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Pharmacognosy:
Pharmacognostic Quality Examination of Herbal Drugs
(Microscopy and Macroscopy)



COMENIUS
UNIVERSITY
BRATISLAVA

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Comenius University Bratislava

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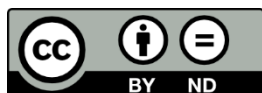
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Preface

We are pleased to present these worksheets, which are intended as supplementary study material for the microscopic and macroscopic analysis of plant drugs.

The pharmacist is a key figure in ensuring the quality of medicines. Their activities involve a range of competencies aimed at ensuring that medications are safe, effective, and properly prepared. The currently applicable Slovak Drug Legislation¹ authorizes the pharmacist to provide pharmaceutical care, including the individual preparation of medicines (IPM), while following the requirements for the preparation, storage, and control of IPM in accordance with good pharmaceutical practice. Medicines are prepared in pharmacies to meet the requirements for pharmaceutical quality and the standards of the European Pharmacopoeia (Ph. Eur.), the national pharmacopoeia of the EU member state, or the Slovak Pharmaceutical Code (SFK)². The European Pharmacopoeia, published by the Council of Europe, and the Slovak Pharmaceutical Code are sets of technical requirements for the preparation, manufacture, labelling, storage of medicinal substances, excipients, pharmaceutical forms, and for evaluating their quality. The pharmacist is required to perform control tests on the identity of medicinal substances (including plant drugs) and excipients according to the SFK if the relevant batch has a certificate of quality control from the state institute and an analytical certificate; if the analytical certificate is missing, the pharmacy must ensure quality control according to the Ph. Eur. or SFK.

From a pharmacognostic perspective, the controls for the authenticity and quality of natural medicines in the European Pharmacopoeia are based on key general monographs covering groups of medicinal products of natural origin, such as: Essential oils (Aetherolea), Herbal drug extracts (Plantarum medicinalium extracta), Herbal drug preparations (Plantae medicinales praeparatae), Herbal drugs (Plantae medicinales), Herbal teas (Plantae ad ptisanam), and Herbal teas, instant (Praeparationes celeres ad ptisanam). These general monographs set out requirements applicable to all medicines/products within a particular group and include their definition, production, characters, identification, general tests, assay, storage, and labelling.

The group of medicines/products that pharmacists most commonly encounter in pharmacies are herbal drugs, which mainly consist of whole, fragmented or broken plants (include algae, fungi and lichens) or parts of plants in an unprocessed state, usually in dried form but sometimes fresh. Certain exudates that have not been subjected to a specific treatment are also considered to be herbal drugs. Herbal drugs are precisely defined by the botanical scientific name according to the binominal system (genus, species, variety and author). Dried herbal drugs are identified through macroscopic and microscopic examination and any other tests that may be required and are specifically described in the individual monographs of the relevant plant drugs. Macroscopic analysis provides an overview of the external characteristics and properties of herbal drugs. The individual monographs in the European Pharmacopoeia contain descriptions of various and specific characteristics of the drug, such as shape diversity, particle size, colour or colour variation, surface, number and characteristics of plant parts, fracture properties, and others. Microscopic examination of herbal drugs is performed using powdered drug (355), with a suitable prescribed reagent (according to monograph 2.8.23.), placed between a slide and a cover slip. The preparation is then examined under a microscope (polarized light is rarely necessary). Individual monographs specify the appropriate reagent for microscopic analysis and identify the plant drug by the presence of specific plant tissue parts, cellular structures, or cellular inclusions.

¹ Zákon č. 362/2011 Z. z., Zákon o liekoch a zdravotníckych pomôckach a o zmene a doplnení niektorých zákonov.

² Vyhláška č. 129/2012 Z. z., Vyhláška Ministerstva zdravotníctva Slovenskej republiky o požiadavkách na správnu lekárenskú prax.

We hope that all the effort we, as authors, have put into creating these worksheets will be valuable for you, enhancing the effectiveness of your work during the practical exercises in the subject of Pharmacognosy (I), and help you improve the quality of your macroscopic and microscopic analysis of herbal drugs.

1 Lichens, underground parts of monocotyledonous plants – rhizome, thalloid, powdery, and amorphous drugs in Ph. Eur. 11

1.1 Microscopic analysis

1.1.1 Lichen islandicus, *Cetraria islandica* (L.) Acharius s.l., Parmeliaceae Iceland moss

In the microscopic preparation, the following are present: hyphae □, algae cells □.

Schematic drawing:

Microscopic drawing:

1 Lichens, underground parts of monocotyledonous plants – rhizome, thalloid, powdery, and amorphous drugs in Ph. Eur. 11

1.1.2 Zingiberis rhizoma, Zingiber officinale Roscoe, Zingiberaceae
Ginger

In the microscopic preparation, the following are present: epidermis □, cortical parenchyma cells □, starch granules □, collateral vascular bundle (sieves □, vessels □, sclerenchymatous sheath □), cells with pigment □, endodermis □, oil cells □, stelar parenchyma cells □.

