ODESSA NATIONAL MEDICAL UNIVERSITY

Department of General and Clinical Pharmacology and Pharmacognosy

METHODICAL DEVELOPMENT OF THE LECTURE

Course: "Pharmacognosy"

Lecture № 17

"Alkaloids. General characteristics Methods of qualitative and quantitative determination. "

Course: 3rd Faculty: medico-pharmaceutical

The lecture was discussed
at the methodical meeting
departments
30.08.2024

Head department

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Odessa - 2024

Lecture № 17 “Alkaloids. General characteristics Methods of qualitative and quantitative determination. " (4 years)

1. ***Actuality of theme. Rationale for the topic.***

Among natural BAS, alkaloids are the main group from which modern medicine derives the largest number of highly effective drugs. 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. ***Objectives of the lecture***

-educational:

- to acquaint students with features of a structure, classification of alkaloids;

-on the example of different classes of alkaloids to form an idea of the ways of their biosynthesis;

- to draw students' attention to the peculiarities of procurement, processing and storage of LRS containing alkaloids;

- to acquaint students with the modern pharmacopoeial and perspective assortment of LRS containing alkaloids.

-educational:

Educating students in professional thinking, a responsible attitude to the release of herbal medicines with LRS containing alkaloids, strengthening awareness of the particularly harmful effects on the human body with relevant scientific data on the subject.

3. ***Lecture plan and organizational structure***

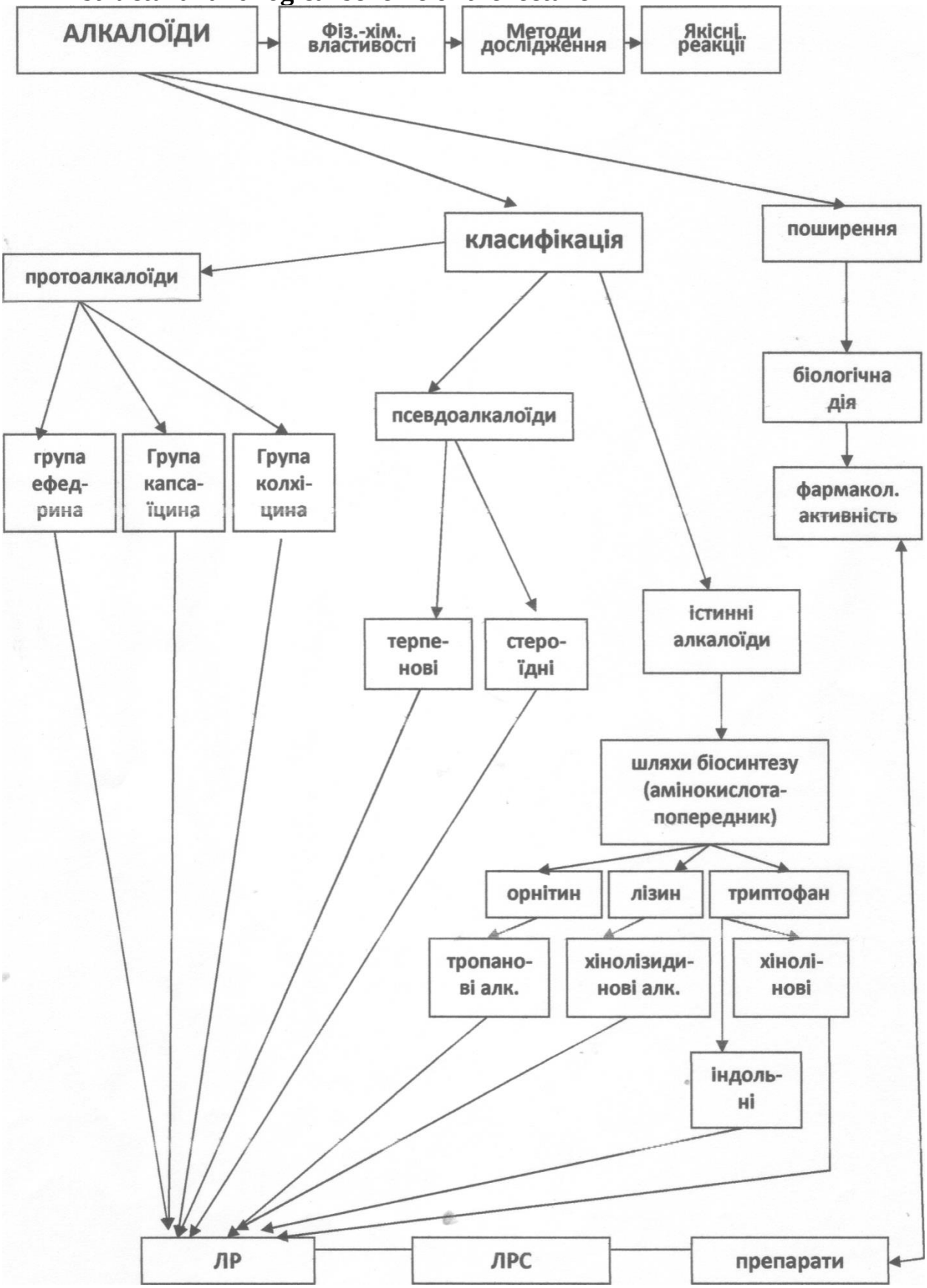
№	The main stages of the lecture and their content	Goals in levels of abstraction	Type of lecture, lecture equipment	Time distribution
1	2	3	4	5
I. 1. 2.	**Preparatory stage** Defining a learning goal Providing positive motivation			5%
II. 3.	**The main stage** **Presentation of lecture material.** **Plan:** *Part 1. General characteristics of alkaloids. Proto- and pseudo alkaloids.* 1. Definition of "alkaloids" 2. Classification of alkaloids	I	Combined, tables, overhead projector,	90%

	3. Distribution and biological function 4. Physico-chemical properties 5. Research methods, qualitative reactions 6. Biological action, types of pharmacological activity 7. Protoalkaloids (general characteristics) 8. LR and LRS, which contains protoalkaloids - ephedrine group - capsaicin group - colchicine group 9. Pseudoalkaloids (general characteristics) 10. LR and LRS, which contains pseudo alkaloids - diterpenes - -steroid (glycoalkaloids) *Part 2. True alkaloids* 11. Classification and ways of biosynthesis 12. LR and LRS containing true alkaloids - derivatives of ornithine: tropane alkaloids; - lysine derivatives: quinolizidine alkaloids; - tryptophan derivatives: quinoline, indole alkaloids	I II II II II I III I III I III	slides, herbarium LR, samples LRS, preparations	
III. 4. 5.	The final stage Summary of the lecture, general conclusions. Lecturer's answers to possible questions. Tasks for self-preparation		References, questions, tasks	2% 2% 1%

4.

Contents of lecture material:

-structural and logical scheme of the lecture



-text of the lecture *(attached)*

5. Materials on activating students during the lecture:

Question:

1. On what grounds are alkaloids isolated in an independent group of BAR?
2. Why is the cyclic part of the alkaloid molecule called heterocycle?
3. What role do alkaloids play in the life of plants, animals, and humans?
4. How have plant alkaloids been used for a long time?
5. Which families of plants of local flora are the richest in alkaloids?
6. With the help of BAR of which group is it possible to bind and excrete alkaloid molecules from the human body?

Situational tasks:

1. Group according to botanical classification alkaloids that have been isolated from the following plants: black cohosh; sleeping poppy; dope ordinary; belladonna; yellow cat ', Dzungarian aconite; high dolphin; celandine ordinary, buttercup caustic.
2. Determine the proportions (raw materials) of plants in which the maximum accumulation of alkaloids: quince tree (bark); sleeping poppy (boxes); spotted hemlock (fruit); Dzungarian aconite (tubers); tea bush (leaves); Arabian coffee (seeds).
3. Suggest a method for producing coniine and nicotine if these alkaloids are volatile liquids. Correct answer: steam distillation.

6 General material and methodological support of the lecture:

- training room: lecture hall (Malinovsky, 37);
- equipment: overhead projector (or multimedia projector), screen;
- illustrative materials: slides, herbariums L R, samples of LS, packed up LRS, pharmaceutical preparations.

Question

(up to 1 part of the lecture topic):

1. Define the term "alkaloids".
2. Give the classification of alkaloids.
2. .Describe the physicochemical properties of alkaloids as weak bases.
3. What role do alkaloids play in the life of the plant organism?
4. What factors affect the accumulation of alkaloids in LRS?
5. Name the types of pharmacological activity of alkaloids.
6. Describe the methods of isolation and study of alkaloids in LRS.
7. Name the qualitative reactions to alkaloids.
8. By what principle are protoalkaloids isolated and classified?
9. Name and describe LR and LRS containing protoalkaloids.
10. What BAR are pseudoalkaloids? What other name does this group have?
11. Name and describe LR and LRS containing diterpene alkaloids.
12. Name and describe LR and LRS containing glycoalkaloids.

