

**ODESSA NATIONAL MEDICAL UNIVERSITY**  
**Department of General and Clinical Pharmacology and Pharmacognosy**

**GUIDELINES**  
**on independent work of students / VTS / № 18**

**on the topic: «Alkaloids (true alkaloids). Lobelia swollen, leafless hedgehog, flat-leaved yellow-leaved, cocaine bush, carniolian scopolia, thermopsis species, opium poppy, yellow water lily, lamb's clownfish, sophora thick-leaved, henna tree, rutka medicinal, Chinese tea, coffee, cocoa beans, cola, paulinia) ''.**

**Course: 3rd Faculty: medico-pharmaceutical**

**Approved on methodical  
meeting of the department  
"30" 08.2024  
Protocol № 1  
Head department  
MD, prof. JV Rozhkovsky**

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**Topic: «Alkaloids (true alkaloids). Lobelia swollen, leafless hedgehog, flat-leaved yellow-leaved, cocaine bush, carniolian scopolia, thermopsis species, opium poppy, yellow water lily, lamb's clownfish, sophora thick-leaved, henna tree, rutka medicinal, Chinese tea, coffee, cocoa beans, cola, paulinia) ". - 5 years**

### **1. Relevance of the topic**

Among natural BAS, alkaloids are the main group from which modern medicine derives the largest number of highly effective drugs. Alkaloids are divided into three classes: true alkaloids, pseudo- and protoalkaloids. True alkaloids have heterocyclic rings and are biosynthetically derived from alkaloidogenic amino acids, or from nicotinic or anthranilic acid. Most alkaloids have a selective effect on a certain group of cells, receptors. Alkaloid-containing raw materials are used for the production of individual and total drugs, which, as well as the corresponding LRS are very toxic, work with them and storage require certain knowledge, which is essential for future pharmacists in their future professional activities.

### **2. Learning objectives:**

As a result of independent elaboration of this theme students should:

**- know:**

- basic information about macroscopic and microscopic methods of analysis of LR and LRS, which contain true alkaloids.
- the effect on the human body of raw materials that contain true alkaloids.
- LR and LRS, which have true alkaloids: lobelia puffed, leafless hedgehog, yellow-leaved flat-leaved, coca bush, scopolia carniolium, species thermopsis, opium poppy, yellow water lily, clownfish, sophora large-fruited, chufora maple, , ipecac, yohimbe, chilibuha, sources of caffeine (Chinese tea, coffee, cocoa beans, cola, paulinia).

**- be able to:**

- perform a macroscopic analysis of LRS, which contains true alkaloids.
- perform microscopic analysis of LRS, which has true alkaloids.
- to know LR, which contains true alkaloids according to herbarium samples
- distinguish from impurities raw materials that contain true alkaloids.

