PHARMACOGNOSY

**LABORATORY CLASS. Topic: «Chemical, morphological and anatomical analysis of MPM containing alkaloids – IІI.»**

**OBJECTIVE.**

Know the macro- and microscopic signs of medicinal plant material containing tropane, pyrrolizidine, quinolizidine, isoqunoline and indole alkaloids.

**RELEVANSE.**

Alkaloids are natural compound of high pharmacological activity. They often are characterized by selective action. Due to their specific activity, alkaloids are widely used in medicine. Among natural biologically active substances alkaloids are represented by the largest amount of highly active pharmaceuticals (more than 10%). Alkaloids containing plants are used in drug stores for preparation of medicines *ex tempore* (especially in homeopathy) and mainly as an industrial source for individual and halenic pharmaceuticals manufacturing. Alkaloids are used in treatment of almost all diseases.

**CONTROL QUESTIONS.**

1. Characterize the relationship between the chemical structure and pharmacological activity of tropane alkaloids.
2. Characterize the relationship between the chemical structure and pharmacological activity of isoquinoline alkaloids.
3. Characterize the relationship between the chemical structure and pharmacological activity of indole alkaloids.
4. Characterize the relationship between the chemical structure and pharmacological activity of pyrrolizidine alkaloids.
5. Characterize the relationship between the chemical structure and pharmacological activity of quinolizidine alkaloids

**TEST.**

1. During the commodity research analysis of the raw material it was discovered that it consists of a mixture of stems, leaves, flowers and fruits. Stems are cylinder, up to 4 сm long, up to 1,5 сm thick, light green with a spongiose core. Flowers are solitary, corolla is five- lobbed and of a dull purplish colour. The plant material is poisonous! It can be concluded that the raw material is:

***A***  Nettle herb

***B*** St. John's-wort herb

***C*** Belladonna herb

***D*** Peppermint herb

***E*** Shepherd's-purse herb

1. The MRM with such characteristics is received for analysis: a mixture of obovate-acuminate leaves up to 25 cm long and up to 20 cm wide; base of the leaf is cuneated with deep sinuate margin; petiole is cylindrical. Venation is palmate-netted: the main vein and major veins come out at the inner surface of a leaf. The upper surface is dark and greyish-green, the under surface paler. A smell is weak, narcotic. Taste is never determined. The plant is poisonous! Which plant does the described MRM belong to?

***A*** Datura stramonium

***B*** Passiflora incarnata

***C*** Chelidonium majus

***D*** Hyoscyamus niger

***E*** Vinca minor

1. The belladonna leaves contain tropane alkaloids and are a poisonous admixture to other types of raw material. This admixture can be identified at microdiagnostics by such anatomic sign:

***A***  Cells with fatty oil s

***B*** Cells with essential oils

***C*** Cells, filled with calcium oxalate sand

***D*** Cells, filled with spherical crystals

***E*** Cells, filled with prismatic crystals

1. The henbane leaves contain tropane alkaloids and are a poisonous admixture to other types of plant material. This admixture can be identified at microdiagnostics by such anatomic indications:

***A***  Cells with essential oils

***B*** Cells with fatty oils

*C* Cells, filled with prismatic crystals

***D*** Cells, filled with spherical crystals

***E*** Cells, filled with calcium oxalate sand

1. The characteristical microdiagnostic feature of the henbane leaves is a presence of multicellular simple and capitate hairs and inclusions of calcium oxalate, named:

***A*** Prismatic crystals

***B*** Druses

***C*** Cystoliths

***D*** Needle-like crystals

***E*** Raphides

1. Medicines of Madagascar periwinkle (*Catharanthus roseus*) are used for treatment of lymphogranulomatosis, haematosarcoma and in acute leukaemia therapy. Quality standardization of this raw material is carried out according to the content of:

***A*** Atropine

***B*** Harmine

***C*** Vinblastine

***D*** Hyoscyamine

***E*** Strophanthidine

1. Atincture and extracts of which raw material are included in complex medicines «Bellataminal», «Becarbon», «Besalol», «Bellalgin»?

