CRUDE DRUGS CONTAINING CARBOHYDRATES

1. MACROSCOPIC INVESTIGATIONS

Taraxaci radix
Dandelion root
Taraxacum Officinale Webb. (Asteraceae)

Root and rhizome are 15 to 20 cm long and 1 to 2 cm thick. Dark brown outside, greyish white inside. The main root is lengthwise attenuating, wrinkled, striated and slightly ramified only. Fracture is smooth.

Cichorii intybi radix
Chicory root
Cichorium intybus L. (Asteraceae)

The root is yellowish-white, stick-like, 20 to 30 cm long, 1 to 4 cm thick, branching, longitudinally wrinkled.

Graminis rhizoma
Couch grass
Agropyron repens (L.) Beauv (Poaceae)
Ph.Eur .

The drug consists of the yellowish, 2-3 mm wide, sweet-tasting rhizomes. Internodes are striated, with hollow inside, squamous leaves are on the nodes.

Agar
Agar
Gelidium species, *Ahnfeltia plicata* (Huds.) Fries (Rhodophyta)
Ph.Eur

Greyish white or brownish yellow, translucent strips or bands.

Acaciae gummi
Arabic gum
Acacia senegal Wild. (Fabaceae)
Ph.Eur.

The drug consists of the exsudation of the stem and branches of Acacia senegal. Rarely colourless, mostly yellowish, the spehrical pieces of acacia are pea- or hazelnut-sized. Being cracked, they are rarely transparent. Fracture conchoidal, when fresh, a glassy, sometimes iridescent surface can be seen.

Tragacantha
Traganth gum
Astragalus species (Fabaceae)
Ph.Eur.

Greyish white horn-like, sometimes transcelucent and slightly yellowish plates, incurved in crest or crescent shape, about 5 mm wide and 1 to 3 mm thick. Semicircular, sinuous layers on their surface.

Trigonellae foenugraeci semen
Fenugreek
Trigonellum foenum-graecum L. (Fabaceae)
Ph.Eur.

The seed is hard, reddish-brown and more or less rhomboidal, with rounded edges. It is 3 to 5 mm long and 2-3 mm wide. The widest surfaces are marked by a groove.

Althaeae folium, radix
Marshmallow leaf, root
Althaea officinalis L. (Malvaceae)
Ph.Eur.

The leaf has a long petiole, on both surfaces densely covered with velvety hairs, greyish green, silky. The lamina is ovate or cordate with 3-5 shallow lobes and irregulary crenated-dentate margin, palmate venation. The leaf is plicate between the veins, its pinnate venation strongly protrudes on the abaxial surface.

The root pieces are cylindrical, not ramified. They are 10 to 30 cm long, 1 to 2 cm thick, white or yellowish white in colour, with brown spots where root branches have been cut off. Bast fibers can be pulled off in fine threads from the root surface. When broken, the cortex is hardly dusting. The cortex breaks in filamentary.

Lichen islandicus
Iceland moss
Cetraria islandica (L.) Acharius (Parmeliaceae)
Ph.Eur.

The upper surface is greenish-brown, the lower surface is light brownish with and shows whitish, depressed spots. The thallus is serrated with the margin appearing ciliated.

Lini semen
Linseed
Linum usitatissimum L. (Linaceae)
Ph.Eur.

The linseed is 4 to 6 mm long, 2 to 3 mm wide, 1 to 1.5 mm thick, flat, ovate, light or dark brown, smooth, shine. Rounded on one end and acute onother.

Malvae sylvestris flos, Malvae folium
Mallow Leaf, Mallow Flower
Malva sylvestris L., in the case of Malvae folium: *Malva sylvestris* L., *Malva neglecta* Wallr., (Malvaceae)
Ph.Eur.

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.

The flower drug consist of the pinkish violet flower. The flower consists of an epicalyx with three parts, a calyx with 5 pubescent triangular lobes, a corolla with 5 petals fused to the staminal tubes on their base and numerous stamens.

Psylli semen
Psyllium seed
Plantago afra L., *P. psyllum* L. *P. indica* L. (Plantaginaceae)
Ph.Eur.

Light brown, smooth and shiny, 2-3 mm x 1 mm. Towards the middle of the dorsal surface there is a fairly marked transverse constriction of light colour; on the ventral surface there is a linear groove with a lighter, clear spot – hilum.

Plantaginis lanceolatae folium
Ribwort plantain
Plantago lanceolata L. (Plantaginaceae)
Ph.Eur.

The leaf is up to 30 cm long and 4 cm wide, yellowish green, with almost parallel venation (3, 5 or 7 primary veins) on the abaxial surface.

Verbasci flos
Mullein flower
Verbascum thapsus L. (Scrophulariaceae)
Ph.Eur.

