

Pharmacognosy

lab exercise 7



Drugs – leaves, herbs



Althaea folium CzPh 2017

- Mother plant: *Althaea officinalis*, Malvaceae (marsh-mallow)



Althaeae folium CzPh 2017



- Macroscopy: leaf grey-green, shortly leafstalked, oval to triangular cordate, 3–5 lobular, toothed, both sides densely grey and trichomous (tomentose), veins on lower side distinguished, without odour, mucilage taste
- Content compounds: mucilage, pectin, flavonoids
- Usage: mucilaginoso, antitussic, antiphlogistic



No marsh-mallow in these marshmallows!

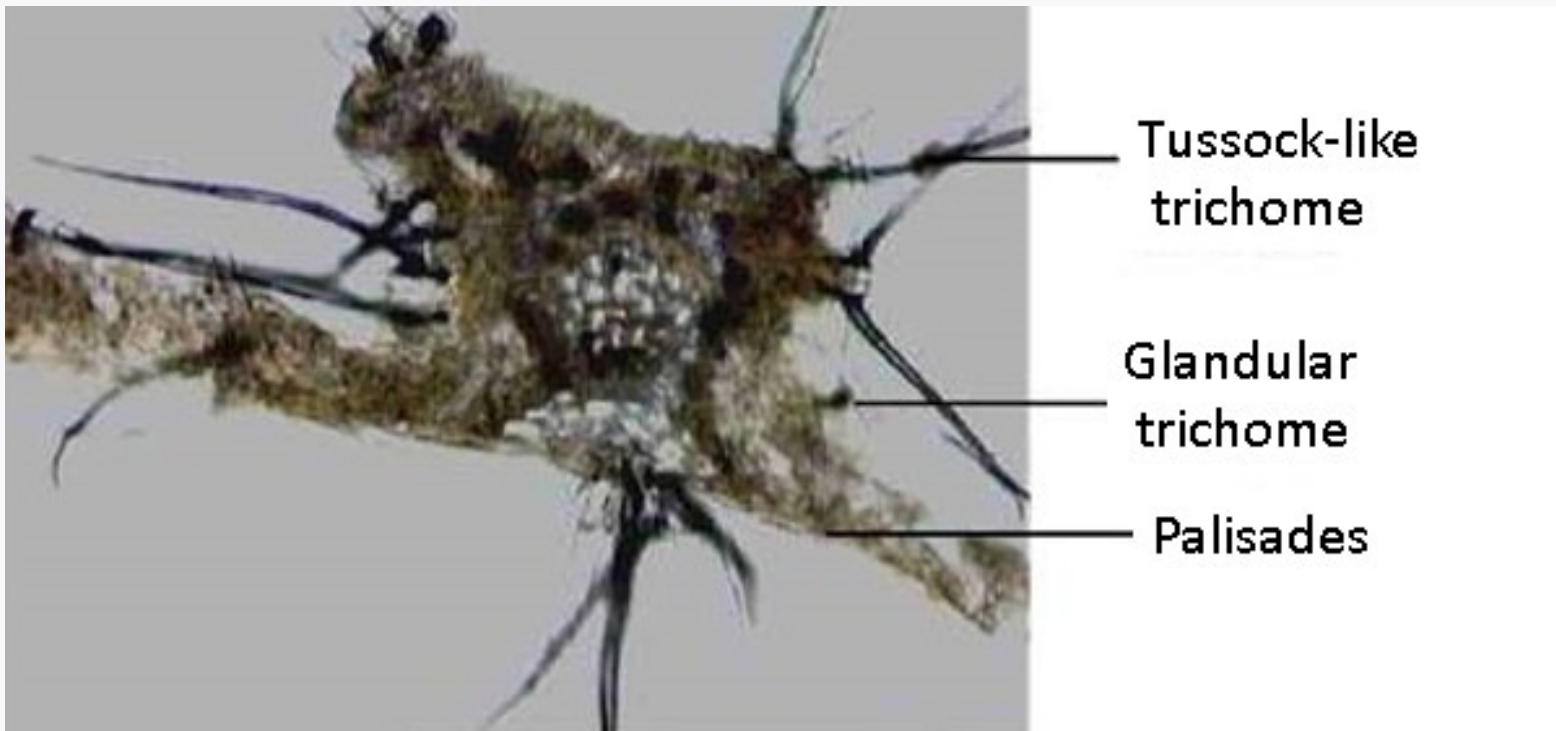
To roast or not to roast?



Althaeae folium CzPh 2017



- **Microscopy:** bifacial leaf, between epidermis cells are mucilage cells, **palisade parenchyma**, **spongy parenchyma** with **crystal aggregates** and large mucilage cells, **collateral vascular bundle**, both skin layers with **one-cell trichomes grouped in clusters/tussocks** and scarce club-shaped glandular trichomes





Althaeae folium CzPh 2017

■ Microscopy:

covering trichome

upper epidermis

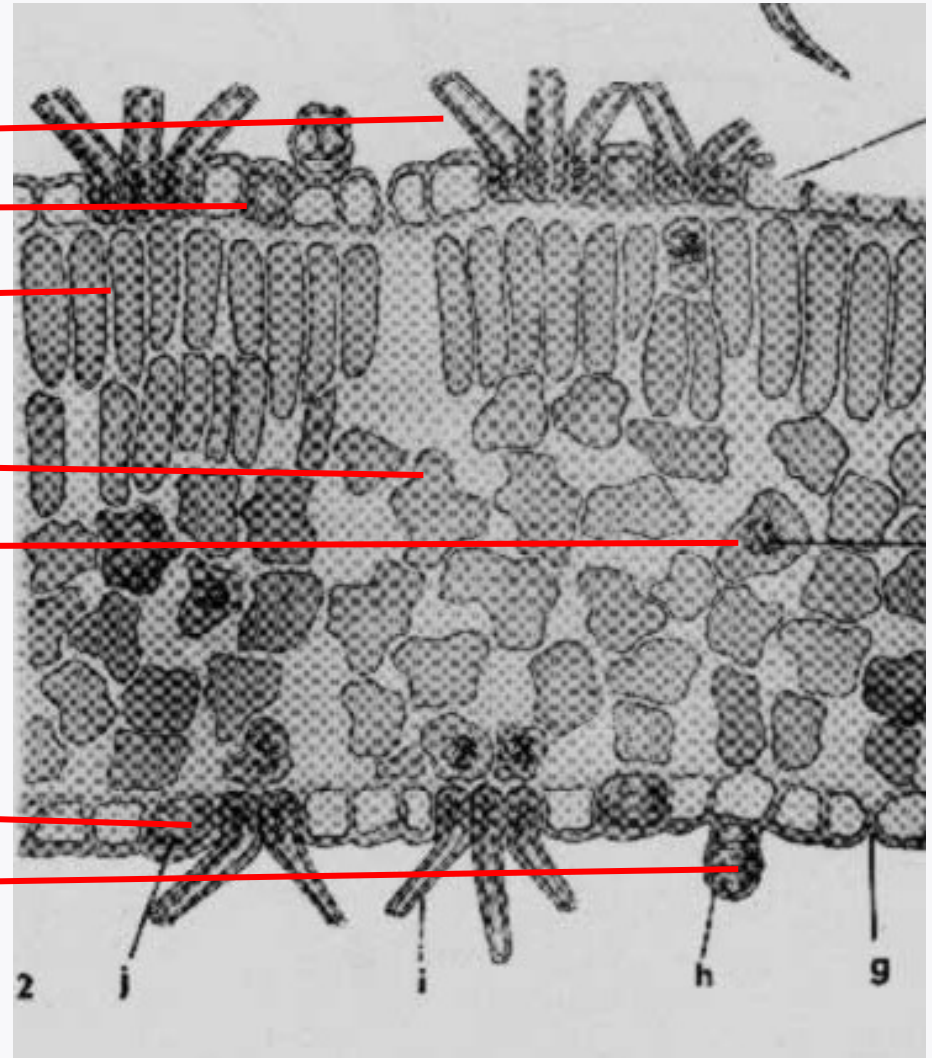
palisades

spongy parenchyma

crystal aggregate

mucilage cell

glandular trichome



collateral vascular bundle

Boldo folium CzPh 2017



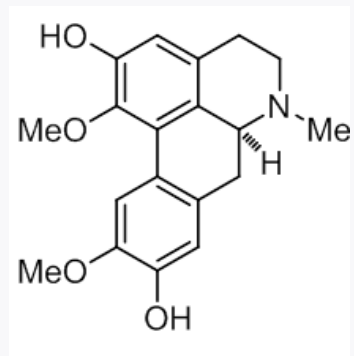
- Mother plant: *Peumus boldus*, Monimiaceae (boldo)
- Boldi folii extractum siccum CzPh 2017



