

Pharmacognosy

lab exercise 4



**Roots and rhizomes
of dicotyledonous plants**



Althaeae radix CzPh 2017

- Mother plant: *Althaea officinalis*, Malvaceae (marsh-mallow)
Althaeae syrup CzPh 2017



https://commons.wikimedia.org/wiki/File:Althaea_officialis.jpeg





Althaeae radix CzPh 2017

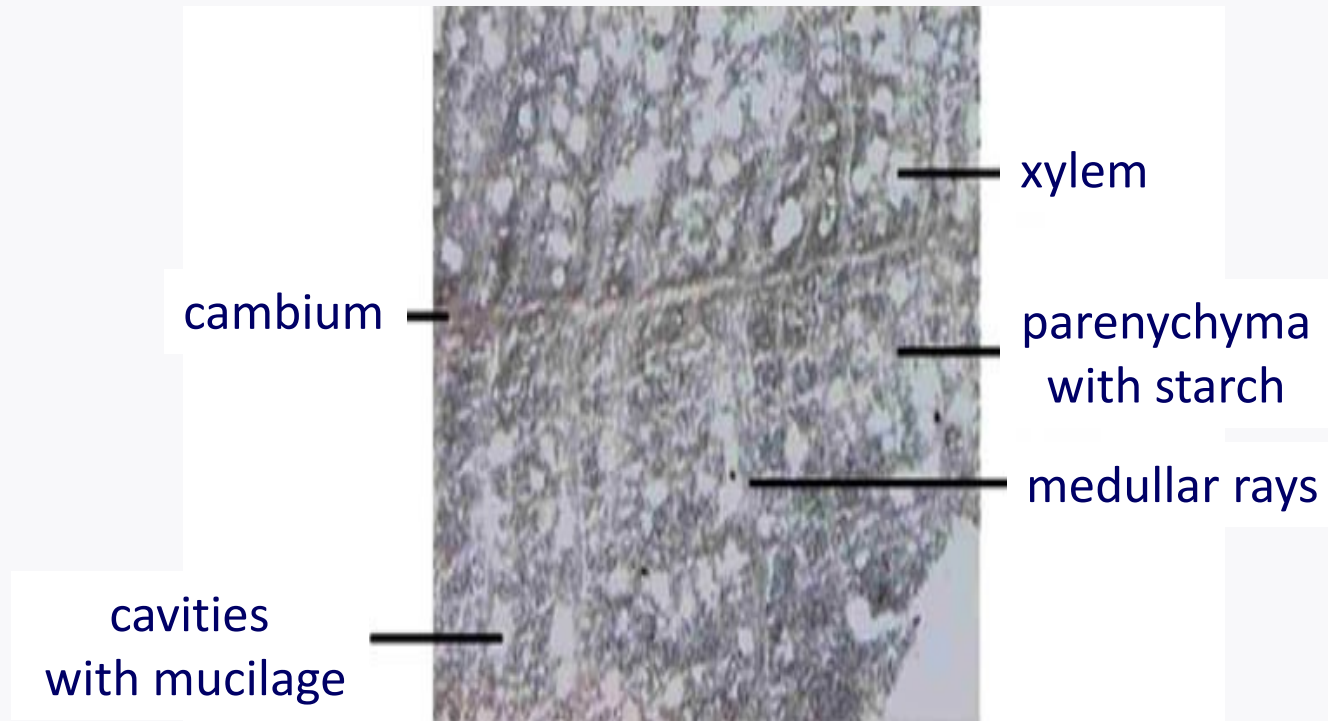
- Macroscopy: moderately twisted root, with many scarifications after side roots, on a surface often projected white fibers of sclerenchyma, weak odour, floury mucous taste
- Content compounds: **mucilage**, starch, glucose, pectin, mineral compounds, flavonoids
- Usage: mucilaginous, antitussive, antiphlogistic



Althaeae radix CzPh 2017



- **Microscopy:** in secondary bark phloem fibres, medullar rays, vessels with libriform, phloem sieve tubes, cells with mucilage and cells with starch





Althaea radix CzPh 2017

■ Microscopy:

medullar rays

phloem fibers

sieve tubes

cambium

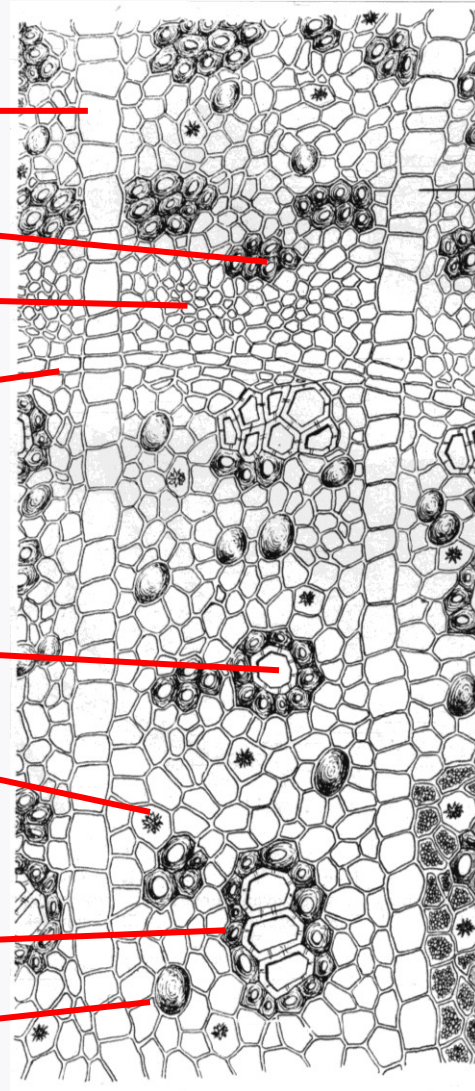
vessel

aggregated crystals

of oxalate

libriform

cell with mucilage





Ipecacuanhae radix CzPh 2017

- Mother plant: *Cephaelis ipecacuanha*, *Cephaelis acuminata*
Rubiaceae, Ipecacuanha (ipecacuanha)
- Ipecacuanhae extractum fluidum normatum CzPh 2017
- Ipecacuanhae pulvis normatus CzPh 2017



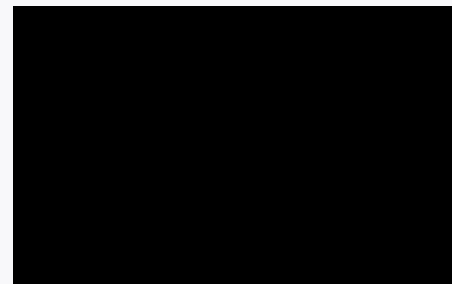
https://commons.wikimedia.org/wiki/File:Cephaelis_acuminata5.jpg