(up to 2 parts of the lecture topic):

13. Define the term "true alkaloids".
14. Give the classification of true alkaloids.
15. Name the main precursors (amino acids precursors) of true alkaloids.
16. Give the general structural formula of the main heterocycles of true alkaloids.
17. List the qualitative reactions used to identify specific groups of true alkaloids: purine; tropanic; indole.
18. Explain the mechanism of physiological action of alkaloids.

19. Name the main types of pharmacological activity of alkaloids.
20. Name the requirements for procurement, processing, storage of LRS containing alkaloids.
21. Name and describe LR and LRS, which contain tropane alkaloids.
22. Name and describe LR and LRS, which contain quinolizidine alkaloids.
23. Name and describe LR and LRS, which contain indole alkaloids.
24. Name and describe LR and LRS, which contain quinoline alkaloids.
25. Name and describe LR and LRS, which contain purine alkaloids.

Situational and test tasks (up to 1 part of the lecture topic):

1. Distribute the following alkaloid-containing raw materials and preparations by storage groups: fruits of annual pepper; tea leaves; late-flowering bulbs of beautiful; chilibukha seeds; celandine herb; periwinkle herb; aconite tubers; ephedra grass; morphine; tincture of capsicum; valokormid; New-grazing.

Answer: Chilibukha seeds, late-flowering tubers, morphine - list A; periwinkle herb, ephedra herb, valokormid - list B; tea leaves, fruits of annual pepper, Novo-pasit, celandine grass - the general list.

2. Classification of alkaloids, which is based on the ways of their biosynthesis:
A. Chemically
B. Botanical
C. Pharmacological
D. Letter

3. Make a significant addition to the proposed definition of alkaloids: "A. is a group of nitrogen-containing substances of plant and animal origin, which show the properties of bases and ... »
A. High pharmacological activity
B. Well soluble in organic solvents
C. Well soluble in water
D. Are in plants in the form of salts of organic acids
4. Without the participation of amino acids, alkaloids are formed:
A. Monoterpenes
B. Tropan
C. Quinolizidine
D. Indole

5. Alkaloids formed from (with participation) amino acids:
A. Indole alkaloids
B. Aconitine
C. Taxoids
D. Steroid alkaloids

6. Unlike true alkaloids, pseudo alkaloids
A. Contain nitrogen in a terpenoid base (isoprenoid residues)
B. Do not contain nitrogen in the molecule
C. Formed as a result of dissimilation of amino acids

D. Contain nitrogen outside the cyclic part of the molecule

7. Water-soluble alkaloids-bases include
A. Ephedrine
B. Morphine
C. Papaverine
D. Atropine

8. Yellow alkaloid is:
A. Berberine
B. Caffeine
C. Ephedrine
D. Morphine

9. The solubility of alkaloids depends on
A. Forms of their presence in vegetable raw materials
B. Extraction temperatures from raw materials
C. Amino acid base
D. Optical activity

10. An alkaloid that forms a precipitate under the action of alkalis and then dissolves in their excess, which makes it possible to determine it among other alkaloids - is:
A. Morphine
B. Ephedrine
C. Atropine
D. Nicotine

11. The largest number of alkaloid-containing plants with a high content of alkaloids is distributed in
A. Tropical countries
B. Temperate countries
C. Asia
D. Australia

12. When working with this raw material it is necessary to wear respirators and goggles, because its dust irritates the mucous membranes. It:
A. Fruits of capsicum
B. Ephedra grass
C. Periwinkle herb small
D. Celandine herb

13. Rhizomes with roots of which plants containing steroid alkaloids are used extensively as an anti-parasitic agent?
A. Lobel's hellebore
B. Belladonna
C. Ipecac
D. Canadian Hydrastis

14. The micropreparation of this LRS shows: exoderm of the primary cortex, aerenchyma of the mesoderm, endoderm with U-shaped thickening, the central cylinder with large xylem rays. It:
    A. Hellebore root
    B. Rhizome of hellebore
    C. Belladonna root
    D. Celandine leaf

15. Sedimentary reactions to alkaloids are usually carried out with 5-7 different reagents because
    A. Some other organic compounds in the extracts also form precipitates with the general sludge reagents.
    B. Different alkaloids have different sensitivities to general sedimentary reagents
    C. Some alkaloids do not form precipitates at all with some standard reagents.
    D. Some alkaloids do not always form precipitates of a certain color with certain reagents.

(up to 2 parts of the lecture topic):

1. Name medicinal plants - sources of alkaloid-containing raw materials from the family Solanaceae and conduct a comparative morphological analysis (leaves).
2. Which of these plants contains atropine?
    A. Belladonna
    B. Horsetail ephedra
    C. Chinese tea
    D. Catharanthus pink

3. Which LRS contains platyphyllin?
    A. Rhizomes with roots of yellow-leaved yellow
    B. Poppy boxes
    C. Barberry roots
    D. Periwinkle herb small

4. To which chemical group do sleeping poppy alkaloids belong?
    A. Isoquinoline derivatives
    B. Tropan derivatives
    C. Pyrrolizidine derivatives
    D. Purine derivatives

5. To which chemical group do belladonna alkaloids belong?
    A. Tropan derivatives
    B. Isoquinoline derivatives
    C. Pyrrolizidine derivatives
    D. Purine derivatives

6. To which chemical group belong the alkaloids of barberry?

A. Isoquinoline derivatives
B. Purine derivatives
C. Pyrrolizidine derivatives
D. Tropan derivatives

7. L. PC, what contains alkaloids, mainly stored according to list B. According to the General list store alkaloid-containing raw materials:
A. Celandine herb
B. Barberry roots
C. Ephedra grass
D. The leaves are pale

8. Which medicinal plant contains glaucine?
A. The cat is yellow
B. B. Oil poppy
C. Poppy sleeping pills
D. Celandine is common
9. The herb of this tropical plant from the periwinkle family is used as an antitumor agent. It:
A. Catharanthus pink
B. Strophant Combe
C. Rauwolfia the Serpent
D. Periwinkle is small

10. LRS securinega spray is:
A. Shoots
B. Grass
C. Leaf
D. Roots

11. Type -source of drugs that stimulate the uterine muscles - ergotal, ergotamine, ergocryptine, are:
A. *Claviceps purpurea*
B. *Berberis vulgaris*
C. *Cinchona officinal*is
D. *Thermopsis lanceolata*

12. The yellow color of dry raw materials Radices Berberidis is due
A. The presence of berberine
B. Slow air drying
C. Fast drying in dryers
D. The presence of glaucine

13. cultivation of this plant and production of the corresponding LPC is controlled by the UN and is forbidden in Ukraine. It:
A. Poppy is a sleeping pill
B. Ginseng

C. Astragalus woolly
D. The cat is yellow

14. It is known that the source of BAR can be mushrooms. For example, the source of indole alkaloids are:
A. Disputes are purple
B. Rauwolfia the Serpent
C. Chilibukha
D. Scopolia of Carniola

Question

A. Name the main sources of replenishment of the modern range of medicinal plants.
2. In which cases of LRS, which have pronounced medicinal properties, require additional study of the chemical composition?
3. What is the difference between the pharmacopoeial range of natural sources of medicinal raw materials from the list of sources that only have a permit for use?
4. What unofficial species of higher and lower plants are included in Zdrenko's collection?
5. What types of LRS, which are part of the collection according to Zdrenko's prescription, were considered in our course as impurities to the official species?

Test tasks

1. In which case in the analysis of good quality and identity of LRS in the analytical sample determine only the content of extractives?
A. The active substance in this raw material has not yet been established or is known
B. B. LRS belongs to the potent
C. LRS is poisonous
D. LRS is used only fresh

2. Name dosage form of use *Cormus Kalanchoes reviews:*
A. Juice
B. Aloe
C. Liquid extract
D. Thick extract

3. How was Kalanchoe periste introduced into scientific medicine?
A. From folk medicine
B. From Tibetan medicine
C. According to the results of chemical studies
D. Accidentally

4. The raw material of the fungus Fungus betulinus is
A. Vegetative body
B. Disputes
C. Mycelium
D. Milk juice.

5. The source of medicinal raw materials called "lycopodia" are spores
A. Plauna mace-shaped
B. Plauna-lamb
C. Plaun annual
D. Male fern

6. Medicinal plant, which is a semi-parasite and inhabits trees (poplars, pears) and is currently used only in homeopathy, is called:
A. White mistletoe
B. Tinder
C. Birch mushroom
D. They infected

8. Literature used by the lecturer to prepare the lecture

- additional

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Додаткова література:

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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.
5. Pharmacognosy with the basics of phytotherapy A. Pastushenkov, N. Bespalova Phoenix Publishing House 2016.