The corolla 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.

Tiliae flos
Lime flower
Tilia cordata Mill., *Tilia platyphyllos* Scop. (Tiliaceae)
Ph.Eur.

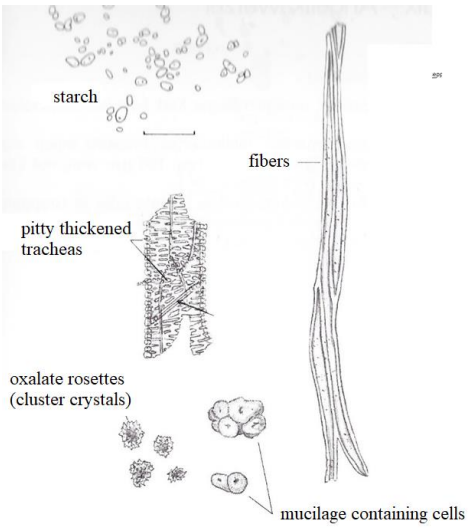
The main axis of the inflorescence bears a linguiform bract, membranous, yellowish-green, the central vein of which is joined for up to the peduncle.
Silver linden (*Tilia argentea* Desf.) has hairs on the lower surface of the bract, which can irritate mucosa.

Salviae hispanicae semen
Chia seed
Salvia hispanica L. (Lamiaceae)

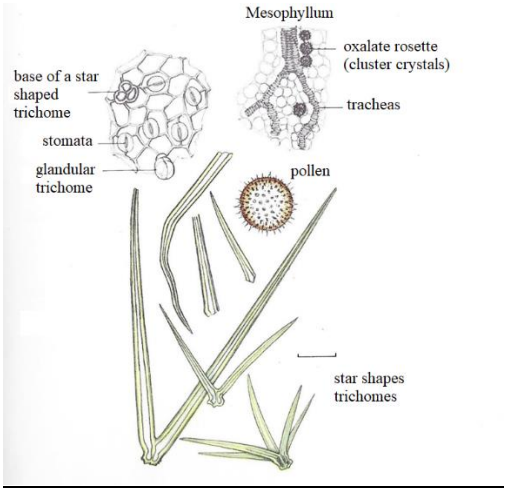
Seeds are oval, have a blunt edge, diameter is 1 mm. The surface is glossí, brown, with grey, white and black spots. A magok ovális alakúak, végük tompa, átmérőjük 1 mm körüli. Felszínük barna, szürke, fehér és fekete foltokkal borított. Felületük fényes.

MICROSCOPIC INVESTIGATION

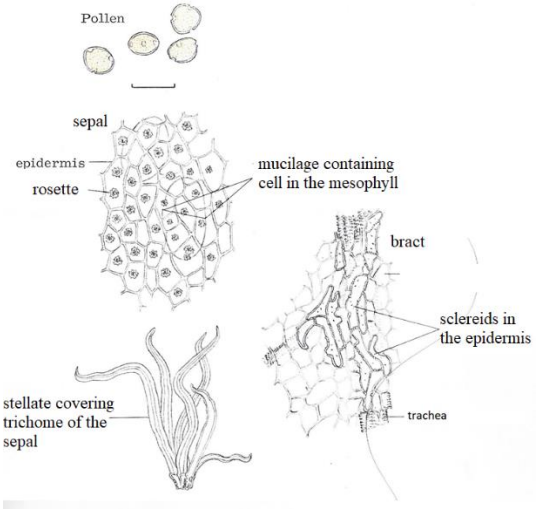
Althaeae radix



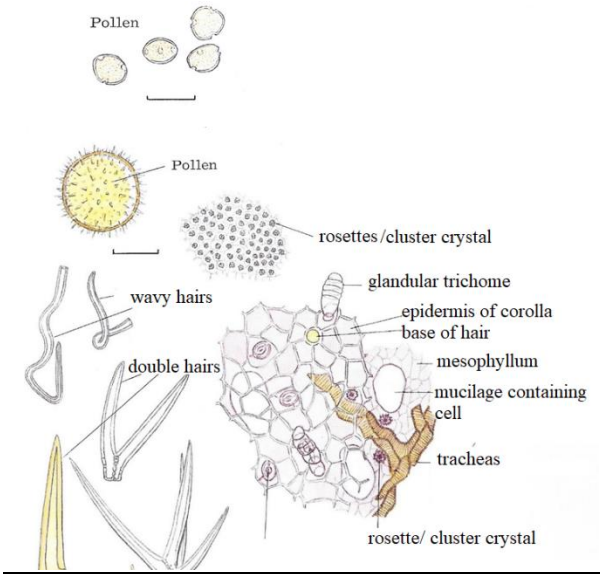
Althaeae folium:



