Ministry of Education and Science of the Kyrgyz Republic

Osh State University

DEPARTMENT OF HUMATARIAN SCIENCE AND MATEMATICS

WORK COPY BOOK for lab and practical lessons of "Medical biology, genetic, parasitology"

student	
	(name)
group№	

Biology provides you with opportunities to develop the skills required to study sciences at a higher level.



2017 year

PRACTICAL LESSON №1

Theme: Microscope device. Chemical composition of the cell.

Aim: 1) Get to know microscope device and main rules of working with it.

2) Know the structure and the main prescriptions of the eukaryotic cell compounds and the chemical organization of the cell itself. Be able to distinguish their structure during microscopic analysis.

Practical work

Task 1. Read and remember the rules of usage of the microscope:

1. Use two hands to carry a microscope, one hand holding the arm, the other holding the base.

2. Only use lens paper and water to clean the lenses.

3. Always start off with the lowest magnification objective and work up to higher power one objective at a time.

4. Always observe the objective as it is rotated into place to ensure it doesn't crash into the slide.

5. Lower the stage to its lowest point before placing a slide on the stage.

6. Raise the stage to its highest point without crashing the slide into the objective.

7. Focus initially by lowering the stage using coarse focus adjustment knob.

8. After getting a close focus with the coarse focus adjustment knob, improve it using the fine focus adjustment knob.

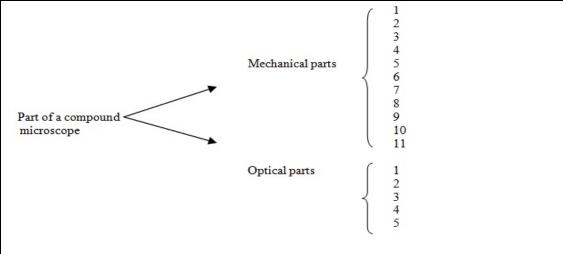
9. Lower the stage to its lowest point.

10. Clean lenses, stage, body, and base if needed.

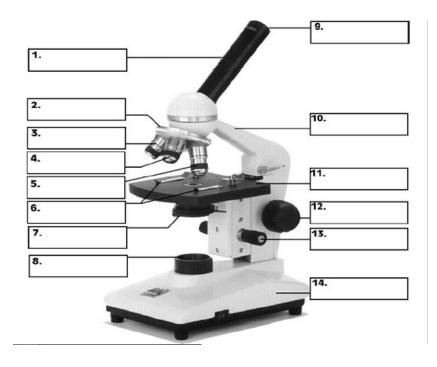
11. Replace protective cover over microscope.

Task 2. Explore device of light microscopes using microscopes, tables and workshops. Remember the name and purpose of their parts. Nothing twist!!! Do not touch the lens!!!

Write down the details of the microscope in a table:



Sign microscope details in the picture:



_____points Task 3. Procedure of the preparation of temporary slide. Plant cell: stained temporary mount of onion peel.

Read and remember! 1. There are two kinds of glasses, which are used to prepare the microscope slides: the **slide** and **cover glass** (**coverslip**). Coverslip very thin and fragile. **Be careful!**

3.1 To prepare stained temporary mount of onion peel.



Materials required: Procedure:

Pour some distilled water into a watch glass.

Peel off a leaf from half a piece of onion and using the forceps, pull out a piece of transparent onion peel (epidermis) from the leaf.

Put the epidermis in the watch glass containing distilled water.

Take a few drops of safranin solution in a dropper and transfer this into another watch glass.

- Using a brush, transfer the peel into the watch glass containing the safranin solution.
- Let this remain in the Safranin solution for 30 seconds, so that the peel is stained.
- Take the peel from the Safranin solution using the brush and place it in the watch glass containing the distilled water.
- Take a few drops of glycerine in a dropper and pour 2-3 drops at the center of a dry glass slide.
 - Using the brush, place the peel onto the slide containing glycerine.

- Take a cover slip and place it gently on the peel with the aid of a needle.
- Remove the extra glycerine using a piece of blotting paper.
- Place this glass side on the stage of the compound microscope and view it.

Observations

- There are a large number of regularly shaped cells lying side by side and each cell has a distinct cell wall.
- A distinct nucleus is present on the periphery of each cell.
- Lightly stained cytoplasm is observed in each cell.
- A large vacuole is present at the centre of each cell, and is surrounded by the cytoplasm.

Conclusion

As cell walls and large vacuoles are clearly observed in all the cells, the cells placed for observation are plant cells.

Precautions

- Use a brush to transfer the peel from one apparatus to another.
- Staining of peel should neither be too dark, nor too light.
- Extra glycerine stain should be removed using blotting paper.

Task 3.2 To prepare stained temporary mount of human cheek cells. Materials required:



Procedure:

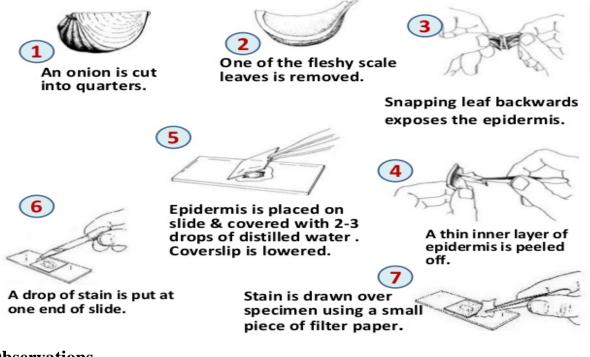
Gently scrape the inner side of the cheek using a toothpick, which will collect some cheek cells.

Place the cells on a glass slide that has water on it.

Mix the water and the cheek cells using a needle and spread them.

Take a few drops of Methylene blue solution using a dropper and add this to the mixture on the slide.

- After 2-3 minutes remove any excess water and stain from the slide using a blotting paper.
- Take a few drops of glycerine using a dropper and add this to the test mixture.
- Take a clean cover slip and lower it carefully on the mixture with the aid of a needle.
- Using a brush and needle, press the cover slip gently to spread the epithelial cells.
- Remove any extra liquid around the cover slip using a blotting paper.
- Place this glass side on the stage of the compound microscope and view it.



Observations

- A large number of flat and irregular-shaped cells are observed.
- The cells do not have a cell wall. However, each cell has a thin cell membrane.
- A deeply stained nucleus is observed at the centre of each cell.
- No prominent vacuoles are observed in the cells.

Task 4. Examine animal and plant cells (demonstration slide) at low and high magnification. Learn how to quickly find objects on permanent micropreparations (finding images).

They have cytoplasm, nucleus and plasma membrane. Cells of animals have smaller sizes in comparison with the cells of plants. Draw the cells.

Characteristics	Prokaryotic cells	Eukaryotic cells
	Bacteria and blue-green algae	Protists, fungi, plants, animals
	1 - 10 nm across	10 – 100 nm across
	By some	By many
	No	Yes
	Single strand of DNA that forms circle, DNA without protein	Coiled, linear strands, complexed with protein
	In nucleoids (nucleus like) in cytoplasm	In nucleus
	A single chromosome	Number of chromosomes varies from 2 to several hundred
	Short	Long
	Never formed during cell	Nuclear spindle formed

Task 5. Compare, contrast and fill the table:

division	
RNA and protein synthesis are not spatially separated	RNA and protein synthesis are spatially separated
Some	Many
No	Yes
Single cells or colonies	Some single-celled, most with differentiation of cell function.

points

Task 7. Write some examples of chemical composition of the cell by dividing to main

groups?_____

points______ signature of the teacher

PRACTICAL LESSON №2

Theme: Cell theory. Morphology of plant and animal cells.

Aim: 1) Get to know cell theory and two exceptions of it.

2) Know the structure and the main prescriptions of the eukaryotic cell compounds.

Be able to distinguish their structure during microscopic analysis.

Practical work

Task 1. Conduct debate about Cell theory, its modern form, includes the following principles:

- 1. All known living things are made up of one or more cells.
- 2. All living cells arise from pre-existing cells by division.
- 3. The cell is the fundamental unit of structure and function in all living organisms.
- 4. The activity of an organism depends on the total activity of independent cells.
- 5. Energy flow (metabolism and biochemistry) occurs within cells.
- 6. Cells contain DNA which is found specifically in the chromosome and RNA found in the cell nucleus and cytoplasm.
- 7. All cells are basically the same in chemical composition in organisms of similar species.

Cells are of two fundamental types according to presence or absence of a nucleus: prokaryotic and eukaryotic.

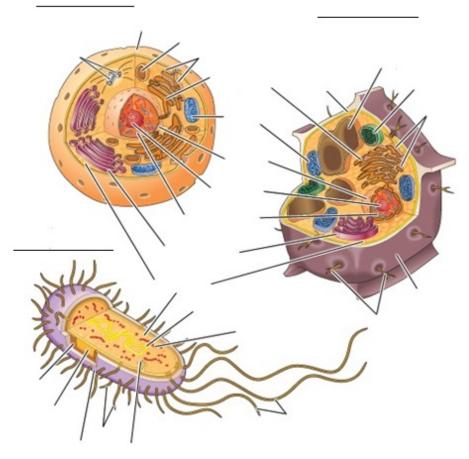
Task 2. Compare, contrast and fill the table:

	Organelles	Structure	Function
--	------------	-----------	----------

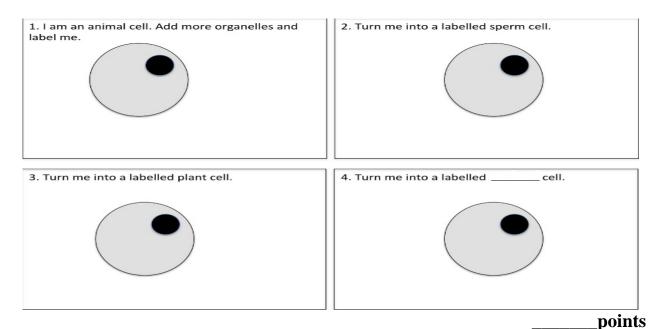
Ribosomes	
Rough endo-	
plasmic	
reticulum(RER)	
Smooth endo-	
plasmic	
reticulum(SER)	
Golgi apparatus	
Lysosomes	
Peroxisomes	
(microbodies)	
Mitochondrion	
Centrosome	
(cell center)	
Vacuole	

points

Task 3. Write down types of the cell. Label cell organelles.



_____points Task 4. Complete the following diagrams:



Task 5. Draw lines from the parts of cells to their functions.

Hun	otion
T'UII	ction

Part of cen
Cell membrane
Chloroplasts
Nucleus
Cell wall
Cytoplasm
Vacuole

Tells the cell what to do
Keeps the cell together and
controls what goes into and out of
the cell
A jelly-like substance in which
many of the cell's activities happen
A storage space filled with sap
Green discs that allow to make
own food
Supports the cell

Vacuole

Task 6. Short answer type questions:

- 1. Give two exceptions of the cell theory?
- 2. Who has invented first simple microscope?
- 3. Who has propounded the cell theory?
- 4. "New cells originate from pre-existing cells." Who has given this statement?
- 5. In cell which scientist discovered the nucleus?
- 6. Give one example of each prokaryotic and eukaryotic cell?
- 7. Write down two differences of prokaryotic and eukaryotic cells?
- 8. "Protoplasm is the physical basis of life" which scientist proposed this view?
- 9. Write the names of two cell organelle enveloped by one cellular membrane?
- 10. Write the names of two cell organelle which do not posses any membrane?
- 11. What are capsid and capsomeres?

____points

_____points______signature of the teacher

PRACTICAL LESSON №3

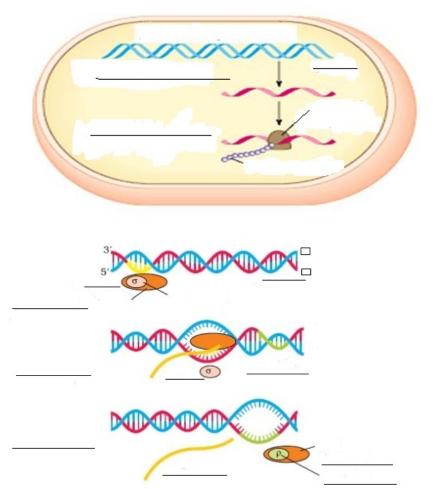
Theme: Gene expression. Protein synthesis.

Aim: 1) To generate knowledge about the main stages of gene expression: **transcription** (capping, the "poly-A tail", splicing, the alternative splicing) and **translation.** Control of an expression of genes.

2) To classify the role of RNA in gene expression. Types of RNAs. Characteristics of tRNAs, mRNA, rRNA, snRNA.

3) To give an idea of the genetic code and its basic properties: triplets, degenerate, nonoverlapping, comma-free, ordered, universal.

Practical work Task 1. Describe following diagram and labeled:

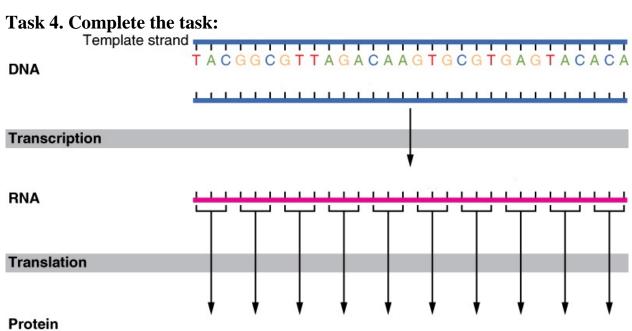


Task 2. Match the following substances and structures involved in the synthesis of protein and its functions (put the right letter next to the number).

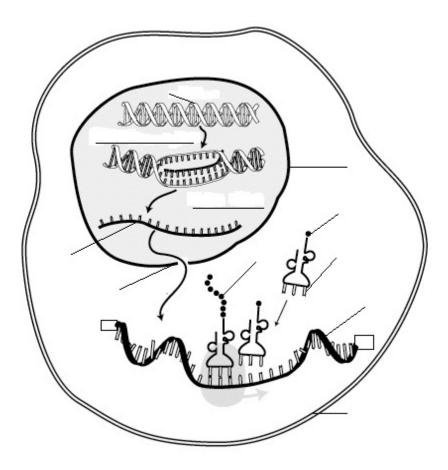
	una no ranceiono (par ene right retter nent to the name of)
1.DNA region	a) transfers information to the ribosome's
2. m-RNA	b) the place of protein synthesis
3. RNA polymerase	c) an enzyme that provides the synthesis of m-RNA
4. Ribosome	d) source of energy for reactions
5. Polysome	e) monomers of protein
6.ATP	f) group of nucleotides encoding 1 amino acid
7. DNA triplet	j) gene encoding protein information
8.Amino acid	k) several ribosomes simultaneously transmitting one
	mRNA molecule

Task 3. Fill the table:

Molecules	Role in biosynthesis	Process in the ribosome's
Messenger RNA (mRNA)		
Transfer RNA (tRNA)		
Enzymes – Proteins		
ATP		



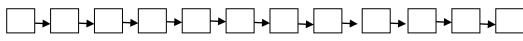
Task 5. Describe following diagram and labeled:



Task 6. Write in the boxes and place them into the correct order to show how protein synthesis

	syn
In the cytoplasm, protein synthesis is initiated by the AUG codon on mRNA. The AUG codon signals both the attachment of the ribosome with mRNA and also the tRNA with the anticodons (UAC).	A
The ribosome moves along the mRNA one codon. The first tRNA is released without its amino acid.	В
When the ribosome reaches a termination codon the ribosome leaves the mRNA and protein synthesis is complete.	С
During the first step in protein synthesis, the DNA / gene is transcripted into mRNA in the nucleus. The DNA unzips and free nucleotides come in and produce the mRNA strand using the complementary base pairing rule: the enzyme that controls this process is RNA polymerase.	D
The ribosome moves along the mRNA one codon. Again the tRNA is released without its amino acid.	E
The next step is for a second tRNA to approach the mRNA and match with the second codon on the mRNA.	F
A peptide bond forms between the amino acids.	G
Another peptide bond forms between the amino acids.	н
The completed amino acid chain is now ready to be folded into a functional protein	. 1
This process called translation continues and causes the amino acid chain to grow.	J
The mRNAs migrate from the nucleus into the cytoplasm.	к
The next matching tRNA brings in the next amino acid.	L

occurs.



Use mRNA Codon chart to solve the following tasks.