The lecture was composed by _____ MD, Professor Ya.V. Rozhkovsky

LECTURE TEXT

ALKALOIDS

Alkaloids are a group of organic nitrogen-containing substances of plant and animal origin that have the properties of bases and exhibit high specific pharmacological activity.

The term "alkaloids" was proposed by chemist-pharmacist W. Meissner in 1819. The alkaloid morphine was first isolated from opium in 1804 by the French pharmacist Segen.

A. is an extremely important group of BAS for medicine and pharmacy, because it is the basis (substance) for many well-known highly effective drugs.

CLASSIFICATION

Currently, there are several types of classifications of alkaloids: botanical, pharmacological, biogenetic (chemical).

Botanical: combines into one group alkaloids isolated from closely related plants (these are, for example, alkaloids of the family Papaveraceae, Solanaceae).

Pharmacological: divides alkaloids by pharmacological properties: narcotic analgesics, M-cholinolytics, alc., Which excite the central nervous system, etc.

Chemical (biogenetic): takes into account the structure of the heterocycle and the path of biosynthesis. This classification is accepted in our course of pharmacognosy. According to this classification, alkaloids can be represented as three groups:

-True alkaloids: have heterocyclic rings with a nitrogen atom in the molecule and biosynthetic ones are derived from alkaloidogenic amino acids, sometimes from nicotinic or anthranilic acid;

-protoalkaloids: contain nitrogen outside the heterocycles, but are also formed from amino acids;

-Pseudoalkaloids (isoprene alkaloids): formed without the participation of amino acids and combined into one group regardless of the presence of a heterocycle. Almost all pseudoalkaloids are of terpenoid origin and are divided into mono-, sesqui-, di-, triterpene and steroid.

A. show the properties of amines, so they can exist in two forms: in the form of salts; in the form of meadows. There are primary amines (mescaline), secondary (ephedrine), tertiary amines (atropine) and derivatives of Quaternary ammonium bases. The most numerous is the group of tertiary amines.

A. are usually monobasic compounds. In plants are in the form of salts of organic or mineral acids: citric, oxalic, succinic, acetic, sulfuric, phosphoric, and others.

Drugs are created on the basis of chlorides, sulfates, nitrates, phosphates, sometimes tartrates of salicylates of alkaloids.

DISTRIBUTION AND BIOLOGICAL FUNCTIONS

Alkaloid-containing plants make up about 10% of the world's flora. More than 6 thousand alkaloids are known, of which 50 are isolated from raw materials of animal origin.

A. are rarely found in lower plants (fungi Claviceps, Penicillum), infrequently - in gymnosperms (genus Taxus, Ephedra).

The richest alkaloid-containing plants are plants: ephedra, nightshade, aster, lobelia, legumes, milkweed, poppy, barberry.

A. accumulate mainly in tissues of 4 types: 1-actively growing, 2-epidermal and hypodermal, 3-lining vascular bundles, 4-latex vessels.

A. are in vacuoles and therefore are not found in young cells before vacuolation. They are rarely found in dead tissues and even in the bark of the quince tree are found exclusively in the parenchyma.

A. are localized in certain organs of plants: in the bark (quince tree); in tubers (aconite); leaves (coca bush); fruits (hemlock), seeds (physostigma).

As a rule, the plant contains a mixture of alkaloids, sometimes up to 15-50, often similar in structure. However, there are exceptions - the only alkaloid in castor oil - ricin.

Content - usually tenths and hundredths of a percent and rarely - 10-15% (cinnamon bark).

Fluctuations in the content of A. are often due to the conditions of drying and storage of LRS: at slow drying unstable a. are destroyed. For example, with rapid drying for 5-6 hours at 60 ºC, datura leaves contain 0.54% a., And after prolonged drying (7 days in the shade) - only 0.35%. Also the content of a. in raw materials can decrease at storage of raw materials in a damp room.

Also the content of A. fluctuates:

-during the growing season LR (example: Richter brine -from the moment of leaf formation to fruiting -increase in number from 0.3 to 1.3%)

- Depending on the time of day (example: lobelia bloated at night contains 40% more alkaloids than during the day).

The largest number of alkaloid-containing plants with a high content of alkaloids is common in tropical countries. At the same time, the content of A. in widespread plants of the same genus can vary depending on the latitude or longitude of the terrain. Example: ephedra in western Europe contains almost no A., and in Sr.Az. - the content is high, the same pattern from north to south.

Weather factor: at the increased precipitations the quantity of alkaloids falls and on the contrary. Warm weather promotes the accumulation of alkaloids, cold - inhibits their formation, and frost - destroys alkaloids.

Lighting also has an effect: in the shade of belladonna decreases the content of atropine, and in shag varieties of tobacco - vice versa.

The influence of altitude above sea level: for each species of alkaloid-containing plants - its optimum. For example, the henna tree - gradually increases to a height above sea level 2 thousand. m, and above - decreases.

BIOLOGICAL ROLE (not fully understood)

A. -can be considered as a spare nitrogenous material.

It is proved that A. actively participate in metabolic processes as:

-vegetable hormones and catalysts (eg, plant respiration)

-Regulator of metabolism and growth of the root system;

-Protective barriers against soil bacteria;

-antifidants (protection against eating by animals);

-sensitizers (increase the sensitivity of plant cells to light).

PHYSICO-CHEMICAL PROPERTIES

Most aganes are solid crystalline substances, colorless or sometimes colored (yellow berberine), and bitter in taste. Oxygen-free liquids are liquids that are distilled with water vapor (horseradish, nicotine), but the salts of these alkaloids are solid crystalline substances.

Alkaloids-bases are soluble in organic solvents (alcohol, ether, chloroform, benzene, etc.) and, as a rule, insoluble or sparingly soluble in water. Exception: bases of caffeine, ephedrine, codeine, pilocarpine - soluble in water!

Alkaloids-salts - soluble in water and insoluble in organic solvents (except alcohol). Some salts of alkaloids are soluble in chloroform (papaverine hydrochloride).

A. - optically active, some have a characteristic fluorescence in UV light.

A. - weak foundations. The strongest bases of a.- codeine, the weakest-caffeine.

A. in solutions show an alkaline reaction. Usually the pH of aqueous-alcoholic solutions does not exceed 8-8.5.

Phenolates containing phenolic hydroxyl form phenolates with alkalis: morphine precipitates under the action of alkalis and then dissolves in excess, which makes it possible to determine it among other alkaloids.

A.-esters (atropine, cocaine) - saponified by alkalis (oxidized).

ISOLATION AND DISTRIBUTION OF ALKALOIDS FROM LRS

Most often, the amount of alkaloids in the form of bases (1), salts (2) or steam distillation (3).

1. Selection of a. in the form of bases: LRS is treated with a weak alkali (solution of ammonia or sodium bicarbonate) -then extraction with an organic solvent -cleaning of the solution from impurities by acidification (alkaloids turn into a salt form, soluble in water, and in the organic layer remain lipophilic substances. Chromatographic methods are then used to separate the alkaloids.

2. Isolation in the form of salts: LRS is treated with an aqueous-alcoholic solution of tartar to-you for the translation of all alkaloids in the salt. In addition to A., a large number of proteins, resins, and oaks pass into solution. substances, etc. ballast. To clean the associated impurities, the extract is treated with alkali. The alkaloids-bases formed in this case are extracted with a suitable organic solvent. Then add 1-5% solution of acid - alkaloids again become salts and turn into a water-acid layer, and all lipophilic substances remain in the organic solvent.

3. Distillation with water vapor produces liquid and volatile alkaloids (Konin, nicotine).

METHODS OF ANALYSIS

General sedimentary reactions based on the ability of A. to give simple or complex salts insoluble in water with acids, salts of heavy metals, and so on.

For these reactions use reagents:

Wagner, Bukshard and Lugol (solution of iodine in potassium iodide) -Red-brown precipitate;

Mayer (solution of mercury dichloride and potassium iodide) - creamy precipitate;

Dragendorf (solution of basic bismuth nitrate or bismuth iodide in potassium iodide) - Red-brown precipitate.

Hager (saturated solution of picrin to-you) - yellow precipitate.

Freshly prepared 5% tannin solution - whitish (yellowish) precipitate.

Analytical value can only have a negative result of these reactions, as with precipitating reagents can give precipitation and other nitrogen-containing organic substances, and caffeine and some other purine alkaloids do not form precipitation!

Specific reactions

They are based on the peculiarities of the chemical structure of alkaloids of certain groups. These are staining reactions with concentrated inorganic acids (nitric, sulfuric) or mixtures thereof.