Ipecacuanhae radix CzPh 2017

- Macroscopy: annular roots, with red-brown surface, broad bark, which can be easily peeled off from yellow wood, undistinguished odour, sharp bitter taste
- Content compounds: alkaloids - emetine, cephaeline, saponins
- Usage: expectorant, emetic, chemotherapeutic to treat amoeba dysentery



emetine

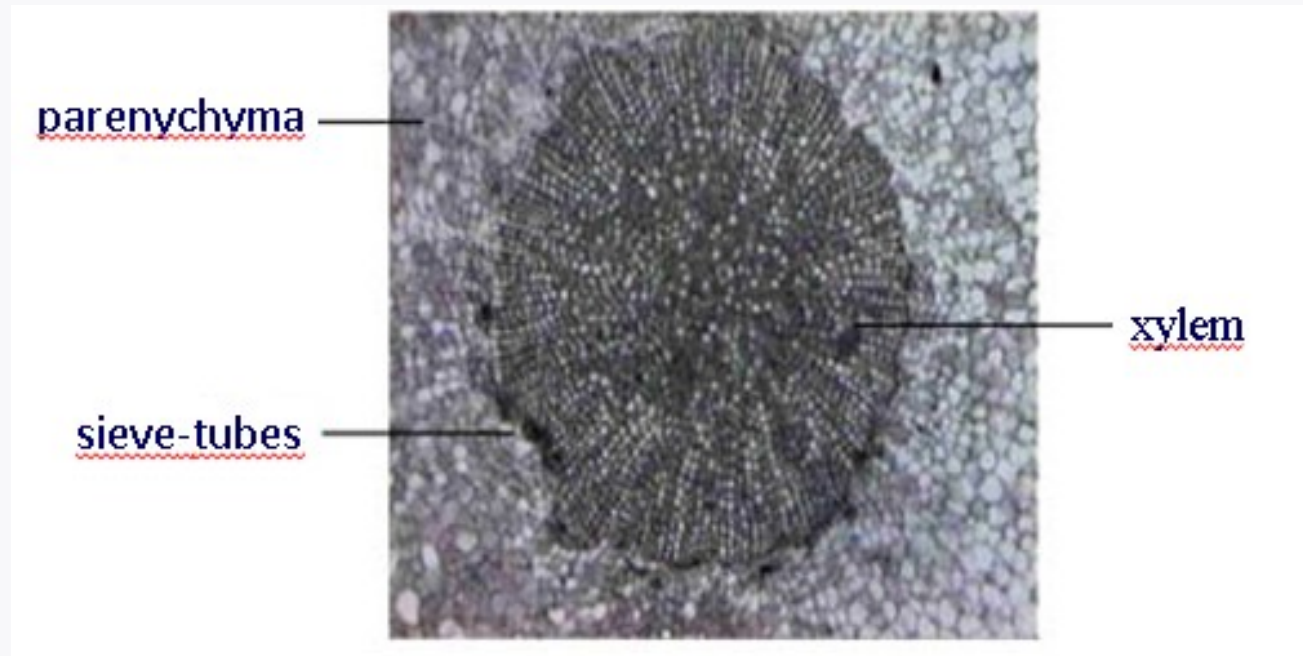


cephaeline



Ipecacuanhae radix CzPh 2017

- **Microscopy:** disproportion between width of bark and wood (4:1), secondary bark with starch cells and rafides of calcium oxalate, sieve tubes, wood with vessels, libriform, parenchyma of wood with starch





Ipecacuanhae radix CzPh 2017

■ Microscopy:

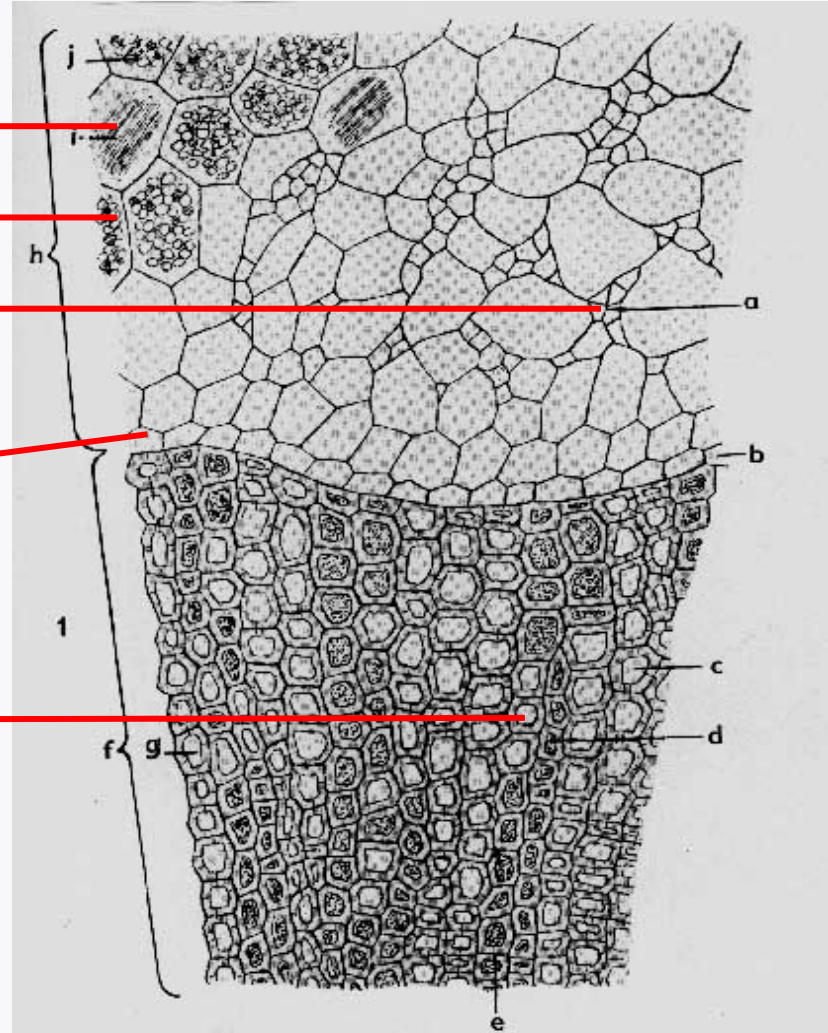
rafides

starch

sieve-tubes

cambium

vessels with
libriform

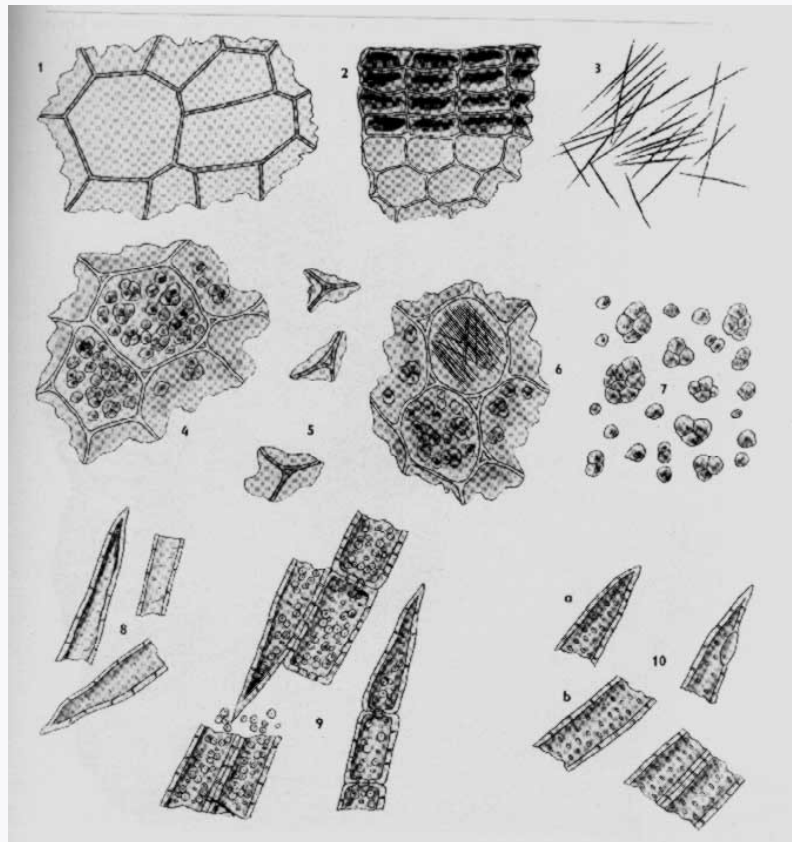




Ipecacuanhae radix CzPh 2017

■ *Ipecacuanhae pulvis normatus* CzPh 2017

In powder can be observed: pices of cork, parenchym, rafides, starch grains, pieces of libriform and vessels