Schematic drawing:

Microscopic drawing:

1.2 Macroscopic analysis

Herbal drug: **Lichen islandicus** – Iceland moss
Plant name: *Cetraria islandica* (L.) Acharius s.l.
Family: Parmeliaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Zingiberis rhizoma** – Ginger
Plant name: *Zingiber officinale* Roscoe
Family: Zingiberaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Lanugo gossypii absorbens**^(without EU herbal monograph) – Cotton, absorbent
Plant name: *Gossypium* L.
Family: Malvaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Lanugo cellulosi absorbens**^(without EU herbal monograph) – Viscose wadding, absorbent

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Agar**^(without EU herbal monograph) – Agar
Plant name: Polysaccharides from various species of Rhodophyceae mainly belonging to the
genus *Gelidium*
Family: Gelidiaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Fucus vel Ascophyllum**^(Ph. Eur. 11) – Kelp/**Fuci vesiculosi thallus**^(EU herbal monograph) –
Bladderwrack
Plant name: *Fucus vesiculosus* L.
Fucus serratus L.
Ascophyllum nodosum Le Jolis.
Family: Fucaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Aloe** – Aloes³ 1. **Aloe barbadensis** – Aloes, Barbados
Plant name: *Aloe barbadensis* Mill.
Family: Asphodelaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Aloe** – Aloes⁴ 2. **Aloe capensis** – Aloes, Cape
Plant name: *Aloe ferox* Mill.
Family: Asphodelaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Acaciae gummi**^(without EU herbal monograph) – Acacia
Plant name: *Acacia senegal* L. Willdenow (syn. *Senegalia senegal* (L.) Britton)
Acacia seyal Delile
other species of *Acacia* of African origin
Family: Mimosaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Myrrha** – Myrh
Plant name: *Commiphora myrrha* (Nees) Engl. (syn. *Commiphora molmol* Engl. ex Tschirch)
and/or other species of *Commiphora*
Family: Burseraceae

³ Note: Two drugs are distinguished.

⁴ Note: Two drugs are distinguished.

1 Lichens, underground parts of monocotyledonous plants – rhizome, thalloid, powdery, and amorphous drugs in Ph. Eur. 11

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Mastix**^(Ph. Eur. 11)/**Pistaciae lentisci resina**^(EU herbal monograph) – Mastic
Plant name: *Pistacia lentiscus* L.
Family: Anacardiaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Tragacantha**^(without EU herbal monograph) – Tragacanth
Plant name: *Astragalus gummifer* Labill.
certain other species of *Astragalus* from western Asia
Family: Fabaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Balsamum peruvianum**^(without EU herbal monograph) – Peru balsam
Plant name: *Myroxylon balsamum* (L.) Harms var. *pereirae* (Royle) Harms.
Family: Fabaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Graminis rhizoma**^(Ph. Eur. 11)/**Agropyri repentis rhizoma**^(EU herbal monograph) – Couch grass rhizome
Plant name: *Agropyron repens* (L.) Beauv. (syn. *Elymus repens* (L.) Gould)
Family: Poaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Curcumae longae rhizoma** – Turmeric rhizome
Plant name: *Curcuma longa* L. (syn. *Curcuma domestica* Valetton)
Family: Zingiberaceae

Colour:
Shape:
Odour:
Other characteristics:

2 Underground parts of dicotyledonous plants – root in Ph. Eur. 11

2.1 Microscopic analysis

2.1.1 **Ononidis radix**, *Ononis spinosa L.*, *Fabaceae* **Restharrow root**

In the microscopic preparation, the following are present: cork □, cortical parenchyma cells □, sclerenchyma □, phloem fibres □, sieves □, medullary rays □, cambium □, libriform (lignified fibres with pitted walls) □, vessels □, primary xylem □.

Schematic drawing:

Microscopic drawing:

2.1.2 Althaeae radix, *Althaea officinalis* L., Malvaceae
Marshmallow root

In the microscopic preparation, the following are present: (cork □), cortical parenchyma cells □, starch granules □, cluster crystals of calcium oxalate □, phloem fibres □, sieves □, medullary rays □, cambium □, libriform (lignified fibres with pitted walls) □, vessels □, tracheids □, mucilage cells □, xylem parenchyma cells □, primary xylem □.

Schematic drawing:

Microscopic drawing:

2.1.3 Ratanhiae radix, *Krameria triandra* Ruiz & Pav., Krameriaceae
Rhatany root

In the microscopic preparation, the following are present: cork □, cortical parenchyma cells □, starch granules □, phloem fibres □, medullary rays □, sieves □, cambium □, vessels □, libriform (lignified fibres with pitted walls) □, xylem parenchyma cells □, primary xylem □.