As special reagents use:

-konts.serchanu to-that; conc. nitrogen to-that; their mixture (Erdman's reagent)

- Fred's reagent, Mark's reagent, Vazitski's reagent.

Murexide test (for purine alkaloids, for example, caffeine, theobromine) (perhydrol + conc. Salt to-and-evaporation-ammonia solution = ammonium salt of purple to-you-murexide (purple color)

Vitaly-Morena reaction (to tropan alkaloids) (conc. Nitric acid - evaporation - yellow color + alcohol. Solution of 0,5 M KOH and acetone (violet coloring).

60% sulfuric acid and n-dimethylaminobenzaldehyde (for indole alkaloids: reserpine, strychnine, physostigmine) (blue-violet-ergoalkaloids or red-strychnine staining).

Vanillin - for the indole cycle (pink color of the solution).

Iron chloride (on a. Containing phenolic group-morphine) (blue color).

Chromatographic and physicochemical methods are also used to analyze alkaloids: photometry, polarography, spectrophotometry, and others.

Quantitative definition

Each type of alkaloid has its own method.

The most common is the titrometric method: direct titration with an acid solution; back titration of excess acid with alkali solution; direct titration with iodine solution, which forms insoluble compounds.

STORAGE OF LRS AND DRUGS

Pure alkaloids are stored on list A, galenic preparations (tinctures, extracts) - usually on list B.

Strong alkaloid-containing raw materials are stored according to list B. (exception: late-flowering tubers and chilibukha seeds - according to list A).

Separately from other types of raw materials store capsicum, work with this raw material - in protective masks.

According to the general list, raw materials of galega medicinal, mackerel, tea, coffee tree, chocolate tree, sterculia, barberry (leaves, fruits) are stored.

Any raw materials are protected from moisture and light. Working with these types of LRS requires certain safety measures.

Precautions when working with alkaloids and raw materials containing alkaloids:

Collect, dry and process LRS containing alkaloids, given its toxicity. Basic precautions:

-instructing collectors;

-work of teenagers and schoolchildren in the procurement of raw materials only under the supervision of an instructor; children are not allowed to collect blackberries, datura, aconite and hellebore;

-pregnant women and women are not allowed to work with alkaloid-containing raw materials;

-During the collection - do not touch your hands to your eyes, face, and after work - wash your hands with soap;

-When processing, drying, sorting, packaging - protect your mouth and nose with a respirator or a damp gauze bandage, and eyes - goggles; do not eat, do not smoke, do not touch the eyes and face with your hands;

-After work, shake off outer clothing, wash face and hands with soap, rinse respirator;

-have a first aid kit with medicines for first aid in case of accidents.

BIOLOGICAL ACTION AND APPLICATION

A. have a wide range of pharmacological activity. These BAS act on specific receptors (specific receptors are named for their sensitivity to natural mediators, such as morphine - opiate receptors) or affect the activity of enzymes.

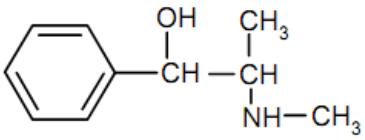
The main types of pharmacological activity:

- • antispasmodic
- • analgesic
- • bronchodilator
- • anesthetic
- • hemostatic
- • analeptic
- • stimulating the CNS (with depression of the central nervous system - asphyxia, collapse, heart failure)
- • antitumor
- • hypotensive
- • antiarrhythmic
- • antiparasitic
- • irritable
- • obstetric.

1. PROTOALKALOIDS (AND BIOGENIC AMINES)

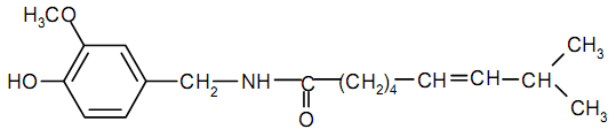
P. -physiologically active compounds that contain a nitrogen atom outside the cycles. Alternatively, they are alkaloids without a heterocycle or exocyclic alkaloids. They are also formed from amino acids.

Among the protoalkaloids are:



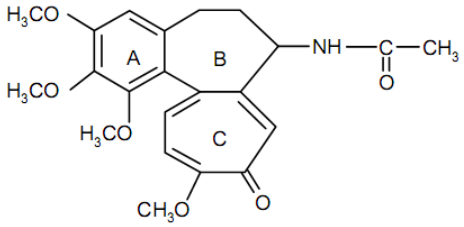
L-Ефедрин

Ephedrine group *capsaicin group*

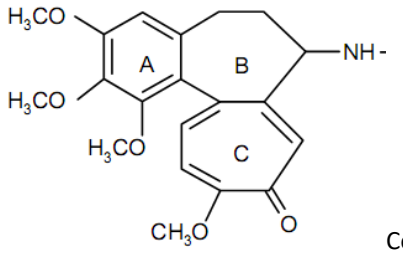


Капсаїцин

colchicine alkaloids



Колхіцин



Colchamin

P. ephedrine group :

Excite adrenoreactive systems (narrowing of blood vessels, increased heart rate, increased blood pressure, dilation of the bronchi, pupils, inhibition of intestinal motility, increased metabolism).

Usage: in the treatment of allergic diseases (bronchial asthma, urticaria, allergic rhinitis). Also used in poisoning by drugs and sleeping pills; locally: as a vasoconstrictor (diagnostics in ophthalmology)

LRS: ephedra grass.

Collection: spring or autumn in the mountains of Central Asia.

Drying- shade, storage according to list B, separately from other types of raw materials. Chem. composition: ephedrine (90% of the amount of alc.), Pseudoephedrine; oak. condensate substances, leukoanthocyanidins. Action: vasoconstrictive, bronchodilator, antiallergic. Drugs: ephedrine hydrochloride, comb. theophedrine, antasman, broncholitin, solutan, and others.

P. capsaicin group (obtained from the fruits of red pepper):

- Acts irritating to the respiratory tract, skin;
-stimulates appetite, secretion of digestive enzymes (juices):
-increases intestinal motility
-has an immunotropic effect.

LRS: the fruits of capsicum. Family of C. America. Cultivated! Drying - in the shade, or in the dryer at 40-50 ° C. Storage - separately from other species, according to the general list. Chem. composition: capsaicinoids (up to 15%): capsaicin, glycoalkaloids: solanine; flavonoids, vitamins, carotenoids, EM, zhm .; steroid saponins, microelements. Action: irritating; vozb. appetite, improves digestion. Preparations: tincture, plaster, ointment Espol, pepper-camphor linimen, capsin oil, capsitrin, Linkas, Tonsipret.

Colchicine alkaloids- there are about 30 compounds, the molecules of which consist of 3 condensed rings. Colchicine is an atypical alkaloid because it is a neutral compound.

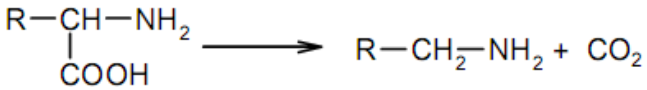
-Has antimitotic activity. Colchamine is less toxic than colchicine. Both compounds are neuro-paralytic poisons that block cell division in metaphase and delay the development of malignant tissues. They suppress lymph and leukopoiesis. Colchicine is used in breeding to obtain polyploids.

LRS: fresh late tubers are fresh-Bulbotubera Colchici recens. Colchicum speciosum, C.autumnale, Melanthiaceae.Caucasus -subalp. belt; Carpathians (Red Book of Ukraine). Preparation. in early autumn during flowering. List A! Chem. composition: tropolone exocyclic a. (0.4-1.6%): colchamine, colchicine, colchicine; glycoalkaloids; flavonoids, phytosterols, phenolcarb. to-you, starch, mono and disaccharides. Action: antitumor. Drugs: colchamine tablets, colchamine ointment.

Biogenic amines of plant origin also include: galegin (hypoglycemic action - from goat grass -Galega officinalis); choline (in the stalks of beans, beets, motherwort grass, etc.) (used in the treatment of liver disease), muscarine - a component of red mushroom poison, in others. lamellar fungi (inocibe) - used in homeopathy in the treatment of neuralgia, atherosclerosis; norepinephrine (in bananas, potatoes) - vasoconstrictive effect; mescaline (in some cacti) - biogenic amine with hallucinogenic properties - is not used in medicine.

