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

**OBJECTIVE.**

Know the definition of the term “Alkaloids”, their classification, physical and chemical properties, the identification and quantitative analysis, pharmacological properties.

Analysis of medicinal plant material containing alkaloids

Chemical analysis of medicinal plant material containing alkaloids

***Task 1*.** Extract alkaloids in form of salts from medicinal plant material for the general quality reactions

Method. Place 1.0 g of powdered plant material in a glass conical flask, add 25 ml of 1% hydrochloric acid. Attach a reflux condenser to the flask and boil on awater bath for 30 minutes stirring from time to time. Cool and filter the solution through a paper filter. The filtrate is used for the general quality reactions.

***Task 2*.** Conduct general and colour quality reactions on alkaloids. Make a conclusion.

Method***.*** Put 1 drop of the filtrate and 1 drop of a reagent on subject glass and mix them up by a glass stick.

General reactions

1. *Reaction with* *Wagner’s reagent* (iodine in potassium iodide).

Observation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. *Reaction with* *Mayer’s reagent* (potassium mercuric iodide).

Observation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. *Reaction with* *Dragendorff’s* *reagent* (potassium bismuth iodide).

Observation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. *Reaction with* *Scheibler’s* *reagent* (1 % phosphotungestic acid).

Observation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. *Reaction with* *Bertrand’s* *reagent* (1 % silicotungestic acid).

Observation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. *Reaction with* *1 % phosphomolybdic acid*.

Observation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7. *Reaction with* *1 % picric acid*.

Observation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8. *Reaction with* *0.1 % tannin solution*.

Observation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Conclusion:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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# Colour reactions

9. *Reaction with* *concentrated sulphuric acid*.

Observation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10. *Reaction with* *concentrated nitric acid.*

Observation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

11. *Reaction with* *Erdmann’s reagent* (concentrated sulphuric and nitric acids).

Observation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

12. *Reaction with* *Froed’s reagent* (ammonium molybdate in concentrated sulphuric acid).

Observation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

13. *Reaction with Marqui’s reagent* (formaldehyde in concentrated sulphuric acid).

Observation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

14. *Reaction with 1 % sodium nitroprusside*.

Observation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Conclusion:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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***Task 3***. Extract the purified sum of alkaloids from belladonna leaf for quality reaction. Make a conclusion

Method. Place 1.0 g of the powdered belladonna leaf in a glass conical flask, add 10 ml of 0.05 % sulphuric acid and stir for 2 minutes. Filter, add 1 ml of concentrated ammonia and 5 ml of water and thoroughly shake with 15 ml of ether. Separate ether layer and filter it through anhydrous sodium sulphate. Transfer ether extract to a flat-bottomed dish and evaporate to dryness on a water-bath. Dissolve the dry residue in 0.5 ml of concentrated nitric acid and evaporate to dryness on a water-bath. Add 10 ml of acetone and 3% potassium hydroxide alcoholic solution by drops.

Observation:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Conclusion:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Task 4** Do the chromatographic determination of alkaloids in belladonna leaf comparing to the standard. Compare Rf, colouring of spots.

Method. Place 0.6 g of pulverized plant material in a flask. Add 15 ml of 0.05 mole/l sulphuric acid, stir for 2 minutes, filter. Wash a filter by 0.05 mole/l sulphuric acid to receive 20 ml of filtrate. Add 1 ml of concentrated ammonia solution to the filtrate, transfer to the separating funnel and treat it by 10 ml twice. Separate ether layes, unite it and filter it through anhydrous sodium sulphate. Ether is distilled off, dry residue is dissolved in 0.5 ml of methanol.

Put filtrate and solutions of hyoscyamine and scopolamine as standards on the start line of chromatographic plates with a size 7×15 cm, covered with silica gel layer. A plate is chambered with mixture of solvents acetone: water: concentrated ammonia (90:7:3) and chromatographed. When front line of solvents passes near 10 cm from the start line, a plate is taken out, dried in the drying box at 100 °C during 15 min, processed with Dragendorff’s reagent*.* The chromatogram is analyzed in the day light. Alkaloids appear as orange or brown spots on a yellow background.

