Topic#10

Biosocial nature of man and ecology

Motivation

Man is the highest stage of development of living organisms on Earth. He, according to I. T. Frolov (1985), is "a subject of the socio-historical process, the development of material and spiritual culture on Earth, a ***biosocial being,*** genetically related to other forms of life, but separated from them thanks to the ability to produce tools, possessing articulate speech and consciousness, creative activity and moral self-awareness."

Purpose of the lesson: to study the features of the biosocial nature of man, the evolutionary features of the species, the influence of the artificial environment on human evolution.

Questions for oral questioning:

1. Man as a biosocial being.
2. Man as a biological species (evolutionary features, heredity, natural selection).
3. The artificial environment and human evolution.
4. Human population characteristics (population growth, age pyramid).
5. Natural resources of the Earth as limiting factors for human survival.

Independent work of students in class:

1. Solution and discussion of a situational problem.
2. Viewing and discussion of the educational video "Last Ones Surviving. The Mystery of Man is a film about the origin and evolution of man."
3. Listening and discussing abstracts prepared by students on the individual instructions of the teacher.
4. Working with tests on the topic of the lesson.

Reference material

The biosocial nature of a person is reflected in the fact that his life is determined by a single system of conditions, which includes both biological and social elements. This necessitates not only its biological, but also its social adaptation, i.e., bringing inter-individual and group behavior into conformity with the norms and values prevailing in a given society, class, social group in the process of socialization (by assimilation of knowledge about this society, class and etc.). Human biological adaptation is very different from that in the animal world, since it strives to preserve not only its *biological, but also social functions* with the increasing importance of the social factor. The latter circumstance has important ecological significance and is reflected in the ecological approach to the definition of the concept "human".

The general laws of the relationship between a person (or a group of people) and the biosphere, the influence of the natural and social environments on a person (or a group of people) are studied by ***the science of human ecology*** .

Man as a biological species

Man is an integral part of the living, and he cannot exist in natural conditions outside the biosphere and living matter of a certain evolutionary type.

The family of hominids **,** to which man belongs, arose in the equatorial part of the Earth, and *the genus Man* - in eastern Africa and South Asia. In early eras on Earth, there were several species of hominids belonging to two subfamilies: *australopithecus and just humans,* of which only one species has survived - *Homo sapiens* - a reasonable person. Echoes of the fact that until recently Neanderthals and humans lived on Earth at the same time are the surviving legends about the "Bigfoot". Many scientists believe that Homo sapiens is divided into two subspecies - *Neanderthal* and *modern man* .

There are a number of turning points in the evolution of living matter on the planet, the last of which in this evolutionary succession is the appearance of man, Homo sapiens . This happened quite recently - 3.5–5 million years ago, which, compared to the 4 billion years of development of the living world, is an insignificant part of it.

Primitive man, until recently (before the advent of agriculture), was actually an ordinary *omnivorous consumer* natural ecosystems. Being engaged in gathering and hunting, he created short-term small settlements, moving from place to place in search of areas with richer vegetation and other food. At this time and even earlier, human influence on the surrounding nature was small. Even 1.5 million years ago, human life expectancy did not exceed 20 years, and the size of its entire population on Earth was about 500 thousand individuals.

However, a person not only depends on the environment, but also influences it. But **unlike** animals, man has intelligence. ***Intelligence*** allowed him to find an "antidote" against one of the most important factors - *the lack of food resources:* agriculture - cattle breeding and farming. This happened about 10 thousand years ago. ***Man began to build his own ecological system.***

Man's ability to think and the creation of the necessary ***tools of labor*** allowed him, at least temporarily, to overcome the action of ordinary abiotic and biotic factors. B, Nebel (1993) believes that a person was able to overcome their effects:

1) producing food in abundance (although there are still problems with its distribution);

2) creating reservoirs and supplying water to populated areas and fields;

3) creating means of combating predators and many pathogens;

4) having built homes and learned to heat or cool them at will;

5) winning in competition with other species .

A person, having learned to overcome the action of limiting factors, nevertheless has not yet won a 100% victory over them. As Yu. Odum (1975) notes,

he can supply a room with conditioned air , but he cannot consider himself independent of the climate .

Thus, although man is a social being, ***nature itself will always be a factor in human existence*** . The artificial environment also affects humans, i.e., feedback occurs here, but it affects both biological and social processes occurring in human populations.

Human heredity

Created during the formation of the species Homo sapiens genetic program defines it as a biological species.

the human gene pool .

Gene pool – this is the entire set of genes of the population (of any biological species) living in a specific historically established territory, and therefore of the human population. Various social conditions determine the formation of people of a certain ***genotype,*** that is, a certain combination of genes transmitted by parents and ensuring a person's life.