Liquiritiae radix CzPh 2017

- Mother plant: *Glycyrrhiza glabra*, *G. inflata*, *G. uralensis*
Fabaceae (liquorice)

Liquiritiae extractum fluidum ethanolicum normatum CzPh 2009

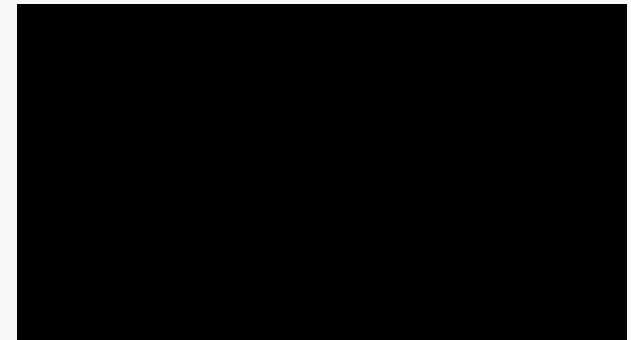
Liquiritiae extractum siccum ad saporandum CzPh 2017



Liquiritiae radix CzPh 2017



- Macroscopy: non-branched capitate (spindle-shaped) root, from outside rugged, grey-white, on the section yellow, sweetish odour, unpleasant sweet taste
- Content compounds: **saponins (glycyrrhizin)**, flavonoids, estrogen-like compounds, starch, sugars
- Usage: expectorant, bacteriostatic effect, (not) diuretic, antiulcerotic, spasmolytic

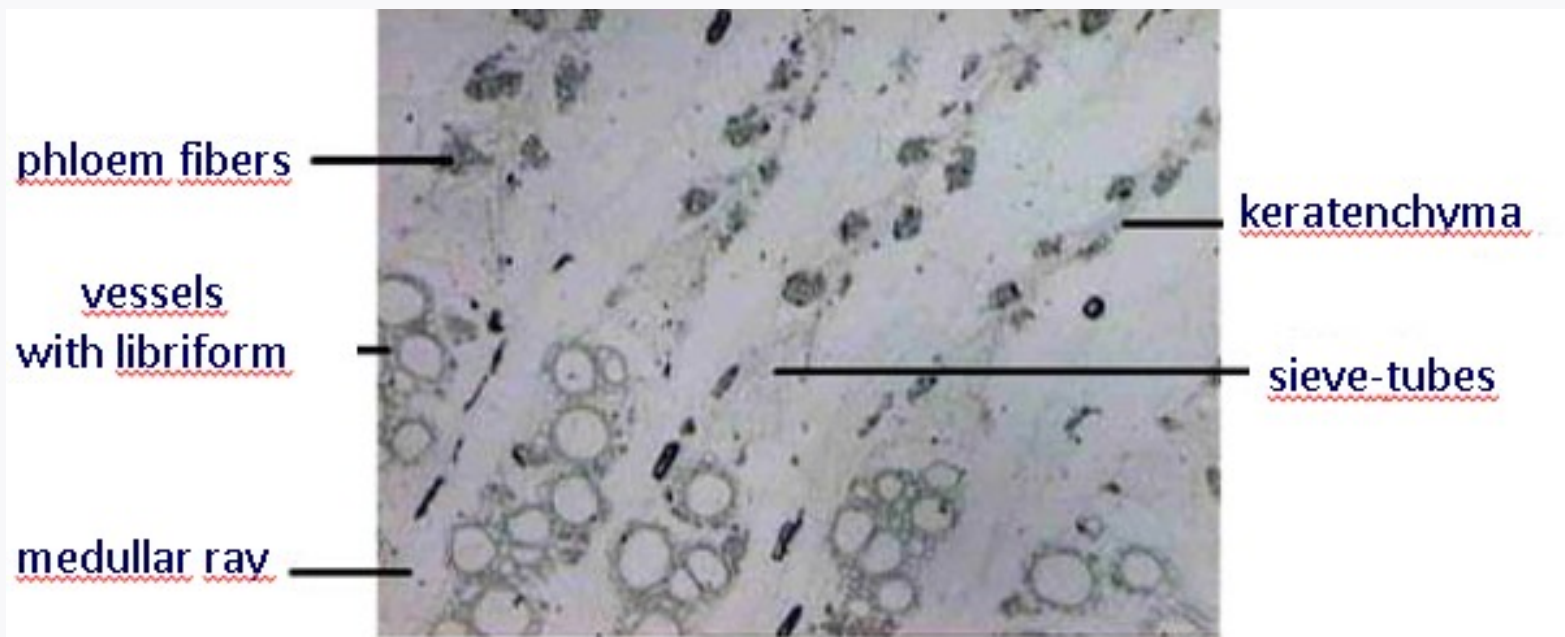


glycyrrhizin

Liquiritiae radix CzPh 2017



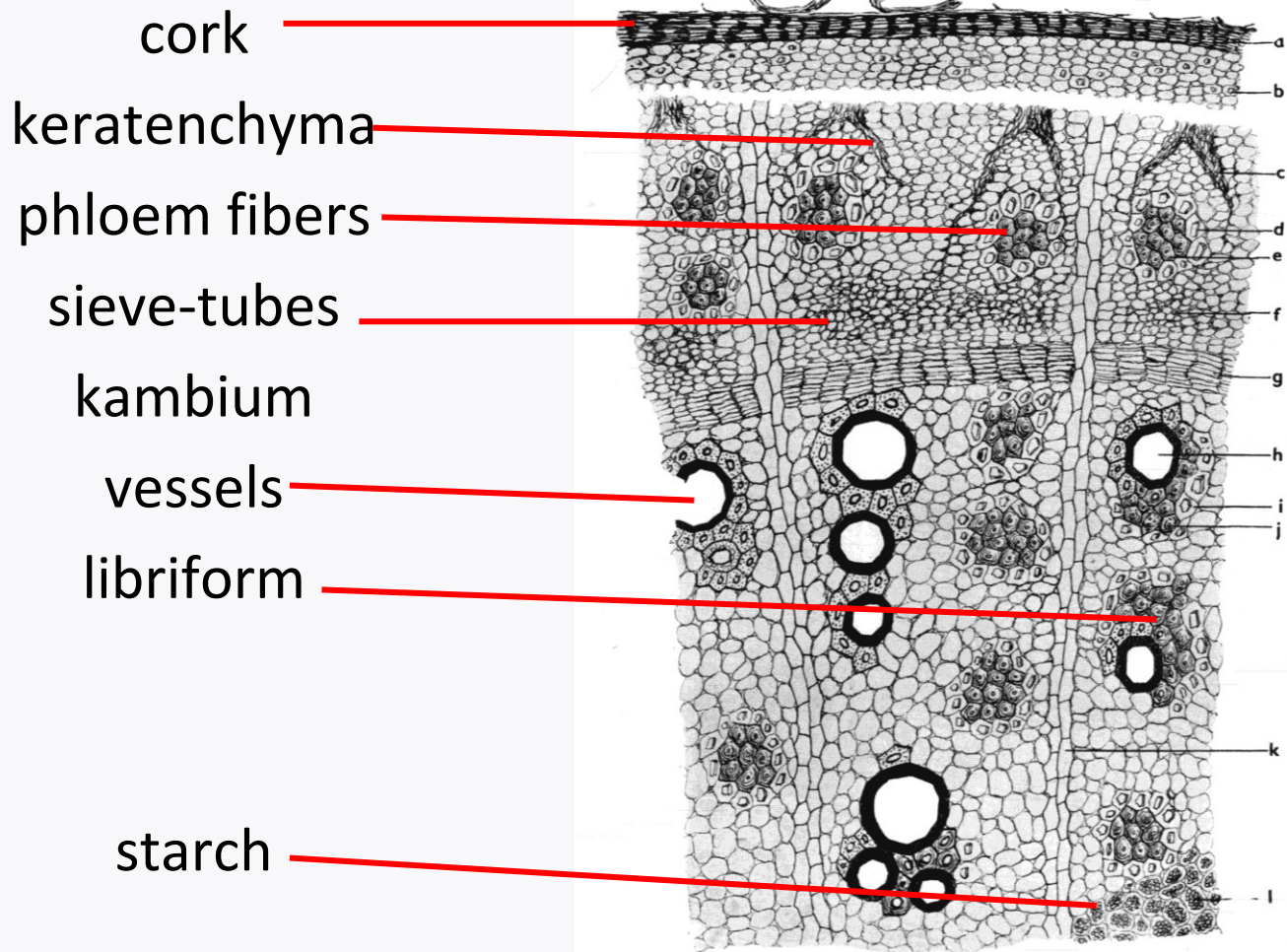
- **Microscopy:** cork, crystals of calcium oxalate, medullar rays, cambium, vessels with libriform and with cellular cells, sieve-tubes, typical **keratenchyma**, phloem fibers, wood parenchyma with starch