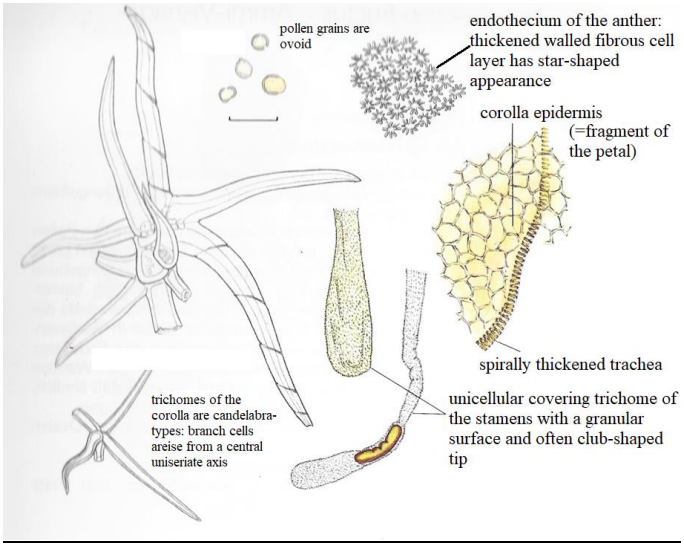
Tiliae flos:



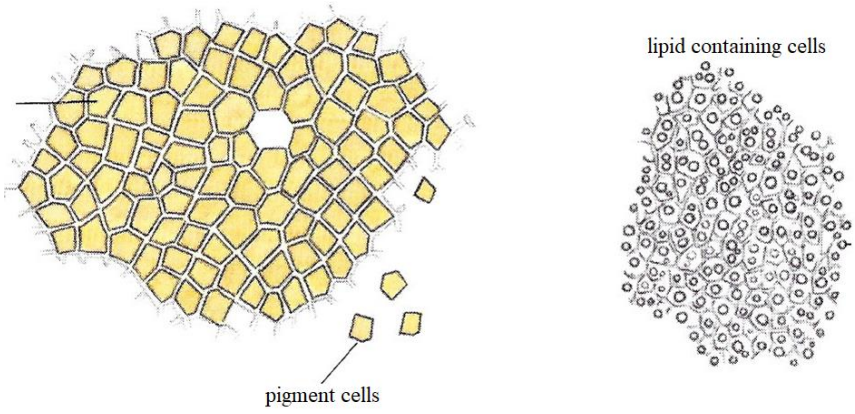
Malvae sylvestris flos:



Verbasci flos:



Lini semen:



CHEMICAL INVESTIGATIONS

1. Preparation of mucilage

crude drugs*: Althaeae radix, Malvae folium, Malvae flos, Verbasci flos, Plantaginis lanceolatae folium, Tiliae flos*

Make suspension from 2.5 g of crude drug with 50 ml water. After 20 minutes, filter the supernatant on mull. Put 10 ml of the filtrate in a beaker and add 40 ml of aceton to the mucilage solution during mixing it. Mucilage precipitate due to dehydratation.

2. Determination of Swelling Value - Ph.Eur: 2.8.4. SWELLING INDEX

Ph. Eur. definition: The swelling index is the volume in millilitres occupied by 1 gram of a drug, including any adhering mucilage, after it has swollen in an aqueous liquid for 4 h.

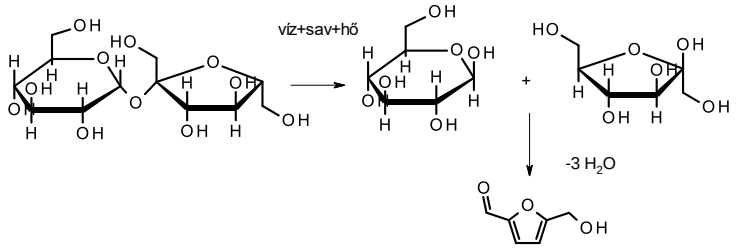
Moisten 1,0 g of air-dry drug with 1 ml of ethanol in a 25 ml volumetric cylinder. Shake up the fluid thoroughly with 25 ml of water. Stir the mixture in every 30 minutes for an hour and then maintain for 2 hours at room temperature. Read the volume of the drug in ml together with any adhering mucilage.

