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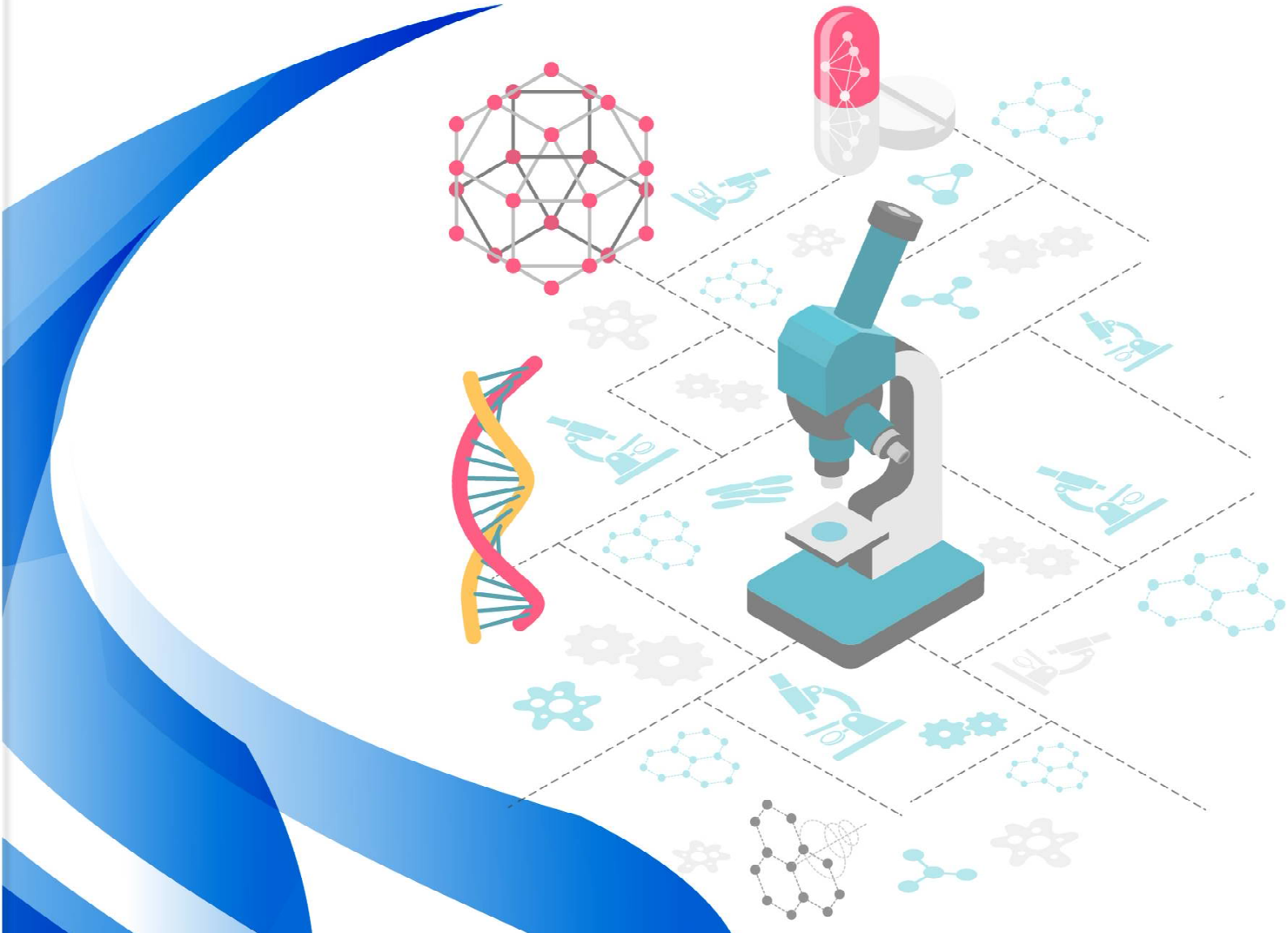