Schematic drawing:

Microscopic drawing:

**2.1.4 Liquiritiae radix, *Glycyrrhiza glabra* L., *G. inflata* Bat., *G. uralensis* Fisch., Fabaceae
Liquorice root**

In the microscopic preparation, the following are present: cork □, cortical parenchyma cells □, starch granules □, calcium oxalate prisms □, ceratenchyma □, phloem fibre accompanied by calcium oxalate prisms (crystal) sheaths □, medullary rays □, sieves □, cambium □, vessels □, libriform (lignified fibres with pitted walls) accompanied by calcium oxalate prisms (crystal) sheaths □, parenchyma of the pith □.

Schematic drawing:

Microscopic drawing:

2.2 Macroscopic analysis

Herbal drug: **Ononidis radix** – Restharrow root
Plant name: *Ononis spinosa* L.
Family: Fabaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Althaeae radix** – Marshmallow root
Plant name: *Althaea officinalis* L.
Family: Malvaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Ratanhiae radix**^(without EU herbal monograph) – Rhatany root
Plant name: *Krameria triandra* Ruiz & Pav.
Family: Krameriaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Liquiritiae radix** – Liquorice root
Plant name: *Glycyrrhiza glabra* L.
Glycyrrhiza inflata Bat.
Glycyrrhiza uralensis Fisch.
Family: Fabaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Angelicae archangelicae radix**^(without EU herbal monograph) – Angelica archangelica root
Plant name: *Angelica archangelica* L. (syn. *A. officinalis* Hoffm.)
Family: Apiaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Arctii radix** – Burdock root
Plant name: *Arctium lappa* L. (syn. *Lappa major* Gaertn.)
Family: Asteraceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Symphyti radix**^(only EU herbal monograph) – Comfrey Root
Plant name: *Symphytum officinale* L.
Family: Boraginaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Valerianae radix** – Valerian root
Plant name: *Valeriana officinalis* L. s.l.
Family: Caprifoliaceae (Valerianaceae)

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Primulae radix** – Primula root
Plant name: *Primula veris* L.
Primula elatior Hill
Family: Primulaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Gentianae radix** – Gentian root
Plant name: *Gentiana lutea* L.
Family: Gentianaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Rhei radix** – Rhubarb
Plant name: *Rheum palmatum* L.
Rheum officinale Baill.
Family: Polygonaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Echinaceae angustifoliae radix** – Narrow-leaved coneflower root
Plant name: *Echinacea angustifolia* DC.
Family: Asteraceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Harpagophyti radix** – Devil’s claw root
Plant name: *Harpagophytum procumbens* DC.
Harpagophytum zeyheri Decne.
Family: Pedaliaceae

Colour:
Shape:
Odour:
Other characteristics:

3 Underground parts of dicotyledonous plants – root, rhizome, aerial parts – herb in Ph. Eur. 11

3.1 Microscopic analysis

3.1.1 Levistici radix, *Levisticum officinale* Koch, Apiaceae Lovage root

In the microscopic preparation, the following are present: cork □, cortical parenchyma cells □, secretory canals □, parenchyma, consisting of mostly thin-walled and rounded cells □, medullary rays □, sieves □, cambium □, vessels □, xylem parenchyma cells □, primary xylem □.

Schematic drawing:

Microscopic drawing:

3.1.2 Taraxaci officinalis radix, *Taraxacum officinale* F. H. Wigg., Asteraceae
Dandelion root

In the microscopic preparation, the following are present: cork □, cortical parenchyma cells □, clusters of sieves tissue and laticiferous vessels □, cambium □, vessels □, xylem parenchyma cells □, primary xylem □.

Schematic drawing:

Microscopic drawing:

3.1.3 Bistortae rhizoma, *Persicaria bistorta* (L.) Samp. (syn. *Polygonum bistorta* L.),
Polygonaceae
Bistort rhizome

In the microscopic preparation, the following are present: cork □, cortical parenchyma □, starch granules □, parenchyma cells containing reddish-brown tannin (phlobaphene) □, cluster crystals of calcium oxalate □, vascular bundle (sieves □, phloem fibres □, vessels □, libriform (lignified fibres with pitted walls) □, vascular bundle enclosed in a bundle sheath of parenchyma □), cambium □, medullary rays □, parenchyma of the pith □.

Schematic drawing:

Microscopic drawing:

3.1.4 Tormentillae rhizoma, *Potentilla erecta* (L.) Raesch (syn. *Potentilla tormentilla* Stokes), Rosaceae
Tormentil

In the microscopic preparation, the following are present: cork □, cortical parenchyma cells □, starch granules □, parenchyma cells containing reddish-brown tannin (phlobaphene) □, cluster crystals of calcium oxalate □, sieves □, cambium □, medullary rays □, xylem parenchyma cells □, libriform (lignified fibres with pitted walls) □, vessels □, parenchyma of the pith.