### **3. Materials for pre-classroom training of students.**

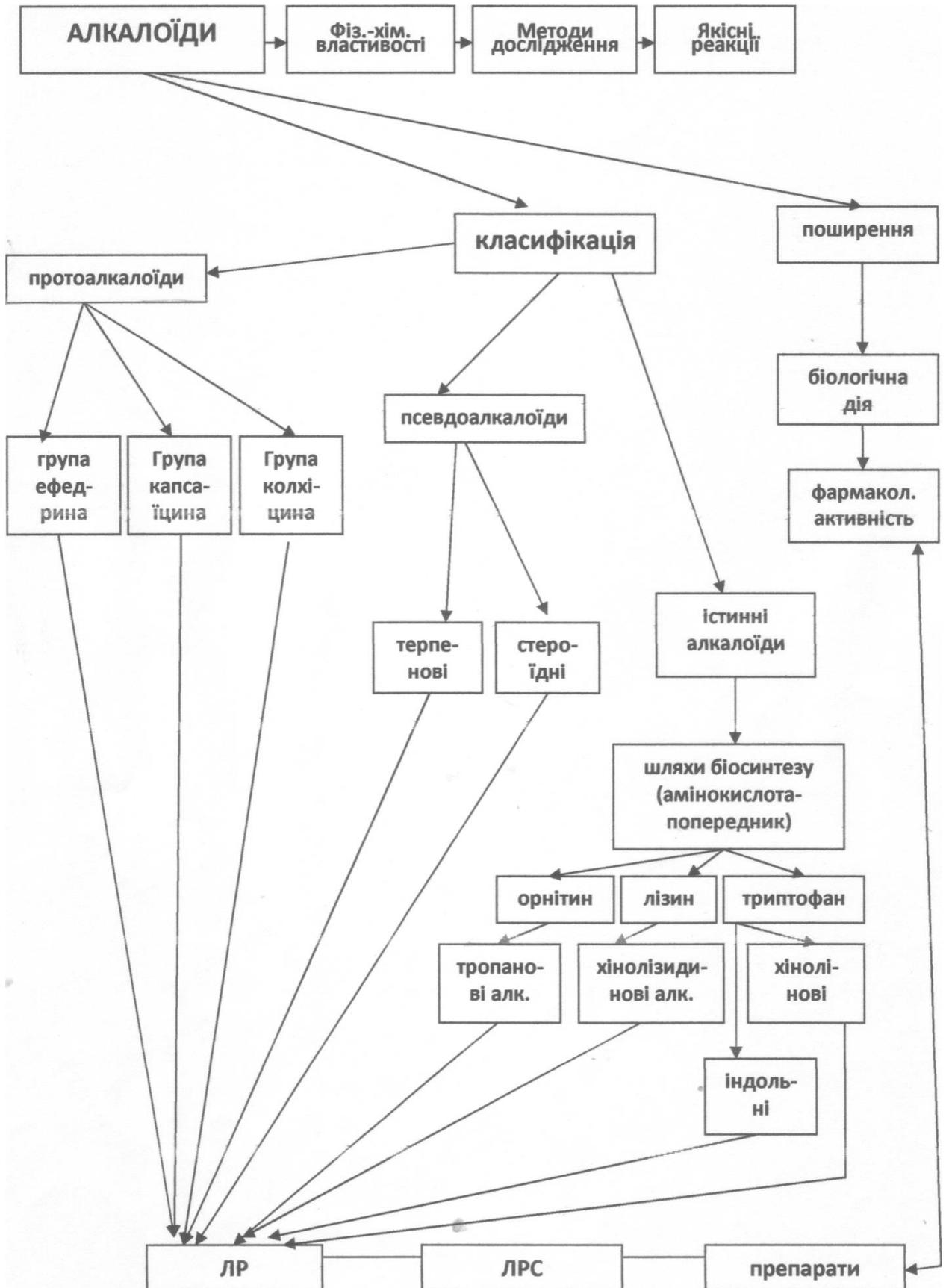
**3.1. Basic basic knowledge, skills, abilities that are necessary for independent study and mastering of the topic and which are based on interdisciplinary connections:**

<b>№</b>	<b>Discipline</b>	<b>Know</b>	<b>Be able</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>

	<p>1. Botany</p> <p>2. Organic chemistry</p> <p>3. Analytical chemistry</p>	<p>Characteristic features of the families of the studied plants. Morphology of stem, bark, leaves, flower, fruit, root and rhizome. Anatomical structure of leaves, bark, fruit, roots, rhizomes.</p> <p>Physical and chemical properties of polysaccharides, glycosides, terpenoids, derivatives of aromatic series, heterocycles.</p> <p>Methods of acid - base titration (neutralization) and permanganatometry</p>	<p>Use a microscope, prepare surface preparations and cross-sections.</p> <p>Carry out qualitative reactions; purification of organic compounds.</p> <p>Work with analytical balances, measuring vessels, photoelectrocalometer, use methods of chromatography on paper and in a thin layer of sorbent.</p>
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### 3.2. Contents of the topic.

- structural and logical scheme



### 3.3. Recommended Books:

#### - additional

1. Фармакогнозія: підручник (I—III р. а.) / І.А. Бобкова, Л.В. Варлахова. – 3-є видання Всеукраїнське спеціалізоване видавництво «Медицина» 2018, 504с.
2. Фармакогнозія: базовий підручн. для студ. вищ. фармац. навч. закл.(фармац. ф-тів) IV рівня акредитації / В.С. Кисличенко, І.О. Журавель, С.М. Марчишин та ін.; за ред. В.С. Кисличенко. – Харків: НФаУ: Золоті сторінки, 2015. - 736 с.
3. Навчальний посібник з дисципліни «Фармакогнозія» / Я. В. Рожковський, Б. В. Приступа, І. А. Бойко, Н. В. Герасимюк, В. В. Черногорюк -: Методична розробка кафедри фармакогнозії ОНМедУ. – Одеса: ОНМедУ, 2019 – 51 с.
4. Державна Фармакопея України: в 3 т. / Державне підприємство «Український науковий фармакопейний центр якості лікарських засобів». – 2-е вид. – Харків: Державне підприємство «Український науковий фармакопейний центр якості лікарських засобів», 2015. – Т. 1. – 1500 с.