Liquiritiae radix CzPh 2017



■ Microscopy:

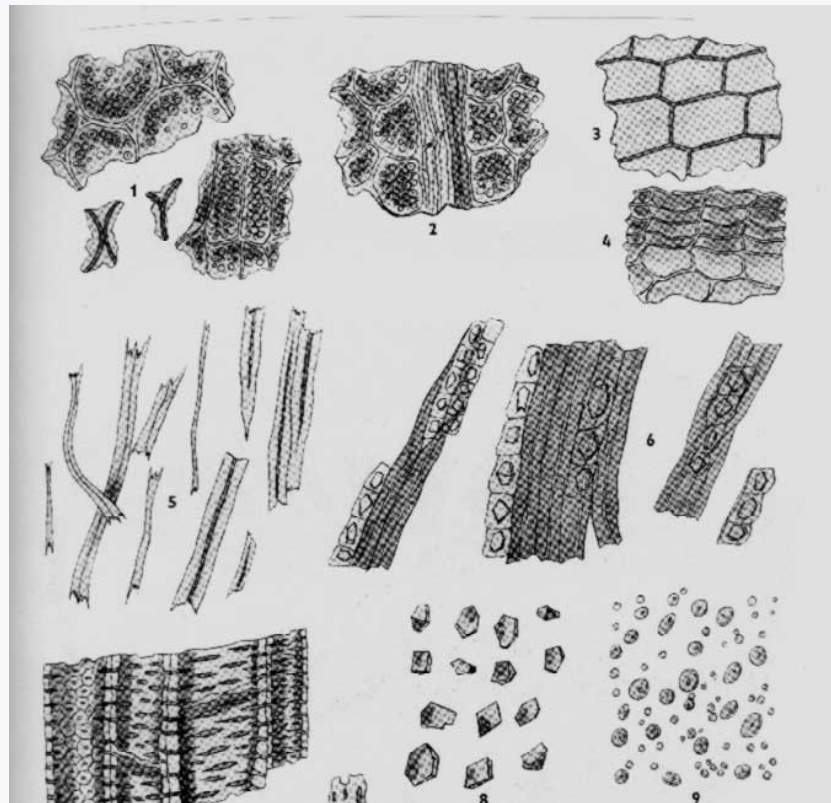




Liquiritiae radix CzPh 2017

- **Liquiritiae radices pulvis**

Can be observed: pieces of cork, bark with keratenchyma, pieces of parenchyma and sclerenchyma, cellular fibres, vessels, crystals of calcium oxalate, starch grains





Ononidis radix CzPh 2017

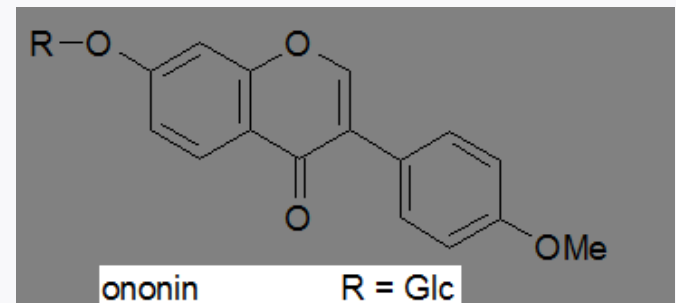
- Mother plant: *Ononis spinosa*, Fabaceae (spiny restharrow)



Ononidis radix CzPh 2017



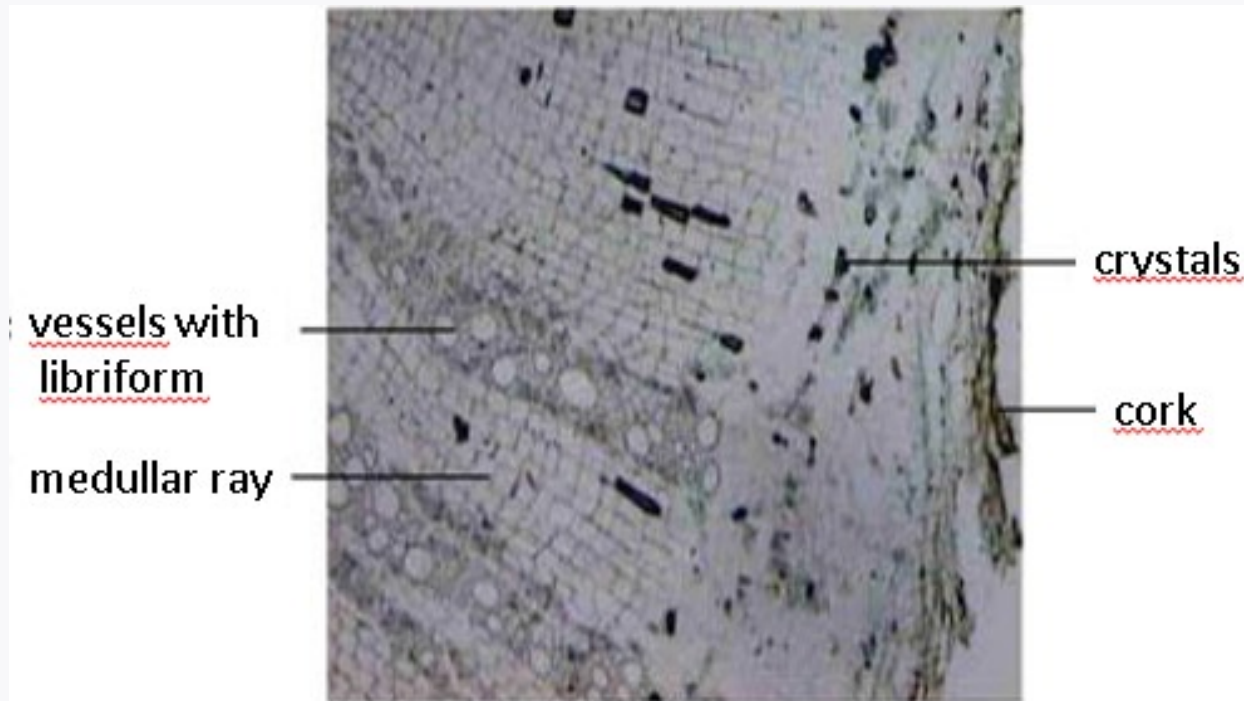
- Macroscopy: long twisted root, non-branched, rugged, grey-brown, on the section yellow, drug without odour, acidish tart taste
- Content compounds: **flavonoids (ononin)**, essential oil, tannins, mineral compounds, organic acids
- Usage: diuretic, stomachic, metabolic, antiphlogistic, antirheumatic