Boldo folium CzPh 2017



- Macroscopy: shortly leafstalked leaf, oval, fragile, tough, leather like, on the margin under winded, green-grey, upper side covered with small bumps, bottom side less bumpy, camphor-like odour, taste bitter and spicy
- Content compounds: **alkaloids** (boldine, sparteine), essential oil (ascaridole), flavonoids
- Usage: cholagogue, choloretic, diuretic

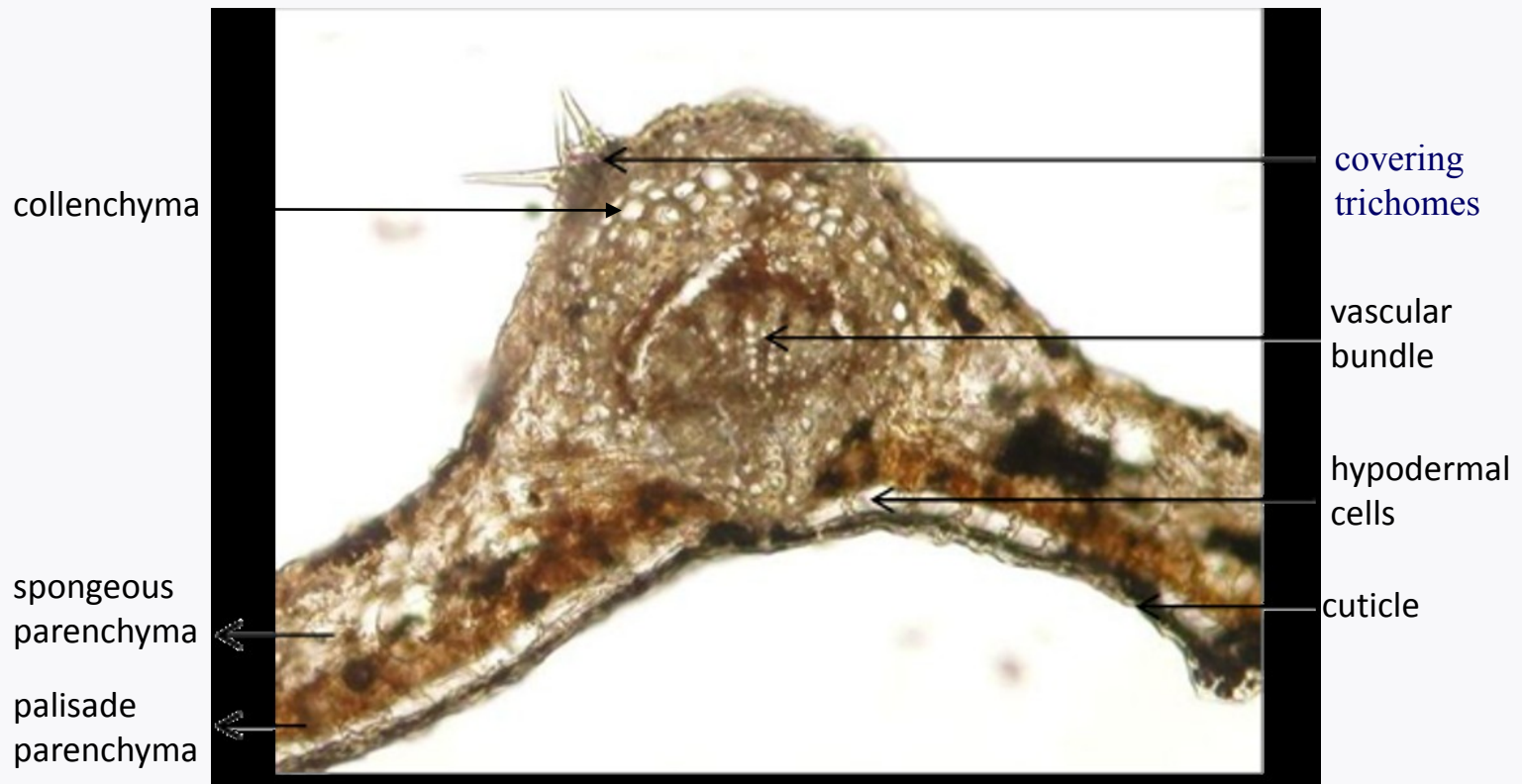


boldine

Boldo folium CzPh 2017



- Microscopy: bifacial leaf, thick cuticle layer, bundles of covering trichomes, under epidermis hypodermal cells with mucilage in one row, reinforcing collenchyma, palisades, spongy parenchyma with cells containing essential oil, collateral vascular bundle with sclerenchyma





Boldo folium CzPh 2017

■ Microscopy:

covering trichome

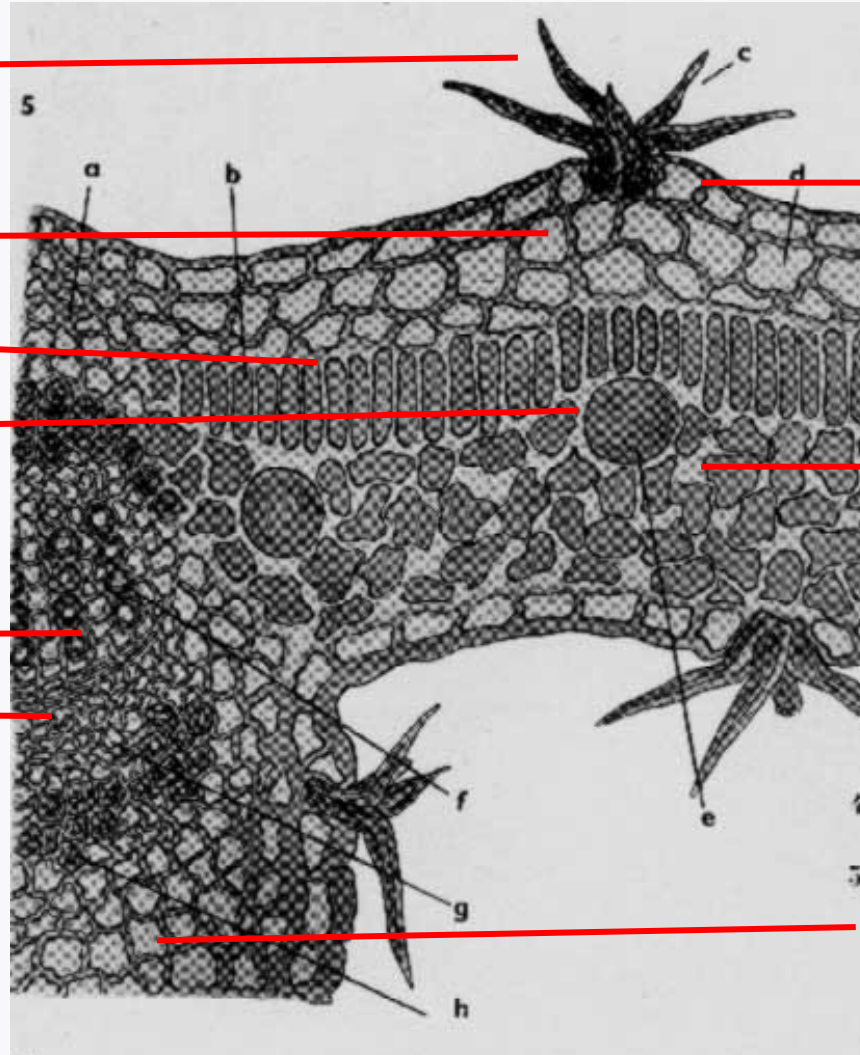
hypodermal cells

palisades

cell with essential oil

xylem

Phloem



epidermis

spongy
parenchyma

collenchyma



Theae folium

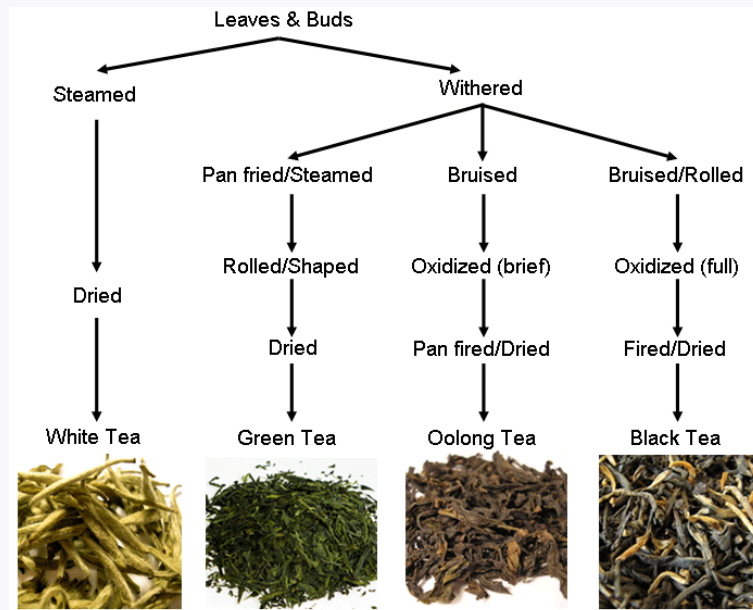
- Mother plant: *Thea sinensis* syn. *Camellia sinensis*, Theaceae (tea plant, tea-tree (do not confuse with *Melaleuca alternifolia*, the source of tea tree oil))





Theae folium

- Macroscopy: fresh leaves are leaf stalked, green, shiny, from lanceolate to oval shape with serrate margin, leaves of black tea are tubularly curled, black, aromatic odour, aromatic taste, astringent

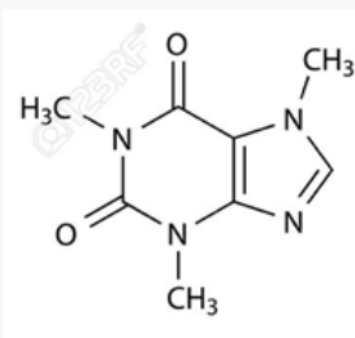


Red tea = rooibos, *Aspalathus linearis*, (Fabaceae), also called bushtea

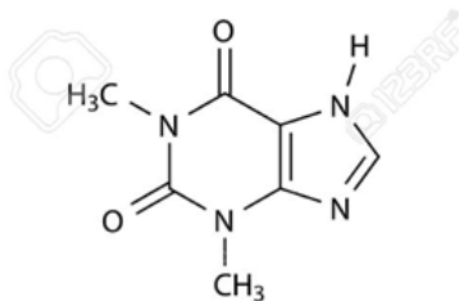


Theae folium

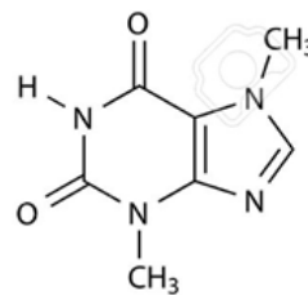
- Content compounds: purine alkaloids (caffeine 1-5%), tannins, essential oils
- Usage: refreshing beverages, diuretic, obstipative, stimulans
- Interactions: influence on iron absorption



caffeine



theobromine

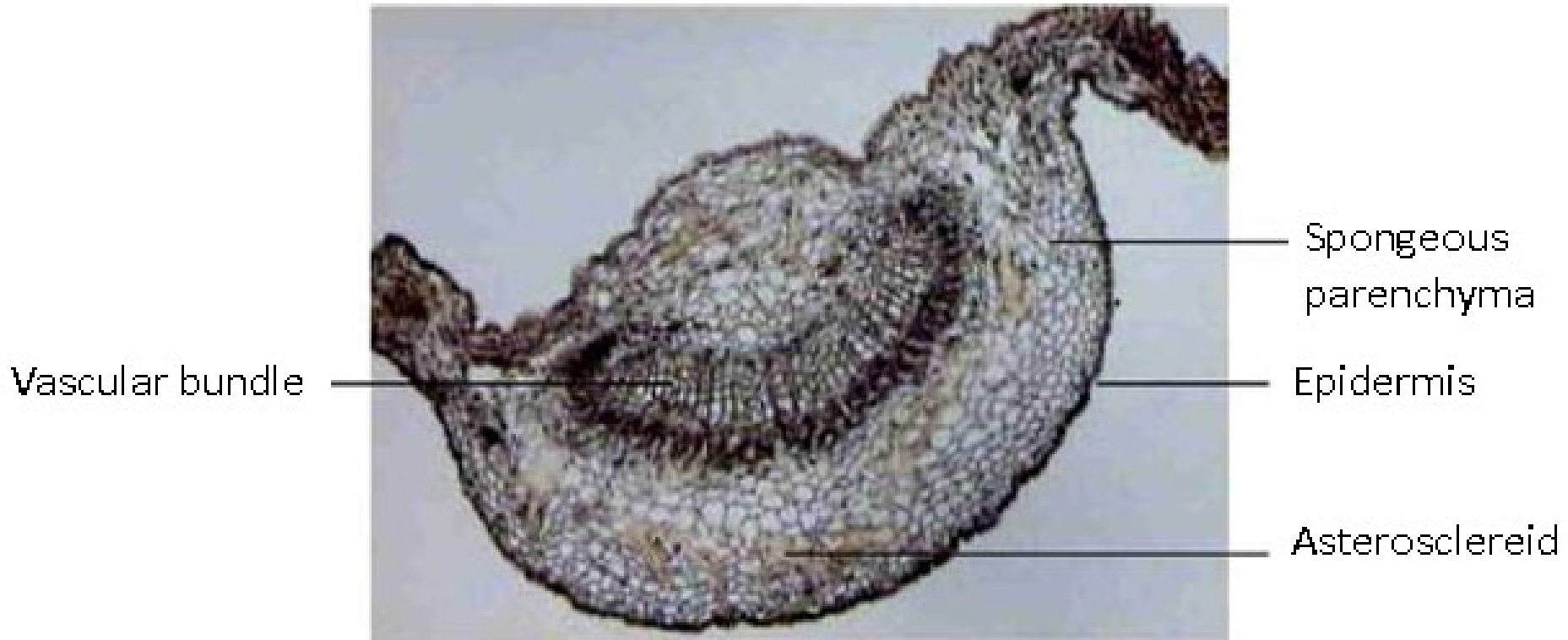


theophylline



Theae folium

- Microscopy: **bifacial leaf**, upper epidermis, palisade parenchyma, spongy parenchyma with crystal aggregates and **asterosclereids (star-shaped sclerenchymatic cells)**, **collateral vascular bundle with sclerenchyma sheath**, lower epidermis with **covering trichomes**