Schematic drawing:

Microscopic drawing:

3.2 Macroscopic analysis

Herbal drug: **Levistici radix** – Lovage root
Plant name: *Levisticum officinale* Koch
Family: Apiaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Taraxaci officinalis radix** – Dandelion root
Plant name: *Taraxacum officinale* F. H. Wigg.
Family: Asteraceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Bistortae rhizoma**^(without EU herbal monograph) – Bistort rhizome
Plant name: *Persicaria bistorta* (L.) Samp. (syn. *Polygonum bistorta* L.)
Family: Polygonaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Tormentillae rhizoma** – Tormentil
Plant name: *Potentilla erecta* (L.) Raeusch. (syn. *Potentilla tormentilla* Stokes)
Family: Rosaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Agrimoniae herba** – Agrimony
Plant name: *Agrimonia eupatoria* L.
Family: Rosaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Alchemillae herba**^(without EU herbal monograph) – Alchemilla
Plant name: *Alchemilla vulgaris* L. s.l.
Family: Rosaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Millefolii herba** – Yarrow
Millefolii flos^(only EU herbal monograph) – Yarrow Flower
Plant name: *Achillea millefolium* L.
Family: Asteraceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Solidaginis herba**^(without EU herbal monograph) – Goldenrod
Plant name: *Solidago gigantea* Ait.
Solidago canadensis L.
Family: Asteraceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Hyperici herba** – St. John's wort
Plant name: *Hypericum perforatum* L.
Family: Hypericaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Centaurii herba** – Centaurii herba
Plant name: *Centaurium erythraea* Rafn. s.l. (syn. *C. umbellatum* Gilib.; *Erythraea centaurium* Pers.)
Family: Gentianaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Meliloti herba** – Melilot
Plant name: *Melilotus officinalis* (L.) Lam.
Family: Fabaceae

Colour:
Shape:
Odour:
Other characteristics:

4 Aerial parts – bark, herb (stem) in Ph. Eur. 11

4.1 Microscopic analysis

4.1.1 **Frangulae cortex, *Rhamnus frangula* L. (*Frangula alnus* Miller), Rhamnaceae Frangula bark**

In the microscopic preparation, the following are present: cork □, collenchyma □, cortical parenchyma □, starch granules □, cluster crystals of calcium oxalate □, mucilage-filled cavities □, phloem fibres in groups with calcium oxalate prisms (crystal) sheaths □, medullary rays □, sieves □.

Schematic drawing:

Microscopic drawing:

4.1.2 Quercus cortex, *Quercus robur* L., *Q. petraea* (Matt.) Liebl., *Q. pubescens* Willd.,
Fagaceae
Oak bark

In the microscopic preparation, the following are present: cork □, collenchyma □, cortical parenchyma □, sclereids (stone cells) □, sclereids accompanied by phloem fibres (mechanic wall) □, cluster crystals of calcium oxalate □, phloem fibres surrounded by a parenchymatous sheath containing prism crystals of calcium oxalate □, medullary rays □, sieves □, sclereids (stone cells) – comb-like structure □.

Schematic drawing:

Microscopic drawing:

**4.1.3 Equiseti herba, *Equisetum arvense* L., Equisetaceae
Equisetum stem**

In the microscopic preparation, the following are present: cuticle □, epidermis □, sclerenchyma □, palisade cells □, vallecular canal □, endodermis □, collateral vascular bundle (sieves a vessels) □, carinal canal □, pith cavity □.

Schematic drawing:

Microscopic drawing:

4.2 Macroscopic analysis

Herbal drug: **Frangulae cortex** – Frangula bark
Plant name: *Rhamnus frangula* L. (syn. *Frangula alnus* Miller)
Family: Rhamnaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Quercus cortex** – Oak bark
Plant name: *Quercus robur* L.
Quercus petraea (Matt.) Liebl.
Quercus pubescens Willd.
Family: Fagaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Equiseti herba** – Equisetum stem
Plant name: *Equisetum arvense* L.
Family: Equisetaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Salicis cortex** – Willow bark
Plant name: *Salix purpurea* L.
Salix daphnoides Vill.
Salix fragilis L.
Family: Salicaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Cinnamomi cortex** – Cinnamon
Plant name: *Cinnamomum verum* J. Presl
Family: Lauraceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Cinchonae cortex**^(without EU herbal monograph) – Cinchona bark
Plant name: *Cinchona pubescens* Vahl (syn. *Cinchona succirubra* Pav.)
Cinchona calisaya Wedd.
Cinchona ledgeriana Moens ex Trimen
Family: Rubiaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Violae herba cum flore** – Wild pansy (flowering aerial parts)
Plant name: *Viola arvensis* Murray
Viola tricolor L.
Family: Violaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Serpylli herba**^(without EU herbal monograph) – Wild thyme
Plant name: *Thymus serpyllum* L. s.l.
Family: Lamiaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Origani herba**^(without EU herbal monograph) – Oregano
Plant name: *Origanum onites* L.
Origanum vulgare subsp. *hirtum* (Link) Ietsw.
Origanum vulgare^(SFK 2007) L.
Family: Lamiaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Marrubii herba** – White horehound
Plant name: *Marrubium vulgare* L.
Family: Lamiaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Epilobii herba** ^(only EU herbal monograph) – Willow herb
Plant name: *Epilobium parviflorum* Schreb.
Chamaenerion angustifolium (L.) Scop. (syn. *E. angustifolium* L.)
Family: Onagraceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Polygoni avicularis herba** – Knotgrass
Plant name: *Polygonum aviculare* L. s.l.
Family: Polygonaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Bursae pastoris herba** – Shepherd's purse
Plant name: *Capsella bursa-pastoris* (L.) Medik.
Family: Brassicaceae