			IDE	CLEOT	SECOND NU			51	
	G		А		С		U		
U	Cysteine	UGU	Tyrosine	UAU	Serine	UCU	Phenylalanine	UUU	U
С	(Cys)	UGC	(Tyr)	UAC	(Ser)	UCC	(Phe)	UUC	
U C A	STOP	UGA	STOP	UAA		UCA	Leudine (Leu)	UUA	
G	Tryptophan (Trp)	UGG		UAG		UCG		UUG	
U	Arginine	CGU	Histidine	CAU	Proline	CCU	Leudine (Leu)	CUU	С
С	(Arg)	CGC	(His)	CAC	(Pro)	CCC		CUC	
C A		CGA	Glutamine	CAA		CCA		CUA	
G		CGG	(Gin)	CAG		CCG		CUG	
U	Serine (Ser)	AGU	Asperagine	AAU	Threonine	ACU	Isoleucine (IIe)	AUU	Α
С		AGC	(Asn)	AAC	(Thr)	ACC		AUC	FIRST NUCLEOTIDE
U C A	Arginine	AGA	Lysine (Lys)	AAA		ACA		AUA	
G	(Arg)	AGG		AAG		ACG	Methionine (Met) START	AUG	
U	Glycine (Gly)	GGU	Aspertic Acid	GAU	Alanine	GCU	Valine (Val)	GUU	G
С		GGC	(Asp)	GAC	(Ale)	GCC		GUC	
U C A		GGA	Glutamic	GAA		GCA		GUA	
G		GGG	Acid (Glu)	GAG		GCG		GUG	

1. Using the gene code table, write the structure of the region of the protein molecule, along the site of the DNA molecule: A - G - C - T - A - G - C - A - T- T - G - A - C - G - T

-]	[_]	G –	- A -	– C	- 0	Г – С																		
2.	1	If	the	e n	ucl	eoti	ide	se	aue	nce		of	the	СС	odin	g	stra	nd	of	· [) NA	A i	is	5'-
-	ГG						, wl		-							-	~			_		_		-
							,	Inde				l		que										
																						-		
2	_ 	the		 1:		noto				10	5 1				 1	II.				 1010		100	0.000	_ ;
					-													-	,		otic			m
the		NA	tha	t er		les	this	pro	otei	n/v	<i>w</i> na	at 1s	the	e ler	ngtr	I OI	this		NA	mo	lecu	lle	(
4.	W	hic	h p	rote	in v	will	be	syr	the	size	ed -	sh	eep	or	rab	bit?	If	had	l be	en	take	en r	abt	oits
rit	oso	ome	<u>'s f</u>	or a	rtif	icia	l sy	nth	esis	s, ar	nd r	n-R	NA	s of	<u>f</u> sh	eep	cel	<u>ls?</u>	Wh	<u>y?</u>				
5.	Wh	hat a	ami	no a	acid	sec	quei	nce	ma	tche	es tl	his	mR	NA	? A	\overline{UG}	-GA	\mathbf{A}						J]
							1																	
6	W/ŀ	l nat e	mi	no s	ncid	SAC	quer		ma	tche	ac tl	hic	DN	Δ?	TT	Γ_Δ	ΔΔ							
0.	**1.					. 500	Juci		ma		-5 ti						1/1							
																								+-+
	XX 71		•		1					4 . 1.	1		<u>י</u> את.	1 1 0			A T T	\overline{C}						
7.	wh	hat a	ami	no a	acid	sec	quei	nce	ma	tche	es ti	n1S 1	IKN	A?		7 (-/	AU	J			1		r –	1
		<u> </u>																			<u> </u>			
8.	Wh	nat a	ami	no a	acid	sec	quei	nce	ma	tche	es tl	his 1	mR	NA	? A	GA	-AA	C						
																					1			
L					í											í	í	í			1		1	

9.During the translation 30 molecules of tRNA participated. Determine the number of amino acids that make up the synthesized protein, as well as the number of triplets and nucleotides in the gene that encodes this protein?

				<u> </u>								

10. Consider the three double stranded DNA molecules below. You slowly heat a solution containing all three molecules, causing them to disassociate and become single stranded. In which order will they disassociate (first to last)? Write answer.

Molecule 1:	Μ	[olecu	ıle 2: Mo	lecule	3:
5' GCGGGGCCAGCCCGAG	3'	5'	ATTATAAAATATTTA	. 3'	5'
GCGGGCCTATTTAGA 3'					
3' CGCCCGGTCGGGCTC	5'	3'	ТААТАТТТТАТАААТ	5'	3'
CGCCCGGATAAATCT 5'					

_____points______signature of the teacher

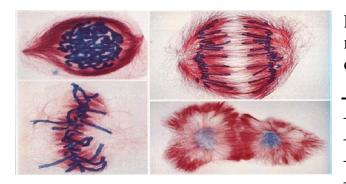
PRACTICAL LESSON №4

Theme: Cell cycle and cell division. Mitosis. Meiosis.

- Aim: 1) Formation of knowledge about the mechanisms of cell division and its biological significance.
 - 2) Describe phase of mitosis: interphase, mitosis, cytokinesis.
 - 3) Meiosis: characteristic of stages, biological role.
 - 4) Differences and similarity between mitosis and meiosis

Practical work

Task 1. Mitosis. Examine the slide "onion root tip cells" using a microscope.



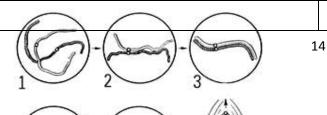
Find cells at different stages of mitosis. Indicate the order and names of the stages of mitosis.

_points

points

Task 2. Meiosis. Sign stages of meiosis and specify the number of chromosomes (n) and DNA content (c) at each stage.

1.



2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.

_points

Task 3. Describe differences and similarity between mitosis and meiosis.

Characteristics	Mitosis	Meiosis
Genetic		
variation		
Selective		
Breeding		
Time and		
energy		
Rapidity		
Mutations		
DNA synthesis		
Crossover		

_____points

Task 4. Short type questions:

1) If the cell has been divided what number and time to divide according to genetic information suppose this 2 daughter cells don't have to divide any more. What this cell going to do?

2) Give examples and characteristics for direct division?

4) Write down difference between mitosis in plant cells and animal cells?

5) The cell cycle control system is regulated by both internal and external controls. Describe them?

6) If mitosis is not controlled, unlimited cell division occurs causing.....? What process is it?

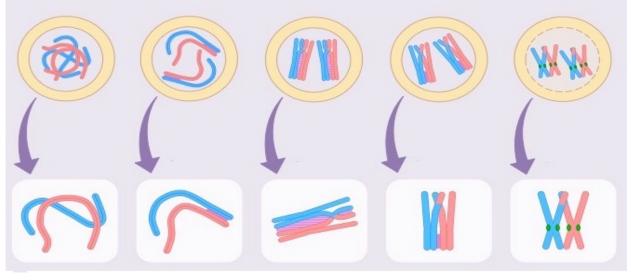
7) What is the process of apoptosis?

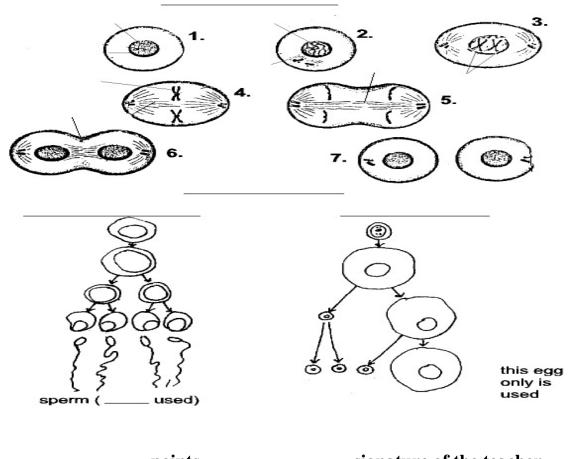
8) What difference has homologues chromosome and non homologues chromosome?

_points

Task 5. Write down 5 subphases of prophase I of meiosis. What is occurring in prophase

I?





Task 6. Complete the diagrams:

__points______signature of the teacher

PRACTICAL LESSON №5

Theme: Reproduction in organisms.

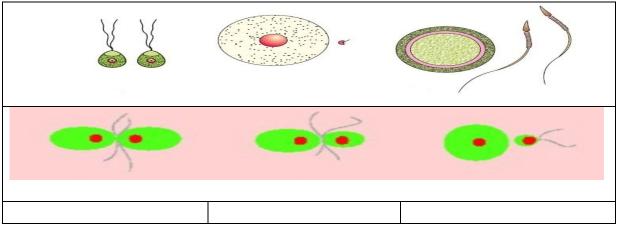
Aim: 1) To form knowledge about the essence and forms of reproduction of organisms; to show the biological significance of asexual reproduction. The role of reproduction in evolution.

2)Types of reproduction: asexual and sexual. Types of asexual and sexual reproduction in unicellular and multicellular organisms. Importance of reproduction.

3) Cell reproduction. Gametogenesis: characteristic of stages.Gametes: structure and functions.

Practical work

Task 1. The evolution of sexual reproduction. Determine the form of the sexual process shown in Figure. Sign drawings: oogamy, isogamy, anisogamy.



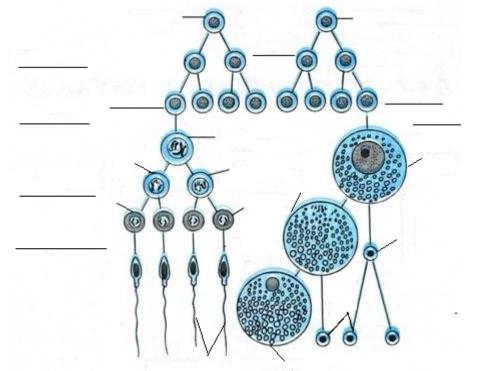
1.2.In the following table shown types of asexual and sexual reproduction in unicellular and multicellular organisms. Complete the table with appropriate examples.

			Ty	pes of re	eprod	uction			
		Ase	exual					Sexual	
Cell	V	^v egetative	propa	gation		Sporula	Syngam	Synga	Parthen
divisio	In an	imals]	In plants		tion	y of	my of	ogenesis
n	Buddin	Fragme	With	With	Wit		unicellul	gamete	Develop
	g	n-tation	roots	shoots	h		ar	S	ing of
				(runner	leav		organis		offsprin
	_		_	,cutting	es		ms		gs from
				,bud)					the egg
									or
									female
									gamete
									without
									the prior
									fertilizat
									ion from
									the male
									gamete.

1.3.	Using all data, fill the table:	
N⁰	Species (examples)	Types of reproduction
1	Infusoria	
2	Freshwater hydra	
3	Wild strawberry	
4	Mushroom	
5	Grapes	
6	Currant	
7	Potato	
8	Earthworm	
9	Ameba	

10	Star fish	
11	Yeast	
12	Bee	
		points

Task 2. Gametogenesis. Write down the names of cells and stages of gametogenesis in the diagram. Indicate the number of chromosomes and DNA in the cells.



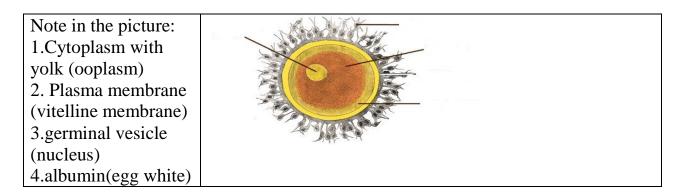
___points

Task3. The structure of sperm.

Examine the slide using a microscope.

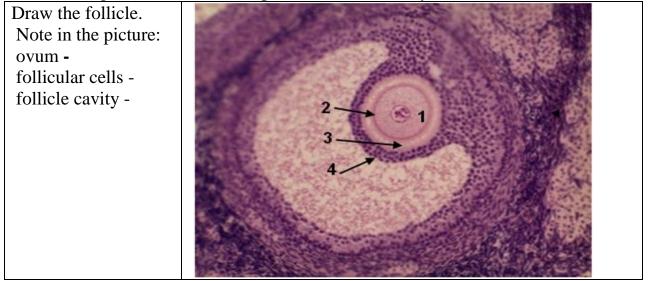
Note in the picture:	
1. head	
2. neck	
3. tail	
4.acrosome	
5. centrioles	
6.nucleus	
7.mitochondria	
8.basal body	

Task 4. The structure of ovum. Note the large size of the egg. The cytoplasm of the egg contains a lot of yolk.



Task 5. The structure of gametes. Ovum of a cat (demonstration slide).

Consider permanent slide « **Ovary Cat Sec.**». This is ovum of placental mammals. In the slide you will see a cross section of the cat ovary. Mammalian ova maturate in special bubbles refers as **follicles**. Follicles are at different stages of development. Find a mature follicle and egg. Follicle cavity filled with liquid. Ovum is large-sized, rounded shape. It is surrounded by small follicular cells.



Task 6. Problem solving.

___points

1. How many mature gametes are produced from 10 primary spermatocytes? 10 secondary oocytes?

		 /	-												
-	T 1	. 1		0 1			T		1			1 T	•	•	<u> </u>

2. The cat has 38 chromosomes. How many chromosomes and DNA contain primary and secondary oocytes of cat?

_												
-												

3. Sheep has 54 chromosomes. How many chromosomes and DNA molecules will be present in the following types of sheep cells?

1) Mature sperm

2) First polar body
3) Primary oocyte
4) Secondary spermatocyte
5) Zygote

Image: signature of the teacher

PRACTICAL LESSON №6

Theme: Introduction to ecology. Human impact on ecology.

Aim: 1) Formation of knowledge about species, communities and ecosystems.

- 2) Energy flow.
- 3) Carbon cycling.
- 4) Climate change. Human impact on ecology.

Progress (practical work)

Task 1. Describe about species, communities and ecosystems and fill the table "Levels of organization". Arrange in right order a hierarchy of organization".

Levels of Organization	Definition

Task 2. Identify ecological levels:

the the state	



Task 3. Use arrow to show food web.



Task 4. Draw 3 types of ecological pyramids:Pyramid of energyPyramid of numbersbiomassPyramid of numbers

Pyramid of

____points

Task 5. Types of symbiotic relationships. Look at the picture and characterize with appropriate interaction.

INTERACTION	TYPE OF SYMBIOSIS	EXAMPLE

_points

	points

Task 6. Describe human impact on the environment (biophysical environments, biodiversity and other resources).

Anthropogenic	How is effected? What diseases does it cause due to human
factor	impact factor?
Greenhouse	
effect	
Ozone	
depletion	
Acid rain	
Desertification	
Deforestation	
Algal blooms	
and	
eutrophication	
Air pollution	
(suspended	
particles,	
nitrogen	
dioxide, sulfur	
dioxide)	
Water	
pollution	
Soil pollution	

_____points______signature of the teacher

points

PRACTICAL LESSON №7

Theme: Basic concepts in genetics. Mendel's Laws. Genetic crosses.

Aim: 1) Practice genetic terminology.

2) Discuss Mendel's 1st law: rule of dominance (law of dominance), Mendel's 2st law (low of segregation), and Mendel's 3nd law (law of independent assortment).

3) Decide genetic crosses problems.

Practical work

Definition Term heredity gene genome chromosomes DNA locus allele trait genotype phenotype dominant allele recessive allele heterozygotes homozygotes, monohybrid cross dihybrid cross polyhybrid cross hybrid test cross backcross Pure line Phenocopy Karyotype

Task 1. Create a table of genetic terms:

_____points

Task 2. Monohybrid Cross.

1) In humans, curly hair (**C**) are dominant over straight hair (**c**). A man with curly hair get married a straight hair woman and they have three children, two of them are with curly hair and one of them is with straight hair. Draw the Punnett square that illustrates this marriage. What is the man's genotype? What are the genotypes of the children?

2)Wheat have dwarf gene (A) dominated over normal growth gene (a) of wheat. Identify genotype and phenotype of offsprings:

- a) Homozygous with normal height?
- b) Two heterozygous dwarf wheat height?

							<u> </u>									
	1	1	l	l	l	l	l			l	l			1	poir	nts

Task 3. Dihybrid Cross.

1) In humans, normal skin color (A) is dominant over albino (a). Diabetes is inherited as a recessive trait (d). A diabetic albino man marries a normal woman whose mother was an albino and whose father was diabetic. What are the genotypes of the man and the woman?

What proportion of their children would be expected to be both non-diabetic and have normal color?

110				•••																			
2)	In	ne	a n	lant	te	ve11	ow	SAC	de	are	de	mi	nan	t to	. σ1	reen	T	f he	ator	071	σOU	<u>ماام</u>	w

2) In pea plants, yellow seeds are dominant to green. If heterozygous yellow seeded plant is crossed with a green seeded plant, what ratio of yellow and green seeded plants would you expect in F1 generation?

_	1		-	1		$\overline{\boldsymbol{\mathcal{O}}}$							
-												•	

____points

Task 4. Trihybrid Cross. In Guinea pigs, black hair (B) is dominant over white (b), rough coat texture (R) is dominant over smooth (r), and short hair (S) is dominant over long hair (s). Assuming these genes are on separate chromosomes, draw the Punnett square for a cross between a homozygous black, rough, shorthaired Guinea pig and a white, smooth, long-haired one. What would the phenotype(s) of the offspring be? If two of the F1 offspring were crossed, draw the Punnett square for this cross.