Theae folium

■ Microscopy:

epidermis

palisades

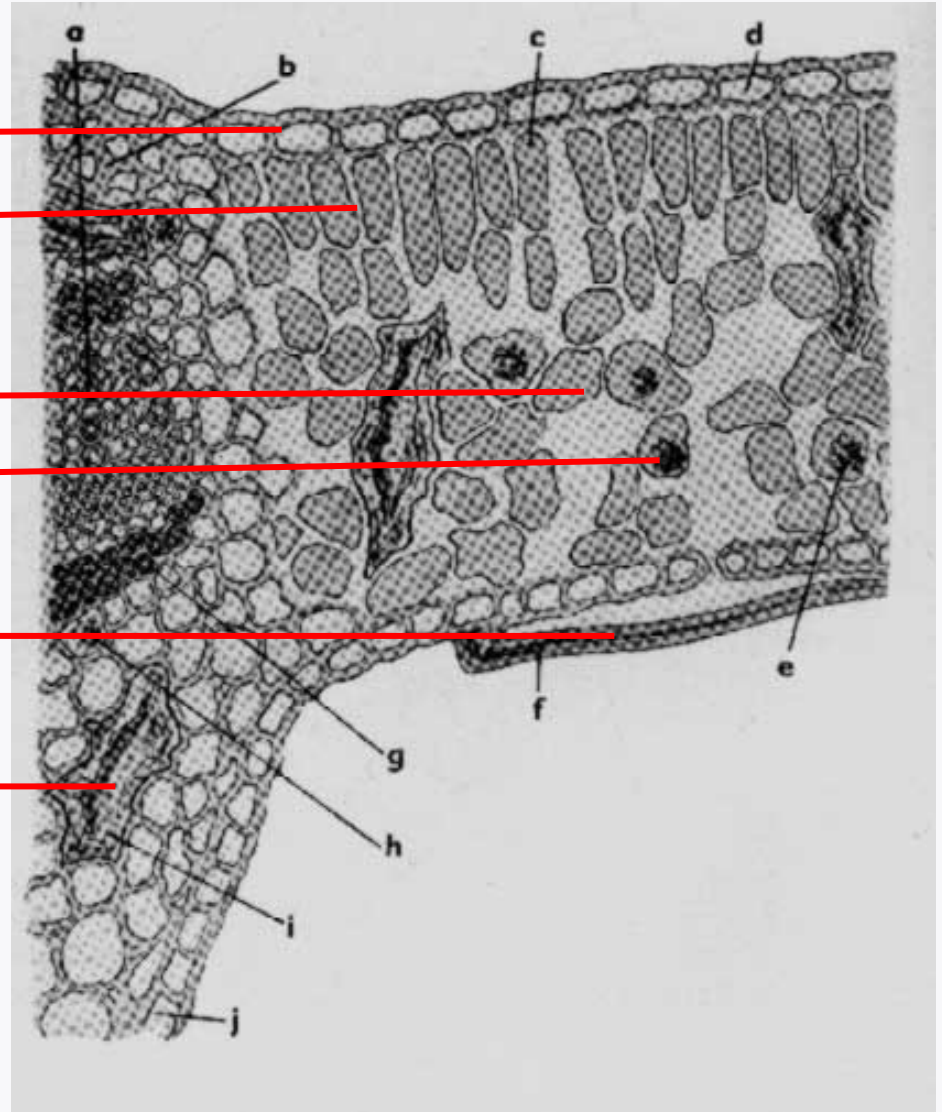
spongy parenchyma

crystal aggregate

trichome

asterosclereid cell

collateral vascular bundle





Trifolii fibrini folium

CzPh 2017

- Mother plant: *Menyanthes trifoliata*, Menyanthaceae
bog-bean, buckbean

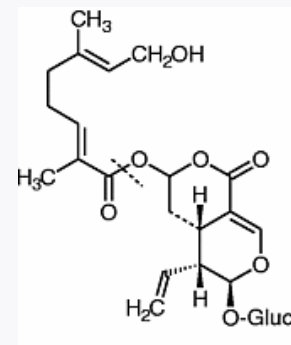




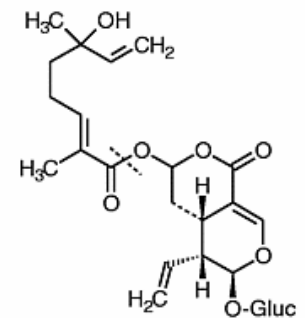
Trifolii fibrini folium

CzPh 2017

- **Macroscopy:** leaves trifoliate, lengthily leaf stalked, integerrimum or slightly toothed, upper side richly green, lower side lighter with a broad main vein, without odour, very bitter taste
- **Content compounds:** glycosidic bitter substances, tannins, flavonoids
- **Usage:** amare, stomachic, mild cholagogue