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| **Scheme of the chromatogram** | **Chromatogram of extracts containing alkaloids** |
|  | **Chromatography conditions**: *sorbent*: silicagel 60 F254  *solvents system*-acetone – water - concentrated ammonia (90:7:3)  *Derivatizing reagent*: Dragendorff’s reagent   1. Belladonna leaves; 2- hyoscyamine; 3- Henbane leaves; 4- scopolamine; 5 - Stramonium leaves; 6 - mixture of hyoscyamine sulfate and scopolamine hydrobromide |

***Task 5*.** Determine the content of alkaloids in Solanaceae family plants. Compare result with the standard.

Method. 1.*Extraction***.** Place 0.0150 g of pulverized plant material, accurately weighed, in a 250 ml flask, add 150 ml of ether, 7 ml of concentrated ammonia solution and shake during 1 hour. Filter through cotton in the 200 ml flask.

2. *Purification***.** Add 5 ml of water to the filtrate, shake vigorously and leave to clarification of ether layer, then measure 90 ml of ether extract by a graduated cylinder to a 200 ml separating funnel. A cylinder is twice rinsed with 10 ml of ether and added to the ether extract.

Ether extract is treated by 1 % hydrochloric acid solution successively by 20, 15 and 10 ml (a test with Mayer’s reagent), each time filtered through a moistened with water filter, to another separating funnel of the same capacity. The filter is twice washed with 1 % hydrochloric acid solution for 5 ml, added to general acid extract.

Acid extract is alkalified by ammonia to the alkali medium on phenolphthalein, and alkaloids extract is treated successively by 20, 15, 10 ml of chloroform, shaking up for 3 minutes. Chloroform extract is filtered in a 100 ml round-bottomed retort through a paper filter, moistened with chloroform and 4-5 g of anhydrous sodium sulphate. A filter is twice washed with 5 ml of chloroform. Chloroform is distilled off on a water bath to 1-2 ml, and the remain is blown out to the complete disappearance of chloroform smell.

3. *Titration*. The dry residue is dissolved in 15 ml of 0.02 mole/l hydrochloric acid solution, heated on an water bath, add 2 drops of methyl orange alcoholic solution and 1 drop of methylene dark blue and the excess of hydrochloric acid is titrated by 0.02 mole/l sodium hydroxide solution to the yellow colouring.

4. *Calculation*.Content of alkaloids in terms of hyoscyamine in percents (X) is calculated using formula:

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where 1 ml 0,02 mole/l of hydrochloric acid solution corresponds to 0,005780 of hyoscyamine, g;

V - volume of 0.02 mole/l sodium hydroxide solution used for titration, ml;

m - mass of plant material, g which corresponds to the measured V of the ether extract;

W - loss in weight at drying of plant material, %.

Conclusion:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

16.03 – 7, 8 groups

18.03 – 1, 2 group

19.03 – 3, 4 groups

20.03 – 5, 6 group

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

**OBJECTIVE.**

Know the macro- and microscopic signs of medicinal plant material containing protoalkaloids, purine alkaloids and pseudoalkaloids.

Macro- and microscopic analysis of medicinal plant material containing protoalkaloids

**Objects**: capsicum, ephedra, colchicum.

Capsicum fruit

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| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |
| перец | Place for medicinal plant material |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Ephedra stem

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| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |
| эфедра  Original appearance of medicinal plant material | Place for medicinal plant material |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Uses in medicine \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Fresh Colchicum corm

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| Latin name of medicinal plant material | |  |
| Latin name of the plant | | English name of the plant |
| Family | |  |
| Картинки по запросу Colchicum corm | Uses in medicine\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | |

Macro- and microscopic analysis of medicinal plant material containing purine alkaloids

**Objects**: tea, coffee, cola, cocoa, guarana.

Tea leaf

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| Latin name of medicinal plant material | |  |
| Latin name of the plant | | English name of the plant |
| Family | |  |
| Картинки по запросу Tea leaf | Uses in medicine\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | |

Coffee bean

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| Latin name of medicinal plant material | |  |
| Latin name of the plant | | English name of the plant |
| Family | |  |
| Картинки по запросу Coffee bean | Uses in medicine\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | |

Cocoa seed

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| Latin name of medicinal plant material | |  |
| Latin name of the plant | | English name of the plant |
| Family | |  |
| Картинки по запросу cocoa seed | Uses in medicine\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | |

Macro- and microscopic analysis of medical plant material containing pseudoalkaloids