Ononidis radix CzPh 2017



- **Microscopy:** cork, primary cortex, secondary cortex, cells with crystals of calcium oxalate, phloem fibers, cambium, sieve-tubes, libriform, cellular fibers, visible medullar rays, rosette of primary vessels

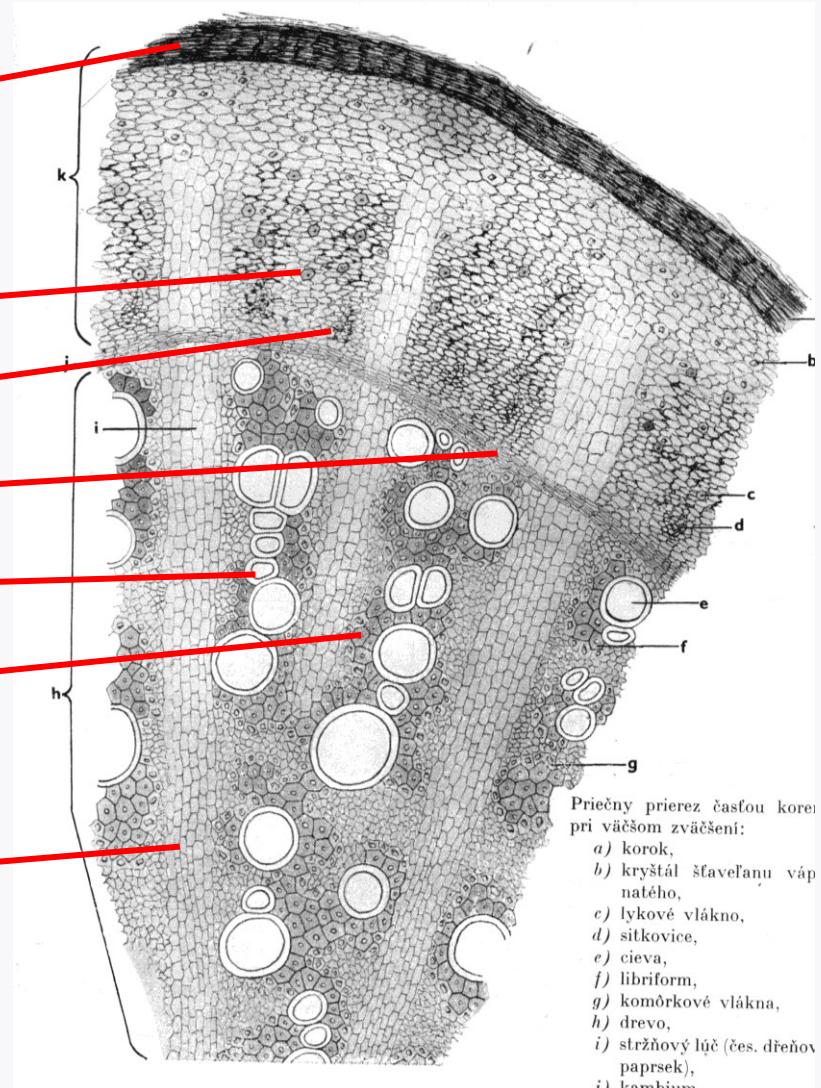


Ononidis radix CzPh 2017



■ Microscopy:

- cork
- crystals
- sieve-tubes
- kambium
- vessels
- libriform
- medullar rays





Tormentillae radix (rhizoma)

CzPh 2017

- Mother plant: *Potentilla tormentilla* syn. *P. erecta*, Rosaceae
(common tormentil)

Tormentillae tinctura CzPh 2017



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

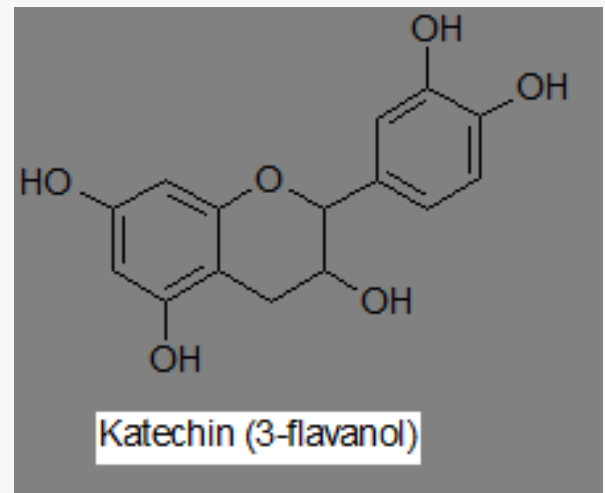




Tormentillae radix (rhizoma)

CzPh 2017

- Macroscopy: very hard cylindrical rhizome, spindle-shaped, dark red with scarification after side roots, on the section brighter, weaved with sclerenchymatic fibers, odour indistinctive, very constricting taste
- Content compounds: catechine tannins, organic acids, waxes, traces of volatiles
- Usage: strong astringent, antidiarrhoic, antiphlogistic, haemostyptic