foliamentin



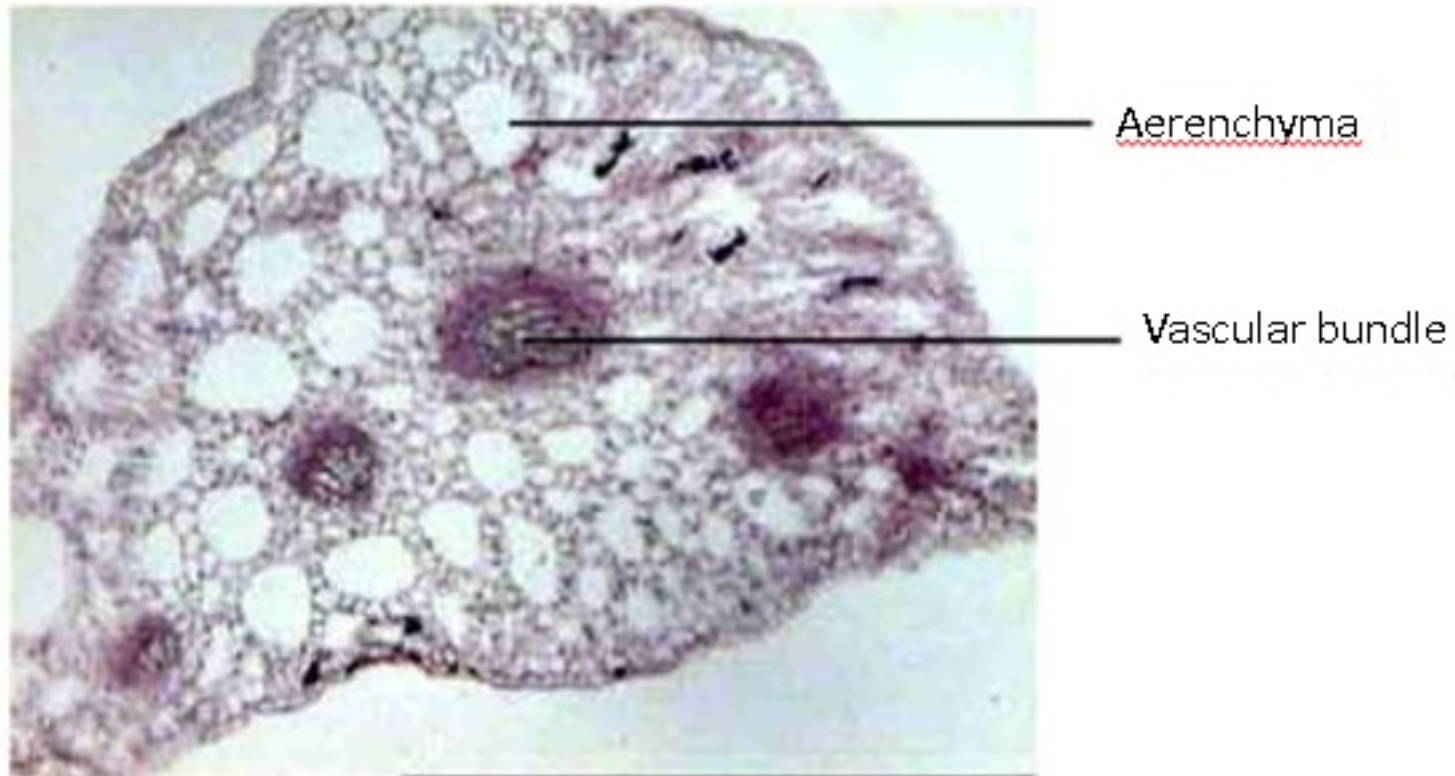
mentiafolin



Trifolii fibrini folium

CzPh 2017

- Microscopy: thin cuticle, palisade parenchyma, typical spongy parenchyma (aerenchyma - cells in a chain-like manner), vascular bundle collateral with sclerenchymatic fibers





Trifolii fibrini folium

CzPh 2017

■ Microscopy:

epidermis

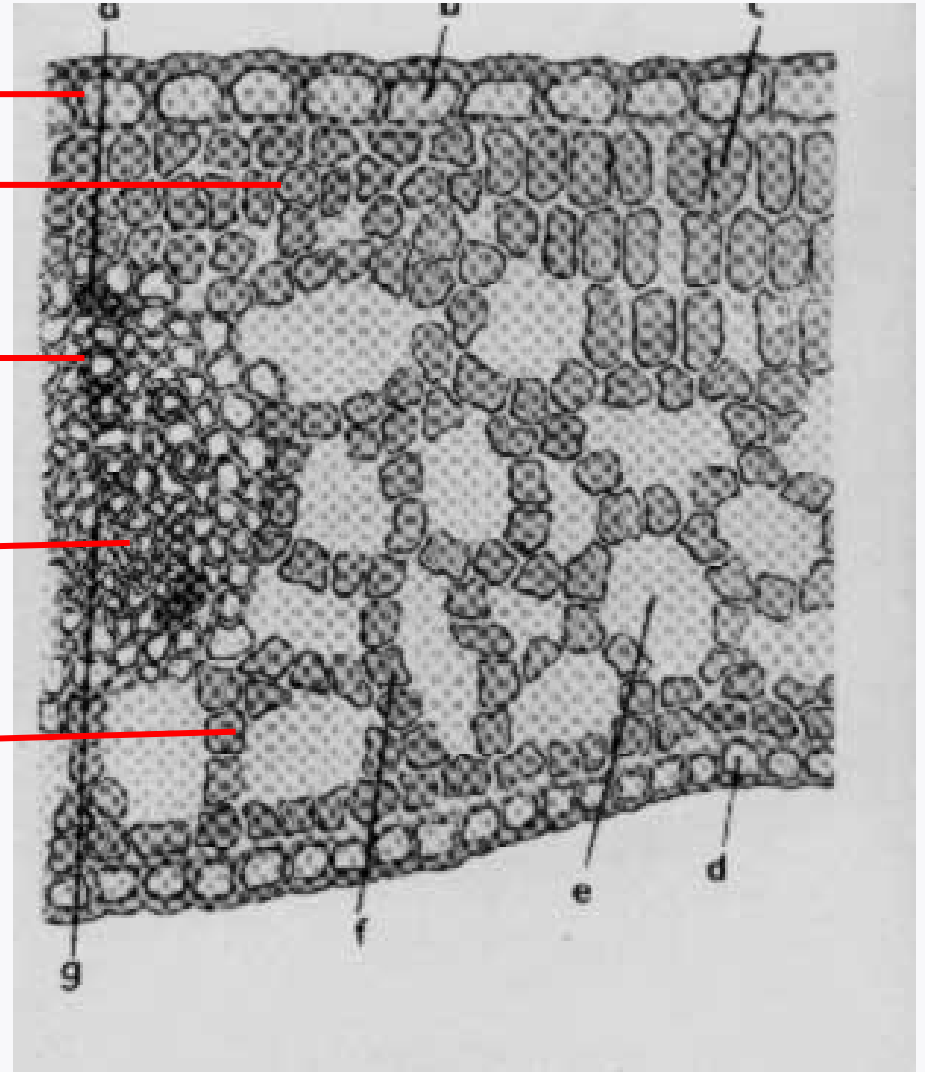
palisades

xylem

phloem

aerenchyma

collateral vascular bundle





Uvae ursi folium CzPh 2017

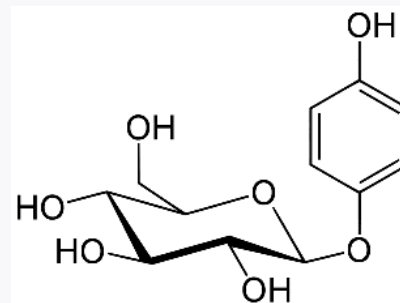
- Mother plant: *Arctostaphylos uva-ursi*, Ericaceae
- Kinnikinnick, Pinemat manzanita, Bearberry



Uvae ursi folium CzPh 2017



- Macroscopy: leaf shiny, leather like, opposite oval, *integerrimum* (whole) with smooth underwinded blade, dark-green, on the reversed side brighter, netting veins, without odour, bitter taste – astringent – later sweetish
- Content compounds: **phenolic glycosides** (arbutine, methylarbutine), tannins, flavonoids
- Usage: desinfectants of urinary tract