I um	ICU L	quu		ing	010	00.									
															i i
													I	poir	Its

Task 5. Test cross. In dogs, there is an hereditary deafness caused by a recessive gene (**d**). A kennel owner has a male dog that she wants to use for breeding purposes if possible. The dog can hear, so the owner knows his genotype is either **DD** or **Dd**. If the dog's genotype is Dd, the owner does not wish to use him for breeding so that the deafness gene will not be passed on. How to test the genotype males? Make a chart crossing. Draw the Punnett squares to illustrate these two possible crosses. In each case, what percentage/how many of the offspring would be expected to be hearing? deaf? Also, using Punnett square(s), show how two hearing dogs could produce deaf offspring.

	 	 r	 					 	 	1	 	
												└───

_points

_____points______signature of the teacher

PRACTICAL LESSON №8

Theme: Chromosomal theory of inheritance. Linked inheritance. Sex linkage and Sex determination.

Aim: 1) Debate about chromosomal theory of Inheritance. Recombination of unlinked genes (Independent assortment of chromosomes).

2) Discuss linked genes. Complete and incomplete linkage. Recombination of linked genes: crossing over. Morgan's experimental evidence of linked inheritance. Practice problems with inheritance of sex linked traits.

3) Formation knowledge about chromosomal sex determination system (heterogametic sex and a homogametic sex).

- 4) Classify sex-linked genes. Inheritance of sex-linked genes:
- ➤ X-linked recessive inheritance, examples
- X-linked dominant inheritance, examples
- ➢ Y- linked inheritance, examples.

Practical work

Task 1. Linked inheritance. Crossing Over.

In pea plants, the peas can be either **rough** or **smooth**, and either **soft** or **hard**. You do some crosses and obtain the following results. **Cross 1:** purebred **rough**, **soft** pea x purebred **smooth**, **hard** pea gives **F1**: all **rough**, **hard**. **Cross 2: rough**, **hard** F1 x **smooth**, **soft** (note: test cross, NOT self cross) gives **F2**: 115 - **rough soft**, 110 - **smooth** hard, 8 - **rough** hard, 12 -**smooth** soft.

a) state the genotypes of the parents, the F1, and each phenotypic class in the F2.b) are the genes for roughness and softness linked? If so, what is the recombination frequency (distance in centimorgans or map units) between the

genes?

0	nes	1		1									

_____points

Task 2. Sex-linked inheritance.

In humans, the gene for **colorblindness** is recessive and located on the X**chromosome** with no corresponding gene on the Y. If a man and a woman, both with normal vision, marry and have a colorblind son, draw the Punnett square that illustrates this. This woman remarries to a colorblind man, draw a Punnett square showing the type(s) of children could be expected from her second marriage. How many/what percentage of each could be expected? **Note: If the gene is localized in the sex chromosome is designated with this chromosome,** e.g. Xd – **colorblindness, XD- normal vision.**

____points

Task 3. Sex-linked inheritance.

Hemophilia in humans is due to an X-chromosome recessive mutation (h). What will be the results of mating between a normal (non-carrier) female and a hemophilac male?

___points

Task 4. Inheritance of two traits: Sex-linked and autosomal.

Color-blindness is a sex-linked recessive trait in humans. The alleles for the hair color are located on a pair of autosomes, and brown hair (**B**) is dominant to blond hair (**b**). A woman who is homozygous for normal vision who has blond hair marries a man that is color blind and heterozygous for brown hair. What is the probability that their first born daughter will have brown hair and normal vision.

1	 -	· .	 		 	101							

___points

Task 5. Inheritance of two traits: Sex-linked and autosomal.

In humans, the gene for colorblindness is recessive and located on the Xchromosome. Brown eyes are dominant over blue. This is NOT a sex-linked trait. If a blue-eyed colorblind woman marries a normal visioned man who is homozygous for brown eye color, what kind of children might they expect with respect to these two traits?

If one of the sons in turn marries a heterozygous brown-eyed, normal visioned woman, not a carrier, what kinds of children might they expect?

_points

Task 6. Sex-linked inheritance. Crossing Over

In humans, the genes for colorblindness (d) and hemophilia (h) are recessive and located on the X-chromosome. The distance between these genes 10 map units. A) A woman whose father suffers from hemophilia and color blindness, and the mother is healthy and homozygous, marries a healthy man. Determine the probable phenotypes of children in this marriage. B) The woman, whose mother is colorblind, and his father with hemophilia marries a man who has both diseases. Determine the probability of those children will have two diseases.

			-									

____points

Task 7. Sex-Influenced Traits.

Baldness in humans is a dominant (**B**), sex-influenced trait. This gene is on the autosomes, not the sex chromosomes, but how it is expressed is **influenced** by the person's sex (due to hormones present, etc.).

A man who is **BB** or **Bb** will be bald and will be non-bald only if he is **bb**. A woman will only be bald if she is **BB** and non-bald if she is **Bb** or **bb** (it's almost like **B** is dominant in males and **b** is dominant in females). Actually, because of the influence of other sex-related factors, most women who are **BB** never become totally bald like men do, but rather, their hair becomes "thin" or sparse. If two parents are heterozygous for baldness, what are the chances of their children being bald?

Note: because the sex of a person does make a difference in how the gene is expressed, you need to set this up as a dihybrid cross to account for the sex of the children.

												1

_points

Task 8. Sex-linked inheritance. Sex differentiation.

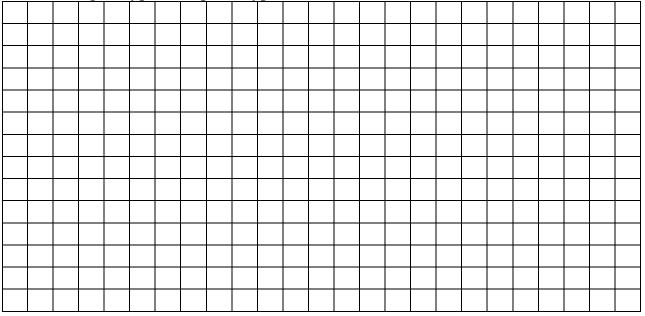
In humans, X-linked gene that codes for androgen (testosterone) receptors in our cells. The dominant allele (**XA**) codes for "make functioning receptors that can correctly receive and bind onto testosterone," but recessive allele (**Xa**) codes receptors that can't receive and bind onto testosterone."

In humans, there is also a Y-linked gene that codes for "make testes," and when present, they, in turn, make testosterone, and the testosterone, in turn, goes to other cells in the body, and when received by the receptors, triggers other events within those cells. During embryonic development, one such event is growth and development of male genitalia.

Consider a person who is genotype XAY. Because this person has a Y chromosome including a normally-functioning gene to make testes, at the appropriate time during embryonic development, testes will form and will start to secrete testosterone. Because this person also has the correctly-functioning allele for the androgen (testosterone) receptor gene, those receptors will form and will begin functioning. As they receive the testosterone made by the testes, this will stimulate development of male genitalia, and (assuming all other genes are working "normally"), this baby will be a boy.

Consider a person who is genotype **XAXA.** Because this person does not have a Y chromosome, there is no gene to provide instructions to make testes, therefore no big prenatal surge of testosterone, therefore no stimulus to make male genitalia (in spite of properly-functioning testosterone receptors), so by "default," female genitalia develop, and (assuming all other genes are working "normally"), this baby will be a girl.

If woman whose genotype **XAXa** marries a normal man, what would their children's genotypes and phenotype be?



											,	poir	nte
										 	ł	J011	115

_____points_______signature of the teacher

PRACTICAL LESSON №9

Theme: Gene interaction.

Aim: 1) To study main types of gene interaction.

2) Discuss about multiple alleles, ABO blood group, Rhesus-system (**Rh**), human leukocyte antigen (HLA) system.

3) Formation of knowledge about interactions between allelic genes:

complete dominance and incomplete dominance, overdominance,

codominance, interallelic complementation, allelic exclusion

4) Classify interactions between non-allelic genes: complementary,

epistasis, polymerism.

5) Pleiotropy.

6) Practice problems with gene interaction.

Practical work

Task 1. Inheritance of blood type (ABO)

1)A man with blood type **I** (**O**) marries a woman with blood type **IV**(**AB**). State the possible phenotypic ratios of the offspring.

 1		~	1				\overline{c}						

_points

2)A woman homozygous for blood type **III (B)** marries a man that is heterozygous for blood type **II (A).** State the possible phenotypic ratios of the offspring.

 	100	 JP	•	- (-	-/•	~ ~	 	Γ P `	555.	101	° P'	 100	/ P *	• •		 	~ 11	PP-	31112	>		

L															

points

3)A type **II**(**A**) woman whose father was type **III**(**B**) marries a type **III**(**B**) man whose mother was was type **II**(**A**). What are the possible phenotypes of their offspring?

 	$\overline{\boldsymbol{\mathcal{O}}}$													

_____points

4)A test was done to determine the biological father of a child. The child's blood type is **II** (**A**) and the mother's is **III** (**B**). Dude #1 has a blood type of **I** (**O**), dude #2 has blood type **IV**(**AB**). Which dude is the biological father?

		~ 1						-					

_points

5) Brown-eyed man and woman have four children. Two children have blue eyes, their blood type I(O) and IV(AB). Two children have brown eyes, their blood type II(A) and III(B). Determine the genotype of the parents. What is the probability that their next born child will have brown eyes and I(O) blood type?

 	-	-	 -	-		 	 -	J	 · (- /	 	-		

____points

Task 2. Inheritance of blood type (ABO) and X-linked traits.

Muscular dystrophy is a X-linked recessive trait in humans. And blood type is a result of three alleles **IA IB IO** (autosomal trait). A women that is carrier of muscular dystrophy and has blood type **IV**(**AB**), marries a man that has **muscular**

							1	· · ·	/				

dystrophy and has type **I**(**O**) blood. What is the probability that their first male child will have **muscular dystrophy** and have type **III** (**B**) blood?

____points

Task 4. Linked inheritance.

In humans, **Rh-factor locus** linked with locus controlling the shape of red blood cells. The elliptical shape of erythrocytes and **Rh**+ are dominant traits. Normal erythrocyte and **Rh**- are recessive. The distance between genes **3 map unit**. Women were heterozygous for both traits. Her mother had elliptical erythrocytes, her father had **Rh**+. Her husband has a normal red blood cells and **Rh**-. Determine the percentage of genotypes and phenotypes of offspring.

____points

Task 5. Incomplete dominance.

Thalassemia is inherited as an autosomal incomplete dominant trait. Homozygous is lethal. Heterozygous have a mild form of the disease. Woman suffers a mild form of thalassemia, her husband is normal. State the possible phenotypic ratios of the offspring.

____points

Task 6. Interactions between non-allelic genes. Complementation.

Normal hearing in humans is determined by the presence of two dominant genes D and **E**. If the person has only one dominant gene (**D-ee, ddE-**) or all recessive (**ddee**) he is deaf. Deaf parents have seven children with normal hearing. Determine the genotypes of the parents. Determine the form of gene interaction.

_____points

Task 7. Additive Gene Interaction. Polymeria.

Human height is controlled by three pairs of unlinked autosomal genes. Genes interact to **additive polymeria.** People with short height (150cm) have all recessive alleles. People with tall height (180cm) have all dominant alleles. Determine the height of people heterozygous for all three pairs of genes. Record genotypes of people with height 155cm, 160cm, 170cm, 175cm.

0-	 <u> </u>	 <u>r</u> -	<u> </u>	 	32	 	• • • • • •	 	-, -	 , -	 			

____points

_points______ signature of the teacher PRACTICAL LESSON №10

Theme: Variation. Mutation.

Aim: 1) Classify variability. Non-hereditary variability. Characteristics of modification variability. Norm of reaction. Expressivity and penetrance of genes. Phenocopy.

2) Discuss hereditary or genotypic variability. Combinative variability. Mechanism of combinative variability. Value for evolution. Practice problems with inheritance due to genetic changes.

Practical work

Task 1. Complete the table. Determining the type of mutational variability. Mutations and hereditary diseases.

	Change in genotype	Type of mutation	Name of disease
1	absence of the enzyme phenylalanine hydroxylase		
2	replacement of one amino acid in the beta-chain of hemoglobin		
3	45, X0		
4	45, YO		
5	47, XXY		
6	47, XXX		
7	47, 13+		
8	47, 18+		
9	47, 21+		
10	46, 5 p-		
11	46, 18q-		
12	46, 21q-		
13	46, tr 21/15		

__points

Task 2. Solving of genetics problems

1. In humans, brown eyes (A) are dominant over blue (a). Retinoblastoma (is the most common malignant tumor of the eye) is inherited as an other autosomal dominant trait (R). Retinoblastoma is 60% penetrant. A woman is heterozygous for color eyes and retinoblastoma, marries a healthy man with blue eyes. What is the probability that their first born will have blue eyes and retinoblastoma.

	 2						J - ~					

points

2. Arachnodactyly ("spider fingers") is inherited as an autosomal dominant trait (A), which has 30% penetrant. Left-handedness is inherited as an autosomal recessive trait with penetrance is complete. Both parents are heterozygous for both traits. What is the probability that their child will have left-handedness and "spider fingers".

 $\overline{\mathcal{O}}$												

_points

3. Schizophrenia is inherited as an autosomal dominant trait. Homozygotes have 100% penetrance, heterozygotes - 20%. One parent is heterozygous, the other parent – normal. Determine the probability that children will have the disease.

_____points______signature of the teacher

PRACTICAL LESSON №11

Theme: Variability and hereditary diseases

Aim: 1) Formation knowledge about Mutational variability. Mutation theory Hugo de Vries. Classification of mutations. Mutagen agent.

2) Classify Gene-level mutation. The types of gene mutations X.

3) Gene diseases and their characteristics: sickle-cell anaemia (SCA),

Phenylketonuria (PKU), Albinism, Galactosemia.

4) Anti-mutagenic mechanisms in multicellular animals

5) Chromosomal Abnormalities, classification and characteristics: numerical aberrations (Genomic mutations) and structural aberrations (Chromosomal aberrations). Mechanism of pathology.

6) Chromosomal diseases condition that results from genome mutation numerical aberrations: Down Syndrome, Patau syndrome, Edwards syndrome, Turner Syndrome, Klinefelter Syndrome, Triple X Syndrome.
7) Chromosomal diseases condition that results from Chromosomal aberrations - structural aberrations: Cri du chat Syndrome or cat-cry Syndrome, deletion syndrome, duplication syndrome, Down Syndrome (Translocation)

Practical work

Task 1. Solving of genetics problems involving hereditary diseases

1)Patient: Girl 10yr old. Lack of skin and hair pigmentation. Intelligence is normal. Girl has vision defects: photophobia, nystagmus. Labs: absence of the enzyme tyrosinase.

Questions:

1. What is diagnosis?

	Iut I	lo ui	lagi	1031	5.		1	1										
		<u> </u>				-												
2. De	tern	nıne	e the	e ty	pe o	ot n	nuta	t101	n?	1	1		1					-
_																		
) Da		 	le a le		1.00		• • •	: 41a :	;	~ ~ ~ ~	?							<u> </u>
3. De	scri	be i	ne i	mec	chai	IISH	1 01	um	s ai	sea	se:	1		1				1
4. Wł	hat i	net	hod	wa	is us	sed	to c	liag	nos	se?	1		1					1
5 11/1		a 41a		a a ta			F 41a 3											<u> </u>
5. Wł	iat i	s th	le tr	eati	men	it oi	t thi	IS OI	isea	se?	1		1					1
_																		
		1 ·	1	1	1		1	1	1	1	1	1	1	1				1

2) Young family has a newborn son. The child is very restless, irritable, sleeps poorly. Boy has pale hair and skin. At the age of one month convulsions appeared. **Labs:** EEG abnormalities, high level of Phe in the serum ([Phe] > 1200 micromol/L).

Questions:

1. What do the lab results tell you about **Phe** metabolism in this child?

2.	Wh	at l	boys	s di	seas	se?									

			•	.1			C			0														
3.	Det	tern	nine	e the	e ty	pe o	of n	nuta	t101	1?			1			1				1				
						_																		
4.	Des	scri	be t	he i	mec	char	nisn	1 of	thi	s di	sea	.se?												
5.	Wh	at 1	net	hod	wa	s us	sed	to c	liag	nos	se?													
6.	Wh	at i	s th	e tr	eati	men	nt of	f thi	s di	isea	se?)												
1																								
7	Wh	at i	s th	e n	roh	ahil	itv	that	the	ir c	ecc	nd	hor	n cł	hild	wil	1 he	he he	alth	$\mathbf{v}^{?}$	Wri	ite c	low	'n
				-			ity	inal		/11 3		mu	001		mu	vv 11	1 00		an	ıy:	**11		10 10	11
th	e cr	OSSI	ing	scn	eme	.																		

