

CONTROL QUESTIONS FOR SELF-PREPARATION FOR THE ORAL SURVEY

SECOND SEMESTER

Section 3. Developmental biology, homeostasis, regeneration

Topic 17. The life and mitotic cycles of the cell.

1. Mitosis and its main phases.
2. Types of chromosomes.
3. Morphofunctional organization of chromosomes.
4. Hetero – and euchromatin.
5. Human karyotype. Classification of human chromosomes.
6. DNA code and protein synthesis.
7. Mechanisms of mitotic activity regulation.

Topic 18. Reproduction. Meiosis. Gametogenesis.

1. Types of sexual reproduction. The meaning of sexual reproduction.
2. Types of asexual cytogamous vegetative reproduction.
3. The meaning of asexual reproduction.
4. Meiosis. The essence and meaning.
5. Formation of eggs and spermatozoa.
6. Fertilization and its phases.
7. Sexual dimorphism (morphological, genetic, endocrine and behavioral aspects).

Topic 19. Ontogenesis. General patterns of embryonic development.

1. Types of eggs.
2. Types of crushing.
3. Types of gastrulation.
4. Organogenesis.
5. Germ shells.
6. The relationship between mother and fetus during embryogenesis.
7. Critical periods of development.
8. Teratogenic environmental factors.
9. Mechanisms of morphogenesis.
10. Pharmacological bodies.
11. Regeneration and transplantation.
12. Regeneration and transplantation.

Topic 20. Postembryonic development.

1. Larval and direct development.
2. The effect of the endocrine glands on growth and development.
3. Postnatal ontogenesis and its periods.
4. Aging. Signs and theory of aging.
5. Problems of longevity.

Topic 21. Colloquium on the topic "Developmental biology and homeostasis".

- 5.1. List of questions to offset section 3:
 1. Types of asexual reproduction.
 2. Types of sexual reproduction.
 3. Parthenogenesis. Hermaphroditism.
 4. Oogenesis. Sexual dimorphism.
 5. Spermatogenesis.
 6. Meiosis. Fertilization.
 7. Embryonic development: fragmentation, gastrulation, organogenesis.
 8. Critical periods.
 9. Germ leaves, germ shells.

10. Postembryonic development.
11. The influence of external and internal environmental factors on embryonic and postembryonic development.
12. Hormones. Glands of internal secretion.
13. Theories of aging. Aging processes. Gerontology. Geriatrics.
14. The role of social factors and preventive medicine in human longevity.
15. Stress. Stages of stress, stress factors. The concept of homeostasis and adaptation.
16. Regeneration, its types.
17. Homeostasis, its importance in maintaining life.

Section 4. Fundamentals of general and medical genetics

Topic 22. Patterns of inheritance. Independent inheritance and gene interaction.

1. The main stages of the development of genetics.
2. Levels of study of genetic patterns.
3. Methods of studying human heredity (genealogical, twin, population-statistical cytological, biochemical, amniocentesis, dermatoglyphics).
4. The essence of Mendel's laws, their cytological justification.
5. The concept of dominance and recessivity, homo- and heterozygosity, geno- and phenotype, gene pool.
6. Return analyzing crossing. The essence and application in genetics.
7. Incomplete dominance, examples.
8. Multiple alleles, examples.
9. Lethal genes, examples, environmental factors that cause lethality.
10. Codominating, overdominating.

Topic 23. Interaction of non-allelic genes localized in non-homologous chromosomes.

1. Complementary interaction of genes.
2. Dominant and recessive epistasis.
3. Cumulative and non-cumulative polymerization.
4. Pleiotropic interaction of genes.
5. Penetrance.
6. The concept of hypostasis, the effect of position, genocopy, phenocopy and polymorphism.
7. Linked inheritance of traits.

Topic 24. Inheritance of sex, signs and diseases linked to sex.

1. Mechanisms of gender inheritance (progamous, epigamous and syngamous).
2. Signs fully linked to the floor. Examples.
3. Signs partially linked to the floor. Examples.
4. Holandric signs and their examples
5. Sexual chromatin and methods of its determination.
6. Chromosomal diseases associated with non-divergence of sex chromosomes (monosomy-X, trisomy-X, polysomy-X, Klinefelter syndrome, over-Klinefelter). Methods of their diagnosis.
7. Chromosomal diseases associated with non-divergence of autosomes (Down's disease, Edwards syndrome, Patau syndrome). Diagnostic methods.

Topic 25. Inheritance of blood groups. Molecular genetics.

1. Mechanisms of inheritance of human blood groups.
2. The concept of "Rh factor" and the mechanism of its inheritance of a person.
3. Characteristics of blood groups and Rh factor as one of the most important genetic traits of a person.
4. The essence of the mechanism of gene regulation of prokaryotic protein biosynthesis according to F. Jacob and J. Mano.
5. The mechanism of DNA repair and its enzymatic security.
6. The concept of genetic engineering and its achievements.
7. The main stages of work in the field of genetic engineering.

8. The concept and essence of transduction, transformation, direct and reverse transcription, lysogeny, autoreproduction.
9. Chromosome maps and mechanisms of their construction.

Topic 26 Variability, its types and mechanisms.

1. Mechanisms and causes of non-hereditary variability of traits.
2. The concepts of "variation series", "variation curve" and "reaction rate".
3. The law of homologous series of hereditary variability of traits according to N.I. Vavilov.
4. Mechanism and causes of hereditary variability of traits.
5. Combinative variability as one of the forms of hereditary variability. Its causes and consequences.
6. Mutagenic factors as a source of mutational variability.
7. Classification of mutations and their characteristics.
8. Mechanism and consequences of gene mutations.
9. Genetic diseases.
10. The mechanism of chromosomal mutations, their causes and consequences.
11. Polyploidy and aneuploidy as the main forms of genomic mutation.
12. Genomic mutations as a source of human chromosomal diseases.
13. Mutation frequency as a mathematical quantity.