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PHILOGENETIC LINKS OF LOWER PLANTS

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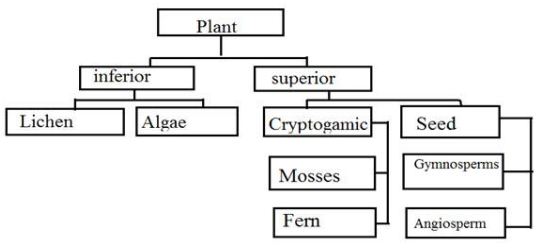
Annotation: Studies of phylogenies and reconstruction of its stages are necessary to build a natural system of organisms. E. Haeckel proposed to use for these purposes the method of triple parallelism, the essence of which is to compare the data of paleontology, comparative anatomy and embryology. In modern phylogenetic, data from genetics, biochemistry, molecular biology, ethology, physiology, parasitology, and other biological sciences are increasingly used.

Keywords: phylogenies, biological classification, genetic line, divergent character, monophilia, system, classification, taxon, blue-green algae.

Phylogeny, (phylogeny - related to birth, the historical development of organisms. In biology, phylogenies considers the development of a biological species in time. Biological classification is based on phylogenies but methodologically may differ from the phylogenetic representation of organisms. Phylogenies considers evolution as a process in which a genetic line - organisms from ancestor to descendant - branches in time, and its individual branches can acquire certain changes or disappear as a result of extinction.



The knowledge available today about the branching of the phylogenetic tree was obtained by constructing a classification of living organisms, which was originally conceived by Carl Linnaeus as a reflection of the "Natural System" of all nature (including inanimate). Subsequently, it was established that such a "Natural System" does not exist, and what K. Linnaeus took for the manifestation of this system in animals and plants is phylogeny, that is, the result of biological evolution.

For a more efficient analysis of phylogeny, principles are currently being developed, in which the method of recording the classification is improved in comparison with the Linnaean one, which makes it possible to more adequately record phylogeny in the form of classification and continue its analysis .

The analysis of phylogeny is far from complete, since it is the identification of one-time unique evolutionary events that occurred in the past, and therefore can be carried out only by indirect methods. Reconstruction and phylogeny requires the fullest possible knowledge of the diversity of species; however, at present, science still knows only a small part of the species of living organisms that live on Earth, and a negligible part of the species that lived on Earth in the past.

The fundamental principles of phylogenetic are: 1) the divergent nature of the evolutionary process - the divergence of signs of organisms of different phyletic lines that arose from a common ancestor; 2) monophilia - a taxon of any rank, comes from a single parent species on the basis of divergence or adaptive radiation, as a result of which a number of groups of organisms can have one common ancestor.

According to modern concepts, divergence is the result of the development of groups of organisms in different conditions, during which they acquire different features and move away from each other according to the degree of similarity. Divergence is facilitated by disruptive selection as well as isolation.

The course and result of phylogenies are depicted graphically in the form of a family tree (dendrogram). The construction of a family tree is possible only on the basis of the recognition of monophilia as the basic principle of the evolution of the organic world. The scheme of the pedigree tree was made for the first time in 1866 by E. Haeckel on the example of animals.

During its construction, E. Haeckel placed: in the lower part of the trunk - primitive groups; in the central part of the trunk - groups that have evolved in the main direction; on the sides - groups that deviated from the main direction of evolution with the acquisition of one or another specialization; at the top - the groups that have reached the highest level of organization. At the same time, the taxonomic proximity of different groups was reflected in the degree of divergence (distance from each other) of the corresponding branches, and the thickness of the branches is proportional to the number of subordinate taxa. Sometimes a pedigree tree is "superimposed" on a geochronological scale (Fig. 162). Such a genealogical tree illustrates the time of isolation, flourishing and extinction of various phylogenetic branches.