Colour:
Shape:
Odour:
Other characteristics:

5 Aerial parts – leaf in Ph. Eur. 11

5.1 Microscopic analysis

5.1.1 Sennae foliolum, *Senna alexandrina* Mill. (syn. *Cassia acutifolia* Delile a
C. angustifolia Vahl), Fabaceae

Senna leaflet

In the microscopic preparation, the following are present: cuticle □, upper epidermis □, paracytic stomata □, upper palisade cells □, isolated prisms and cluster crystals of calcium oxalate □, spongy parenchyma (mesophyll) □, lower palisade cells □, lower epidermis □, sclerenchyma □, vessels □, sieves □, collenchyma □.

Schematic drawing:

Microscopic drawing:

5.1.2 Boldi folium, *Peumus boldus* Molina, Monimiaceae
Boldo leaf

In the microscopic preparation, the following are present: cuticle □, covering trichomes □, upper epidermis □, hypodermis □, stomata □, palisade cells □, raphides of calcium oxalate □, spongy mesophyll (parenchyma) □, oil cells □, lower epidermis □, sclerenchyma □, vessels □, sieves □.

Schematic drawing:

Microscopic drawing:

5.2 Macroscopic analysis

Herbal drug: **Sennae foliolum**^(Ph. Eur. 11)/**Sennae folium**^(EU herbal monograph) – Senna leaflet
Plant name: *Senna alexandrina* Mill. (syn. *Cassia acutifolia* Delile a *C. angustifolia* Vahl)
Family: Fabaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Boldi folium** – Boldo leaf
Plant name: *Peumus boldus* Molina
Family: Monimiaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Camelliae sinensis folium non fermentatum**^(Ph. Eur. 11)/
Camelliae sinensis non fermentatum folium^(EU herbal monograph) – Green tea
Plant name: *Camellia sinensis* (L.) Kuntze
Family: Theaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Rubi idaei folium** – Raspberry leaf
Plant name: *Rubus idaeus* L.
Family: Rosaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Ribis nigri folium** – Blackcurrant leaf
Plant name: *Ribes nigrum* L.
Family: Grossulariaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Betulae folium** – Birch leaf
Plant name: *Betula pendula* Roth – breza previsnutá
Betula pubescens Ehrh. – breza plstnatá
Family: Betulaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Plantaginis lanceolatae folium** – Ribwort plantain
Plant name: *Plantago lanceolata* L.s.l.
Family: Plantaginaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Cynarae folium** – Artichoke leaf
Plant name: *Cynara cardunculus* L.
Cynara scolymus L.
Family: Asteraceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Urticae folium** – Nettle leaf
Plant name: *Urtica dioica* L.
Urtica urens L.
Family: Urticaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Eucalypti folium** – Eucalyptus leaf
Plant name: *Eucalyptus globulus* L.
Family: Myrtaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Ginkgonis folium**^(Ph. Eur. 11)/**Ginkgo folium**^(EU herbal monograph) – Ginkgo leaf
Plant name: *Ginkgo biloba* L.
Family: Ginkgoaceae

Colour:

Shape:

Odour:

Other characteristics:

6 Aerial parts – leaf in Ph. Eur. 11

6.1 Microscopic analysis

6.1.1 **Althaeae folium**, *Althaea officinalis* L., Malvaceae **Marshmallow leaf**

In the microscopic preparation, the following are present: cuticle □, covering trichomes □, upper epidermis □, palisade cells □, cluster crystals of calcium oxalate □, spongy parenchyma □, mucilage cells □, lower epidermis □, secretory trichomes, □, collenchyma □, sieves □, vessels □.

Schematic drawing:

Microscopic drawing:

6.1.2 Menyanthis trifoliatae folium, *Menyanthes trifoliata* L., Menyanthaceae
Bogbean leaf

In the microscopic preparation, the following are present: cuticle □, upper epidermis □, palisade cells □, aerenchyma – spongy (auriferous) parenchyma □, intracellular □, lower epidermis □, sieves □, vessels □, vascular bundle enclosed in a bundle sheath of parenchyma □.

Schematic drawing:

Microscopic drawing:

6.1.3 Uvae ursi folium, *Arctostaphylos uva-ursi* (L.) Spreng., Ericaceae
Bearberry leaf

In the microscopic preparation, the following are present: cuticle , upper epidermis , palisade cells (three or more rows) , spongy parenchyma , intracellular , lower epidermis , stomata , sieves , collenchyma , vessels , “medullary rays” .