_points

3) Young family has a newborn son. In the first days of life feeding difficulties and vomiting appeared. Baby is not gaining. The doctor diagnosed an enlarged liver, jaundice and sent for a blood test. **Labs**: Low blood sugar, high levels of galactose in the blood and urine.

Questions:

1. What do the lab results tell you about metabolism in this child?

									2											
2.	Wh	nat ł	boys	s di	seas	se?	I			l	l	I	1	1	l			l		L
3.	Det	tern	nine	e the	e ty	pe o	of n	nuta	tion	n?		1								
4.	Des	scri	be t	he i	mec	har	nisn	ı of	thi	s di	sea	se?								

	5011	110	/1101	11011	1 01	UIII	u u	beu	50.						
															.

5.	Wh	at r	netl	nod	wa	is us	sed	to d	liag	nos	se?		1		1						1		1	
6.	Wh	at i	s th	e tr	eati	men	t of	f thi	s di	sea	se?													
7.	Wh	at i	s th	e pi	rob	abil	ity 1	that	the	ir s	seco	nd	bor	n cł	nild	wil	l be	he	alth	y?	Wri	te c	low	'n
	e cr			_			•													•				
																						I	ooir	nts

4)The patient complains of chest and joint pain, difficulty breathing, weakness. A blood test revealed low red blood cell count. Electrophoresis revealed the presence of abnormal hemoglobin HbS.

Questions:

1. What patients disease?

		iui j	Juir	one	un	scas															
													-								
2.	Wh	at c	caus	sed	the	low	/ nu	mb	er c	of re	ed b	loo	d ce	ells'	?						
							Ļ														
3.	Wh	iy tl	ne p	atie	ent l	has	pai	n?						•							
			•	.1			C			0											
4.	Det	tern	nıne	e the	e ty	pe o	of m	iuta	t101	n?	r					r					
_				1		1	•			1.											
5.	Des	scri	be t	the 1	mec	char	nisn	1 of	thi	s di	sea	se?	1	1	1	1	1	1			
	XX 71	<u> </u>	. 1	1			1		1.												
6.	Wh	at 1	net	nod	wa	is us	sed	to c	nag	nos	se?	r –	1			1					
											1	1	1								

7. What is the treatment of this disease?

5) The patient is directed to a medical examination with suspected heart disease. Boy from the second pregnancy. Woman gave birth him at age 40.

On examination: flat face and epicanthus, muscle hypotonia, the child's height and weight below normal. Sick natured, emotional, motor and mental development delay. Mild degree of mental retardation. Meager vocabulary.

Karyotyping: found 47 chromosomes, trisomy 21

Questions:

1. What patient's disease?

					~ ~ ~	~	~				1	1	1										()	
0	***	<u> </u>	•		C .1								.1	1.		•	0							
2.	Wh	nat s	sign	S O	the	e pa	tier	it ai	e e	ssei	ntia	l to	r th	e dı	agn	OS1	s?							
3.	Wh	nat i	net	hod	wa	s us	sed	to c	liag	nos	se?													
4.	Typ	pe c	of m	luta	tior	1? N	[lec]	han	ism	of	pat	hole	ogy	?										
5.	Ma	ke a	a sc	hen	ne c	of th	ne fo	orm	atic	on a	nd	fusi	ion	of g	gam	etes	5							
6.	Wh	nat i	s th	e pi	rogi	nosi	is o	f of	fspi	ring	in g	this	s fai	nily	/?									
				1	0				1		Í													
																								<u> </u>
7.	Wh	nat i	s th	e pi	rogi	nosi	is o	f th	is p	atie	ent's	of	fspr	ingʻ	? M	ake	ac	ros	sing	g sc	hen	ne.		
				- P	-~8'				-~ P				~ []	8					38	, .				
	•	•										•										T	poir	nte
																						ł	101	113

6)Girl 2 months. Multiple malformations: high muscle tone, seizures, microcephaly, small eyes, small lower jaw, ventricular septal defect, hands with 2nd and 5th fingers on top of the others. The family has two children (a boy and a girl). Children are healthy.

Karyotyping: 47, 18+ **Questions:**

1.	Wh	nat j	pati	ent'	s di	isea	se?			I	1	•	1	r	r	•	I	r	r	1		•		
			l											1.										
2.	Wh	at s	sign	s oi	the	e pa	tier	nt ai	e e	ssei	ntia	l to	r th	e di	agn	IOS1	s?			1	r –	r]
2	XX 71.			 			1	4	1:		- 9													
3.	Wh	iat 1			wa	s us	sea		nag	nos	se?													
1	Typ) f m	liito	tion	? N	/loci	han	iam	of	nat	hold		າ										
4.	<u> </u>			luta		1 / 10	Tec	llall	15111		pai		Jgy	<i>:</i>										
5	Ma	ke	a sc	hen	ne c	of th	ne fø	orm	atic	on a	nd	fusi	on	of s	ram	etes								
									aure															
6.	Wh	hat i	is th	e pi	rogi	nosi	is o	f of	fspi	ring	in	this	far	nily	/?		1	1	1				1	
7.	Wh	nat i	is th	e pi	rogi	nosi	is o	f th	is p	atie	nt's	off	spr	ingʻ	?	-				-	-	-		
_																								
]	poir	its

7)Patient (female) 15 years, was directed to the genetic counseling: Significant deviations in mental development, increased irascibility, Content of speech: unreal fantasies. Increased interest in the male gender. In the department of gynecology was conducted abortion (12 - 14 weeks).

Analysis of sex chromatin: Found 2 Barr bodies in buccal scrapings Questions:

1. What patient's disease?

		-																
																		l
																		1
																		<u> </u>
																		1
																		1
																		1
																		1
																		1
L																		·
0	XX /1-	at a	inn	a	۲ 4 1.	 1:	+ ~	 	1	1 .	1.	- 1:	 	- 0				

2. What signs of the patient are essential for the diagnosis?

		 0	 	 			-		0	 				
_														

3	Wh	at t	net	hod	wa	c 110	her	tod	lian	noc	<u>6</u> ?					1	1			1	1	1	1	
5.	••1			liou	wa	.5 U.S	scu		nag	1103		1	1											
				1																				
	T		C			01	<u>л</u> г. 1		•	ſ		1 1		0										
4.	Typ	pe c	or m	iuta	tion	1 / IV	leci	nan	ism	OI	pat	noi	ogy	<i>!</i>										
Ļ				Ļ		0.1																		
5.	Ma	ke a	a sc	hen	ne c	of th	ne fo	orm	atic	on a	nd	fusi	on	of g	gam	etes	5			-	-	-	-	
			-																					
6.	Wh	nat i	s th	ie pi	rogi	nosi	is o	f th	is p	atie	ent's	off	spr	ingʻ	? M	ake	e a c	ros	sing	g sc	hen	ne		
																								<u> </u>
7.	Wh	$\operatorname{nat} \overline{\mathbf{C}}$	othe	er m	leth	$od \overline{c}$	can	be	use	d to	dia	agno	ose	? _										
																							onir	nte

points

8)Woman, 27 years old, height 142 cm, weight 50 kg short stature, wide and webbed neck, low posterior hairline, broad chest. Oligophrenia (dementia) in moronity stage. Mammary glands are underdeveloped, Uterus is very small, underdeveloped.

Karyotyping:45, XO

Questions:

1. What patient's disease?

2. What signs of the patient are essential for the diagnosis?

3. What method was used to diagno	se?
-----------------------------------	-----

4.	Typ	be o	of m	uta	tior	n? N	lec	han	ism	of	patl	holo	ogv	?					

_	••	- 71			 1001	 10111	Pau	1010	~ DJ	•					
ſ															

5. Make a scheme of the formation and fusion of gametes

														<u>ر</u>	/					
6.	Wh	at i	s th	e pi	rog	nosi	is o	f thi	is p	atie	nt's	off	spr	ingʻ	?					

7. What other method can be used to diagnose?

points

9) Patient (male) 18 years old admitted to the genetic counseling with complaints of obesity and sexual underdevelopment. Height 184 cm, weight 97 kg. Reduced body and facial hair. Testicles reduced.

Analysis of sex chromatin: Found sexual X - chromatin body in buccal scrapings **Questions:**

1. What patient's disease?

																					1
																					1
														L							
2	Wh	at s	sign	s of	² th∉	na י	tier	nt ar	• e	scer	ntia	l foi	r the	- di	aon	osio	2?				

3. What method was used to diagnose?

4. Type of mutation? Mechanism of pathology?

5. Make a scheme of the formation and fusion of gametes

6. What is the prognosis of this patient's offspring ?

															 		L	L	· · · · · · · · · · · · · · · · · · ·	
																	1 1	1		
																	1 1	1		
																	1 1	1		
																	\vdash	-	+	
																	1 1	1		
																	1 1	1		
																	1 1	1		
L				•	•		•			•	•	•	•	•	 		· · · · ·	·		
7	XX 71.	4 .	- 41		- 41-	- 1		1	 1 4 -	1: -)								

7. What other method can be used to diagnose?

_points

10)Healthy parents have a child (boy) with multiple congenital malformations. **On examination:** Microcephaly, scalp defects, sloping forehead, nose broad and flat, cleft lip and cleft palate, polydactyly, holoprosencephaly, interatrial septal defect.

Karyotyping: Found 47 chromosome, trisomy 13 **Questions:**

1. What patient's disease?

1.	wn	iai j	Jall	ent	s ai	isea	se															
																						n
	Wh	ont o	ian		f the	2 12 12	tior	nt or	·0 0		ntin	1 fo	r th	a di	oan	oci					L	
<i>∠</i> .	VV 11		lgn	5 01		z pa	uci.	n ai		5501	liia	1 10			agn	051	5:					
3.	Wh	at 1	net	hod	wa	ls us	sed	to d	liag	nos	e?											
4	Typ	ne c	of m	nita	tior	19 N	/lecl	han	ism	of	nat	hole	ngv	?							I	
т.	- y ₁			lutu		1. 1	1001	Iun	15111		pui		<u>565</u>	•								
5.	Ma	ke :	a sc	hen	ne c	of th	ie fo	orm	atic	on a	nd	fusi	ion	of g	gam	etes	5		1			
6.	Wh	at i	s th	e p	rogi	nosi	IS O	f of	fspi	ing	in	this	fai	nilv	?							
				- r ·	- 01				~ [-	2					-							
	XX 71	L				L		C (1)		<u> </u>					0							
/.	Wh	at 1	s th	le p	rogi	nosi	IS O	t th	is p	atie	nts	of	spr	ıng	?							1
																		 		 	ooir	nts

11)Unborn child could have a genetic disorder. They decide to have amniocentesis and karyotyping performed to look for chromosomal abnormalities. It turns out that the child has 47 chromosomes: 22 normal autosomal pairs plus one Y chromosome and two X chromosomes.

Questions:

1. Will this child be a male or a female?

		1	r	1	1	1						1	1		1	1	1	1	r	1	1			r
			<u> </u>																					
2.	Wh	nat p	pati	ent'	s di	isea	se?			1	1	1	1		1	1	1	1	1	1	1	1	1	<u> </u>
-	XX 71						. 1	/ 1						1 •	1.									
3.	wh	hat s	sign	s ar	e e	sser	itial		iara	icte	risti	IC) 1	tor 1	his	dis	eas	e?		1					<u> </u>
																								
1	XX 71.			 			1		1:		- 9													
4.	wn	lat i	net	noa	wa	s us	sea	to c	nag	nos	e?													<u> </u>
																								-
5	Ттл)f m		tion	. 2 N	/lool	hon	iam	of	not	hol		າ										
5.	ту			luta		n? N	Tec	llall	15111		pau		Jgy	<i>:</i>										<u> </u>
6	Ma	ke :	2 50	hen	ne (of th	ne fo) rm	atic	n a	nd	fusi	on	of c	ram	ete								
0.	1010								an			lusi			sam		5							
7	Wh	nat i	s th	e n	rog	nosi	is o	f th	is n	atie	nt's	off	spr	ing	?									L
/.	,,,,								lo P				- spr	115	•									
8.	Wh	at o	othe	r m	leth	od (can	be	use	d to	dia	igno) Dse	?	I	I	I	I	I	I	I	1	1	<u> </u>
												0												
		1	1	1	1	1	<u>.</u>	<u>.</u>	<u>.</u>	1	1	1	1	I <u></u>	1	1	1	1	1	I	I]	poir	nts

12)Patient (female) visited Genetic counseling with the purpose to know the prognosis offspring. Her son with Down syndrome died at the age of one month from sepsis. She is married to 33 years. Up to 38 years of pregnancy was not. Subsequently 3 spontaneous abortions was occurred, the cause of which has remained unknown. The fourth pregnancy ended by the birth of a child with Down syndrome.

On examination:

Therapist: Abnormalities were not found.

Psychiatrist: Intelligence without gross violations. Social adaptation threshold is normal.

Karyotyping: 45, tr21/14 **Questions:**

	nat	pati	ent'	s di	isea	.se?										1	1					1	
_																							
		<u> </u>			0.1				6		1 1		0										
$\frac{1}{1}$	ype o	of m	luta	tior	1? N	/lec	han	1SM	10	pat	hol	ogy	?	<u> </u>	<u> </u>		<u> </u>			<u> </u>	1	<u> </u>	1
																		-				-	
			1		0.1																		
<u>. M</u>	lake	a sc	her	ne c	of th	ne fo	orm	atic	on a	nd	fus	lon	of g	gam	letes	5	1		1	-	1	1	
_																							
<u>. W</u>	hat :	met	hod	wa	is us	sed	to c	liag	nos	e?	1	1	1	1	1	1	1	1	1	1	1	-	-
\perp		<u> </u>																					
. W	hat :	is th	e p	rog	nos	is o	f of	fspi	ring	in	this	s fai	mily	/?		T						_	
5. W	/oma	in w	vith	alte	erati	ions	in	kar	yot	уре	has	s no	sig	nifi	ican	nt al	onoi	rma	litie	es o	n		
	oma nina					ions	in	kar	yot	ype	has	s no	sig	nifi	ican	it al	onoi	rma	litie	es o	on .		
						ions	in	kar	yoty	ype	has	s no	sig	nifi	ican	it al	onoi	rma	litie	es o	on		
						ions	in	kar	yot	ype	has	s no	sig	nifi	ican	it al	onoi	rma	litie	es o	on		
						ions	in	kar	yoty	ype	has	s no	sig	nifi	ican	nt al	onoi	rma	litie		on		
xan		tion	. W	hy?																		Dn?	
xan	nina	tion	. W	hy?																		on?	
xan	nina	tion	. W	hy?																		Dn?	
xan	nina	tion	. W	hy?																		Don?	
xan . He	ow c	an v	. W	hy?	lain	the	e wo	oma	ın's	ini	tial	inf	ertil	lity	and	spo	onta		ous	abo	ortio		
x an	ow c	an v	. W	hy?	lain	the	e wo	oma	ın's	ini	tial	inf	ertil	lity	and	spo	onta		ous	abo	ortio		
xan	ow c	an v	. W	hy?	lain	the	e wo	oma	ın's	ini	tial	inf	ertil	lity	and	spo	onta		ous	abo	ortio		
xan	ow c	an v	. W	hy?	lain	the	e wo	oma	ın's	ini	tial	inf	ertil	lity	and	spo	onta		ous	abo	ortio		
x an	ow c	an v	. W	hy?	lain	the	e wo	oma	ın's	ini	tial	inf	ertil	lity	and	spo	onta		ous	abo	ortio		
xan	ow c	tion	. W	hy?	lain	avii	e wo	oma	ild	ini	tial h D	inf(n's s	ity	and	me	onta	ma	rrie	abc	our	ple	
xan	ow c	tion	. W	hy?	lain	avii	e wo	oma	ild	ini	tial h D	inf(n's s	ity	and	me	onta	ma	rrie	abc	our	ple	
xan	ow c	tion	. W	hy?	lain	avii	e wo	oma	ild	ini	tial h D	inf(n's s	ity	and	me	onta	ma	rrie	abc	our	ple	

_points

13)Patient (female) 15 years is directed to the genetic counseling about the lack of menstruation and stunting. Patient has complaints of headache, fatigue, poor memory, academic failure in school.

Gynecologist: Uterus is very small, underdeveloped.

Endocrinologist: Low estrogen levels.

During chromosomal analysis 11 cells were examined. Karyotype of 6 cells - 46, XX; 5 cells had only one X-chromosome.