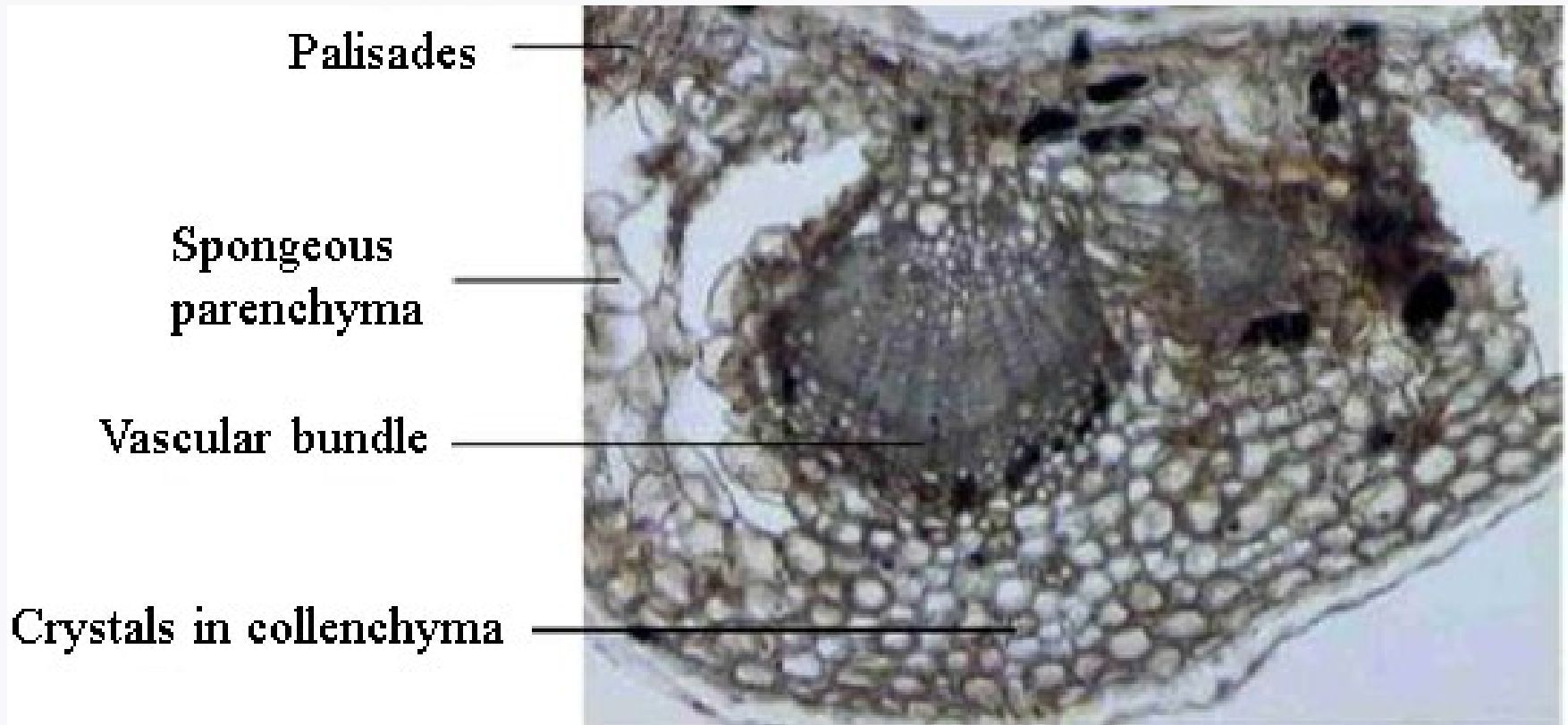


arbutin



Uvae ursi folium CzPh 2017

- Microscopy: upper epidermis with anomocytic stomata (air ducts), thick cuticle, palisades, spongy parenchyma, **crystals of calcium oxalate**, lower epidermis with stomata, **collateral vascular bundle with collenchyma**





Uvae ursi folium CzPh 2017

■ Microscopy:

epidermis

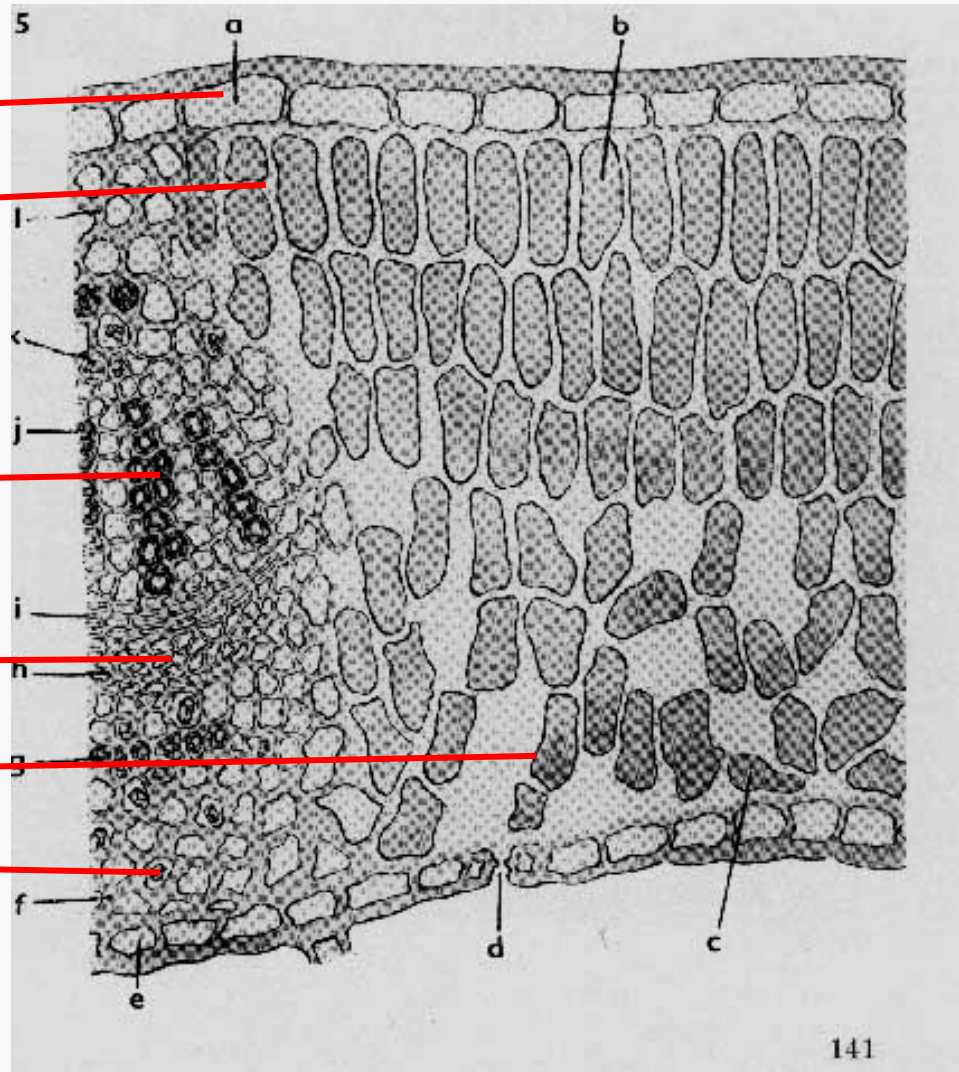
palisades

vessels

sieve tubes

spongy parenchyma

crystals



Collateral vascular bundle



MACROSCOPY



Mate folium

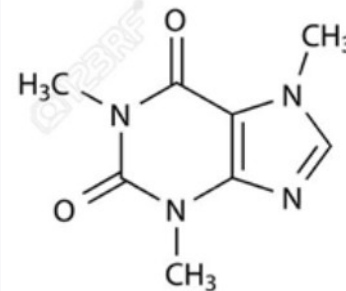
- Mother plant: *Ilex paraguariensis*, Aquifoliaceae
- leaves and tops of branches treated by smoke of fire (Yerba maté)





Mate folium

- Macroscopy: fresh leaves oval-lanceolate, leatherlike, shiny, with numerous glandules, characteristic smoke odour, astringent taste
- Content compounds: **purine alkaloids** (caffeine 0.5-2.1%), tannins
- Usage: refreshing beverages, stimulans



caffeine



Mate in a traditional calabash gourd

https://commons.wikimedia.org/wiki/File:Mate_en_calabaza.jpg

Crataegi folium cum flore CzPh 2017



- Mother plant: *Crataegus monogyna*, *Crataegus laevigata* (*C. oxyacanthoides*), Rosaceae (Common Hawthorn)
- Crataegi folii cum flore extractum fluidum quantificatum CzPh 2017
- Crataegi folii cum flore extractum siccum CzPh 2017





Crataegi folium cum flore

CzPh 2017

- **Macroscopy:** both species leaves on the face dark green, on the reversed side brighter with evident veins, bald or sporadically hairy, pleasant odour, weakly bitter taste