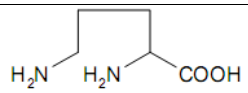
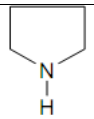
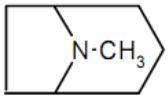
2. TRUE ALKALOIDS

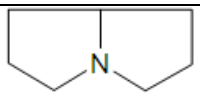
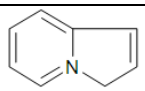
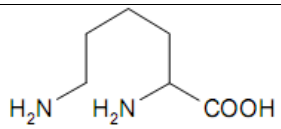
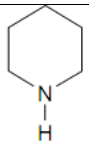
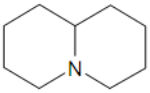
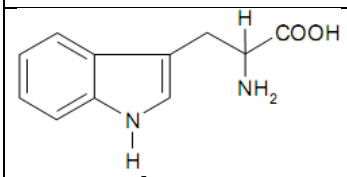
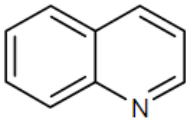
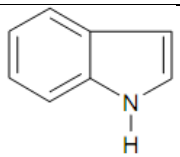
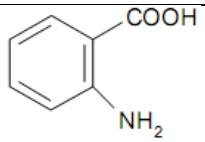
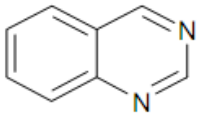
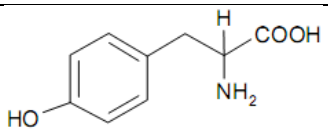
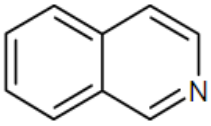
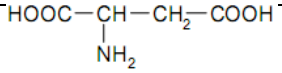
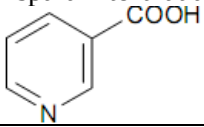
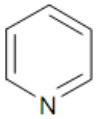
I.a. - biogenetically derived from amines, which are formed due to decarboxylation of amino acids:

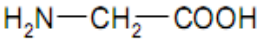
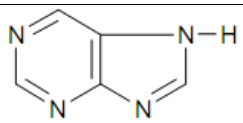
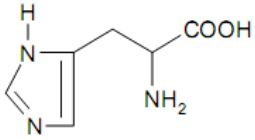
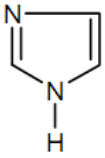


Precursor amino acids: ornithine, lysine, tyrosine, tryptophan, histidine, glycine, asparagine. Nicotinic acid is also used in the synthesis of some alkaloids.

Classification of true alkaloids

Predecessor	Type of alkaloid (heterocycle structure)	An example of an alkaloid	Plant source
1	2	3	4
 L-ornithine	 pyrrolidine	Stahydrin Gigrin	The initial letter, Nettle dog heart., (action: hypotension, sedation-tivn.)
	 **tropan**	**Hyoscyamine** **Scopolamine**	**Beauty, white-faced, Dope types, Skopje**

		Cocaine	**Coca bush**
	 pyrrolizidine	Platyphyllin Sarracin Norsecurinin	Types of godchildren (kornev.s kor. K. shiroko-leafy and flat-leaved.) - spasm. - "Platif.hydrot." Securinega half-house.
	 indoliizidine	Securinin	Securinega hemisphere. Pob., "Securin.nitrate" -zob.CNS
 L-lysine	 piperidine	Anabasine Lobelin Coniine	Hedgehog leafless. Lobelia swollen. (S.Am.) (tr.-lobeline hydrochloride., - analept.-asthma, bronchitis; loBesil.-Removable. nicotine. Hemlock spotted
	 **quinolizidine**	**Cytisine** **Pachycarpine** **Lycopodine**	**Thermopsis lanceolate.** **Sophora thick.** **Lamb habit.**
 L-tryptophan, sometimes anthranilic acid	 **Quinoline**	**Quinine** Echinopsin	**Cinchona** Holovaten ordinary
L-tryptophan	 **Indole**	Carboline alc. (Garmin, Aimalin), **Reserpine**,, **Ergolin alc.,** **Strychnine, brucine**	**Passiflora** **Rauwolfia snake** **Periwinkle is small** **Disputes** **Vomiting nut**
 Antranilov to-that	 Quinazoline	Peganin	The cannon is ordinary
 L-tyrosine	 Isoquinoline	Opium alc .: pa-paverin, morphine, narcotics, etc., Glaucine, Helidonine, Sanguinarine, Berberine Gindarin Galantamine	Poppy is a sleeping pill The cat is yellow Celandine is large Maclea small fruit Barberry Stephanie is smooth Types of Hungary
 L-Asparain to-that and 	 Pyridine	Nicotine Ricinin	Genus Tobacco Ricina

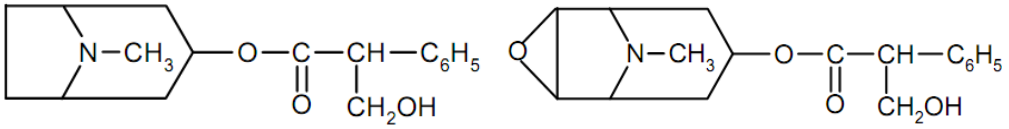
Nicotine to-that			
 L-glycine and anthranium hunting to-that	 Purine	Caffeine Theophylline Theobromine	Chinese tea Coffee Guarana, Mate; Chocolate tree
 L-histidine	 Imidazole	Pilocarpine	Types of pilocarpus

LR and LRS, which contain true alkaloids

-derivatives of ornithine

T ROPANE ALKALOIDS:

(Tropin group: hyoscyamine and scopolamine; ecgonine group - cocaine)



Hyoscyamine (and the racemate of hyoscyamine is scopolamine -atropine).

Hyoscyamine is twice as active as atropine, but in honey. Atropine is used as an acetylcholine antagonist (blocks m-cholinoreactive systems).

Pharmacological action: antispasmodic; bronchodilator; analgesic; reduces the secretion of salivary, sweat, digestive glands; dilates the pupils; tachycardia.

Application: diseases. Gastrointestinal tract as antispasmodics; cardiac neuroses; function violations of veg.n.s .; menopause. violation; insomnia.

Leaf; grass; The roots are beautiful- Foil; Herba; Radices Belladonnae (Atropa belladonna, Solanaceae) Crimea, Carpathians - in beech forests. Kr. The book! Культ.Сп. В.

*Chem. storage:*tropan. alc. (Up to 0.8%): hyoscyamine, atropine, scopolamine, belladonin; flavonoids, oxycoumarins, phenol. to-you.

Action and application: antispasmodic., analgesic, sedative. Tincture, "antastman, valokormid, solutn, anuzol, hemorrhoids.

Leaf; The grass is fading-Folia; Herba Hyoscyami (Hyoscyamus niger, Solanaceae)

Chem. storage: тропанов.алк. (Up to 0.16%): hyoscyamine, hyoscine, atropine, clopolamine, etc .; flavonoids (quercetin, hyperoside, rutin).

Action and application: Antispasmodic., Analgesic., Irritant. Blackberry oil, "capsin"

Datura leaves -Folia Stramonii (Datura stramonium, Solanaceae)

Chem. storage: tropan. alc. (0.27%): hyoscyamine, scopolamine; essential oils, carotenoids, oak. substances, phenolic. to-you, flavonoids.

Action and application: Dilates the bronchi. Externally - with neuralgia, rheumatism. Datura oil, asthmatin, asthmatol.

Fruits; Indian datura seeds-Fruit; Semina Daturae innoxiae Datura innoxia, Solanaceae) Central and South Africa. Cult. in Wed. Me.

Chem. storage: tropans. alkaline. (0.55% -pl., 0.31% -seeds): Scopolamine, hyoscyamine, pseudoatropine, nicotine; proteins, butter.

Action and application: In psychiatry as a sedative, with parkinsonism, seasickness; analgesic; in ophthalmology - instead of atropine. scopolamine hydrobromide, aeron.

Rhizomes of Carniolan scopolia- Rhizomata Scopoliae carniolicae (Scopolia carniolica, Solanaceae) Carpathian broadleaf. forest. Kr. Book List A!

Chem. storage: тропанов.алкал. (Up to 1.26%): hyoscyamine, scopolamine, Tropin; coumarins, flavonoids, phenolic acids.

Action and application: In psychiatry as a sedative, with parkinsonism, seasickness; analgesic; in ophthalmology - instead of atropine. Scopolamine hydrobromide, aeron.

Coca leaves-Folia Cocae (Erythroxylon coca, Erythroxylaceae) South. Am.-tropics. Cult.

Chem. storage: tropane alkaloids. (0.5-1.5%): cocaine, ecgonine, methylecgonine

Action and application: Tonic, reduces hunger; local anesthetic in ophthalmology and otolaryngology. Cocaine hydrochloride (pure cocaine - the first anesthetic - a quick addiction, destructive. N. S.).

-derived lysine

QYNOLYSIDINE ALKALOIDS:

Pharmacological action: irritating to the respiratory center; expectorant; analeptic, H-cholinoblocking, antiarrhythmic.

Application: expectorant; vozb. they breathe. center -in asphyxia, shock, intoxication; strengthening of ancestral dessality; treatment of chronic. alcoholism.

Sophora herb - Herba Sophorae pachycarpae (S.pachycarpae, Fabaceae) Central Asia (foothills), South Kazakhstan.