Questons:

1. What patient's disease?

3. What method w	vas used						e di	agn		5?							
	vas used						e di	agn	osis	5?							
3. What method w	vas used						e di	agn		\$?							
3. What method w	vas used						e di	agn		5?							
3. What method w	vas used									5? 							
		to dia	agno	ose?													
3. What method w 4. Type of mutatio		to dia	agno	ose?													
			agno	ose?													
			agno														
4. Type of mutatio	on?																
4. Type of mutatio	on?																
4. Type of mutatio	on?																
4. Type of mutatio	on?																
																i I	
5. What causes dif	fferent a	mour	nts o	fch	m	050	mes	in	the	cell	ls?]	Med	cha	nici	n o'	f	
		moun	11.5 0		UIII	030	mee	, 111	the	cen	10 1		cna	11151	11 01	L	
pathology?						1									,		
																İ İ	
6. What is the prog	onosis o	f this	nati	ent'		fenr	inσ	?							<u> </u>	<u> </u>	
			pau			lspi	mg	•									
				_													
																İ İ	
7. What is the treat	tment of	f this	dise	ase)												
				_											┝──┦		
				_		<u> </u>											
																	L
															T	poir	nte

Task 2. Solving of problems of the Pedigree Analysis Study pedigrees and answer the following questions Write down:

1. What is the mode of inheritance? (Autosomal dominant, Autosomal recessive,

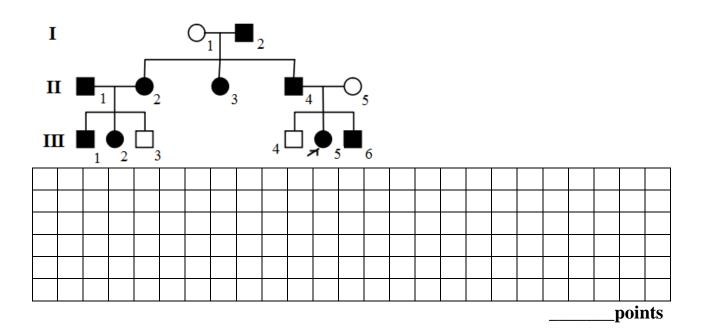
X-linked recessive, X-linked dominant, Y-linked (holandric).

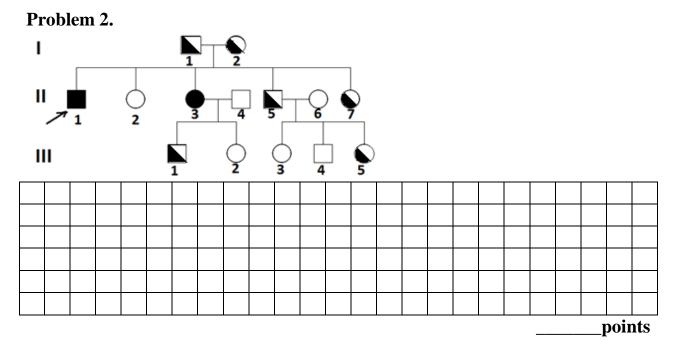
2. Write down hallmarks of this type of inheritance

3. Determine the genotypes of the all persons of this family.

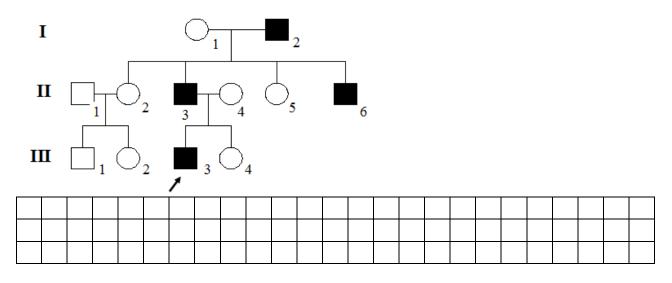
4. Determine the probability of an affected offspring for a proband with the healthy spouse.

Problem 1.





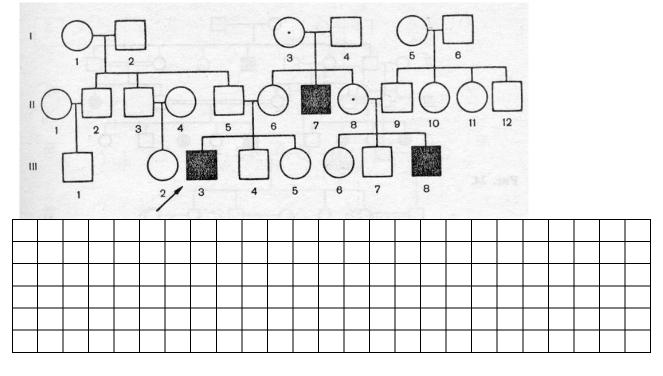
Problem 3.



												i i
												i i
	 			 						 		<u> </u>
												1
												l l
												1
											•	

____points

Problem 4.



_____points

_____points_____signature of the teacher

PRACTICAL LESSON №12

Theme: Basic concepts of parasitology. Medical protozoology. Phylum Sarcomastigophora.

Aim: 1) Formation knowledge about medical parasitology.

2) Classify parasites. Describe life cycle, classification of host, parasitic system, localization, transmission of the parasite.

3) Subkingdom Protozoa. Protozoan classification and its characteristics. Protozoa life cycle.

3.1. Phylum Sarcomastigophora: Subphylum Sarcodina and Mastigophora: Characteristics.

3.2 Non – pathogenic Sarcodina: Ameba proteus, Entamoeba gingivalis, Entamoeba coli

3.4 Pathogenic Sarcodina: Entamoeba histolytica, Acanthamoeba, Naegleria

3.5 Non – pathogenic Mastigophora: Euglena

3.6 Pathogenic Mastigophora: Giardia lamblia (Lamblia intestinalis),

Trypanosoma, Leishmania, Trichomonas

Practical work

Task 1. Entamoeba histolytica. Examine the slide Entamoeba histolytica . What form of amoeba do you see? Note in drawing and write down the main components of a cell.

Morphological forms of Entamoeba histolytica

Size:

____points

Task 2. Draw the life cycle of Entamoeba histolytica in your drawing book.

____points

Task 3. Fill the table:

Tusk Stillin the tublet	
Disease	
Pathogen	
Distribution of the	
disease	
Invasive (Infective) stage	
Source of infection	
Localization	
Transmission mechanism	
Route (pathway)	
Transmission factors	
Vectors – organisms	

for circulating parasites	
Diagnosis	
Prevention	

Task 4. Lamblia intestinalis (Giardia lamblia).

____points

Examine the slide Lamblia intestinalis. Draw the structure of Giardia.

Lamblia intestinalis	Lamblia intestinalis	5
trophozoite	cyst	
Size:	Size:	
		points

Task 5. Fill the table:

_points

Task 6.Leishmania. Examine and draw the slide Leishmania in culture and Leishmania in the cell.

Leishmania in culture	Leishmania in the cell (Amastigotes)
(Promastigotes)	

Size:	Size:	
		points

Task 7. Complete the table:

Disease	Cutaneous leishmaniasis	Visceral leishmaniasis
Pathogen		
Infective stage		
Source of infection		
Distribution of the		
disease		
Localization		
Transmission		
mechanism		
Vectors		
Diagnosis		
Prevention		
		points

Task 8. Trypanosoma.

Trypanosoma	Note in drawing:
	1. nucleus
	2. plasma membrane
	3. flagella
	4. undulating membrane
	5. erythrocyte
Size:	
	points

Task 9. Complete the table:

Task 7. Complete the tabl		
Disease	African Trypanosomiasis	American
	or "sleeping sickness"	trypanosomiasis or
		Chagas Disease
Pathogen		
Invasive stage		
Source of infection		
Distribution of the disease		
Localization		
Transmission mechanism		

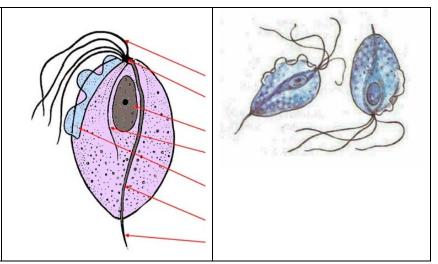
Vectors - organisms for	
circulating parasites	
Diagnosis	
Prevention	

Task 10. Trichomonas.

Note in drawing

- 1. nucleus
- 2. plasma membrane
- 3. flagella
- 4. axostyle
- 5. undulating membrane

What is a form?



_points

points

Task 11. Complete the table:

Disease	Urogenital trichomoniasis
Pathogen	
Distribution of the disease	
Invasive (Infective) stage	
Source of infection	
Localization	
Transmission mechanism	
Route (pathway)	
Transmission factors	
Vectors - organisms for circulating	
parasites	
Diagnosis	
Prevention	

_points

Task 12. Solving problems of parasitology.

1.During prophylactic (laboratory) examination of student's dining hall cook cysts and vegetative forms (trophozoites) of amoebae were found in fecal smears. However, she continued to work and did not receive treatment.

nowever,			k and uiu	
a) Which s	species of a	moebae w	ere found	1?

/		 	 									

b) Why the presence of amoebae in her organism did not affect health?

2. The patient complains of frequent stools with mucus and blood, general weakness. The examination revealed vegetative forms of Protozoa. Protozoan had pseudopodia and ingested erythrocytes in the cytoplasm.

a) What disease has the patient?

a)	Wh	nat o	lise	ase	has	s the	e pa	tier	nt?															
																								1
b)	Wł	nat i	is th	ne ca	aus	ativ	e ag	rent	t of	dis	ease	<u>-</u> ?												
0)							- uz																	
\ \	 тт			.1			• •		10															
c)	HO	w v	vas	the	pat	ient	: 1NI	ecte	ea /															
																							L	
d)	Wł	iy i	s th	e bl	000	l co	ntai	nec	l in	the	sto	ol?												
e)	Wh	nat 1	net	hod	of	dias	gno	sis	was	us	ed?													
					-				-								-				-			
f)	W/h	at a	re t	he j	nres	ient	ive	me	2611	rec	of	he	dise	226	.?									
1)	**11					v CIII	IVC	me	asu	105				lasc]
~	T 71	• 1		1	1		1	•	1 .	1		6	1				1	1			1	•		
				rpho	-	-		-			-	of	dys	ente	ery	amo	beb	a do	0 00	cur	dui	rıng	r	
pa	tien	it tr	eatr	nen	t ar	nd c	onv	ale	scei	nce	?		<u> </u>											
				epic							ed	in n	atu	ral f	focu	is o	f cu	itan	eou	s le	ish	mar	iias	is.
Y	ou a	re a	a do	octo	r of	thi	s gr	oup). 1()														
1)	Wł	nat 1	mea	sur	es v	vill	VOI	ı tal	ke f	or 1	brev	vent	ion	of	this	par	asi	tic c	lise	ase'	?			
-/							<u> </u>			1				~		г ч					-			
F	A			b a-	<u> </u>		1.	1			 				 	<u> </u>	1 ₆ -	م <u>ا</u> 11 -	ter		r r		1 :	
5.	Аţ	oatie	ent	has	ger	iital	dis	scna	irge	an	u pa	ain i	in u	rina	1110	n. F	lag	ena	tes	wei	ет	Jun	u in	

smears of vaginal discharge.

1) What disease has the patient?

2) What is the causative agent of disease?

		Iat I	is u		uus		c az	5011	. 01	uis	cas					-	 		-		
3)	Ho	w v	vas	the	pat	ient	: inf	ecte	ed?												
4)	Wh	hat a	are	the	pre	ven	tive	me	easu	ires	of	the	dise	ease	e?						

6. Leishmaniasis, trypanosomiasis, giardiasis, trichomoniasis - which of these diseases are transmissible, natural focal? Explain your answer.

____points

_____points______signature of the teacher

PRACTICAL LESSON №13

Theme: Protozoology: Subphylum Sporozoa, Subphylum Ciliophora (Infusoria).

Aim: 1) Formation knowledge about subphylum Sporozoa. Pathogenic Sporozoa: Plasmodium

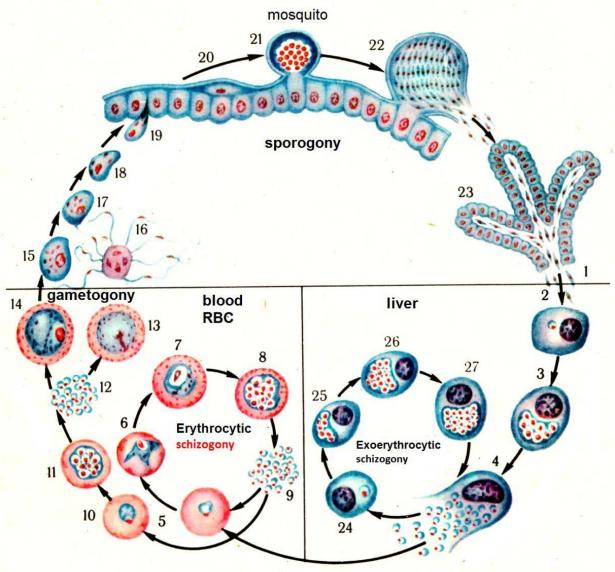
Toxoplasma gondii.

2) Study Phylum Ciliophora (Ciliates). Non – pathogenic Ciliates: Paramecium. Describe life cycle, classification of host, parasitic system, localization, transmission of the parasite.

3) Pathogenic Ciliates: Balantidium coli

Practical work





human

Define the stage of Plasmodium development in the mosquito and human. Draw the life cycle, note and write down the stage name:

0
14
15
16
17
18
19
20
21

9	22
10	23
11	24
12	25
13	26

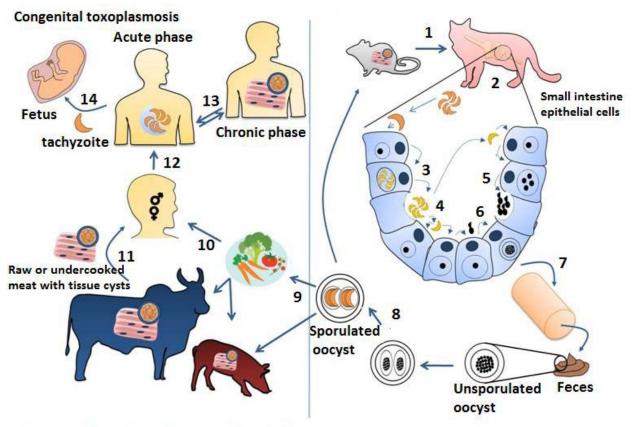
2)Plasmodium vivax. Examine and draw Plasmodium vivax.

	Note in drawing:
	1. erythrocytes
	2. plasmodium
Size:	
3)Complete the table:	
Disease	
Pathogen	
(causal agent)	
Definitive host	
Intermediate host	
Source of infection	
Localization	
Route (pathway,	
mode of transmission)	
Vectors	
Diagnosis	
Prevention	

_points

Task 2. 1)The life cycle of Toxoplasma. Define the stage of Toxoplasma development in the cat and human. Draw the life cycle, note and write down the stage name.

1	8
2	9
3	10
4	11
5	12
6	13
7	14



Intermediate host (asexual cycle)

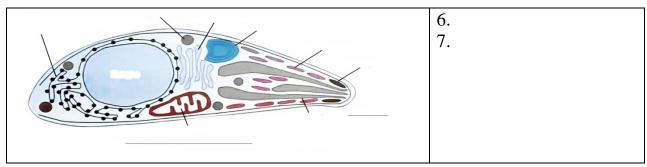
Definitive host (sexual cycle)

2)Complete the table:

Disease	
Pathogen	
(causal agent)	
Definitive host	
Intermediate host	
Source of infection	
Invasive (Infective) stage	
Source of infection	
Localization	
Route (pathway,	
mode of transmission)	
Transmission factors	
Vectors	
Diagnosis	
Prevention	

3)Toxoplasma gondii

Note in drawing:
1.nucleus
2.plasma membrane
3.cytoplasm
4.
5.



_points

Task 3.1) Balantidium coli. Examine and draw Balantidium coli.

trophozoite		cyst
	Note in drawing 1. macronucleus 2. plasma membrane 2. extendeere	
	3. cytoplasm	

2) Fill the table:

Disease	
Pathogen	
Invasive (Infective) stage	
Source of infection	
Localization	
Transmission mechanism	
Route (pathway)	
Transmission factors	
Vectors – organisms	
for circulating parasites	
Diagnosis	
Prevention	
	• .

____points

Task 4. Solving problems of Parasitology

1. In the examination of fecal smears of patients with symptoms of acute intestinal colitis was found the large vegetative form of the Protozoa with large sausage-shaped nucleus in the cytoplasm.