Topic 27. The doctrine of the population.

1. The concept of plant, animal, and human populations and their examples.
2. Mechanisms and causes of populations.
3. Types of isolations of humans and animals.
4. Mutation process in populations and its consequences.
5. The fate of dominant lethal, harmful and neutral mutations.
6. The fate of recessive lethal, harmful and neutral mutations.
7. Types of selection and their consequences for populations.
8. Population waves and gene drift.
9. Features of human populations and their classification.
10. Definition of the ideal population and its features.
11. Panmixia and its significance for populations.
12. The Hardy–Weinberg law and its mathematical expression.

Topic 28. Colloquium on the topic "Anthropogenetic".

- 5.1. List of questions for the offset under section 4
 1. G. Mendel's laws and conditions of their manifestation. Analyzing, recurrent and reciprocal crossing. Expressiveness, penetrance.
 2. Inheritance of human blood groups, importance in medicine, forensic examination and anthropology. The Rhesus system. The concept of Rh incompatibility.
 3. Interaction of non-allelic genes: complementarity, epistasis, polymerization (cumulative and non-cumulative), "position effect".
 4. The subject and tasks of genetics, stages of development of genetics. Methods of studying human heredity (clinical-genealogical, twin, population-statistical, cytogenetic, biochemical methods, recombinant DNA, methods of somatic cell genetics, biological modeling, mathematical modeling, express methods, methods of prenatal diagnosis of hereditary diseases).
 5. Types of inheritance and their characteristic features.
 6. Phenotypic variability. Features. The reaction rates. The variation curve of variability.
 7. Genotypic variability. Features. Its significance in ontogenesis and evolution.
 8. Combinative variability and its mechanisms. The phenomenon of heterosis.
 9. Mutational variability. Mutations and mutagens.
 10. Types of chromosomal aberration.
 11. Aneuploidy and polyploidy.
 12. Gene diseases. Classification. Examples of diseases and their characteristic signs.
 13. DNA repair.
 14. Theories of carcinogenesis.

15. The structure of DNA and RNA molecules
 16. DNA replication
 17. Genetic code and stages of implementation of genetic information in the cell
 18. Proof of the role of nucleic acids in the transmission of hereditary information. Transformation, transduction, conjugation and lysogeny.
 19. The mechanism of regulation of gene activity in pro- and eukaryotes.
 20. Methods of genetic engineering. Cloning.
 21. Chromosomal theory of heredity.
 22. Theories of sex determination. Variations of sex determination.
 23. The formation of gender in humans. Sex ratio.
 24. Gonosomal inheritance (partially, completely, holandric).
 25. Denver and Paris classifications of human chromosomes.
 26. Stages of karyotype research
 27. Sexual chromatin. The hypothesis of M. Lyon.
 28. The mechanism of occurrence of chromosomal abnormalities associated with non-divergence of sex chromosomes and autosomes.
 29. Population structure of the species
 30. Distinctive features of human populations.
 31. Genetic processes in large populations (Hardy-Weinberg law)
 32. Genetic processes in small populations (mutations, genetic load, population waves, gene drift, isolation)
- Types of selection in populations.

Section 5. Phylogeny of vertebrate organs

Topic 29. Phylogeny of the circulatory system. Phylembryogenesis. Malformations of development.

1. The structure of the heart and major vessels in representatives of the Acrachia subtype.
2. The structure of the heart and major vessels in representatives of the Pisces class.
3. The structure of the heart and vessels of amphibians.
4. The structure of the heart and blood vessels in reptiles. Distribution of venous, arterial and mixed blood flows.
5. The structure of the heart and blood vessels in birds (Aves)
6. The structure of the heart and blood vessels in mammals (Mammalia)

Topic 30. Phylogeny of the genitourinary and nervous systems. Phylembryogenesis. Malformations of development.

1. The structure of the excretory system of the protonephridium type (flatworms) and the type of metanephridium (annelid worms).
2. The structure of the kidney type Pronephros (Cyclostomata).
3. The structure of the kidney type Mesonephros (Pisces, Amphibia).
4. The structure of the kidney type Metanephros (Reptilia, Aves, Mammalia).

Section 6. Biosphere and ecology.

Topic 31. Evolutionary teaching. Anthropogenesis.

1. The place of man in the system of the animal world.
2. Similarities and differences with great apes.
3. Characteristics of the main human fossil ancestors: placental mammals, insectivores, Dryopithecus, Australopithecus, Pithecanthropus, Synanthropus, Neanderthal, Cro-Magnon, Homosapiens.
4. Human races. The anti-scientific essence of racism.
5. The biological heritage of man as one of the factors providing the possibility of social development.

Topic 32. Ecology and biosphere

1. Ecology, its subject and tasks.
2. The concept of ecological systems, their characteristics and the relationship between the components.
3. The components of the ecosystem, their characteristics and the relationship between the components.
4. The concept of abiotic and biotic environmental factors.
5. The effect of temperature, light, ionizing radiation on the body. The laws of Bergman, Allen, Gloger.
6. Relationships between organisms: parasitism, predation, symbiosis, commensalism and other types of relationships.
7. The concept of bioadaptation and biological rhythms, their significance for medicine. Human adaptation to the tropics, the north and the highlands.
8. The concept of the biosphere, its boundaries and components.
9. The concept of nature, vitasphere, noosphere.

Control questions are used when the student works out missed classes, as additional questions on the exam, as well as for self-control.