Chem. storage: quinolizidines. alkaline. (2-6.4%): pachycarpine, soforamine, matrin, isosophoramine; flavonoids, org. to-you, iridoids.

Action and application: ganglioblocking at peripheral spasms. blood vessels, myopathy; to stimulate labor. Pachycarpine hydrochloride.

Grass; Thermopsis seeds lanceolate- Herba Thermopsidis lanceolatae (Thermopsis lanceolata, Fabaceae) Siberia, Transbaikalia-steppe, salt marshes.

Chem. storage: quinolizidine. alkali: Thermopsin, pachycarpine, anagirine; flavonoids, saponins, oak. substances, resins, mucus, vit. WITH.

Action and application: Отхарків .; stimulating. Breathing - in Ozb. they breathe. center, strengthens the heart. activities; facilitates. nicotine withdrawal. Infusion; dry extract, table. from cough, (from seeds: cytiton, theophedrine, tabeks)

Lamb grass- *Herba Hupersiae (Huperzium selago, Huperziaceae*) Carpathians (rocks). Кр.Книга!

Chem. storage: quinolizidine alkaloids (0.16-1.1%): lycopodine, selyagin, acrifolin; flavonoids. Carotenoids.

Action and application: With chronic alcoholism-vomiting. Infusion, decoction, solvents

-tryptophan derivatives:

QUINOLINE ALKALOIDS.

There are more than 300 representatives. They are often divided into groups on a phylogenetic basis, for example, alkaloids of the quince tree. The most important of the quinine alkaloids is quinine (4 isomers are known). Quinidine (differs in configuration) is of medical importance.

Cinchona -Cortex Chinae (Cortex Cinconae) - (Cinchona succirubra, Rubiaceae-cinchona krasnosokovaya. Mountain forests of the Andes. Cult. On the islands in the tropics.

Chem. storage: quinoline alc. (Up to 30%): quinine (30-60% of the amount), quinidine, cinchonine, cinchonidine; quinine to, the glycoside quinine.

Action and application: antiprotozoal in the treatment of malaria, antiarrhythmic. In the food industry - a source of tsinhotaninovy to-you (bitterness). Tincture, decoction, quinine sulfate - for arrhythmia, tachycardia, quinine hydrochloride, analgin-quinine.

INDOLE ALKALOIDS

-type harmonica

Passionflower grass-Herba Passiflorae (Passiflora incarnata, Passifloraceae) North America. Cult. on the Black Coast of the Caucasus.

Chem. storage: indoln. alkaline. (0.05%): hormone, hormone, hormone; pectin, flavonoids, saponins, coumarins, quinones, Witsen.

Action and drugs: Sedative. Liquid. extract, passit, Novo-Passit.

-type of reserpine

The roots of Rauwolfia snake - Radices Rauwolfiae serpentinae *R. serpentina, Apocynaceae)*P. - S. Asia (India, Pakistan, Indonesia). Cult. in India.

Chem. storage: indoln. alkaline. (More than 50): reserpine,serpentine, aimalin, etc.

Action and drugs: Hypotensive, sedative, tranquilizing, antiarrhythmic. Raunatin, cristepine, reserpine, aimalin (antiarrhythmic.).

-type eburnana

Periwinkle herb small-Herba Vincae minoris (V.minor, Apocynaceae) Deciduous. forest. Harvesting from May to July.

Chem. storage: индольн.алкал. (More than 14): VINK (minorin), reserpine, vinoxin, vincaminorin, devincan; ursolova to-that, flavonoid.robinin, leukoanthocyanidins.

Action and drugs: Hypotensive, improves. Blood supply to the brain. Devinkan, vinkaton, vinkapan, cavinton.

-dimeric indole alkaloids

Catharanthus leaves pink-Folia Catharanthi rosei (C. roseus, Apocynaceae) Homeland - Madagascar, grown in the tropics and ow. subtropics.

Chem. storage: indoln. alkaline. (Up to 80): vincristine, vinblastine, leurosin, catharantin, aimalicin.

Action and drugs: Cytostatic, antitumor Vincristine-for leukemia, cancer mol. glands, vinblastine (Rosevin) - for lymphogranulomatosis and hematosarcoma.

-ergoalkaloids

Uterine horns -Secale cornutum (Claviceps purpurea, Claviceptaceae-marsupials) - parasitizes on cereals (rye). Sclerotia is harvested.

Chem. storage: indoln. Alkal. ergotamine, ergotoxin, ergometrine; amines histamine. choline; amino acids, w. m., dairy to-that, pigments, monosaccharides.

Action and drugs: uterotonic, sedative, antihypertensive, adrenolytic, reduces prolactin secretion. Ergotal, ergometrine maleate, ergotamine hydrotartrate, bellataminal, bellaspon.

-alkaloids of chilibukha

Vomiting seeds(chilibuhi) -Semen Strichni (Semen Nux vomicae) (Strichnos nux-vomica, Loganiaceae) Tropical forests of India, Ceylon, Australia. Cultivated in the trail. countries. List A!

Chem. storage: indoln. alkaline. (2-3%): strychnine, brucine; starch, proteins, chlorogenic to-that, loganin to-that.

Action and drugs: Stimulates the CNS, stimulates metabolism. Tincture, dry extract, strychnine nitrate, homeopath. drops "Nux Vomica-Homocord".

-tyrosine derivatives

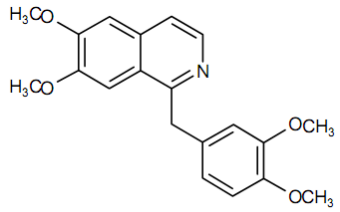
ISOCHINOLINE ALKALOIDS

Isoquinoline and its derivatives underlie a large number of natural compounds, including plant alkaloids. The richest plants of the orders Papaverales, Rutales, Ranunculales. There are more than 1000 isoquinoline alkaloids of 12 types from 27 families.

Types of the most important isoquinoline alkaloids:

A) type of benzylisoquinoline (papaverine, rotundin)

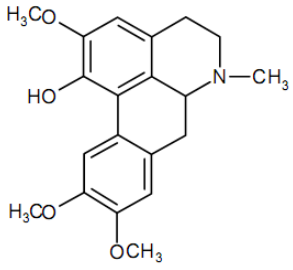
Papaverine - a strong antispasmodic, first isolated from opium (about 1%), is a weak base (methylated all 4 hydroxyl)



Папаверин

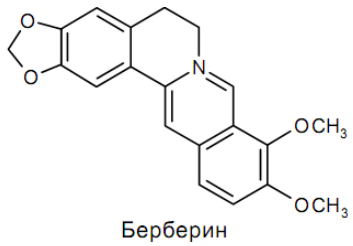
Currently, papaverine is synthesized, used as antispasmodics synthetic analogues: no-spa, dibazole, typhoon.

B) the type of aporphine(glaucine, magnoflorin, boldin). Distributed in the families of barberry, laurel, magnolia, menisperm, nymph, poppy, buttercup and root. All alkaloids of this type are optically active. Pharmacological activity: Antitussive, antispasmodic (glaucine) antihypertensive and curare-like (magnoflorin), choleretic, antitussive (Boldin)



Глауцин

C) type of protoberberin(berberine, drug, hydrastine, palmatine) - geosynthetic precursors are two tyrosine molecules. These alkaloids are mainly localized in plants of the families: barberry, birch, menisperm, poppy, buttercup, root. Berberine - exists only in solutions. Salts are yellow.



Берберин

It is used in the form of berberine bisulfate as a choleretic agent, enhances bile secretion, in addition, has a calming effect, lowers blood pressure, causes uterine contractions.

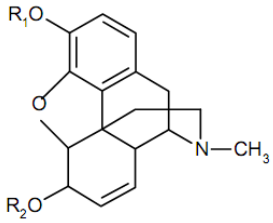
The drug is about 10% of the opium alkaloids. Stimulates the respiratory center, potentiates the analgesic effect of morphine and has no narcotic properties.

D) type of protopine-these alkaloids are mainly found in plants of the poppy family. Protopin has no pharmacological activity.

E) type of emetine. It includes alkaloids of emetic root (emetine and cephalein), which are part of a separate biogenetic group. These alkaloids reflexively cause expectorant effect or, in large doses, vomiting. In addition, the roots of ipecac (Cephaelis ipecacuanha, Rubiaceae) have strong antiprotozoal activity and have antitumor effects.

E) type of morphinan(morphine, codeine, thebaine). Alkaloids of this type are found in plants of the family Poppy, megnisperm, milkweed, lily.

Morphine is the main alkaloid of opium, which has a phenolic character and exhibits the properties of phenone. Codeine and thebaine are present in the products of biochemical transformations of morphine.