***A*** Celandine herb

***B*** Lily-of-the-valley herb

***C*** Locoweed herb

***D*** Tickseed herb

***E*** Belladonna herb

1. Medicines «Passit», «Novopassit» are used as tranquilizers, sedative and light soporific remedies. These medicines are obtained from:

***A*** Elecampane herb

***B*** Tickseed herb

***C*** Sage leaves

***D*** Passionflower herb

***E*** Common periwinkle herb

1. Medicines «Ajmaline» and «Pulsnorma» are used as antiarrhythmic remedies. These medicines are obtained from:

***A*** Nux vomica seeds

***B*** Common periwinkle herb

***C*** Stramonium leaves

***D*** Catharanthus leaves

***E*** Snakeroot

1. Choose the medicinal raw material which is used for obtaining medicine «Sanguiritrin» with antimicrobial activity:

***A*** Plume poppy

***B*** Datura

***C*** Celandine

***D*** Capsicum

***E*** Bush pea

1. Medicines «Ajmaline» and «Pulsnorma» are used as antiarrhythmic remedies. These medicines are obtained from:

***A*** Stramonium leaves

***B*** Common periwinkle herb

***C*** Snakeroot

***D*** Catharanthus leaves

***E*** Nux vomica seeds

1. Write Latin names of each plant, plant material and family and make a logic chain: A – medicinal plant; B – group of biologically active compounds; C – active compound; D– pharmacological activity.

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|  | **A** | **B** | **C** | **D** |
| 1. | Bush pea  | Tropane | Morphine, codeine, papaverine | Expectorant  |
| 2. | Datura | Isoquinoline | Scopolamine | Analgesic, narcotic |
| 3. | Opium poppy | Quinolizidine | Thermopsine  | Treatment of sea sickness, anthiasmatic |
| 4. | Passionflo-wer  | Indol | Atropine, hyoscine | Sedative |
| 5. | Ergot | Indol | Ergonovine, lysergic acid | Uterotonic |
| 6. | Celandine  | Tropane | Sanguinarine, chelidonine, berberine | Anticholinergic (parasympatholytic), analgesic, antispasmotic |
| 7. | Belladonna | Isoquinoline | Harmine, harmol | Cholagogue, cell division inhibitor |

1. Match the logical chain: structure – name – group of alkaloids – plants.

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| a. Morphine | 1. Isoquinoline alkaloid | I. Celandine |
| b. Atropine | 2. Tropane alkaloid | II. Opium poppy |
| c. Harmine | 3. Indol alkaloid | III. Ergot |

1. Match the logical chain: structure – name – group of alkaloids – plants.

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| a. Thermopsine | 1. Indol alkaloid | I. Periwinkle |
| b. Scopolamine | 2. Quinolizidine alkaloid | II. Datura |
| c. Vincamin | 3. Tropane alkaloid | III. Snakewood |

1. Match the logical chain: structure – name – group of alkaloids – plants.

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| 1. Harmol
 | 1. Pyrrolizidine alkaloid | I. Madagascar periwinkle |
| b. Strychnine  | 2. Isoqunoline alkaloid | II. Stramonium |
| c. Hyoscyamine  | 3. Indol alkaloid | III. Nux vomica |

1. Match the logical chain: structure – name – group of alkaloids – plants.

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| a. Glaucine | 1. Tropane alkaloid | I. Thermopsis |
| b. Papaverine  | 2. Indol alkaloid | II. Сoca |
| c. Berberine | 3. Isoqunoline alkaloid | III. Tulip poppy |

**PRACTICAL TASKS.**

You have to fill in your laboratory hand-book on the topic: Macro- and microscopic analysis of medicinal plant material containing tropane, pyrrolizidine, quinolizidine, isoqunoline and indole alkaloids.

**Objects:** belladonna, stramonium, datura, henbane, coca, senecio, bush pea, poppy, tulip poppy, plum poppy, celandine, barberry, passionflower, snakeweed, periwinkle, catharanthus, ergot, hatchet-vetch.

**LITERATURE TO PREPARE FOR THE LESSON.**

1. Pharmacognosy: textbook for higher school students / V.S. Kyslychenko, L.V. Upyr, Ya.V. Dyakonova, V.Yu. Kuznetsova, I.G. Zinchenko, O.A. Kyslychenko; ed. by V.S. Kyslychenko. – Kharkiv : NUPH: GoldenPages, 2011. – 552 p.; il.
2. Pharmacognosy: textbook for higher school students / V.S. Kyslychenko, L.V. Lenchyk, I.G. Gurieva et al.; ed. by V.S. Kyslychenko. – Kharkiv : NUPH: GoldenPages, 2019. – 584 p.
3. Tests KROK–2. Topic Alkaloids.