1)	Ŵł	nat i	is th	ne n	ame	e of	dis	eas	e?												
	3371	·	1.	I	I		I	I		1.	L	. 0	I	1	I		1			L]	L

2) What is the causative agent of disease?

3)	Ho	w v	vas	the	pat	ient	: inf	ecte	ed?				•			•					
4)	4) What method of diagnosis was used?																				
5)	Wh	nat a	are	the	pre	ven	tive	e me	easu	ires	of	the	dis	ease	e?						

2. Prophylactic examination of workers of meat plant revealed the presence of vegetative forms of Protozoa in some fecal smears. Was focused attention that all vegetative forms were large, rounded and had sausage-shaped nucleus. Are these workers sick? What name of disease?

3. In a blood smear of a patient with attacks of fever in some erythrocytes (staining according to Romanovsky) the accumulations of cherry color nuclei with blue cytoplasm were observed.

1) What is the cause of the patient fever?

2) What is the causative agent of disease?

3) Who is the definitive host and intermediate host of the parasite?

4)	Ho	w v	vas	the	pat	ien	t inf	fect	ed?								

5)	3371		1	C C	1.	 •		. 10							

5) What method of diagnosis was used?

													1
													1
													1
													1
L													

6)	Wł	nat a	are	the	pre	ven	tive	e me	easu	ires	of	the	dise	ease	e?					

4. A patient has fever, swollen lymph nodes. In oral mucous secretions microorganisms in crescent shape was found. The large nucleus is seen in cytoplasm.

1) What is the name of disease?

		Iat I	lo u	СП	ann	- 01	uis	Cus	0.											
2)	Wh	hot i	ic th	ne c	0110	otiv	0.00	ront	of	dia	000	22								
	VV I.	iat I	ls u		ausa	auv	e ag	zem	. 01	uis	eas		1			1				
3)	Ho	w v	vas	the	pat	ient	: inf	ecte	ed?		1									
4)	Wh	nat i	met	hod	lof	dia	gno	sis	was	s us	ed?									
5)	Wł	nat a	are	the	pre	ven	tive	me	easu	ires	of	the	dis	ease	e?					
					<u>r</u> -•						~-				•					
<u> </u>																	 	 		

5. The woman had a child with hydrocephalus (dropsy on the brain). Genetic testing did not reveal pathology. Cause of abnormal development was protozoan invasion.

1) What is the name of disease?

2) What is the causative agent of disease?

3)	Wł	no is	s th	e de	efin	itiv	e ho	ost a	nd	inte	erm	edia	ate l	host	t of	the	par	rasi	te?			

4)	Ho	w v	vas	the	pat	ient	t inf	ecte	ed?													
5)	Wł	nat i	net	hod	l of	dia	gno	sis	was	s us	ed t	o d	eter	mir	ne o	f th	is d	isea	ase	?		
6)	Wł	nat a	are	the	pre	ven	tive	e me	easu	ires	of	the	dis	ease	e?							

6. Russian Engineer returned from abroad and at once went to the doctor complaining of attacks of fever systematically repeating after 3 days.

1) What disease has the patient?

/																								
																							1	
2)	Wł	nat i	is th	ne c	aus	ativ	e ag	gent	: of	dis	ease	e?												
2)	XX 71	:	a 41a	- 1.	.	:4:	- 1	4		:		- 1:	- 4 - 1		f	<u>41</u>			4 - 9				<u> </u>	
3)	WI	101	s th		enn	itiv	e no	ost a	ina	inte	erm	ean		nos	t ot	the	pa	rasi	te :		1			
4)	Ho	w v	vas	the	nat	ient	inf	ecte	-d?			1]
-1)	110		vus		pui		. 1111		cu.															
5)	Wł	nat	met	hod	l of	dia	gno	sis	was	s us	ed t	to d	eter	mir	ne o	f th	is d	lise	aseʻ	?				
,																								
	<u> </u>			Ļ								Ļ											Ĺ	
6)	Wł	nat a	are	the	pre	ven	tive	me	easu	ires	of	the	dis	ease	e?									
	İ.	1	1	1	1	1					İ.	1	1	1		İ.	İ.	İ.	İ.	İ.	1	1	1 1	

____points

PRACTICAL LESSON №14

Theme: Medical Helminthology. Phylum Plathelminthes. Cestoidea infections.

Aim: 1) Formation knowledge about phylum Plathelminthes.

2) Study Pathogenic Cestods: Taenia solium (pork tapeworm), Teniarhynchus saginatus (beef tapeworm), Diphyllobothrium latum (fish tapeworm), Echinococcus granulosus, Alveococcus multilocularis, Hymenolepis nana (dwarf tapeworm).Describe life cycle, classification of host, parasitic system, localization, transmission of the parasite.

Practical work

Task 1. Taenia solium and Taenia saginatus (Taeniarhynchus saginatus).

1) Draw Cysticercus Taenia solium and Cysticercus Taeniarhynchus saginatus . Compare scolexes structure. Draw the scolexes. Designate figure of suckers and hooks.

Taenia solium (scolex)	Taenia saginatus (scolex)
scolex have hooks and 4 suckers that aid in attachment	scolex have only 4 suckers that aid in attachment

2) Designate mature proglottids. Remember the differences between Pork tapeworm and Beef tapeworm.

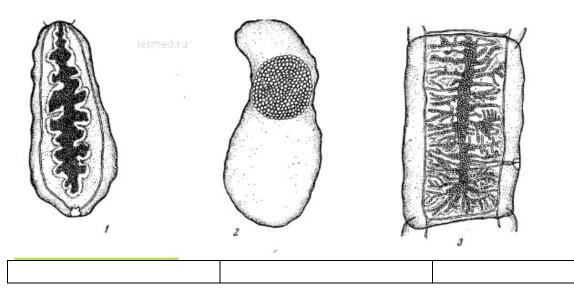
Taenia solium	Taeniarhynchus saginatus
The germarium (ovary) is divided	The germarium (ovary) is divided
into 3 lobes	into 2 lobes

3) Draw gravid proglottids.

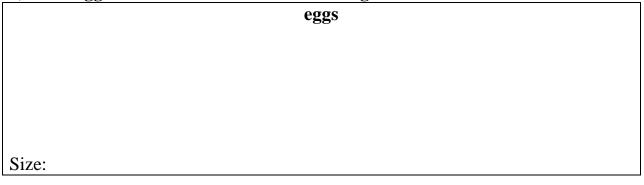
Taenia solium	Taeniarhynchus saginatus

Size:	Size:
The uterus is a blind sac with 8-12 pair lateral branches	The uterus is a blind sac with 17-35 pair lateral branches

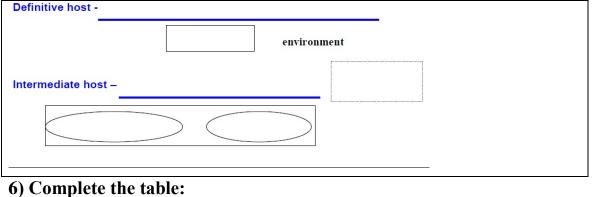
The scheme of a structure of a uterus at teniat (original). Sign them:



4) Draw eggs of Taenia solium and Taenia saginatus.



5) Life cycle of Taenia solium: Definitive host -



Disease	Taeniasis solium	cysticercosis	Taeniasis

		saginata
Pathogen		
Distribution of the		
disease		
Definitive host		
Intermediate host		
Localization		
Route (pathway)		
Invasive stage		
Diagnosis		
Prevention		

__points

Task 2. Diphyllobothrium latum. 1)Draw gravid proglottids and eggs of Diphyllobothrium latum.

gravid proglottids D. latum	eggs D. latum
Size:	Size:
Note in drawing: uterus	

2) Life cycle of Diphyllobothrium latum.

Definitive host –	
	water
The second intermediate host -	kaanaanaanaanaanaanaanaa
nost -	
The first intermediate host -	I
	\rightarrow

3) Complete the table:

Disease	
Pathogen	
Distribution of the disease	
Definitive host	

Intermediate host	
Localization	
Route (pathway)	
Invasive (Infective) stage	
Diagnosis	
Prevention	

_points

Task 3. Hymenolepis nana 1) Designate your drawing of Hymenolepis nana.

Hymenolepis nana (adult)	Note in drawing:	
	1. scolex	
	2. strobila	
Size:		

2) Complete the table:

<u></u>	
Disease	
Pathogen	
Distribution of the disease	
Definitive host	
Intermediate host	
Invasive (Infective) stage	
Source of infection	
Localization	
Transmission mechanism	
Transmission factors	
Vectors - organisms for circulating	
parasites	
Diagnosis	

Task 4. Echinococcus granulosus and Echinococcus multilocularis.

1) Note in drawing:	Echinococcus	Echinococcus
1. scolex	granulosus	multilocularis
2. rostellum		
3. immature proglottids		
4. mature proglottids		
5. gravid proglottids		

Size:	Size:

2) Life cycle of Echinococcus granulosus.

Definitive host -	
	environment
Intermediate host –	

3) Complete the table:

Disease		
Pathogen	Echinococcus granulosus	Echinococcus multilocularis
Definitive host		
Intermediate host		
Distribution of the disease		
Invasive stage for human		
Source of infection		
Localization		
Transmission mechanism		
Transmission factors		
Diagnosis		
Prevention		

_____points

Task 5 . Solving problems of Parasitology.

1. The patient complains of abdominal pain, loss of appetite, weakness, and occasionally the presence of "noodles" (white tapes) in the faeces. Laboratory analysis detected proglottids of tapeworm. Uterine had 30 lateral branches.

1)	Wľ	nat (aise	ase	nas	s the	e pa	tier	nt ?								

2) What is the causative agent of disease?

_	-,	,, ,	1000			0 42	2011	. 01	GID.	- ab							
																	1
																	1
																	1
																	1
																	i

3) How many hosts has this parasite? What hosts?

4) What invasive stage?

												, [,]
												, [,]
												, [,]
												. '

5) What is a pathway (route) of infection?

												1
												1
												1
												1
												1
												1
												1
												1
												1

6) How was the patient infected?

7) What are the preventive measures of the disease?

 -												

2. Patient: 12 years old girl. She complains of abdominal pain, weakness, dizziness. Laboratory analysis detected anemia caused by vitamin B12 deficiency. Disease caused by Cestoidea was diagnosed.

1) What disease has the patient?

/				1									
													1 1
													1 1
													1 1
													1 1
													· · · · ·

2) What is the causative agent of disease?

3) How many hosts has this parasite? What hosts?

_	- /	-	 		 	- F	 		 					
- Г														(
														1 1
														(

4) What invasive stage?

• /	 iut i		• • •	~8°	•									

5) What is a pathway (route) of infection?

6)	Ho	w v	vas	the	pat	ient	t inf	ecte	ed?											
7)	Wł	nat a	are	the	pre	ven	tive	e me	easu	ires	of	the	dise	ease	e?					

Patient: 2 years old girl. Complaints: abdominal pain, loss of appetite, attacks such as epilepsy. Laboratory analysis detected helminthes eggs: colourless, oval, 30–50 µm in diameter, has polar filaments. Shell consists of two distinct membranes. Disease caused by Cestoidea was diagnosed.

1) What disease has the patient?

2) What is the causative agent of disease? 3) How many hosts has this parasite? What hosts?	
3) How many hosts has this parasite? What hosts?	
3) How many hosts has this parasite? What hosts?	
3) How many hosts has this parasite? What hosts?	
3) How many nosts has this parasite? What hosts?	
	1 1
4) What invasive stage?	
5) What is a pathway (route) of infection?	
6) How was the patient infected?	
7) What are the preventive measures of the disease?	

4.Patient: male, 42 years old. Complaints: pain in the liver, nausea, low-grade fever. Doctor revealed enlargement of the liver, jaundice. From history: the patient has a dog, like hunting. CT scan revealed rounded shape cyst in right lobe of liver. Disease caused by Cestoidea was diagnosed.

1) What disease has the patient?

- /		ince		abe		5 111																	
2)	2) What is the causative agent of disease?																						
3)	3) How many hosts has this parasite? What hosts?																						
4)	Wł	nat i	is a	hur	nan	ho	st: f	ina	l or	int	erm	edi	ate	?									
5)	Wł	nat	stag	e o	f th	e pa	ras	ite 1	ife	cyc	le i	s fo	orme	ed i	n th	e h	uma	an b	ody	/?			

6)	6) What invasive stage for human?																	
7)	7) What is a pathway (route) of infection?																	
8)	8) How was the patient infected?																	
9)	9) What are the preventive measures of the disease?																	

5. Preventive examination 6 year old boy revealed liver fluke eggs in the faeces (large, yellowy-brown, on a pole is an operculum). However, the child has no symptoms of liver disease. Give a possible explanation for this fact.

1) What disease can be caused by liver fluke?

2)	2) How liver fluke eggs entered the body of the child?																							
3)	3) Why the child is not sick?																							
4)	4) How many hosts has this parasite? What hosts?																							
5)	Wł	nat i	ls a	hur	nan	ho	st: f	ina	l or	inte	erm	edi	ate)										
6)	Wł	nat i	nva	isiv	e st	age	for	hu	mar	n?														
		•	•		•	•					•			•	•	•		•		•	•	F	ooir	its
						_p	oint	ts						_ si	gna	tur	e o	f th	e te	ach	ner	-		

PRACTICAL LESSON №15

Theme: Medical Helminthology. Phylum Plathelminthes. Trematode infections.

Aim: 1) Formation knowledge about phylum Plathelminthes.

2) Study Pathogenic Trematods: Blood fluke: Schistosoma;Lung fluke: Paragonimus Westermani;Biliary (liver) flukes: Fasciola hepatica, Opisthorchis felineus, Dicrocoelium lanceatum. Describe life cycle, classification of host, parasitic system, localization, transmission of the parasite.

Practical work

Task 1. 1) Examine and draw Fasciola hepatica. Find oral and ventral sucker, testicles, uterus with eggs. Draw the structure of the liver fluke.

Fasciola hepatica (adult)	eggs of Fasciola hepatica
Size:	Size:

2) Life cycle of Fasciola hepatica:

	water	
er intermediate host		

3) Complete the table:

mode of transmission)	
Transmission factors	
Diagnosis	
Prevention	

_points

Task 2. Opisthorchis felineus and Dicrocoelium dendriticum (lanceatum)

1) Describe and draw Opisthorchis **felineus** and **Dicrocoelium lanceatum**. Find the testes and uterus with eggs. Compare the structure of flukes. Draw the structure **Opisthorchis felineus** and **Dicrocoelium lanceatum**

2) Consider Opisthorchis felineus eggs and Dicrocoelium lanceatum eggs Draw the eggs.

<u>Opisthorchis felineus</u> (adult)	Note in drawing: 1. testes 2. oral sucker 3. ventral sucker 4. uterus	Dicrocoelium lanceatum (adult)
Size:		Size:
Egg Size:	Note in drawing: operculum of the egg	egg
		Size:

3) Life cycle of Opisthorchis felineus.

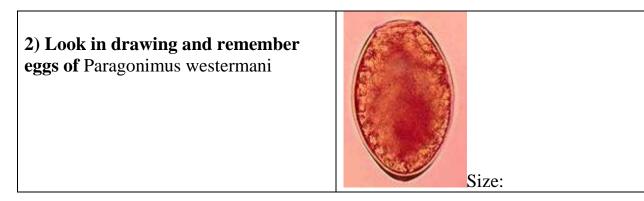
water
>

4) Complete the table:

Disease	Opisthorchiasis	Dicrocoeliasis
Pathogen		
(causal agent)		
Distribution of the disease		
Definitive host		
Intermediate host		
Invasive (Infective) stage		
Source of infection		
Localization		
Route (pathway,		
mode of transmission)		
Transmission factors		
Diagnosis		
Prevention		

____points

1) Look and label in drawing adult		
Paragonimus westermani:	ATTA	
1. oral sucker	R. MA	
2. ventral sucker	A BAS	
3. pharynx		
4. intestine	15 NOV	
5. ovary	Vicities P	
6. uterus	No. 61	
7. testis	VV	and the second se
	Size:	



3) Life cycle of Paragonimus westermani.

		Definitive host -	
ater The first intermediate host -	he seco	ond intermediate host-	water
ater The first intermediate host -			

4) Fill the table:

Disease	
Pathogen (causal agent)	
Distribution of the disease	
Definitive host	
Intermediate host	
Invasive (Infective) stage	
Source of infection	
Localization	
Route (pathway,	
mode of transmission)	
Transmission factors	
Diagnosis	
Prevention	

__points

Task4. Solving problems of Parasitology.

1)The patient complains of pain at the end of urination. From history: worked 2 years in Africa. Laboratory analysis revealed admixture of blood in urine of patient. Disease caused by *Trematoda* was diagnosed.