$R_1 = R_2 = H$ — Морфін

$R_1 = CH_3$, $R_2 = H$ — Кодеїн

R1 = R2 = CH3 - thebaine

Forms salts with acids. With alkalis, morphine forms phenolates by phenolic hydroxyl.

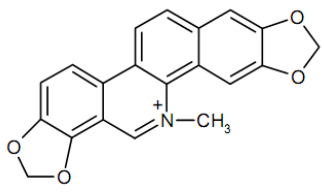
When methylation of morphine produces codeine, during ethylation - ethyl-morphine, during acylation - heroin, when cleaving two water molecules - apomorphine.

Orfin -a strong narcotic analgesic. Abuse - leads to drug addiction (morphine).

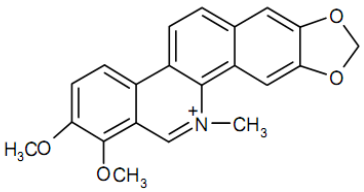
Codeine -methyl ester of morphine, contained in opium in small doses (about 0.5%). As an analgesic is not used alone. In therapeutic doses causes mild euphoria. Used for cough (antitussive effect). Prolonged use leads to addiction.

Thebaine - used in morphine poisoning.

G) type of benzophenateredine (chelidonine, sanguinarine, chelerythrin, nitidine, gindarin)



Сангвінарин



Хелеритрин

These alkaloids are found in celandine, Stephanie smooth, Maclay species.

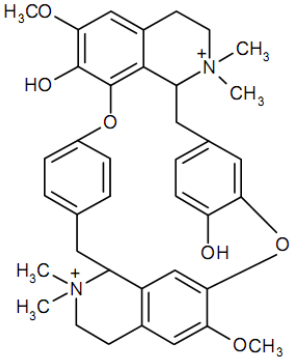
Pharmacological action: antimicrobial; antitrichomonad; anticholinesterase.

Usage: sanguinarine - antitrichomonad; cerebral palsy, myopathy; muscular dystrophy.

C) bis-benzylisoquinoline(tubocurarine, dauricin, talicarpine). Plants: species of chilli, root, in the families of magnolia, menisperm, barberry, annon, combret, buttercup.

Pharmacological activity: muscle relaxant (relaxation of respiratory muscles); antitumor, spiazmolytic, antihypertensive (talicarpine - from basil).

Curare alkaloids (South American arrow poison, from the Indian "Urar" - poison) - a mixture of extracts of chilibuha (Strychnos, Loganiaceae) and chondodendron (Menispermaceae). From the dry extract of curare receive drugs tubocurarine and curarin chloride used in surgery (as a muscle relaxant) ..



d-Тубокурарин

LR and LRS, CONTAINING ISOCHINOLINE ALKALOIDS:

Poppy boxes-Capita Papaveris (Papaver somniferum, Papaveraceae). Cultivated in Turkey. Kazakhstan, Uzbekistan, Romania, Australia, Spain. Cultivation is prohibited in Ukraine! (Import of opium for the production of drugs). Harvest - after ripening, drying at 50 ° C.

Chem. storage: isochin. alc. (10-25%): morphine (about 50% of the amount), narcotics, codeine, papaverine, thebaine; org. k-ti, triterp. alcohol cyclolaudenol.

*Action and application:*Antitussive, antispasmodic, sedative; narcotic analgesic. omnopon; morphine, codeine, codeine phosphate, papaverine hydrochloride, kellatrin, kelliverin, codetermops, pentalgin, solpadein, sedalgin.

Grass cat yellow- Herba Glaucii flavi (Glaucium flavum, Papaveraceae). Crimea-Black Sea coast. Cult. Kr. book! Mr. B.

*Chem. storage:*more than 15 alc. (Up to 4%), glaucine (50% of the amount); fumaric to-that, flavonoids, mucus.

*Action and application:*Antitussive - a non-narcotic substitute for codeine. Analgesic. Glaucine hydrochloride, broncholitin, bronchosevt, bronchocin.

Celandine herb- Herba Chelidonii (Chelidonium majus, Papaveraceae) Harvesting during flowering. Mr. B.

Chem. storage: isoquinoltines. alkali: coptisin, stylopine, chelidonine, chelerythrin, sanguinarine, protopine, berberine, sparteine; saponins, flavonoids, carotenoids, vit. C, org. to-you, oak. substances.

Action and application: Analgesic, choleretic, diuretic, laxative, antitumor, immunosuppressive, anti-TB, antispasmodic. Infusion, juice, Galsten, Hepatofalk Plant.

Maclay's grass- Herba Macleayae (Macleaya cordata, M.microcarpa, Papaveraceae) Homeland -Jap., China. Cult. in Ukraine. Prepared by: But.-beginning. color Poisonous. General list.

Chem. storage: isoquinoline.

Action and application: Antimicrobial, anticholinesterase, antifungal. Sanguiritrin.

Leaf; barberry roots- Foil; Radices Berberidis (Berberis vulgaris, Berberidaceae) Crimea, Caucasus. Cult.! Preparation: l.-before the beginning. or during flowering; k.-autumn or early spring. Dry-45-50 ° C. General list.

Chem. storage: isoquinoline.alkal. (1.5% -l .; up to 15% -do.): Berberine, + k.-yatrorizine, magnoflorin; L.-palmatine, oxycanthin, berbamine; accompaniment: to.-policies., chelidon to-that; l.-anthocyanins, phenolic carbon. to-you, vit.S. carotenoids, coumarins. Conc. Su.

*Action and application:*Hemostatic, choleretic. L .: tincture, infusion, barberry COMP IOB-Maplyuk - homeopathic granules; K: berberine bisulfate, solvents.-

Tubers with the roots of Stephanie smooth- Tuberacum radicibus Stephaniae glabrae (Stephania glabra, Menispermaceae) Homeland - China, India, Indochina. Cult. in Batumi. Preparation. autumn, drying 60-80 ° C. List B.

Chem. storage: isoquinoline. alkali (6-8%): gindarin (30% of the amount), cycleanin, Stephaglabrin, gindarin, stephanin; policies., org. to-you.

Action and application: Sedative, mild laxative, hypotension., Anticholinesterase. gindarin, stephaglabrin sulfate.

Leaves of Victor Ungern- Folia Ungerniae victiris (Ungernia victoris, Amarillidaceae) endemic to the mountains of Uzbekistan and Tajikistan. Preparation. In April and May. Sush .: Sunny in the air. Mr. B.

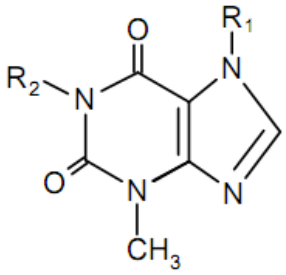
Chem. storage: galantamine, licorine, gordenine, tacettin.

Action and application: anticholinesterase. Galantamine hydrobromide, nivalin.

Other sources of galantamine: snowdrops (P. Voronova), daffodils.

-derivatives of glycine and anthranilic acid:

PURINE ALKALOIDSused in medicine (caffeine, theophylline, theobromine) - are N-methylated derivatives of xanthine - which have oxygen in the metabolic products of purine bases, in turn, are part of nucleic acids.



	R_1	R_2
Кофеїн	CH_3	CH_3
Теобромін	CH_3	H
Теофілін	H	CH_3

These alkaloids are very weak bases and are readily soluble in water. Common in the plants of the family madder, tea, sapinda, aquatic, sterculi.

Contained in the seeds of cocoa (chocolate tree), coffee, when, in a tea leaf, plantain sterculia.

Pharmacological action: stimulating, tonic.

Usage: as stimulants and tonics for fatigue, headache, poisoning, hypotension.

Caffeine - affects the cerebral cortex, stimulates the heart, is an antagonist of alcohol and drugs.

Theobromine - has antispasmodic and diuretic effects:

Theophylline - acts as a psychoanaleptic, but weaker than caffeine.

The content of caffeine in beverages should be in the range of 5-200 mg / l (if less - the drink is considered decaffeinated).

LR and LRS, which contain purine alkaloids:

Tea leaves- Folia Theae (Thea sinensis, Theaceae) Mountain forests of southern China and Indochina. Cult. Preparation. - Young flash drives are reusable! Drying herbs. - Shadow, black.- after enzyme. , In the dryer 40-50 ° C. General list.

Chem. storage: purine alc .: caffeine (1.5-3.5%), theophylline (traces); oak. condensate substances., catechins, flavonoids:; ef.m., vit. C, B1, I2, PP.

Action and application: Tonic; vozb. CNS, heart. d-st and breathing .; radioprotective; antioxidant, vitamin P. Antidote. Infusion, you-green- Health, caffeine (powder), balm "Grail".