Schematic drawing:

Microscopic drawing:

6.2 Macroscopic analysis

Herbal drug: **Althaeae folium** ^(without EU herbal monograph) – Marshmallow leaf
Plant name: *Althaea officinalis* L. – ibiš lekársky
Family: Malvaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Menyanthis trifoliatae folium** – Bogbean leaf
Plant name: *Menyanthes trifoliata* L.
Family: Menyanthaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Uvae ursi folium** – Bearberry leaf
Plant name: *Arctostaphylos uva-ursi* (L.) Spreng.
Family: Ericaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Rosmarini folium** – Rosemary leaf
Plant name: *Rosmarinus officinalis* L.
Family: Lamiaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Salviae officinalis folium** – Sage leaf
Plant name: *Salvia officinalis* L.
Family: Lamiaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Hamamelidis folium** – Hamamelis leaf
Plant name: *Hamamelis virginiana* L.
Family: Hamamelidaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Juglandis folium**^(only EU herbal monograph) – Walnut leaf
Plant name: *Juglans regia* L.
Family: Juglandaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Hederae folium**^(Ph. Eur. 11)/**Hederae helicis folium**^(EU herbal monograph) – Ivy leaf
Plant name: *Hedera helix* L.
Family: Araliaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Crataegi folium cum flore** – Hawthorn leaf and flower
Plant name: *Crataegus laevigata* (Poir.) DC.
Crataegus monogyna Jacq. (Lindm.)
Crataegus pentagyna Waldst. et Kit. ex Willd.
Crataegus azarolus L.
Family: Rosaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Mate folium** – Mate leaf^(Ph. Eur. 11)/**Maté Leaf**^(EU herbal monograph)
Plant name: *Ilex paraguariensis* A.St.-Hil.
Family: Aquifoliaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Vitis viniferae folium**^(only EU herbal monograph) – Grapevine Leaf
Plant name: *Vitis vinifera* L.
Family: Vitaceae

Colour:
Shape:
Odour:
Other characteristics:

7 Aerial parts – leaf, flower in Ph. Eur. 11

7.1 Microscopic analysis

7.1.1 **Melissae folium**, *Melissa officinalis* L., Lamiaceae **Melissa leaf**

In the microscopic preparation, the following are present: eight-celled secretory trichomes of lamiaceous type □, secretory trichomes with unicellular to tricellular stalks and unicellular or, more rarely, bicellular heads (secretory trichomes capitate) □, short, straight, unicellular, conical covering trichomes □, multicellular, uniseriate covering trichomes with pointed ends □, epidermis with sinuous walls □, diacytic stomata □.

Schematic drawing:

Microscopic drawing:

7.1.2 Menthae piperitae folium, *Mentha × piperita* L., Lamiaceae
Peppermint leaf

In the microscopic preparation, the following are present: eight-celled secretory trichomes of lamiate type □, secretory trichomes with unicellular to tricellular stalks and unicellular or, more rarely, bicellular heads (secretory trichomes capitate) □, short, straight, unicellular, conical covering trichomes □ multicellular, uniseriate covering trichomes with pointed ends □, epidermis with sinuous walls □, diacytic stomata □.

Schematic drawing:

Microscopic drawing:

7.2 Macroscopic analysis

Herbal drug: **Melissae folium** – Melissa leaf
Plant name: *Melissa officinalis* L.
Family: Lamiaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Menthae piperitae folium** – Peppermint leaf
Plant name: *Mentha × piperita* L.
Family: Lamiaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Malvae sylvestris flos** – Mallow flower
Plant name: *Malva sylvestris* L.
Family: Malvaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Lavandulae flos** – Lavender flower
Plant name: *Lavandula angustifolia* Mill. (syn. *L. officinalis* Chaix)
Family: Lamiaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Tiliae flos** – Lime flower
Plant name: *Tilia cordata* Mill.
Tilia platyphyllos Scop.
Tilia × europaea L.
Family: Tiliaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Sambuci flos** – Elder flower
Plant name: *Sambucus nigra* L.
Family: Viburnaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Calendulae flos** – Calendula flower
Plant name: *Calendula officinalis* L.
Family: Asteraceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Arnicae flos** – Arnica flower
Plant name: *Arnica montana* L.
Family: Asteraceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Filipendulae ulmariae flos**^(only EU herbal monograph) – Meadowsweet Flower
Plant name: *Filipendula ulmaria* (L.) Maxim.
Family: Rosaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Cannabis flos**^(without EU herbal monograph) – Cannabis flower
Plant name: *Cannabis sativa* L.
Family: Cannabaceae

Colour:
Shape:
Odour:
Other characteristics:

8 Aerial parts – flower, herb in Ph. Eur. 11

8.1 Microscopic analysis

- 8.1.1 Matricariae flos**, *Matricaria recutita* L. (syn. *Chamomilla recutita* (L.) Rauschert),
Asteraceae
Matricaria flower

In the microscopic preparation, the following are present: tubular florets (disk flower) □, epidermis of the corolla (petal) □, epipetalous stamens with pollen grains □, groups of cells at the apex of the stigmas forming elongated papillae □, ovary □, sclereids from the base of the ovary wall □, mucilage cells □, biseriate glandular trichomes (asteraceous type) □, pollen grains spherical or triangular □, anomocytic stomata □.