#### Додаткова література:

- 1 Державна Фармакопея України: в 3 т. / Державне підприємство «Український науковий фармакопейний центр якості лікарських засобів». – 2-е вид. – Харків: Державне підприємство «Український науковий фармакопейний центр якості лікарських засобів», 2014. – Т. 3. – 732 с.
2. Сербін А.Г., Сіра Л.М., Слободянюк Т.О. Фармацевтична ботаніка. Підручник. – Вінниця: НОВА КНИГА, 2007. – 488 с.
3. Практикум з ідентифікації лікарської рослинної сировини: навч. посіб. / [В. М. Ковальов, С. М. Марчишин, О. П. Хворост та ін.] ; за ред. В. М. Ковальова, С. М. Марчишин. – Тернопіль: ТДМУ, 2014. – 250 с.

### 3.4. Guidance card for self - study of a student with using the literature on the topic:

№№ р / р	Basic tasks and instructions	Answers
	2	3
	Write down the Latin name of the swollen lobelia and LRS, which is obtained from this plant.	
	Give a botanical description of the swollen lobelia	
	What organs of lobelia are used in medicine, give their pharmacognostic description, how to harvest and dry them.	
	Lobelia bloating in medicine is used as ....	

	Write down the Latin name of the leafless hedgehog and the LRS derived from this plant.	
	Give a botanical description of the leafless hedgehog	
	What organs of the leafless hedgehog are used in medicine, give their pharmacognostic description, how they are harvested and dried.	
	Hedgehog leafless in medicine used as ....	
	Write down the Latin name of the following plants: yellow-leaved flat-leaved, coca bush, carniolian scopolia, thermopsis species, opium poppy, yellow water lily, cranberry, quince tree, henna tree, rutka, stephania smooth, chicory, maklei, spring, Chinese tea, coffee, cocoa beans, cola, paulinia) and LRS, which are obtained from this plant.	
	Give a botanical description of the following plants: yellow-leaved flat-leaved, coca bush, carniolian scopolia, thermopsis species, opium poppy, yellow water lily, clownfish, sophora thick-leaved, henna tree, rutka, stephania smooth, macelau, kocheliha, ipepe Chinese tea, coffee, cocoa beans, cola, paulinia)	
	What are the organs of such plants: yarrow, coca bush, carniolian scopolia, thermopsis species, opium poppy, yellow water lily, clownfish, sophora thick-leaved, henna tree, medicinal root, stephania smooth, maclea, ipecacuana chibabuha, yohi Chinese, coffee, cocoa beans, cola, paulinia) are used in medicine, give their pharmacognostic description of how they are harvested and dried.	
	The following plants: flat-leaved yellow-leaved, coca bush, carniolian scopolia, thermopsis species, opium poppy, yellow water lily, lamb's clownfish, sophora thick-leaved, henna tree, medicinal root, stephania smooth, maclea, ipecac, chihuahua, yohim coffee, cocoa beans, cola, paulinia) are used in medicine as ....	

### 3.5. Materials for self-control.

### 3.5.1. Questions for self-control.

1. Define the term "true alkaloids".
2. Give the classification of true alkaloids.
3. Name the main precursors (amino acids precursors) of true alkaloids.
4. Give the general structural formula of the main heterocycles of true alkaloids.
5. List the qualitative reactions used to identify specific groups of true alkaloids: purine; tropane; indole.
6. Explain the mechanism of physiological action of alkaloids.
7. Name the main types of pharmacological activity of alkaloids.
8. Name the requirements for procurement, processing, storage of LRS containing alkaloids.
9. Name and describe LR and LRS, which contain tropane alkaloids.
10. Name and describe LR and LRS, which contain quinolizidine alkaloids.
11. Name and describe LR and LRS, which contain indole alkaloids.
12. Name and describe LR and LRS, which contain quinoline alkaloids.
13. Name and describe LR and LRS, which contain purine alkaloids.