**Objects:** aconite, delphinium, yew, kangaroo apple, veratrum.

**Aconite root**

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| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |
| Картинки по запросу Aconite root | Place for medicinal plant material |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Delphinium herb**

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| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |
| Картинки по запросу Delphinium elatum | Place for medicinal plant material |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |
| Картинки по запросу Yew | Place for medicinal plant material |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Veratrum rhizomes and roots**

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| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |
| чемерица | Place for medicinal plant material |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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06.04 – 7, 8 groups

08.04 – 1, 2 group

09.04– 3, 4 groups

10.04 – 5, 6 group

**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.

Macro- and microscopic analysis of medicinal plant material containing tropane, pyrrolizidine, quinolizidine alkaloids

**Objects:** belladonna, stramonium, datura, henbane, coca, senecio, bush pea.

Belladonna leaf

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| --- | --- |
| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |
| красавка-лист | Place for medicinal plant material |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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*Microscopic analysis of belladonna leaf*

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| --- | --- |
| красавка-лист-микро | Anatomical features of belladonna leaf  1.  2.  3.  4.  5.  6.  7. |

Uses in medicine \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Belladonna root

|  |  |
| --- | --- |
| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |
| красавка-корень | Place for medicinal plant material |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Uses in medicine \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Stramonium leaf

|  |  |
| --- | --- |
| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |
| дурман | Place for medicinal plant material |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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*Microscopic analysis of stramonium leaf*

|  |  |
| --- | --- |
| дурман-микро | Anatomical features of stramonium leaf  1.  2.  3.  4.  5.  6. |

Uses in medicine \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Henbane leaf**

|  |  |
| --- | --- |
| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |
| белена | Place for medicinal plant material |

*Adulteration*:

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Microscopic analysis of henbane leaf*

|  |  |
| --- | --- |
| белена-микро | Anatomical features of henbane leaf  1.  2.  3.  4.  5.  6. |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Uses in medicine \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Thermopsis herb

|  |  |
| --- | --- |
| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |
| термопсис | Place for medicinal plant material |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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*Microscopic analysis of Thermopsis leaf*

|  |  |
| --- | --- |
| термопсис-лист | Anatomical features ofBush pea leaf  1.  2.  3.  4.  5. |

Uses in medicine \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Macro- and microscopic analysis of medical plant material containing isoquinoline, indole alkaloids

**Objects:** poppy, tulip poppy, plum poppy, celandine, barberry, passionflower, snakeweed, periwinkle, catharanthus, ergot, hatchet-vetch.

Celandine herb

|  |  |
| --- | --- |
| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |
| чистотел | Place for medicinal plant material |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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*Microscopic analysis of celandine leaf*

|  |  |
| --- | --- |
| чистотел-микро | Anatomical features of celandine leaf  1.  2.  3.  4.  5.  6. |

Uses in medicine \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Tulip poppy herb

|  |  |
| --- | --- |
| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |
| мачок | Place for medicinal plant material |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Uses in medicine \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Barberry root

|  |  |
| --- | --- |
| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |
| барбарис-корень | Place for medicinal plant material |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Uses in medicine \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Barberry leaf

|  |  |
| --- | --- |
| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |
| барбарис-лист | Place for medicinal plant material |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Passionflower herb

|  |  |
| --- | --- |
| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |
| пассифлора | Place for medicinal plant material |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Snakeweed root

|  |  |
| --- | --- |
| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |
| раувольфия | Place for medicinal plant material |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Uses in medicine \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Common periwinkle herb

|  |  |
| --- | --- |
| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |
| барвинок | Place for medicinal plant material |

*Adulteration*:

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Uses in medicine \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Catharanthus (Madagascar periwinkle) herb

|  |  |
| --- | --- |
| Latin name of medicinal plant material |  |
| Latin name of plant source | English name of plant source |
| Family |  |
| катарантус | Place for medicinal plant material |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Ergot

|  |  |
| --- | --- |
| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |
| спорынья | Place for medicinal plant material |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Uses in medicine \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Hatchet-vetch stem

|  |  |
| --- | --- |
| Latin name of medicinal plant material |  |
| Latin name of the plant | English name of the plant |
| Family |  |
| секуринега | Place for medicinal plant material |

Specific features:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Uses in medicine \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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