Schematic drawing:

Microscopic drawing:

8.1.2 Verbasci flos, *Verbascum densiflorum* Bertol., *V. phlomoides* L., *V. thapsus* L.,
Scrophulariaceae
Mullein flower

In the microscopic preparation, the following are present: covering trichomes of the candelabra type (dendroid trichomes) □, covering trichomes from the stamen filaments □, polygonal and isodiametric epidermal cells □, endothecium □, secretory trichomes □, ovoid, tricolpate pollen grains □.

Schematic drawing:

Microscopic drawing:

8.1.3 Thymi herba, *Thymus vulgaris* L. alebo *Thymus zygis* L., Lamiaceae
Thyme

In the microscopic preparation, the following are present: glandular trichomes with a unicellular head and a unicellular \square , covering trichomes of different types \square , eight-celled secretory trichomes of lamiaceous type \square , diacytic stomata \square , epidermis with sinuous walls \square .

Schematic drawing:

Microscopic drawing:

**8.1.4 Absinthii herba, *Artemisia absinthium* L., Asteraceae
Wormwood**

In the microscopic preparation, the following are present: T-shaped trichomes □, biserial glandular trichomes (asteraceous type) □, fragments of the corollas of the tubular and ray florets □, the outer bracts linear □, trichomes – paleae each composed of a small cell forming a stalk and a very long, cylindrical and thin-walled terminal cell □, anomocytic stomata □.

Schematic drawing:

Microscopic drawing:

8.2 Macroscopic analysis

Herbal drug: **Matricariae flos** – Matricaria flower
Plant name: *Matricaria recutita* L. (syn. *Chamomilla recutita* (L.) Rauschert)
Family: Asteraceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Verbasci flos** – Mullein flower
Plant name: *Verbascum densiflorum* Bertol. (syn. *V. thapsiforme* Schrad.)
Verbascum phlomoides L.
Verbascum thapsus L.
Family: Scrophulariaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Thymi herba** – Thyme
Plant name: *Thymus vulgaris* L.
Thymus zygis Loefl. ex. L.
Family: Lamiaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Absinthii herba** – Wormwood
Plant name: *Artemisia absinthium* L.
Family: Asteraceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Chamomillae romanae flos** – Chamomile flower, Roman
Plant name: *Chamaemelum nobile* (L.) All. (syn. *Anthemis nobilis* L.)
Family: Asteraceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Lupuli flos** – Hop strobile
Plant name: *Humulus lupulus* L.
Family: Cannabaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Caryophylli flos**^(without EU herbal monograph) – Clove
Plant name: *Syzygium aromaticum* (L.) Merr. et L. M. Perry (syn. *Eugenia caryophyllus*
(Spreng.) Bullock et S.G.Harrison)
Family: Myrtaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Primulae flos**^(only EU herbal monograph) – Primula flower
Plant name: *Primula veris* (L.) Hill
Primula elatior L.
Family: Primulaceae

Colour:
Shape:
Odour:
Other characteristics:

9 Aerial parts – fruit in Ph. Eur. 11

9.1 Microscopic analysis

9.1.1 Foeniculi amari fructus, *Foeniculum vulgare* Mill. subsp. *vulgare* var. *vulgare*,
Apiaceae
Fennel, bitter

In the microscopic preparation, the following are present: cuticle □, fragments of the epicarp (exocarp) with stomata accompanied by oil droplets □, sclerenchyma □, vascular bundle (sieves a vessels) □, reticulate parenchyma of the mesocarp □, mesocarp □, secretory canals (made up of yellowish-brown-walled secretory cells) □, endocarp consisting of thin-walled, transversely elongated cells, having a parquetry arrangement □, endocarp □, endosperm containing aleurone □, raphe □, carpophore □.

Schematic drawing:

Microscopic drawing:

9.1.2 Anisi fructus, *Pimpinella anisum* L., Apiaceae
Aniseed

In the microscopic preparation, the following are present: cuticle □, covering trichomes □, epicarp (exocarp) □, vascular bundle (sieves a vessels) □, mesocarp □, secretory canals (cells) □, endocarp with testa □, endosperm containing oil droplets, aleurone grains □, raphe □.

Schematic drawing:

Microscopic drawing:

9.2 Macroscopic analysis

Herbal drug: **Foeniculi amari fructus** – Fennel, bitter
Plant name: *Foeniculum vulgare* Miller subsp. *vulgare* var. *vulgare*
Family: Apiaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Anisi fructus** – Aniseed
Plant name: *Pimpinella anisum* L.
Family: Apiaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Agni casti fructus** – Agnus castus fruit
Plant name: *Vitex agnus-castus* L.
Family: Lamiaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Rosae pseudo-fructus**^(without EU herbal monograph) – Dog rose
Plant name: *Rosa canina* L.
Rosa pendulina L.
other *Rosa* species
Family: Rosaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Silybi mariani fructus** – Milk thistle fruit
Plant name: *Silybum marianum* (L.) Gaertn.
Family: Asteraceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Avenae fructus**^(only EU herbal monograph) – Oat Fruit
Plant name: *Avena sativa* L.
Family: Poaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Capsici fructus** – Capsicum
Plant name: *Capsicum annuum* L. var. *minimum* (Miller) Heiser
Capsicum frutescens L.
Family: Solanaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Crataegi fructus**^(without EU herbal monograph) – Hawthorn berries
Plant name: *Crataegus monogyna* Jacq.
Crataegus laevigata (Poir.) DC. (syn. *C. oxyacantha* L.)
Family: Rosaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Myrtilli fructus siccus** – Bilberry fruit, dried
Plant name: *Vaccinium myrtillus* L.
Family: Ericaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Sennae fructus** – Senna pods
Plant name: *Senna alexandrina* Mill. (syn. *Cassia acutifolia* Delile a *Cassia angustifolia* Vahl)
Family: Fabaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Juniperi galbulus** – Juniper
Plant name: *Juniperus communis* L.
Family: Cupressaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Anisi stellati fructus**^(without EU herbal monograph) – Star anise
Plant name: *Illicium verum* Hook. f.
Family: Illiciaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Phaseoli fructus sine semine**^(only EU herbal monograph) – Green bean (pod)
Plant name: *Phaseolus vulgaris* L.
Family: Fabaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Carvi fructus** – Caraway fruit
Plant name: *Carum carvi* L.
Family: Apiaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Aurantii amari epicarpium et mesocarpium**^(without EU herbal monograph) –
Bitter-orange epicarp and mesocarp
Plant name: *Citrus aurantium* L. subsp. *aurantium* (*C. aurantium* L. ssp. *amara* Engl.)
Family: Rutaceae

Colour:
Shape:
Odour:
Other characteristics:

10 Aerial parts – seed in Ph. Eur. 11

10.1 Microscopic analysis

10.1.1 Lini semen, *Linum usitatissimum* L., Linaceae Linseed

In the microscopic preparation, the following are present: cuticle □, outer testa (epidermis) with mucilage □, collenchyma □, sclerenchyma □, hyaline layer □, inner testa filled with brown-orange pigment □, endosperm containing aleurone grains and oil droplets □.

Schematic drawing:

Microscopic drawing:

**10.1.2 Trigonellae foenugraeci semen, *Trigonella foenum-graecum* L., Fabaceae
Fenugreek**

In the microscopic preparation, the following are present: thick cuticle □, lageniform epidermal cells □, radial walls □, flattened cells □, aleurone grain □, endosperm associated with mucilage □.

Schematic drawing:

Microscopic drawing:

10.2 Macroscopic analysis

Herbal drug: **Lini semen** – Linseed
Plant name: *Linum usitatissimum* L.
Family: Linaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Trigonellae foenugraeci semen** – Fenugreek
Plant name: *Trigonella foenum-graecum* L.
Family: Fabaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Colae semen** – Cola
Plant name: *Cola nitida* (Vent.) Schott et Endl. (syn. *C. vera* K. Schum.)
Cola acuminata (P. Beauv.) Schott et Endl. (syn. *Sterculia acuminata* P. Beauv.)
Family: Malvaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Hippocastani semen** – Horse-chestnut
Plant name: *Aesculus hippocastanum* L.
Family: Sapindaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Psyllii semen** – Psyllium seed
Plant name: *Plantago afra* L.
Plantago indica L. (syn. *Plantago psyllium* L.)
Family: Plantaginaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Cucurbitae semen** – Pumpkin seed
Plant name: *Cucurbita pepo* L.
Family: Cucurbitaceae

Colour:
Shape:
Odour:
Other characteristics:

Herbal drug: **Plantaginis ovatae seminis tegumentum** – Ispaghula husk
Plant name: *Plantago ovata* Forssk. (syn. *Plantago ispaghul* Roxb.)
Family: Plantaginaceae

Colour:
Shape:
Odour:
Other characteristics:

References

European Directorate for the Quality of Medicines & HealthCare (EDQM). (2024). European Pharmacopoeia (11th ed.). Strasbourg, France: Council of Europe. Dostupné na: <https://pheur.edqm.eu/home>

European Medicines Agency, Committee on Herbal Medicinal Products. (2024). Herbal Monographs. Dostupné na: <https://www.ema.europa.eu/en/committees/committee-herbal-medicinal-products-hmpc>

Mučaji, P., Bitner Fialová, S., Czige, S., Grančai, D., Nagy, M. Farmakognózia. Biologicky aktívne rastlinné metabolity a ich zdroje, 3. vydanie. Herba, spol. s.r.o., 2025. ISBN 978-80-8229-054-0

Vyhláška č. 129/2012 Z. z., Vyhláška Ministerstva zdravotníctva Slovenskej republiky o požiadavkách na správnu lekárenskú prax.

World of Flora. (2025). World of Flora. Dostupné na: <https://www.worldofflora.com>

Zákon č. 362/2011 Z. z., Zákon o liekoch a zdravotníckych pomôckach a o zmene a doplnení niektorých zákonov.

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