### 3.5.2. Test tasks for self-control.

1. Colchicine alkaloids are used to treat malignant tumors. The source of their receipt is:
  - A. Late flower is beautiful
  - B. Thermopsis lanceolate
  - C. Periwinkle is small
  - D. Ordinary belladonna
  - E. Lobelia bloated
2. Specify the LRS used for the production of colchamine ointment:
  - A. late-flowering bulbs
  - B. rhizome with hellebore roots
  - C. rhizome of Scopolia carniola
  - D. roots of beauty
  - E. roots of Rauwolfia
3. Preparations of belladonna are used as anti-asthmatic, antispasmodics. The official raw materials are:
  - A. Leaves and roots of belladonna
  - B. Belladonna grass
  - C. Belladonna fruit
  - D. Belladonna flowers
  - E. Belladonna rhizomes

4. Children and schoolchildren are often involved in the procurement of vegetable raw materials. Choose which medicinal plant raw materials children and schoolchildren are not allowed to harvest.

- A. Herba Belladonnae
- B. Herba Hyperici
- C. Herba Bidentis
- D. Herba Leonuri
- E. Herb Oregano

5. Belladonna leaf contains tropane alkaloids and is a poisonous impurity in other raw materials. This impurity in microscopic analysis can be determined by the following anatomical features:

- A. cells filled with calcium oxalate sand
- B. cells containing essential oil
- C. cells containing fatty oil
- D. cells filled with spherocrystals
- E. cells filled with prism-like crystals

6. During the commodity analysis of raw materials, it was found that it consists of a mixture of stems, leaves, flowers and fruits. Stems cylindrical, up to 4 cm long, up to 1.5 cm thick, light green with a loose core. The flowers are solitary, the calyx is toothed, the corolla is tubular-bell-shaped, brown-violet. Raw material is poisonous. It is concluded that the raw material is grass:

- A. Belladonna grass
- B. St. John's wort herb
- C. Mint herb
- D. Nettle grass
- E. Grits grass

7. From vegetable raw materials make tincture, extracts which are a part of complex preparations "Belataminal", "Bekarbon", "Besalol", "Belalgin", etc., for this purpose use:

- A. belladonna grass
- B. lily of the valley grass
- C. astragalus herb
- D. grass herds
- E. celandine herb

8. Chemical identification of belladonna herb in accordance with the State Pharmacopoeia of Ukraine is carried out using thin layer chromatography. On the chromatographic plate after treatment with the reagent identify the following substance:

- A. hyoscyamine
- B. vinblastine
- C. routine
- D. head acid

E. arbutin

9. Standardization of this raw material is carried out according to the content of alkaloids in terms of hyoscyamine. Name these raw materials:

A. Folia Belladonnae.

B. Radices Berberidis.

C. Herba Chelidonii.

D. Herba Thermopsis lanceolatae.

E. Fructus Capsici.

10. The drug bellalgin has an antispasmodic effect in diseases of the gastrointestinal tract, due to the presence of alkaloids. What group do they belong to?

A. Tropan

B. Pyrolisidine

C. Pyridine

D. Quinolizidine

E. Indole

11. The amount of alkaloids extracted from the raw material of belladonna ordinary and uterine horns of ergotamine strain, is part of such a complex drug with sedative, antispasmodic, analgesic action

A. Belataminal

B. Becarbon

C. Omnopon

D. Aimalin

E. Raunatin

12. For analysis received LRS, which is a mixture of ovate-pointed leaves up to 25 cm long and up to 20 cm wide; leaf base wedge-shaped, coarse-edged edge; petiole long cylindrical. Leaf veining pinnate; the main vein and the veins of the first order strongly protrude on the lower surface of the leaf. The leaves are dark green above, lighter below. The smell is weak, narcotic. The taste is not determined. The plant is poisonous! Which plant belongs to the described LRS?

A. Datura stramonium

B. Passiflora incarnata

C. Chelidonium majus

D. Hyoscyamus niger

E. Vinca minor

***Methodical recommendations were made by***



***associate professor Boyko IA***