Natural selection played a decisive role in the evolution of Homo sapiens . Modern humans arose during the last ice age, approximately 40–50 thousand years ago. As we have already noted, during this period he was engaged in hunting, gathering, and much later - cattle breeding, agriculture and crafts, and only in the last two or three centuries did industrial production rapidly develop. Throughout this history, the role of the natural environment has gradually decreased and the role of the artificial environment in human life has increased. At the same time, the magnitude and qualitative nature of the pressure of natural selection changed.

Thanks to social change and the development of medicine in developed countries, the pressure of natural selection has been significantly reduced. Nevertheless, man, being a biosocial being, has not freed himself from the action of general biological laws that are universal for all living things .

The built environment and human evolution

The driving force of evolution is natural selection, the pressure of which in developed countries in general, and especially in urban systems , is significantly reduced. But zonal ***geographical conditions continue to operate;*** even the formation, regardless of ethnicity, of zonal adaptive types of humans has been noted: *tropical, desert, high-mountain, continental, temperate, arctic.*

Taking into account the indicated genetic characteristics of man and the fact that he has occupied spaces where environmental influences are largely opposite, we can state: *man, unlike animals, has placed the species in the conditions of a very wide ecological niche, characterized by a general orientation of adaptation.*

"Self-adjustment" of body systems to the environment indicates the possibilities of human survival in new conditions, which allows us to look optimistically at the future of all humanity, without predicting its death. Examples of "self-tuning" of human body systems when the environment changes include: acceleration processes, adaptive dynamics of the sex ratio in the population, the physiological reaction of the body to conditions of high mountains, high latitudes, hypokinesia and weightlessness, etc.

A person not only adapts, but is firmly "tied" to his environment, both in individual and species aspects (Urban Environment..., 1990). Data from space biology show that a person, adapting to new conditions in Space, returning to Earth, is forced to again develop his previous skills - *to deadapt* .

Approximately the same thing happens if it is not a person who changes the environment, but the environment changes in the place of his residence, in production, etc. For example , the noise of the mechanisms in the workshop, the level of pollution, etc., has increased, say, for some time. But if these changes occur quickly and powerfully, then evolutionary processes, selection mechanisms, no longer have time, "lag behind," and adaptation becomes impossible. Such a sharp imbalance in the system causes stressful situations that lead to human diseases, including genetic disorders - *mutagenic phenomena.*

In the urban environment, traditional environmental factors are added to such factors as *desynchronosis* (inconsistency of adaptation of geographic zonality during translatitudinal and transmeridian migrations), *transport fatigue, electromagnetic fields, symbiotic bacterial and viral flora , medical interventions , information richness of the environment, viral transduction* (transfer of genetic material from one cell to another using a virus), etc.

There is a problem of assessing the quality of the urban environment. In natural ecosystems, indicator species can be used . But man, unlike animals, retains his species-specific morphofunctional characteristics regardless of changing living conditions thanks to labor socio-historical activity, as a result of which a new "artificial" environment was created. Therefore, *assessing the state of a person's environment is possible only through the state of health of the person himself.*

Human population characteristics

Human population **,** i.e. a population of a special species - Homo sapiens , has the same properties as the animal population, but the nature and form of their manifestations differ significantly due to the action of factors such as the artificial environment, socio-economic conditions and others, called by a single term - society

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All people on Earth form a population system - **humanity.** The growth of this population is limited ***by available natural resources and living conditions, socio-economic and genetic mechanisms*** (Reimers , 1994).

But if human behavior is truly reasonable, then, according to Yu. Odum (1975), he must: 1) study and understand the form of his own population growth; 2) determine quantitatively the optimal size and configuration of the population in connection with the capacity of a given area; 3) be ready to accept "cultural regulation" where "natural regulation" is ineffective.

Natural resources of the Earth as a limiting factor for human survival

Resources _ "It is something extracted from the natural environment to satisfy one's needs and desires" (Miller, 1993). ***Needs*** man can be divided into ***material and spiritual*** *(beauty of nature, recreational resources, etc.)* .

So, ***natural (natural) resources*** - these are natural objects and phenomena that people use to create material goods that ensure not only the maintenance of the existence of humanity, but also a gradual increase in the ***quality*** *of life.*

Man, thanks to his ever-increasing material needs, cannot be content with the gifts of nature only to the extent that he should not upset its balance, i.e., about 1% of the resources of the natural ecosystem, so he has to use those natural resources that have been accumulated for billions and millions of years in the bowels of the Earth. To create material wealth, people need metals (iron, copper, aluminum, etc.) and non-metallic raw materials (clay, sand, mineral fertilizers, etc.), as well as forest products (timber for the production of pulp and paper, etc. .) and much more.