum raffinatum* – Maize oil, refined  
(Ph. Eur. 5.0)**

**Definition**

Refined maize oil is the fatty oil obtained from the seeds of *Zea mays* L. by expression or by extraction, then refined.

**Characters**

clear, light yellow or yellow oil, practically insoluble in water and in alcohol, miscible with light petroleum (bp: 40 °C to 60 °C) and with methylene chloride.



## ***Zingiberis rhizoma* – Ginger (Ph. Eur. 5.0)**

### Definition

Ginger consists of the dried, whole or cut rhizome of *Zingiber officinale* Roscoe, with the cork removed, either completely or from the wide flat surfaces only. Whole or cut, it contains not less than 15 ml/kg of essential oil, calculated with reference to the anhydrous drug.

### Macroscopic characters

The rhizome is laterally compressed, bearing short, flattened, obovate oblique branches on the upper side, each sometimes having a depressed scar at the apex; the whole rhizomes are about 5 cm to 10 cm long, 1.5 cm to 3 cm or 4 cm wide and 1 cm to 1.5 cm thick, sometimes split longitudinally. The scraped rhizome with a light-brown external surface shows longitudinal striations and occasional loose fibres; the outer surface of the unscraped rhizome varies from pale to dark brown and is more or less covered with cork which shows conspicuous, narrow, longitudinal and transverse ridges; the cork readily exfoliates from the lateral surfaces but persists between the branches. The fracture is short and

starchy with projecting fibres. The smoothed transversely cut surface exhibits a narrow cortex separated by an endodermis from a much wider stele; it shows numerous, scattered, fibrovascular bundles and abundant scattered oleoresin cells with yellow contents. The unscraped rhizome shows, in addition, an outer layer of dark brown cork.



### II.249

*Zingiberis rhizoma* – Ginger (Ph. Eur. 5.0)

### Microscopic characters

The powder is pale yellow to brownish. When examined under a microscope using *chloral hydrate solution R*, the powder shows groups of large, thin-walled, septate fibres, with one wall frequently dentate; fairly large vessels with reticulate thickening and often accompanied by narrow, thin-walled cells containing brown pigment; abundant thin-walled parenchyma of the ground tissue, some cells containing brown oleoresin; fragments of brown cork, usually seen in surface view. When examined under a microscope using a 50 per cent *V/V* solution of *glycerol R*, the powder shows abundant starch granules, simple, flattened, oblong to oval or irregular, up to about 50



$\mu\text{m}$  long and  $25 \mu\text{m}$  wide, with a small point hilum situated at the narrower end; occasional granules show faint, transverse striations.

**Other characters**

Ginger has a characteristic aromatic odour and a spicy and burning taste.

## Glossary of medical and pharmaceutical terms

**abortifacient:** a substance that causes miscarriage, induces abortion

**adaptogenic:** increases the body's ability to adapt to various stressors such as fatigue, anxiety etc.

**adjuvant:** a substance added to other agent, modifying their effect

**allelopathic:** enhancing or inhibiting the metabolism of other organisms by releasing specific chemical compounds

**amarum:** a bitter substance

**amenorrhoea:** the absence of a menstrual period in a woman of reproductive age

**analgesic:** painkiller, relieving pain

**anorexia:** serious eating disorder, characterized by refusal to maintain a healthy body weight, an intense fear of gaining weight and a distorted body image

**anthelmintic:** drugs that expel parasitic worms (helminths), act against infections caused by parasitic worms

**antiarrhythmic:** drugs used to suppress abnormal rhythms of the heart (arrhythmias)

**antiatherosclerotic:** an agent preventing atherosclerosis, in which an artery wall thickens as a result of the accumulation of calcium and fatty materials such as cholesterol and triglycerides

**antibacterial:** a substance that negatively affects bacteria; bactericidal agents kill bacteria; while bacteriostatic agents slow down bacterial growth

**antibiotic:** an agent that either kills or inhibits the growth of a microorganism

**anticholinergic:** inhibiting acetylcholine

**antidiabetic:** a drug used to treat diabetes, by lowering glucose levels in the blood

**antidiarrh(o)ic:** relieves diarrh(o)ea, a condition that involves the frequent passing of loose or watery stools

**antiemetic:** a drug that is effective against vomiting and nausea

**antifungal:** a medication used to treat fungal infections

**antihypertensive:** lowering high blood pressure

**antihypertonic:** decreasing high blood pressure

**antimicrobial:** antifungal, an agent that kills, inhibits or prevents the growth of fungi

**antimitotic:** preventing or interfering with mitosis

**antimutagenic:** agents that interfere with (inhibit, prevent) the mutagenicity of a substance

**antiparasitic:** medications used in the treatment of infections caused by parasites such as nematodes, infectious protozoa and amoebas