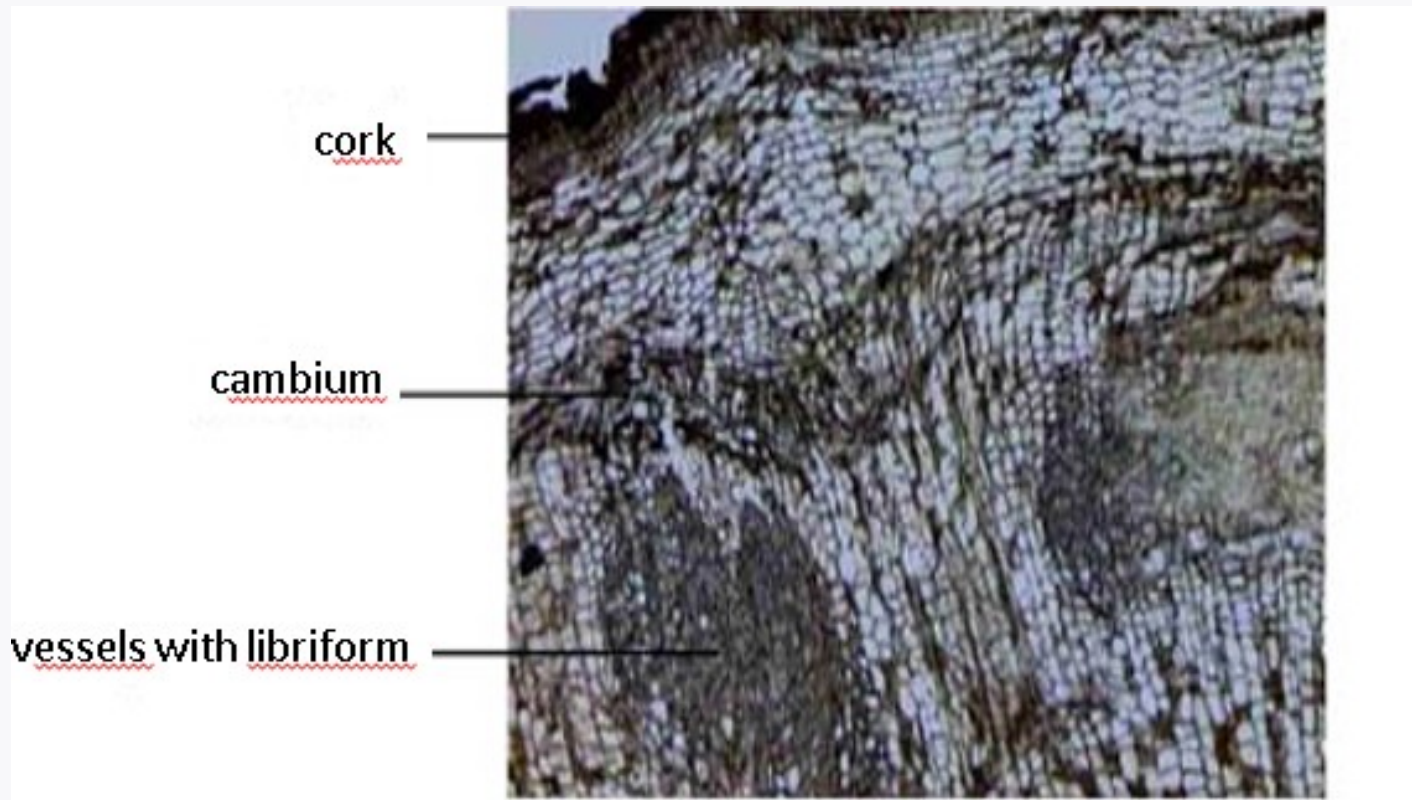


Tormentillae radix (rhizoma)

CzPh 2017



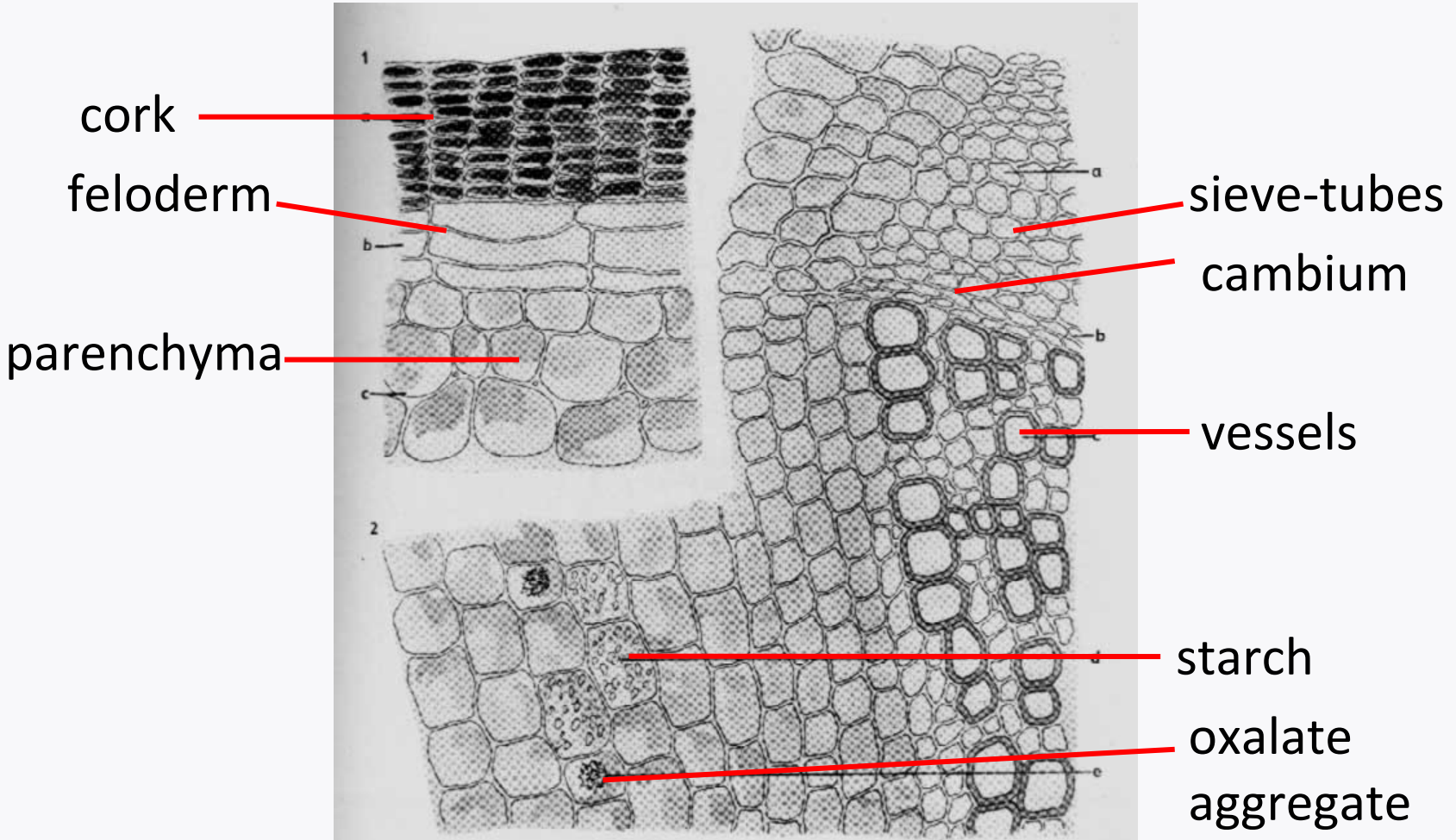
- **Microscopy:** cork, feloderm, cortical parenchyma, cambium, sieve-tubes, vessels with libriform, cells with aggregates of calcium oxalate and starch



Tormentillae radix (rhizoma) CzPh 2017



■ Microscopy:





Bistortae radix (rhizoma)

CzPh 2017

- Mother plant: *Polygonum bistorta* syn. *Persicaria bistorta* (*Bistorta major*), Polygonaceae (Bistort)

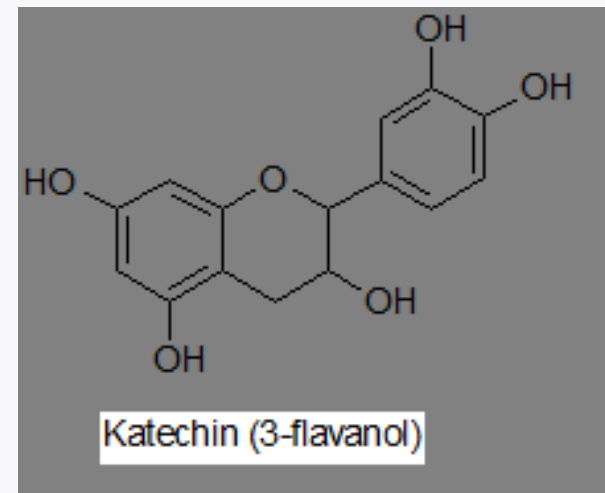




Bistortae radix (rhizoma)