C. oxyacanthoides – leaf oval, 3-5 lobular, narrowing to stalk, bluntly to notched toothed

C. monogyna – obovate and deeply lobed, sometimes almost to the midrib, with the lobes spreading at a wide angle

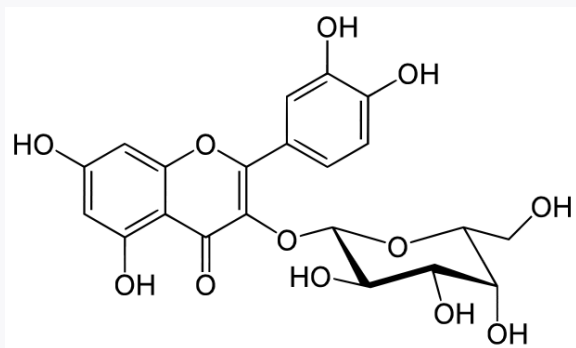




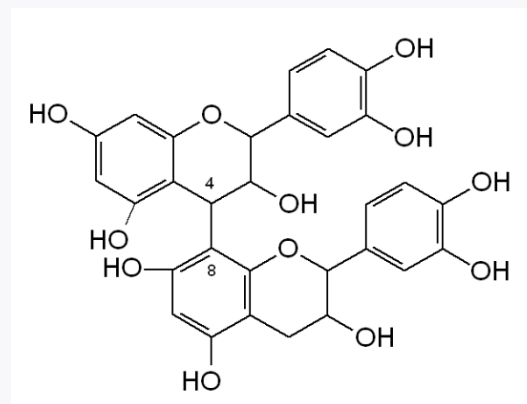
Crataegi folium cum flore

CzPh 2017

- Content compounds: flavonoids (hyperoside, rutin, vitexine) proanthocyanidins, triterpene acids, purine bases



hyperoside



dimeric procyanidine B2

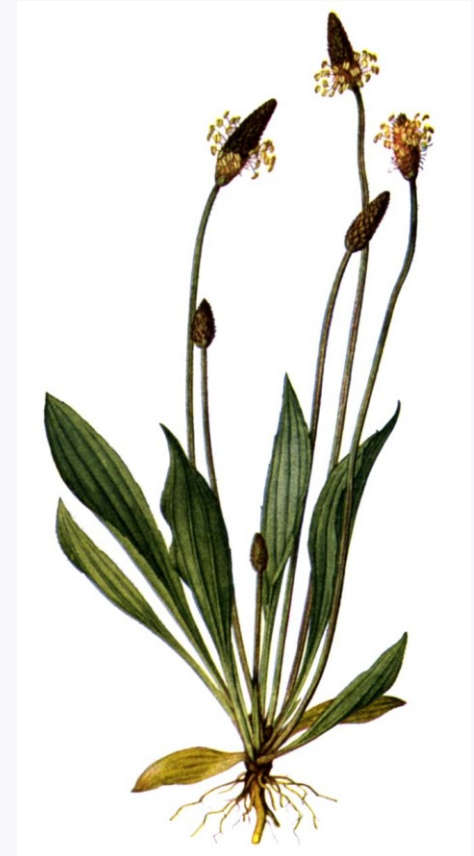
- Usage: hypotonic, spasmolytic, antisclerotic, sedative tea mixtures



Plantaginis folium CzPh 2017

Mother plant: *Plantago lanceolata*, Plantaginaceae (narrowleaf plantain)

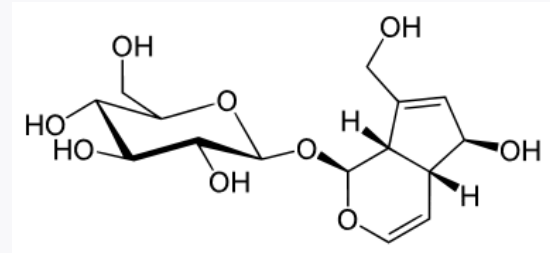
- *Plantaginis sirupus* CzPh 2009
- *Plantaginis extractum fluidum* CzPh 2009



Plantaginis folium CzPh 2017



- Macroscopy: leaf lanceolate, narrowing to stalk, *integerrimum*, brown-green or grey-green, bald, veins parallel with 3-7 down located prominent veins, without odour, mucilaginous taste, bitter-salty
- Content compounds: **iridoid glycoside aucubin**, flavonoids, mucilage
- Usage: mucilaginous, expectorans, antiphlogistic



aucubin



Ribes nigri folium CzPh 2017

- Mother plant: *Ribes nigrum*, Grossulariaceae (blackcurrant)





Ribes nigri folium CzPh 2017

- Macroscopy: leaf stalked, palm-like, 3-5 lobular, serrated on the margin, dark-green, distinct characteristic odour, acidish mild astringent taste



- Content compounds: **flavonoids**, essential oil, tannins, vitamin C
- Usage: diuretic, diaphoretic, metabolic



Herbs

Drugs consist of stem, leaves and flowers



Adonidis herba

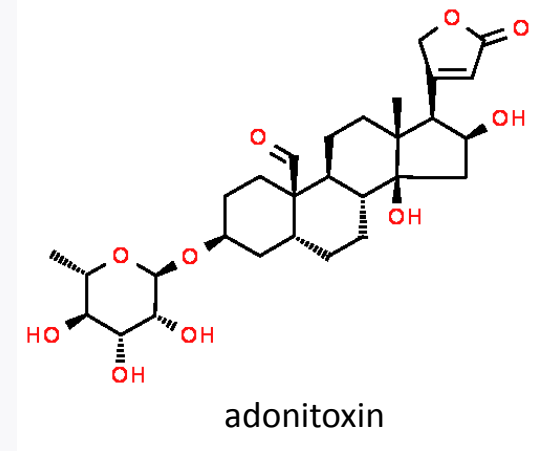
- Mother plant: *Adonis vernalis*, Ranunculaceae (Pheasant's Eye)





Adonidis herba

- Macroscopy: rounded, grooved stem with sitting, smooth leaves and big shiny yellow flowers, without odour, bitter taste
- Content compounds: **cardioactive glycosides** (adonitoxin, cymarine = k-strophantidin + D-cymarose), flavonoids, saponins
- Usage: cardiotonic, diuretic, **!poisonous plant!**
- ◆ Bekhterev's infusion- mixture of the plant extracts with sodium bromide or codeine to treat heart diseases, panic disorder, dystonia and mild forms of epilepsy.





Agrimoniae herba CzPh 2017

- Mother plant: *Agrimonia eupatoria*, Rosaceae (Common Agrimony)





Agrimoniae herba CzPh 2017

- Macroscopy: branched stem, rounded, roughly hairy, green, leaves imparipinnate with serrated margin, on the face dark green, on the reversed side brighter, felt-like, flowers 5-membered, petals prolonged, gold-yellow, weak aromatic odour, taste slightly bitter, spicy, astringent



- Content compounds: catechine tannins, silicic acid, essential oil
- Usage: antiphlogistic, cholagogue, astringens (poorly healing wounds)



Alchemillae herba CzPh 2017

- Mother plant: *Alchemilla vulgaris*, Rosaceae (lady's mantle)





Alchemillae herba CzPh 2017

- Macroscopy: stems and leaves richly green, hairy, leaves 7-9 palm-like lobular, without odour, bitter astringent taste



- Content compounds: **mixed tannins**, bitter substances
- Usage: astringent, stomachic, dermatic, haemostyptic, gynecologic (folk medicine)



Centaurii herba CzPh 2017

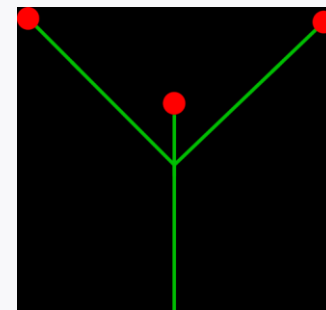
Mother plant: *Centaurium erythraea*, *C. majus*, *C. suffruticosum*,
C. umbellatum, *C. minus* Gentianaceae (Centaury)