Coffee seeds Semina Coffeae (Coffea Arabica, Rubiaceae) Homeland -Ethiopia. Cult. Drying berries - in the sun, or remove the raw flesh mechanically. Storage - a general list!

Chem. storage: purine.alkal .: caffeine (0.7-2%), theobromine, theophylline; oak. substances (3-5%), glucose, dextrin, g.m. (10-13%), proteins, ef.m.

Action and application: excites the CNS. Antidote for drug poisoning. Caffeine (powder), caffeine-sodium benzoate, theophedrine, anastman, Pyatchatka IC.

Cocoa seeds- Semina Cacao (Theobroma cacao, Sterculiaceae) Rainforests of South America. Cultivated. Drying -not above 80 ° C. General list.

*Chem. storage:*purines. alkaline: theobromine (1-2%), caffeine; ж.м. (45-55%); glycerides of palmitic, stearic, lauric, etc. saturated. to-t.

Action and application: Tonic. Cocoa butter base for suppositories; cocoa powder for tonic drinks.

Leaves of Sterculia platanolistoy- Folia Sterculiae platanifoliae (Sterculia platanifolia, Sterculiaceae) Homeland -China, South. Japan, India. Can be cultivated on PBK. Harvest - before the appearance of yellow leaves, drying -shade. Storage -general list.

Chem. storage: caffeine; choline, betaine, oak. substances (4%), org. to-you.

Action and application: Stimulating, toning. Tincture.

PSEUDOALKALOIDS

They are structurally close to iridoids, and the nitrogen atom in them is not synthesized from amino acids; they are synthesized from malonic acid. Nitrogen in the molecule is introduced into the residue of isoprene origin.

Classification: monoterpenes, sesquiterpenes, diterpenes, triterpenes, steroid pseudoalkaloids.

Monoterpenes in the terpenoid skeleton by type of pyridine derivatives (actinidine - in actinidia, valerian - sed. action) or piperidine.

Sequiterpenes-they are divided according to the botanical principle: groups of nufaridine from the genus. water lilies (jugs, water lilies), orchids (dendrobin), fabiano (fabianin).

Diterpenes- are divided into 2 groups: aconitine and atizin. Known among the plants of the family buttercup, aster.

Aconitine - esters of plant acids with various polyhydric alcohols. Found in plants of the genus Delphinium and Aconite. Aconitine is toxic to humans, but it is unstable and easily hydrolyzed. Getting on the skin causes itching and anesthesia. Poisoning can cause death from respiratory arrest. Lycoctonin contains comfrey. Has a curare-like effect.

Atizin - free amino alcohols. The skeleton of which contains 20 carbon atoms in a structure such as perhydrophenanthrene.

Taxoids are allocated to a separate class. Found in an alcoholic extract of yew bark (Taxus brevifolia-Pacific species), from which was isolated (USA) the drug paclitaxel (taxol) - a drug for the treatment of tumors. In France, docetaxel (taxotere) was synthesized (semi-synthesis) from yew needles.

Steroids (or glycoalkaloids) - have about 350 members in the family of nightshade, lily, melanthia, cuttlefish, birch. They combine the properties of alkaloids and steroid saponins. Divided into 3 groups: derivatives of cholesterol (C27), C-nor-D-homosteroid, derivatives of exiled (C21).

Cholestane derivatives - have a nucleus of cyclopentaneperhydrophenanthrene; surfactant glycosides that exhibit hemolytic properties and are present in the raw material together with steroidal saponins in plants of the genus Solanum. They are divided into two subgroups: spirosolan (eg, solasodin) and spirostan (tomatidine).

Solasodin derivatives - glycoalkaloids solasonin and solamargin are isolated from Solanum laciniatum, S.aviculare and are used as substances for the production of steroid hormones (cortisone).

C-nor-D-homosteroid alkaloids. Uncommon in nature. These include the main alkaloids of hellebore - cerveratra, and the American plant Sabadilla (birch family) - ceveratra. These alkaloids have high pharmacological activity and toxicity.

Pregnane groups are common in African plants of the genera Funtumia, Hollarrhena (Apocynaceae) and are of interest as substances for the semi-synthesis of steroid hormones such as progesterone.

LR AND LRS, WHICH CONTAIN PSEUDOALKALOIDS

-sesquiterpenes:

Rhizomes of yellow jugs- Rhizomata Nupharis lutei (Nuphar luteum, Numphaeaceae) Drying - air or at 60 ° C. Сп.Б!

Chem. storage: nufaridines: nuflein, nufarin, nufamine; oak. substances, starch, steroids: sitosterol, stigmasterol; carotene, asc. to-that, higher. fat to-you.

Action and application: Antimicrobial, contraceptive, anti-inflammatory. Lutenurin (tablet, vaginal suppository, liniment)

-diterpenes:

Reticulated comfrey herb- Herba Delphinii dictyocarpae (Delphinium dictyocarpum, Ranunculaceae) endemic horn. districts of the West. Siberia, Eastern Kazakhstan. Cultivated. Prepared-but.-color .. Sush. -shade or at 50 ° C. Сп.Б!

*Chem. storage:*diterp. alc. atizin groups: methyllicaconitine, eldelin, gelatin; aconitine groups: condelfin, etc .; isoquine. alc., org. to-you, min. salt.

Action and application: muscle relaxant (curare-like) with increased muscle tone. Mellictin (Table).

Locust grass tangled- Herba Delphinii confuse (Delphinium confusum, Ranunculaceae) endemic to the mountains of Central Asia in Western Siberia. List B!

Chemical composition: diterpene alkaloids of the aconitine group - condelfin.

Action and application: Muscle relaxant. Condelfin -table.

Grass of field axes- Herba Consolidae arvensis (Consolida arvensis = C. regalis, Ranunculaceae) Prepared during flowering. Shadow drying. Mr. B!

Chem. storage: diterpene alkaloids of the aconitine group: aconitine, consolidin, delcosine, delsonin; flavonoids (quercetin, kaempferol, isoramnetin), mannitol.

Action and application: Anti-inflammatory, diuretic, muscle relaxant (curare-like effect). Delacet tincture for external use (pediculosis).

Dzungarian fresh aconite (wrestler) herb-Herba Aconiti soongorici recens (Aconitum soongoricum, Ranunculaceae) endemic to the Alps. the Tien Shan belt. Harvesting during flowering. Сп.Б!

Chem. storage: diterpene alc. aconite groups - aconitine, atizin-zongorin, acetylzonogorin, napellin groups; flavonoids.

Action and application: Anti-inflammatory. Externally -with sciatica. Tincture of fresh herbs.

Grass aconite (wrestler) white-bearded- Herba Aconiti leucostomi (Aconitum leucostomum, Ranunculaceae) Altai, Central Asia. Procurement-phase boot. Sushi. airy. Or at 80 ° C. Mr. B.!

Chem. storage: diterpene. alkaline: lappaconitine, mesoconitine, axin; isoquine. alc (corridin), saponins, coumarins, oak. substances.

Action and application: Antiarrhythmic. Alapinin -tab., Solution for injection.

Berries of yew berry-Baccae Taxus (Taxus baccata, Taxaceae) Zah. Europe, West. Belarus., Ukr., PBC, Caucasus, Mal. Asia. Preparation-after ripening. Sush.-solar. Or at 80 ° C. Сп.Б!

Chem. storage: taxol.

Action and application: Cytostatic. Paclitaxel (Abitaxel) -conc. for preparations. solution for injection., Doxytaxel (taxotere, docetaxel) -polusint. prep. based on taxol.

-steroid (glycoalkaloids):

Solanum grass lobed- Herba Solani laciniati (Solanum laciniatum, Solanaceae) Subtrop. The islands of Australia and N. Zel. Cult. in Moldova, Southern Kazakhstan. Preparation. in the lane. color 2-3 times a summer. Dry-air. Сп.Б!

Chem. storage : glycoalkaloids (1-2%): solasonin, solamargin.

Action and application: Source of steroidal anti-inflammatory drugs - progesterone, cortisone. Externally -with burns, sciatica. Solosodin citrate (solacite) -table.

Rhizomes with hellebore roots-Rhizomata cum radicibus Veratri (Veratrum lobelianum, Melanthiaceae) Drying at 50 ° C. Сп.Б!

Chem. storage: yerverat steroid alkaloids: protoveratrin A and B, yervin, isoyervin, rubiervin, etc .; oak. substances, resins, monosaccharides, flavonoids.

Action and application: Antiparasitic (veterinary medicine - from skin parasites). Tincture, hellebore water.

Sabadilla seeds- Semina Sabadillae (Sabadilla officinalis = Schoenocaulon officinale, Melanthiaceae)

Chem. storage: veratrin, cevadin, etc. alkaloids

Action and application: Antiparasitic (from lice). Ointment, homeopathic remedies.