CzPh 2017

- Macroscopy: flat, twisted, dark brown rhizome, on the section red-brown, without odour, constricting taste
- Content compounds: catechin tannins, pigment – bistort red, higher amount of starch
- Usage: astringent, haemostyptic, externally on inflamed mucous membrane and edema, antidote for intoxications

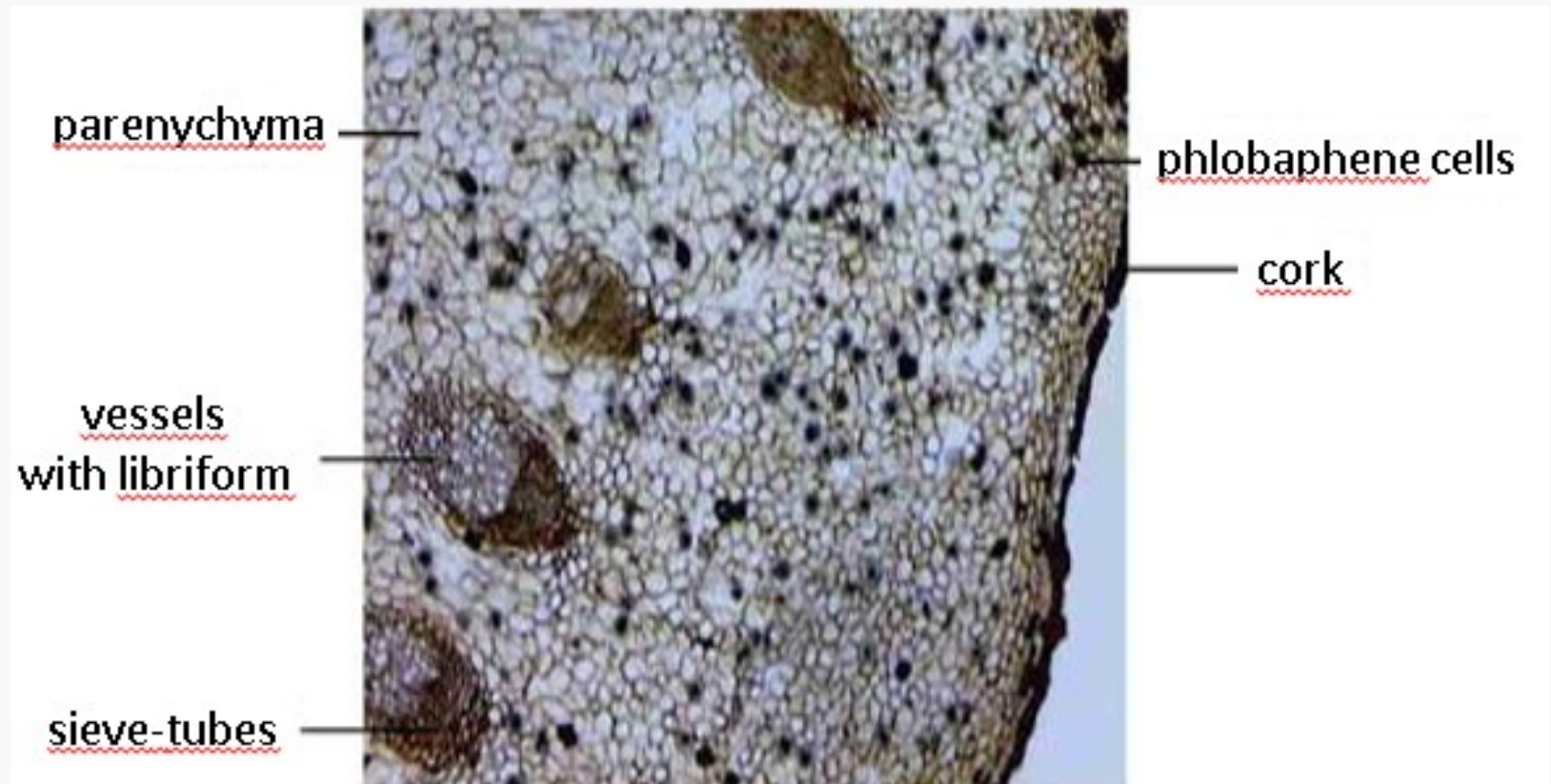


Bistortae radix (rhizoma)

CzPh 2017



- **Microscopy:** cork, phloem cells, cells with aggregates of calcium oxalate, sieve-tubes with phloem fibers, cambium, vessels with libriform, parenchyma with starch

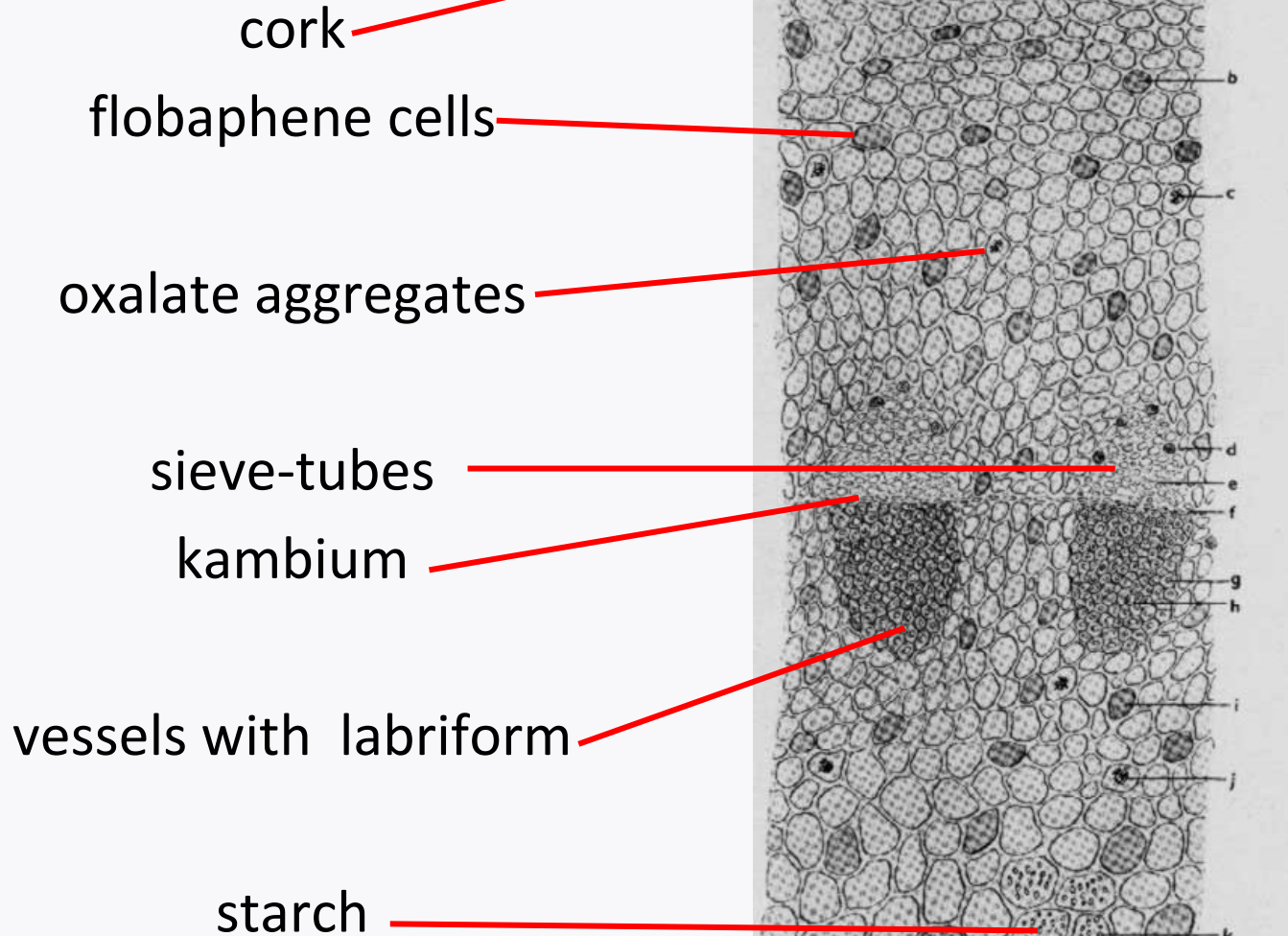


Bistortae radix (rhizoma)

CzPh 2017



■ Microscopy:





MACROSCOPY



Angelicae radix CzPh 2017

- Mother plant: *Archangelica archangelica*, syn. *Archangelica officinalis*, *Apiaceae*, (angelica)



<https://commons.wikimedia.org/wiki/File:AngelicaArchangelica1.jpg>



Archangelica officinalis Hoffm.