Centaurii herba CzPh 2017

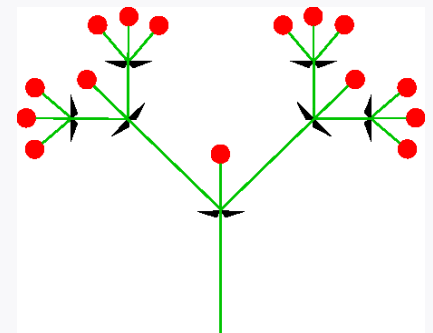


- **Macroscopy:** hollow stem, on the top branched, bald, green to brown, lanceolate leaves, *integerrimum*, dark green, flowers in cime-like *dichasium*, pinkish, without odour, very bitter taste
- **Dichasium** – type of determinate inflorescence, the development of the flower at the apex is followed by two new flower axes developing from buds opposite one another



Simple dichasium

https://upload.wikimedia.org/wikipedia/commons/thumb/8/80/Simple_dichasium.png/638px-Simple_dichasium.png



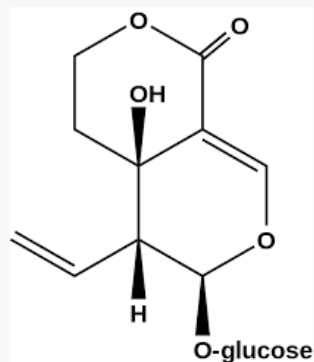
Dichasium

[https://commons.wikimedia.org/wiki/File:Dichasium_\(inflorescence\).PNG](https://commons.wikimedia.org/wiki/File:Dichasium_(inflorescence).PNG)

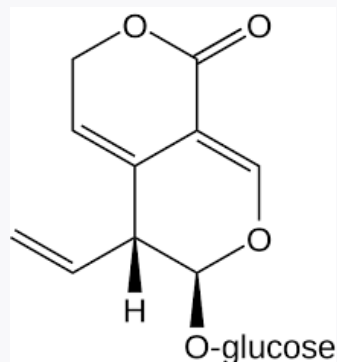


Centaurii herba CzPh 2017

- Content compounds: **bitter substances** (swertiamarin, sweroside, genciopicrine), flavonoids, essential oil



swertiamarin



genciopicrine

- Usage: amare, stomachic, digestive, tonic



Herniariae herba

- Mother plant: *Herniaria glabra*, *Herniaria hirsuta*,
Caryophyllaceae (Rupturewort)

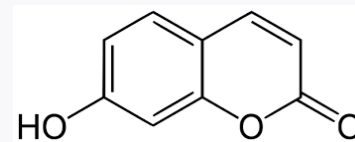
Photo Henriette Kress
<http://www.ibiblio.org/herbmed>



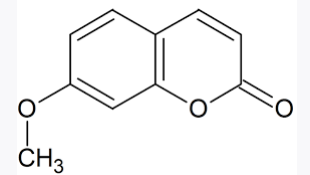


Herniariae herba

- **Macroscopy:** filamentous, richly branched stems, *integerrimum* leaves oval shaped, small flowers in underarms of leaves, characteristic odour, weak bitter taste
- **Content compounds:** **acidic saponins,** flavonoids, **coumarins** (umbelliferone, methylumbelliferone herniarin) =
- **Usage:** diuretic, spasmolytic,



umbelliferone

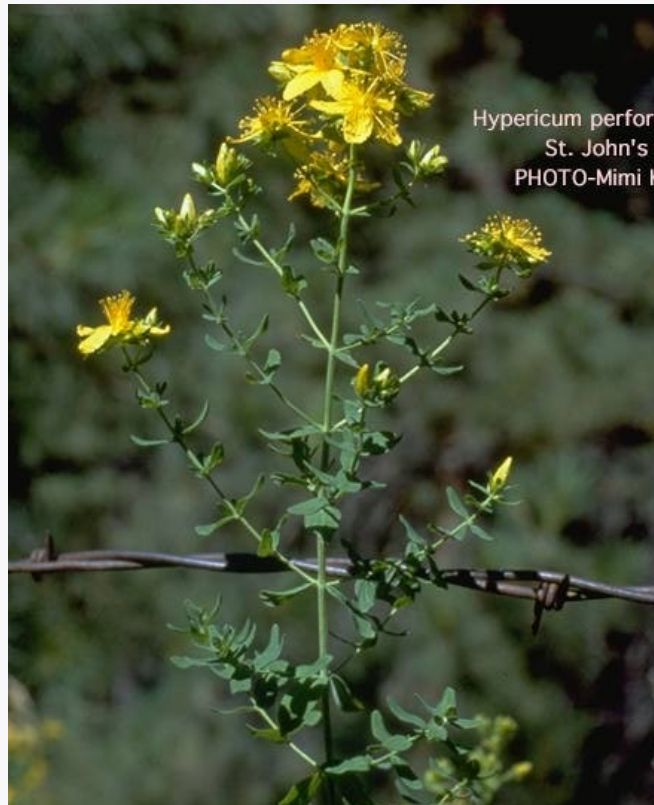


herniarin



Hyperici herba CzPh 2017

- Mother plant: *Hypericum perforatum*, Hypericaceae (St. John's Wort)
- *Hyperici herbae extractum siccum quantificatum* CzPh 2017





Hyperici herba CzPh 2017

- Macroscopy: round stem with two longitudinal narrow slats, on the top branched, leaves oval, *integerrimum*, blade of leaves pointed, 5-membered flowers in cime-like *dichasium*, yellow, balsamic odour, bitter astringent taste



Hyperici herba CzPh 2017

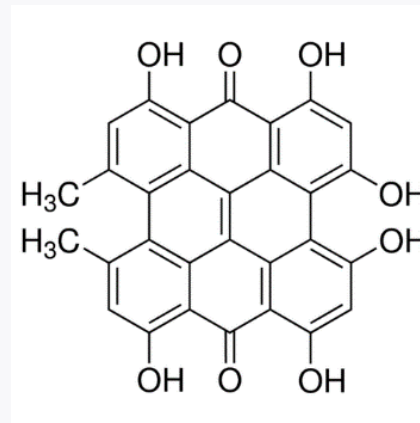


- Content compounds: dianthrone derivatives (hypericin), acylphloroglucinols (hyperforin), flavonoids, essential oil, tannins
- Usage: antidepressive, astringent, stomachic, cholagogue, sedative
- !not a laxative! (although contains dianthrone)
- Interactions: induction of CYP450 isoenzymes => faster metabolization of medicines (p.o. contraceptives, antidepressants) => they can be ineffective

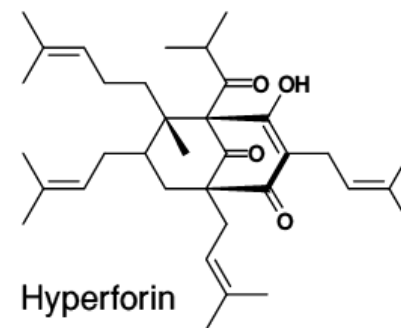


Phototoxicity! (urticary can develop)

Czechia – stomachic herbal teas (Species stomachicae) often contain *Hyperici herba*



hypericin



Hyperforin



Hyssopi herba

- Mother plant: *Hyssopus officinalis*, Lamiaceae (Hyssop)





Hyssopi herba

- Macroscopy: branched stem with narrow sitting lanceolate leaves, *integerrimum*, blue-purple flowers in verticiles in underarms of leaves, typical odour of camphora, sharp spicy taste



- Content compounds: **essential oil** (pinens, ketone pinocamphone), tannins, flavonoids
- Usage: amare, carminative, expectorant, stomachic, diuretic