**antiphlogistic:** reducing inflammation

**antirheumatic:** against rheuma, relieving rheumatic complaints

**antiseptic:** antimicrobial substance applied to living skin or other living tissues to reduce the possibility of infection

**antitumor:** counteracting or preventing the formation of malignant tumors

**antiviral:** used for treating viral infections

**aperitif:** increasing appetite

**aphrodisiac:** a substance that increases sexual desire

**arthritis:** joint disorder that involves the inflammation of one or more joints

**asthma bronchiale:** chronic inflammation of the respiratory tract, characterized by airflow obstruction and spasm of the bronchi

**a(d)stringent:** a substance that causes the shrinkage or contraction of tissues, e.g. cause shrinkage of mucous membranes, internally check discharge of blood serum or mucous secretions

**bactericid(al):** an agent that kills bacteria

**bronchitis:** a condition in which the bronchi(al tubes) become inflamed

**broncholytic:** agents that cause an increase in the expansion of a bronchus or bronchial tubes

**cardioprotective:** an agent protecting the heart

**carminative:** a drug that either prevents formation of gas in the gastrointestinal tract or facilitates the removal of excess gas, thus relieving flatulence

**cholagogue:** an agent that promotes the discharge and flow of bile from the gall bladder into the duodenum

**cholangitis:** inflammation of the biliary tract, caused by infection of the bile duct

**cholecinctic:** enhances the flow of bile

**cholecystitis:** inflammation of the gallbladder

**cholelythiasis:** formation of gallstones (calculi) in the gallbladder

**choleretic:** increases the volume of bile produced by the liver

**c(h)olic:** a form of pain which starts and stops abruptly, usually as the result of muscular constructions of the colon, ureter etc.

**colitis:** an inflammation of the inner lining of the colon

**coronaria/coronary sclerosis:** sclerosis of the coronary arteries of the heart, which can create life-threatening blockages in these arteries

**cystitis:** inflammation of the bladder

**cytostatic:** inhibiting or suppressing cellular growth and multiplication

**cytotoxic:** inhibits or prevents the function of cells, causing cell death

**deodorant:** a substance applied to the body to prevent body odour caused by the bacterial breakdown of perspiration (sweat)

**depurant:** a substance that cleans or purifies; an agent or substance that promotes the excretion and removal of waste material

- dermatitis:** inflammation of the skin
- diaphoretic:** a substance that promotes sweating
- diarrhoea:** the condition of having three or more loose or liquid bowel movements per day
- digestive:** promoting digestion
- discomfort:** distress
- disinfectant:** a substance applied to non-living objects to destroy microorganisms
- diuretic:** a substance that promotes the elimination of water from the body through urination
- dysentery:** an inflammatory disorder of the intestine that results in severe diarrh(o)ea containing blood and mucus in the faeces, with fever and abdominal pain
- dysmenorrhoea:** painful periods, a medical condition of pain during menstruation
- dyspepsia:** indigestion, impaired digestion
- emetic:** an agent causing vomiting
- emmenagogue:** a substance which stimulates blood flow in the pelvic area and the uterus; stimulates menstruation
- enteritis:** inflammation of the small intestine
- expectorant:** promoting the discharge of phlegm from the respiratory tract
- flatulence:** gas produced in the gastrointestinal tract, passed per rectum
- fungistatic:** having an inhibitory effect on the growth and reproduction of fungi without destroying them
- furuncle:** a skin abscess, a painful bump formed under the skin, full of puss, caused by a bacterial or fungal infection of a hair follicle
- gastritis:** inflammation of the lining of the stomach
- gastrointestinal:** related to the digestive system, responsible for consuming and digesting foodstuff, including all structures between the mouth and the anus
- gingivitis:** inflammation of the gum tissue
- hepatoprotective:** protecting the liver
- hepatotoxicity:** liver damage induced by chemicals
- hyperaciditas:** or acid dyspepsia, which develops when the level of digestive acids in the stomach rises above the required one, and there is a burning sensation
- hyperaemia:** increase of blood flow to various tissues of the body
- hyperplasia:** increase in number of cells, proliferation of cells, and as a consequence the enlargement of a certain tissue or organ
- hypoaciditas:** a condition of less than normal acidity, mainly in the stomach
- hypochondria:** health anxiety, when a person worries excessively about having a serious illness
- immunomodulant:** modifying the function of the immune system