Angelicae radix CzPh 2017



- Macroscopy: short rhizoma, transversally stripped with roots scarification, grey-brown to red-brown colour, on the section grey-yellow wood, spicy odour, taste sharp spicy
- Content compounds: **volatile oils (pinen)**, coumarins (angelicin), bitter compounds
- Usage: amare, stomachic, spasmolytic, carminative, sedative



α -pinen



Bardanae radix

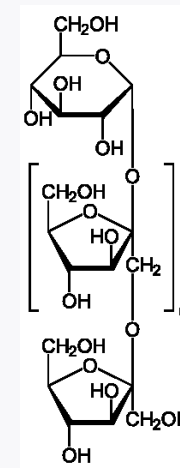
- Mother plant: *Arctium tomentosum*, *A. lappa*, *A. minus*,
Asteraceae (downy burdock)





Bardanae radix

- Macroscopy: roots of grey-brown colour, on the section whitish, without odour, bitter taste
- Content compounds: **inulin**, polyacetylenes, mucilage, tannins, essential oil, bitter compounds
- Usage: dietetic, diagnostic, diuretic, bacteriostatic and mycostatic effects





Graminis radix (rhizoma)

CzPh 2017

- Mother plant: *Elymus repens* (*Agropyron repens*, *Elytrigia repens*), **Poaceae**, twitch, quick grass, quitch grass

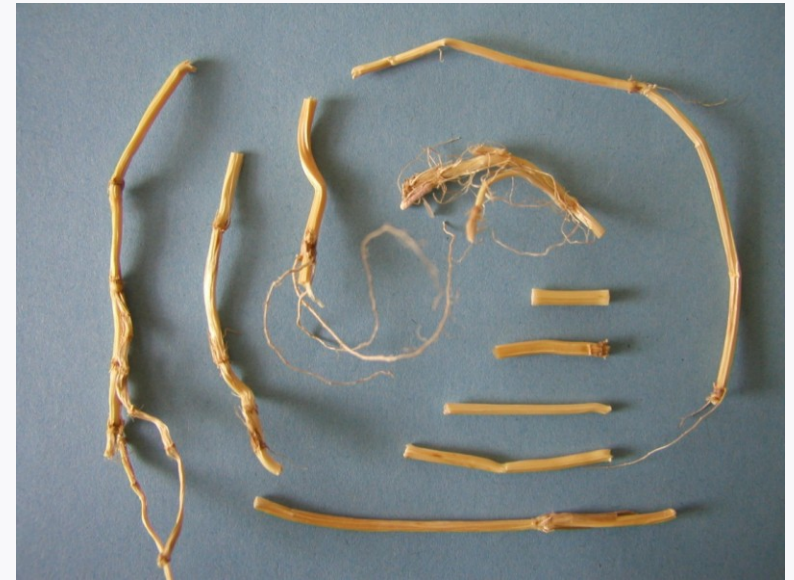




Graminis radix (rhizoma)

CzPh 2017

- Macroscopy: yellow peaces of rhizome – articulate and hollow, only in nodes full, without side roots, without odour, sweetish taste
- Content compounds: **sugars, inuline,** mucilage, inositol, saponins, silicic acid, volatiles
- Usage: diuretic, metabolic





Inulae radix

- Mother plant: *Inula helenium*, *Asteraceae*, (Elecampane, also called Horse-heal)





Inulae radix

- Macroscopy: side roots - cylindrical, from outside yellow to grey-brown, inside brown, rhizomes – grey-brown, wrinkled, aromatic odour, spicy bitter taste
- Content compounds: **essential oil**, **inulin**, bitter compounds, sugars
- Usage: expectorant, spasmolytic, diuretic





Primulae radix CzPh 2017

- Mother plant: *Primula veris*, *Primula elatior*, Primulaceae (primrose)



GULLVIVA. PRIMULA VERIS (L.) HUDS.



Primulae radix CzPh 2017



- Macroscopy: irregular, twisted root, *P. veris* – roots break-able, bright yellow, *P. elatior* - brown to brown-red, acidish taste, weak odour
- Content compounds: saponins (primulic acid), phenolic glycosides (primulaverine), flavonoids, essential oil
- Usage: expectorant, diuretic





Rhei radix CzPh 2017

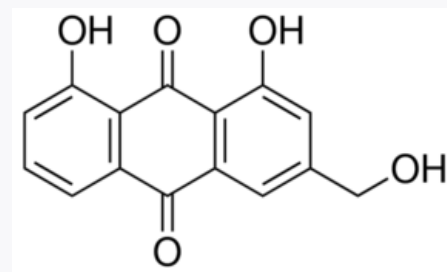
- Mother plant: *Rheum palmatum*, *Rheum officinale* or their hybrids, Polygonaceae, (rhubarb)





Rhei radix CzPh 2017

- Macroscopy: round or cylindric rhizomes, peeled off, yellow-brown – marble-like, characteristic unpleasant odour, spicy acrid taste
- Content compounds:
anthraquinone glycosides (aloe-emodin), tannins, rutin, pectine, calcium oxalate
- Usage: laxative, stomachic, astringent



aloeemodin



Saponariae radix

- Mother plant: *Saponaria officinalis*, Caryophyllaceae, (Soapwort)





Saponariae radix

- Macroscopy: red-brown cylindrical roots, longitudinally wrinkled, white cortex and yellow wood on the section, taste at the beginning sweet, then bitter and soapy
- Content compounds: **saponins**, sugars
- Usage: expectorant, diuretic, antiphlogistic



Valerianae radix CzPh 2017



- Mother plant: *Valeriana officinalis*, Valerianaceae (valerian)

Valerianae extractum siccum CzPh 2017

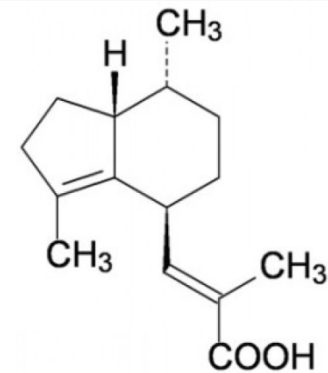
Valerianae tinctura CzPh 2017



Valerianae radix CzPh 2017



- Macroscopy: obovate rhizome with small roots, red-brown to grey-brown, strong characteristic odour, sweet spicy taste
- Content compounds: essential oil, valepotriates, pyridine alkaloids, valerenic acid, flavonoids
- Usage: sedative, spasmolytic, antiemetic



valerenic acid