2) What is the causative agent of disease? *3) How was the patient infected?* 4) What is a pathway (route) of infection? 5) How many hosts has this parasite? What hosts? 6) What invasive stage? 7) Why is the blood contained in the urine? 8) What method of diagnosis was used? 9) What are the preventive measures of the disease?

1) What disease has the patient?

2)The patient complains of cough and chest pain. Laboratory analysis revealed admixture of blood in sputum. Disease caused by Trematoda was diagnosed.

1) What disease has the patient?

							_														
																					1
2)	Wh	at i	is th	ne ci	aus	ativ	e aş	geni	t of	dis	eas	e?									
3)	Но	w n	vas	the	pat	ient	t inf	ecte	ed?												
) How was the patient infected?																				
4)	Wh	at i	inva	isiv	e ste	age	?														
5)	Но	w n	nan	y ha	osts	has	s thi	is po	ara	site	? W	hat	t ho	sts ?)	-	-	-			

6)	Wh	ıy is	s the	e bl	ood	con	ntai	ned	! in	the	spi	itun	n?							
7)	Wh	nat r	net	hod	of	dia	gno.	sis 1	was	us	ed?									
8)	Wh	nat d	are	the	pre	ven	tive	e me	easi	ires	of	the	dis	eas	e?					

3)Husband has a diagnosis Opisthorchiasis. What is the probability of his wife infection from contact at home?

1) What is the	causative agent	of disease?
----------------	-----------------	-------------

								,	J										 	
2)	Но	w n	nan	y ha	osts	has	s thi	is po	ara	site	? W	hat	t ho	sts?)					
3)	Но	w n	vas	the	pat	ient	t inf	ect	ed?											
4)	Wh	at i	nva	isiv	e ste	age	?													

5) What method of diagnosis was used?

					J	, c	,													
6)	Wh	at c	ire	the	pre	ven	tive	e me	easi	ires	of	the	dise	ease	e?					

4)The patient has pain in the liver. Laboratory analysis detected very small pale yellow eggs of trematodes in duodenal aspirate.

1) What disease has the patient?

2)	2) What is the causative agent of disease?																			
2)	Ua			. L.	a a f a	had	+ h	ia n	ana	aita	2 U	Ilaat	· ho	ata 2)					

3) How many hosts has this parasite? What hosts?

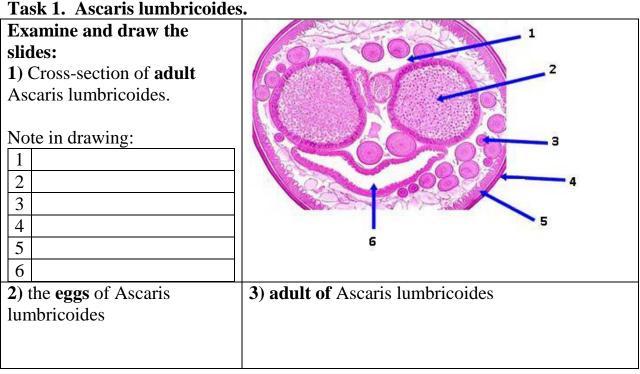
1)	TT 71						9																	
4)	Wh	iat i	inva	isive	e ste	age	<i>:</i>				1	1												
5)	Wh	iat i	is a	pat	hwa	ay (rou	te)a	of in	fec	tion	n?												
				Î						Ĭ														
6)	<i>() How was the patient infected?</i>																							
																		1						
7)	Wh	iat d	are	the	pre	ven	tive	e me	easi	ires	s of	the	dis	ease	e?	•								
	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1			1				
																						r	ooir	nts
	points												signature of the teacher							I				

PRACTICAL LESSON №16

Theme: Medical Helminthology. Phylum Nemathelminthes. Class Nematoda.

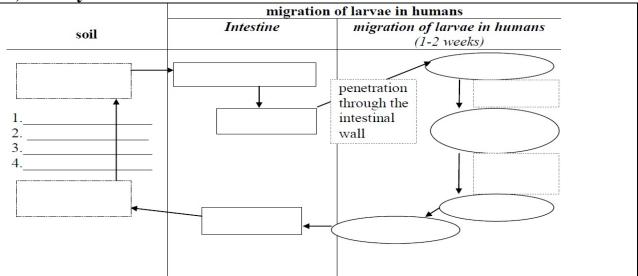
Aim: 1) Formation knowledge about phylum Nemathelminthes.
2) Study Pathogenic Nematods: Ascaris lumbricoides, Trichocephalus trichiuris – whipworm, Enterobius vermicularis – pinworm or threadworm. Describe life cycle, classification of host, parasitic system, localization, transmission of the parasite.

Practical work



Size:	Size:

4) Life Cycle Ascaris lumbricoides:



5) Complete the table:

Disease	
Pathogen	
Definitive host	
Intermediate host	
Distribution of the disease	
Invasive stage	
Source of infection	
Localization	
Transmission mechanism	
Route (pathway)	
Vector	
Transmission factors	
Diagnosis	
Prevention	

____points

Task 2. Trichocephalus trichiurus.

Compare and contrast male and female of Trichocephalus trichiurus. Draw it.
 Classify Eggs of Trichocephalus trichiurus. Draw it.

Ad	ult	Eggs
Male	Female	

1. anterior end 2. posterior e	. anterior end 2. posterior end									

3) Complete the table:

Disease	
Pathogen	
Definitive host	
Intermediate host	
Distribution of the disease	
Invasive stage	
Source of infection	
Localization	
Transmission mechanism	
Vector	
Transmission factors	
Diagnosis	
Prevention	

____points

Task 3. Enterobius vermicularis.

Compare and contrast male and female of Trichocephalus trichiurus. Draw it. Classify Eggs of Trichocephalus trichiurus. Draw it.

Adult		Eggs	
Male	Female		
1. anterior end 2. posterior end			
3) Complete the table:			
Disease			
pathogen			

Intermediate host	
Distribution of the disease	
Invasive stage	
Source of infection	
Localization	
Transmission mechanism	
Mode of transmission:	
Vector	
Transmission factors	
Diagnosis	
Prevention	
	nointa

points

Task 6. Solving problems of Parasitology.

1. The child has severe itching at night in the anus area, weakness, irritability, loss of appetite, abdominal pain. Disease caused by Nematoda was diagnosed.

1) What disease has the patient?

2) What is the causative agent of disease 2) What is the causative agent of disease 3) What is a pathway (route) of infection? Is this biohelminthes or geohelminthes? 4) How was the patient infected? 5) How many hosts has this parasite? What hosts? 5) How many hosts has this parasite? What hosts? 5) How many hosts has this parasite? What hosts? 5) What invasive stage? 7) What method of diagnosis was used? 7) What method of diagnosis was used? 2. Woman found in your cat's feces fusiform worms, size 5-8cm. 1) What is the kind of parasites?	1)	VV I	lat (uise	ase	nas	s une	e pa	luei	IU :				-											
3) What is a pathway (route) of infection? Is this biohelminthes or geohelminthes? 4) How was the patient infected? 4) How was the patient infected? 5) How many hosts has this parasite? What hosts? 6) What invasive stage? 7) What method of diagnosis was used? 8) What are the preventive measures of the disease? 8) What are the preventive measures of the disease? 2. Woman found in your cat's feces fusiform worms, size 5-8cm.																									
3) What is a pathway (route) of infection? Is this biohelminthes or geohelminthes? 4) How was the patient infected? 4) How was the patient infected? 5) How many hosts has this parasite? What hosts? 6) What invasive stage? 7) What method of diagnosis was used? 8) What are the preventive measures of the disease? 8) What are the preventive measures of the disease? 2. Woman found in your cat's feces fusiform worms, size 5-8cm.																									
3) What is a pathway (route) of infection? Is this biohelminthes or geohelminthes? 4) How was the patient infected? 4) How was the patient infected? 5) How many hosts has this parasite? What hosts? 6) What invasive stage? 7) What method of diagnosis was used? 8) What are the preventive measures of the disease? 8) What are the preventive measures of the disease? 2. Woman found in your cat's feces fusiform worms, size 5-8cm.	$\frac{1}{2}$	X /1		ia th		0110	otiv		roni	of	dia														L
4) How was the patient infected? 4) How was the patient infected? 4) How was the patient infected? 5) How many hosts has this parasite? What hosts? 5) How many hosts has this parasite? What hosts? 6) What invasive stage? 6) What invasive stage? 7) What method of diagnosis was used? 7) What are the preventive measures of the disease? 8) What are the preventive measures of the disease? 2. Woman found in your cat's feces fusiform worms, size 5-8cm.	2)	VV I	lat			aus	auv	e ag	zem		uis	ease													
4) How was the patient infected? 4) How was the patient infected? 4) How was the patient infected? 5) How many hosts has this parasite? What hosts? 5) How many hosts has this parasite? What hosts? 6) What invasive stage? 6) What invasive stage? 7) What method of diagnosis was used? 7) What are the preventive measures of the disease? 8) What are the preventive measures of the disease? 2. Woman found in your cat's feces fusiform worms, size 5-8cm.																									
4) How was the patient infected? 4) How was the patient infected? 4) How was the patient infected? 5) How many hosts has this parasite? What hosts? 5) How many hosts has this parasite? What hosts? 6) What invasive stage? 6) What invasive stage? 7) What method of diagnosis was used? 7) What are the preventive measures of the disease? 8) What are the preventive measures of the disease? 2. Woman found in your cat's feces fusiform worms, size 5-8cm.																									
 b) How many hosts has this parasite? What hosts? b) How many hosts has this parasite? What hosts? b) What invasive stage? c) What invasive stage? c) What invasive stage? c) What method of diagnosis was used? c) What method of diagnosis was used? c) What are the preventive measures of the disease? c) What are the preventive measures of the disease? c) What are the preventive measures of the disease? c) Woman found in your cat's feces fusiform worms, size 5-8cm. 	3)	Wł	nat i	is a	pat	hwa	ay (rout	te) (of ii	nfec	ctio	n? I	s th	is t	oioh	elm	int	hes	or g	geol	helr	nint	thes	;?
 b) How many hosts has this parasite? What hosts? b) How many hosts has this parasite? What hosts? b) What invasive stage? c) What invasive stage? c) What invasive stage? c) What method of diagnosis was used? c) What method of diagnosis was used? c) What are the preventive measures of the disease? c) What are the preventive measures of the disease? c) What are the preventive measures of the disease? c) Woman found in your cat's feces fusiform worms, size 5-8cm. 																									1
 b) How many hosts has this parasite? What hosts? b) How many hosts has this parasite? What hosts? b) What invasive stage? c) What invasive stage? c) What invasive stage? c) What method of diagnosis was used? c) What method of diagnosis was used? c) What are the preventive measures of the disease? c) What are the preventive measures of the disease? c) What are the preventive measures of the disease? c) Woman found in your cat's feces fusiform worms, size 5-8cm. 																									
 b) How many hosts has this parasite? What hosts? b) How many hosts has this parasite? What hosts? b) What invasive stage? c) What invasive stage? c) What invasive stage? c) What method of diagnosis was used? c) What method of diagnosis was used? c) What are the preventive measures of the disease? c) What are the preventive measures of the disease? c) What are the preventive measures of the disease? c) Woman found in your cat's feces fusiform worms, size 5-8cm. 	4)	Ho	W V	vas	the	nat	ient	inf	ect	-d?															L
6) What invasive stage? 6) What invasive stage? (7) What method of diagnosis was used? 7) What method of diagnosis was used? (8) What are the preventive measures of the disease? 8) What are the preventive measures of the disease? (2) Woman found in your cat's feces fusiform worms, size 5-8cm.	-1)																								
6) What invasive stage? 6) What invasive stage? (7) What method of diagnosis was used? 7) What method of diagnosis was used? (8) What are the preventive measures of the disease? 8) What are the preventive measures of the disease? (2) Woman found in your cat's feces fusiform worms, size 5-8cm.																									
6) What invasive stage? 6) What invasive stage? (7) What method of diagnosis was used? 7) What method of diagnosis was used? (8) What are the preventive measures of the disease? 8) What are the preventive measures of the disease? (2) Woman found in your cat's feces fusiform worms, size 5-8cm.	-																								<u> </u>
7) What method of diagnosis was used? 7) What method of diagnosis was used? 8) What are the preventive measures of the disease? 2. Woman found in your cat's feces fusiform worms, size 5-8cm.	5)	Ho	w r	nan	y ho	osts	has	s th	is p	aras	site	? W	'hat	hos	sts?										r—
7) What method of diagnosis was used? 7) What method of diagnosis was used? 8) What are the preventive measures of the disease? 2. Woman found in your cat's feces fusiform worms, size 5-8cm.																									
7) What method of diagnosis was used? 7) What method of diagnosis was used? 8) What are the preventive measures of the disease? 2. Woman found in your cat's feces fusiform worms, size 5-8cm.																									1
7) What method of diagnosis was used? 7) What method of diagnosis was used? 8) What are the preventive measures of the disease? 2. Woman found in your cat's feces fusiform worms, size 5-8cm.	6)	Wł	nat i	inva	asiv	e st	age	?																	
 8) What are the preventive measures of the disease? 2. Woman found in your cat's feces fusiform worms, size 5-8cm. 																									
 8) What are the preventive measures of the disease? 2. Woman found in your cat's feces fusiform worms, size 5-8cm. 																									
 8) What are the preventive measures of the disease? 2. Woman found in your cat's feces fusiform worms, size 5-8cm. 	7)	3371			1l	_ f	1:-					- 19													L
2. Woman found in your cat's feces fusiform worms, size 5-8cm.		WI	nat i	met	noa	101	aia	gno	S1S	was	s us	ea													
2. Woman found in your cat's feces fusiform worms, size 5-8cm.																								<u> </u>	<u> </u>
2. Woman found in your cat's feces fusiform worms, size 5-8cm.																									
	8)	Wł	nat a	are	the	pre	ven	tive	e me	easu	ires	of	the	dis	ease	e?									
	2	We	ma	n fe	<u>וור</u>	l in	VO	ur e	at'e	fec	ee f	filei	for	n w	nrn	<u>ר</u> חפי פ	size	5_9	Rom	l					L
							•				051	usi	1011	11 W	UII	13, 1	5120	, J -(1.					
	1)	I VV	lat	is u	ie K	ma	01]	Jara	isite	28 (

2) Is the parasite dangerous to humans?

3)	3) What to do with a cat?																			

3.	3. Child ate unwashed strawberries. What types of roundworms he could infect?																			
	points														nts					

signature of the teacher _points_

PRACTICAL LESSON №17

Theme: Medical Helminthology. Phylum Nemathelminthes. Class Nematoda.

Aim: 1) Formation knowledge about phylum Nemathelminthes.

2) Study Pathogenic Nematods: Trichinella spiralis, Ancylostoma duodenale and Necator americanus (hookworms), Strongyloides stercoralis Dracunculus medinensis. Toxocara

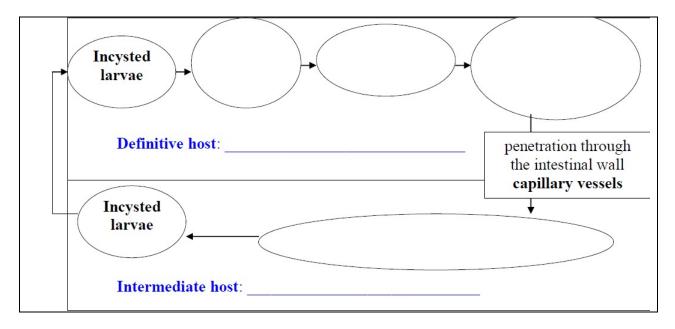
2.1 Filariasis: Wuchereria Bancrofti, Loa loa, Onchocerca volvulus.

Describe life cycle, classification of host, parasitic system, localization, transmission of the parasite.