Drug	after 2 hours
Salviae hispanicae semen	20
Lichen islandicus	5,5
Lini placentae farina	5
Lini semen	4
Psylli semen farina	20
Trigonellae foenugraeci semen	12

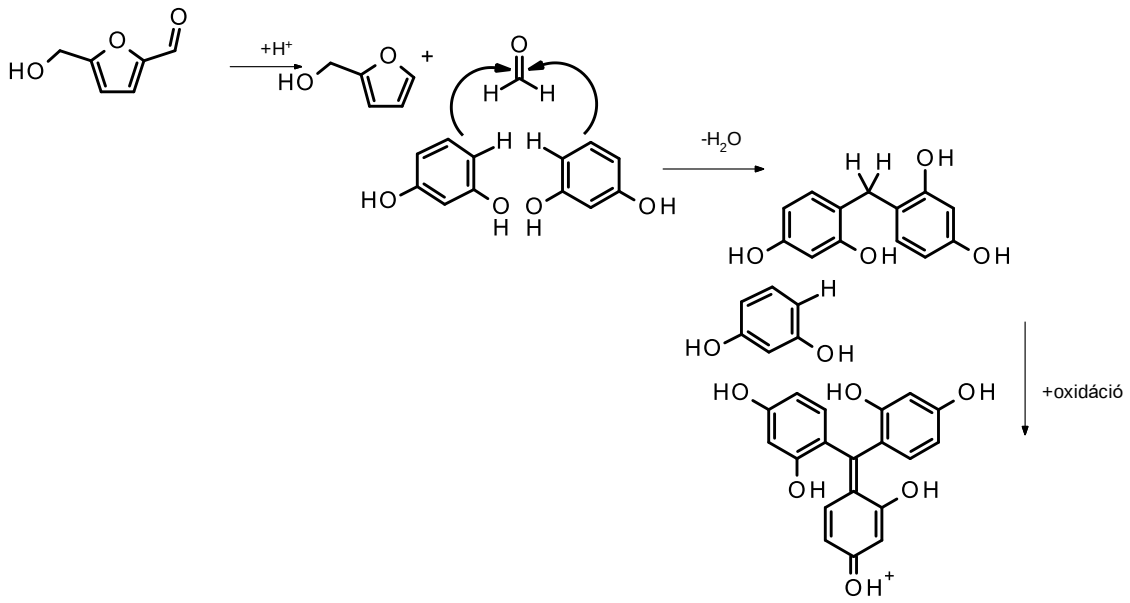
3. Adulteration of honey by artificial invert sugar

Mix carefully 5 g of honey with 10 ml of chloroform in a porcelain mortar. Filter the mixture and evaporate the chloroformic phase in a porcelain disk. Add a few drops of freshly prepared resorcin solution (1 % resorcin in cc. HCl) to the residue. The colour is pinkish or light orange for a short time, but a lasting red colour is a mark of hydroxy-methyl furfural.

Explanation: <u>Preparation of invert sugar</u> (= glucose:fructose, 1:1): beetsugar is boiled to a sirup with water and acetic acid/tartaric acid/citric acid. During the hydrolysis of beetsugar, glucose, fructose, and by H_2O loss, hydroxy-methyl-furfural generate. The latter one gives the reaction of artificial honey.



<u>Seliwanoff reaction:</u> heating in acidic condition, ketoses and aldoses (due to isomerisation by time) give red colour with resorcin. The reaction is suitable to detect glucose and fructose and is not selective to hydroxy-methyl-furfural.



<u>Differenciating artificial and real honey:</u> highly polar sugars are not dissolving in the apolar chloroform, while hydroxy-methyl-furfural present in artificial honey yes. That is why real honey's extract show pale colour, while artificial ones intense red.

4. Investigation of crude drugs containing inulin

Put 1,0 g of defatted crude drug in conical Erlenmeyer (with stopper), add 100 ml methanol and boiling stone. Boil on water-bath, with reflux cooler during 1 hour. After cooling down, put quantitatively in a 100 ml volumetric flask and fill to sign (stock solution).

Prepare the the reaction mixture in a 100 ml conical Erlenmeyer flask and heat on water-bath for 8 minutes with reflux cooler:

1 ml **Taraxaci radix** stock solution / 2 ml **Graminis rhizoma** stock solution / 4 ml **Cichorii radix** stock solution / 1 ml distilled water (blind)

+ 1 ml 0,01 % tiocarbamide solution
+ 1 ml 1% resorcine solution
+ 8 ml methanol
+ 9 ml cc. HCl

After cooling down, put the mixture in a 100 ml volumetric flask and fill up untill the sign with distilled water. Measure its absorbance beside the blind on 480 nm.

$$Inulin\,\frac{m}{m}\% = \frac{A1*X1}{m1} * \frac{m2}{A2*X2} * 100\ \%$$

A1= absorbance of measured solution on 480 nm
A2=0,243 absorbance of inulin solution on 480 nm
X1= dilution of measured solution
X2=100, dilution of inulin solution
m1= mass of weighted crude drug
m2 =0,0833g, mass of inulin

Explanation: see at „3. Adulteration of honey by artificial invert sugar". Fructose, arisen from the hydrolysis of inulin react with resorcine. The reaction is selective in these conditions. Tiocarbamide is needed to set the reductive medium.