**immunostimulant:** enhancing the function of the immune system

**inotropic:** increasing or decreasing the force of (heart) muscular contractions; negatively inotropic agents weaken, while positively inotropic substances increase the force of muscular contractions

**insecticide:** a substance used to kill insects

**keratolytic:** an agent used to enhance the removal of excess skin, epidermal layers, e.g. in removal of warts

**lactagogue:** an agent that promotes the flow of breast milk

**laxative:** an agent that facilitates or increases bowel movements, most often used to treat constipation

**linimentum:** a topical preparation for application to the skin, typically rubbed in to relieve pain and stiffness

**lumbago:** low back pain, resulting from muscle strain or a slipped spinal disk

**menorrhagia:** an abnormally heavy and prolonged menstrual period at regular intervals

**menorrhoea:** normal bleeding in menstruation

**nephritis:** inflammation of the kidneys

**nephrolithiasis:** formation of urinary stones in the kidney

**neurasthenia:** nervous exhaustion

**neurotoxic:** substances altering the normal activity of the nervous system, causing damage to the nervous tissue

**obstipant:** causing constipation, anti-diarrh(o)eal

**obstructive:** blocking or filling a passage (e.g. airways)

**obstructive bronchitis:** mucus accumulates in the bronchi due to a respiratory tract infection, the bronchial mucosa swells and the muscles may contract causing exhaling difficulties

**osteoarthritis:** degenerative joint disease, including the degradation of cartilage and bone

**oxytocic:** facilitating childbirth, particularly by stimulating contractions of the uterus

**parenteral:** a way of administering drugs; including intravenous, subcutaneous and intramuscular injections, as well as infusions

**pharyngitis:** inflammation of the pharynx (passageway leading from the oral and nasal cavities to the esophagus and larynx)

**polyarthritis:** a type of arthritis which involves 5 or more joints simultaneously

**prostate hypertrophy:** enlargement of the prostate due to a growth in the size of individual prostate cells

**prostatic hyperplasia:** enlargement of the prostate due to an increase in the number of cells

**prostatitis:** inflammation of the prostate

**proteolytic:** breaking down proteins into smaller polypeptides or amino acids

- pruritus:** itching, a sensation that causes the desire to scratch
- psoriasis:** a chronic, immune-mediated skin disease, characterized by red, scaly patches, papules and plaques, which usually itch
- repellent:** a substance applied on various surfaces to keep insects away
- roborant:** a substance having a strengthening effect
- secretolytic:** increasing the production of mucus in the respiratory tract, and decreasing the viscosity of mucus, which facilitates its discharge from the respiratory tract
- secretomotoric:** enhancing the activity of cilia in the respiratory tract, thus aiding the discharge of mucus
- sedative:** tranquilizer, reducing excitement or irritability
- spasmolytic:** antispasmodic; smooth muscle relaxant; arresting or checking spasms
- stimulant:** substances that induce temporary improvements in mental or physical functions, or both
- stomachic:** an agent that improves stomach functions, stimulating digestion
- stomatitis:** inflammation of the mouth, which affects the mucous membranes of the mouth and the lips
- sympatholytic:** a drug that blocks the sympathetic (adrenergic) nervous system, by blocking or inhibiting the release or activity of catecholamines
- sympathomimetic:** drugs that mimic the effects of transmitter substances of the sympathetic nervous system such as catecholamine and adrenalin
- tachycardia:** faster than normal heart rate
- thrombophlebitis:** a vein inflammation related to a thrombus (blood clot)
- tonic:** increasing or restoring physical or mental tone; refreshing
- tranquilizer/tranquilliser:** a substance used to reduce anxiety, fear or tension; sedative
- ulcus cruris:** venous leg ulcer
- ulcus duodeni:** ulcer of the duodenum, the first section of the small intestine
- ulcus ventriculi:** ulcer of the stomach; the mucous membrane is not intact for at least 5 mm
- uterotonic:** an agent used to induce contractions of the uterus
- vasoconstrictor:** an agent that causes a narrowing of a blood vessel



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