Task 1. Trichinella spiralis. 1) Adult 2) Larva in muscular Size: Size:

3) Life cycle of Trichinella spiralis

Practical work



4) Complete the table:

Disease	
Pathogen	
Definitive host	
Intermediate host	
Distribution of the disease	
Invasive stage	
Source of infection	
Localization	
Transmission mechanism	
and pathway	
Transmission factors	
Diagnosis	
Prevention	

points

Task 2. Toxocara, Ancylostoma, Strongyloides, Dracunculus, Filaria. Complete the tables:

Complete the tables.	
Disease	Toxocariasis Visceral larva migrans (VLM)
Pathogen	
Definitive host	
Accidental host	
Distribution of the disease	
Invasive stage	
Source of infection	
Localization	
Transmission mechanism	
Vector	
Transmission factors	
Diagnosis	
Prevention	

Disease	Ancylostomiasis	Strongyloidiasis
Pathogen		
Definitive host		
Intermediate host		
Invasive stage		
Source of infection		
Distribution of the disease		
Localization		
Transmission mechanism		
Transmission factors		
Diagnosis		
Prevention		

Disease	Dracunculiasis
Pathogen	
Definitive host	
Intermediate host	
Invasive stage	
Source of infection	
Distribution of the disease	
Localization	
Transmission mechanism	
Transmission factors	
Diagnosis	
Prevention	

Filariasis

		1 1 1 2 1 3 1 5	
Species name	Wuchereria	Loa loa –	Onchocerca
	bancrofti	the eye worm	volvulus
Name of disease	Wuchereriasis or	Loiasis	Onchocerciasis
	bancroftosis,	(Subcutaneous or	(river blindness)
	Lymphatic	Loa loa filariasis)	
	filariasis		
Definitive host			
intermediate host			
(vector)			
Distribution			
Infective stage			
Mode of			
transmission			
Localization (adult			
worm)			
Localization			

(larva)		
Diagnosis		

____points

Task 3. Solving problems of Parasitology.

1. Patient: male, 50 years old. Complaints: high fever, severe muscle pain, swelling of the face. From history: working as a forester, like hunting, often eats the meat of wild animals. A blood test revealed eosinophilia. Disease caused by Nematoda was diagnosed.

1) What disease has the patient?

	VV I	lai	uise	ase	nas	s un	e pa	liei	π:	1	1	1	1				1	1	1	1	1			
2)	X /1	nat ·	ie tł		2110	ativ	e ag	Ton	tof	die	0.000	-9 T	e th	ic h	ioh	alm	intl		r ac	oh	alm	inth	<u>6</u> 62	
	••1	Iai .			aus		C ag	zem		uis	Cast		s ui	15 0				15 0	n gu		-1111		05:	
3)	Ho	w v	vas	the	pat	ient	t inf	ect	ed?															
<u>4)</u>	Wł	nat :	is a	pat	hwa	ay (rout	te) (of ii	nfec	ctio	n?							1					
5)	Ho	W/r	nan	v h	nste	hay	ve t	hie	nar	asit	م وي آ	Whe	at h	nete	?	1	1	1	1	1	1	1		<u> </u>
5)	110	** 1		y III	5513	110			Par	usit		, , 110	II	0313	••									
6)	Wł	nat	inva	asiv	e st	age	?																	
	3371			11	- f	1: -					- 19													
	W	iat i	met	noa	OI	dia,	gno	S1S	was	s us	ea :		r –						1					
8)	W	nat	are	the	pre	ven	tive	me	east	ires	of	the	dis	ease	e?									
					<u> </u>									- as										
2.	Pat	ien	t: m	ale	5 y	ears	s ol	d. C	lom	pla	ints	: at	odoi	nin	al p	ain	, vo	mit	ing	. M	om	saw	/	
so	me	fus	ifor	m v	vor	ms i	in tł	ne v	om	it, s	size	15	-20	cm										
1)	Wł	nat	dise	ase	has	s the	e pa	tier	nt?															
-/							<u> </u>																	
	<u> </u>				<u> </u>								Ļ								Ļ			
2)	Wł	nat	is tł	ne c	aus	ativ	e ag	gent	t of	dis	ease	e? I	s th	is b	ioh	elm	inth	is o	r ge	ohe	elm	inth	les?	0
3)	Чо	XX 7 X	W2C	the	nat	iont	t inf	Port	പറ	L	L	L	L	l	L	I	L	L	L	L	L	I		<u> </u>
	110	W V	vas	ule	pai	IUII	ιIII		uu :					-		-								
5)																								

4)	Wł	nat i	is a	pat	hwa	ay (1	rout	te) (of ii	nfec	ctio	n?				•				
5)	Ho	w n	nan	y ho	osts	has	s thi	is p	aras	site	? W	'hat	hos	sts?						
6)	Wł	nat i	inva	asiv	e st	age	?													
7)	Wł	nat i	met	hod	l of	diag	gno	sis	was	s us	ed?									
8)	Wł	nat a	are	the	pre	ven	tive	e me	easu	ires	of	the	dise	ease	e?					

3. Patient: male 7 years old. Complaints: colicky abdominal pain, diarrhea, weakness, dizziness, transient loss of consciousness. A blood test revealed anemia. Laboratory analysis revealed eggs of roundworms. Eggs was barrel-shaped, colorless and have bipolar protuberances.

1) What disease has the patient?

<u> </u>	1	1	1	-	-		-		1	1	1	1	1		-	-					-			
																								n I
2)	Wł	nat i	s th	ne c	aus	ativ	e ag	gent	t of	dis	ease	e? I	s th	is b	ioh	elm	intł	is o	r ge	ohe	elmi	inth	es?	
3)	Ho	w v	vas	the	pat	ient	t inf	ect	ed?															
4)	Wł	hat i	s a	pat	hwa	ay (1	rout	te) (of ii	nfec	tio	n?		1										
5)	Ho	w n	nan	y he	osts	hav	ve t	his	para	asit	e? V	Whi	ch a	are	hos	ts?								
				Ĩ																				
6)	Wł	nat i	nva	asiv	e st	age	?					1	1	1	1	1								
7)	Wł	hat i	met	hod	of	dia	gno	sis	was	s us	ed?	ı	I	ı	ı	ı								
8)	8) What are the preventive measures of the disease?																							
- /			-												-									
L	L	I	L	I	I				L	I	I		L	I	I	I								

												(
												1
												1
												1
												1
												1

____points_______signature of the teacher

PRACTICAL LESSON №18

Theme: Medical Arthropodology. Phylum Arthropoda. Class Crustacea. Class Arachnida. Class Insecta.

Aim: 1) Formation knowledge about phylum Arthropoda.

2) Study Class Crustacea. General characteristics, medical significance of Some Crustaceans.

3)Study Class Arachnida. General characteristics, medical significance. Order Scorpions, Solifugae (camel spiders), Aranei (Spiders), Acarina (Ticks and mites), Acariform ticks (Acariformes). Sarcoptes scabei, Demodex folliculorum.

4) Family Ixodidae ("hard ticks").Genus Ixodes, Genus Dermacentor, Genus Rhipicephalus. Family Argasidae ("soft ticks").

5) Class Insecta. Order Phthiraptera (Anoplura). Lice. Order Siphonaptera. Fleas. Characteristics, medical significance.

Practical work

Task 1. Itch-mite – Sarcoptes scabiei or Acarus siro.

Examine the slide(see **Atlas of Human Parasitology**) Sarcoptes scabiei (adult).

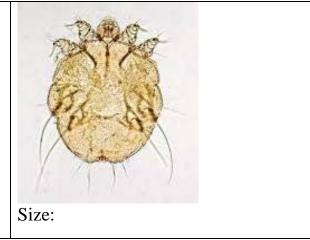
Write down their medical significance.

Note in drawing:

 four pairs of legs (two pairs in front and two pairs behind)
 Palps and chelicerae (highly

specialized mouthparts, capitulum /hypostome).

Medical significance:



____points

points

Task 2. Head louse (Pediculus humanus capitis)

Examine the slide (see Atlas of Human Parasitology) Pediculus capitis (adult).

Note in drawing: head thorax abdomen legs Medical significance:	Size:
	points

Task 3. Human flea /Pulex irritans/

Examine the slide (see Atlas of Human Parasitology) adult Pulex irritans .

Note in drawing:	
1. head	
2. thorax	
3. abdomen	South and the second second
4. legs	the second second second
Medical significance:	
	and the second sec
	Size:

_points

Task 4. European Sheep tick /I. ricinus/, Taiga tick /I. persulcatus/ and Dermacentor pictus

Look in the microscope (see Atlas of Human Parasitology) adult mites without drawing.

Task 5. Medical significance of some ticks.

Examine some of the tick's species and write down their medical **significance**. Determine sex differences.

I. ricinus - European Sheep tick – Europe, Turkey, Iran						
I. persulcatus - Taiga tick- Eurasian						

D. pictus	送					
D. marginatus						
A. persicus – Fowl tick						
O. papillipes	We det					ints

Task 6. Medical significance of some insects:

I uph of Meur	 8	 	 -	 					
Bug									
Sandfly									
Tsetse fly									

	-		1		1						
											1
Deer fly											
Blackfly											
Housefly											
Musca											
domestica											
~											
Spotted flesh											
fly											
Wohlfahrtia											
magnifica	-					 	 	 			
											inte

__points

Task 7. The main differences of the mosquitoes Culex and Anopheles Examine and draw the slide (see **Atlas of Human Parasitology**) head, larva, **pupa** and **egg** of Culex sp. and Anopheles sp.

Features	Anopheles malaria mosquito	Culex pipiens (the common house mosquito)
Landing mosquito		
	Rests with body parallel	Rest with body at an
	to surface.	angle to the surface.
Head of mosquitoes male		
Head of mosquitoes		
female		
Larvae of mosquitoes		
location in the water		
Pupae of mosquitoes		
Eggs of mosquitoes		

The medical significance of mosquitoes	
	points

points______signature of the teacher

Phylum Protozoa

	Scientific	Disea	The way	Parasi	Laborat	Prophyl	Definit	Intermed
	species	se	of	tic	ory	axis	ive	iate host
	name		contamina	locati	diagnos		host	
			tion	on	is			
				Class Sa	arcodina			
1	Entamoeb							
	а							
	histolitica							
2	Entamoeb							
	a coli							
3	Entamoeb							
	а							
	gingivalis							
				Class F	lagellata			
1	Lamblia							
	intestinali							
	S							
2	Trichomo							
	nas							

Phylum Platelminthes

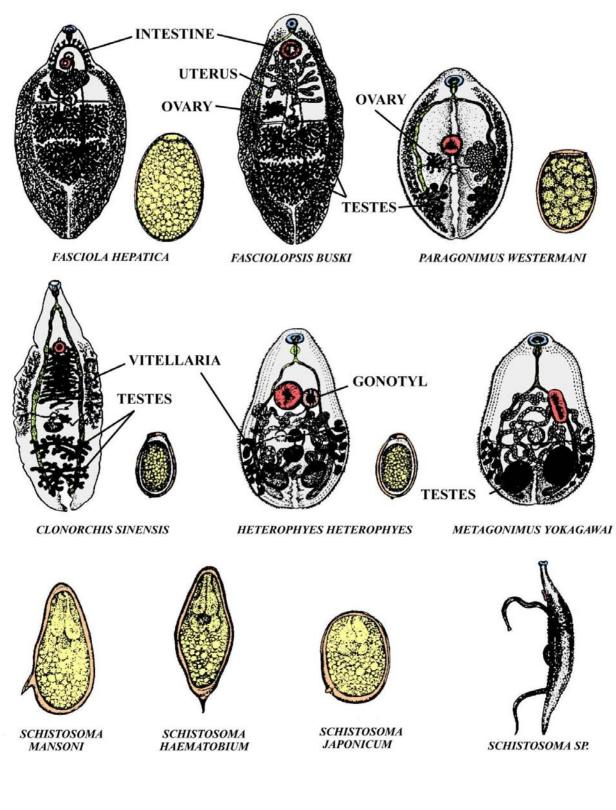
	Scientific	Dise	The way	Parasi	Laborat	Prophyl	Definit	Intermed
	species	ase	of	tic	ory	axis	ive	iate host
	name		contamin	locati	diagnos		host	
			ation	on	is			
			C	lass Tro	ematoda			
1	Fasciola							
	hepatica							
2	Opisthorchi							
	s felineus							
3	Paragonim							
	us							
	westermani							
				Class C	Cestoda			
1	Taeniarhyn							
	chus							
	saginatus							
2	Taenia							
	solum							

3	Echinococc				
	us				
	granulosus				
4	Alveococcu				
	S				
	multilocula				
	ris				
5	Hymenolep				
	is nana				
6	Diphyllobo trium latum				
	trium latum				

Phylum Nematelminthes

	Scientific	Dise	The way	Parasi	Laborat	Prophyl	Definit	Intermed
	species	ase	of	tic	ory	axis	ive	iate host
	name		contamin	locati	diagnos		host	
			ation	on	is			
				Class No	ematoda			
1	Enterobius							
	vermicular							
	is							
2	Ascaris							
	lumbricoid							
	es							
3	Trichocep							
	halus							
	trichiurus							
4	Ancylosto							
	ma							
	duodenale							
5	Trichinella							
	spiralis							
6	Dracuncul							
	us							
	medinensi							
	S							

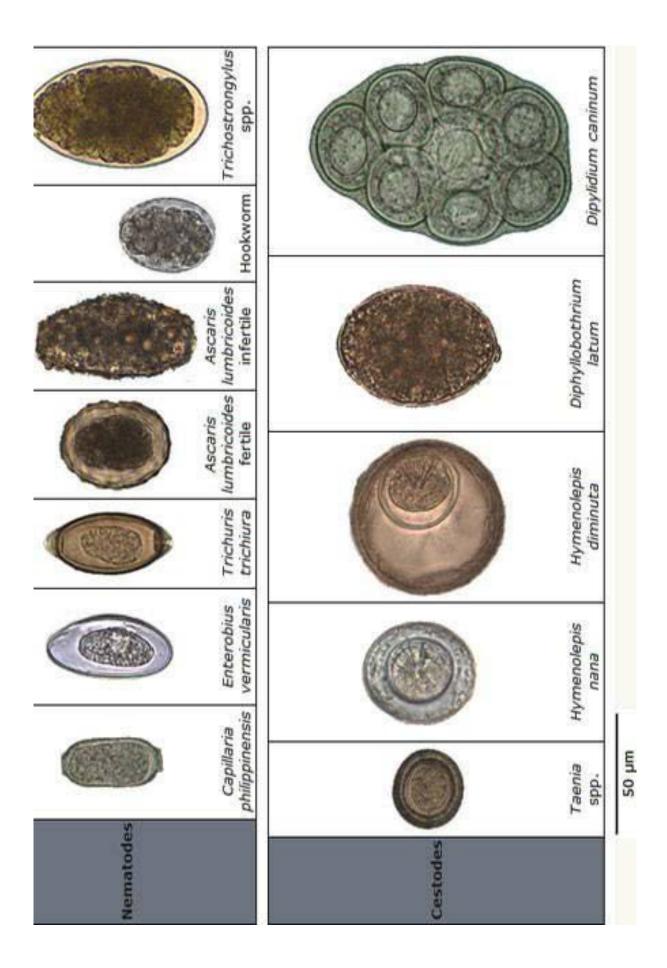
SOME TREMATODES AND EGGS

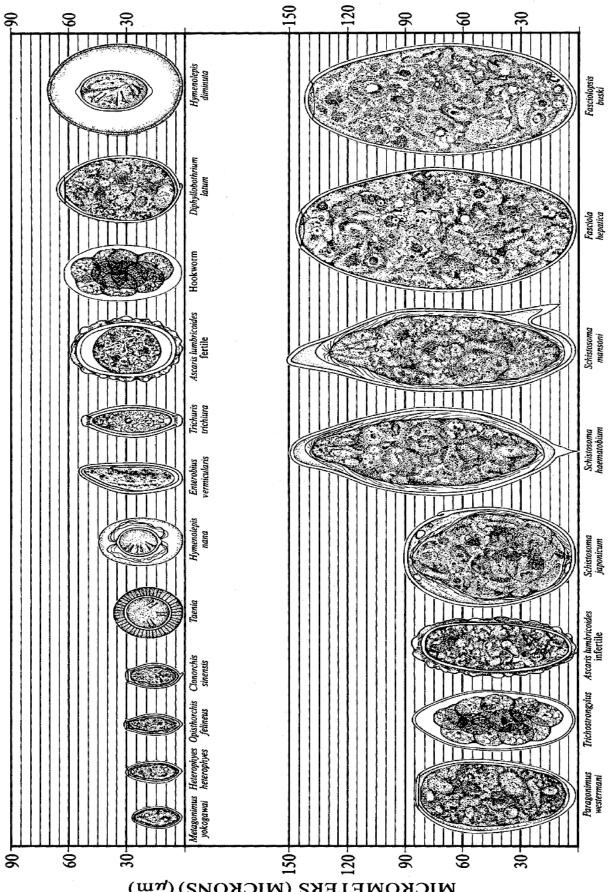


NEMATODES AND EGGS

NURSE CELL

TRICHURIS CAPILLARIA DIOCTOPHYMA RENALE TRICHINELLA SPIRALIS CUTTING PLATES CUTTING TEETH MORULA HOOKWORM **ENTEROBIUS** NECATOR ANCYLOSTOMA STRONGYLOIDES EXCRETORY PORE SHEATH MICROFILARIA ASCARIS (FERTILIZED) ASCARIS (UNFERTILIZED)





MICROMETERS (MICRONS) (µm)