The ultimate goal of phylogenetic research is to create a phylogenetic or natural system of organisms. A system is a classification (distribution) of organisms by groupings of various ranks - taxa. It creates an opportunity for biologists of various profiles and specializations to navigate the many existing types of organisms. Attempts to classify organisms have been known since antiquity (Aristotle, Theophrastus, etc.), but the foundations of taxonomy as a science were laid in the period from 1686 to 1704. in the works of the English naturalist J. Ray (1628-1705), then (from 1735) in the famous works of the Swedish naturalist K. Linnaeus (1707-1778). The first systems (the systems of J. Ray, C. Linnaeus, and others) were artificial: the combination of species into groups was based on several purely external features. Then the classical systems arose, which were based on taking into account morphological characters and, to a much lesser extent, embryological and paleontological data.

Department of Cyanobacteria (Cyanophyta) This includes unicellular, colonial and filamentous algae, painted in bluish green, black green or olive green. The color depends on the pigments: chlorophyll a, some carotenoids, phycobilins (blue phycocyanin and red phycoerythrin). Pigmentation, as well as the complete absence of flagellar stages, brings blue-green algae closer to red ones. The cell membranes are pectin, often slimy. The cytoplasm does not contain vacuoles with cell sap, in the peripheral part it is darker - chromatoplasm, colorless in the center - centroplasm. DNA is localized in the centroplasm, although the nuclear envelope and nucleolus are absent. Spare product - glycogen, volutin, cyanophycin protein grains. In many, mainly planktonic, in the protoplasm in the form of black dots or circles there are cavities filled with gas - gas vacuoles. They are believed to contain N and contribute to floating in the water column. In many filamentous species, in different places along the thread or at the base of it, so-called. heterocyst are special rounded cells with strongly thickened walls and homogeneous cell contents.

Various assumptions have been made regarding the role of heterocyst. In filamentous forms, the break of filaments into sections occurs along heterocyst; a known role in vegetative reproduction was attributed to them. According to the latest data, the process of fixing atmospheric nitrogen under aerobic conditions takes place in heterocyst. Other specialized cells that are also formed by differentiation of vegetative cells are spores - akinets. These cells are larger than vegetative ones, they are thick-walled, overflowing with spare cyanophytic grains, the DNA content in akinets increases 20-30 times. The spores can withstand drying out, then each grows into a new specimen. Unicellular and colonial forms reproduce by dividing cells

in half. The overwhelming majority of filamentous forms reproduce with the help of hormogonia, which are obtained when the filament breaks down into separate areas. After a certain period of movement associated with the secretion of mucus, hormogonies grow into new threads. Blue-green algae are widespread everywhere, grow where no other plants can grow. Most blue-greens live in fresh waters, less in the sea. Trichodesmium erythraeum (from an excess of red phycoerythrin) causes "blooming in the Red Sea, which is why the sea was named. Many cyanea grow out of water, in soil, on rocks, in trees. Among them, symbiosis is common in lichens. Blue-green algae are of great importance in human life, both positive (nitrogen fixation, edible) and negative (causative agents of "blooming" of water, which, when dying off, spoil the water and can cause the death of the fish population of the reservoir). The department of blue-green algae is considered the oldest group of autotrophic plants on Earth. The primitive structure of the cell, the absence of sexual reproduction and flagellar stages are proof of their antiquity. Cyaneans are similar in cytology to bacteria, and some of their pigments are also found in red algae. However, blue-green algae are an independent branch of evolution. Their taxonomy is far from perfect. The comparative simplicity of morphology, wide variability have led to the fact that all systems are subjective. The total number of species in the department is 1500-2000. The department is divided into 3 classes: chroococcal (unicellular without differentiation) and colonial organisms, whose cells secrete a large amount of mucus at the base and apex); hamesiphonic (unicellular colonial and filamentous, their thalli are differentiated into base and apex, live attached); hormogonium (multicellular filamentous algae, whose cells are connected to each other through plasmodesmata, form trichrome). Representatives: Genus Chroococcus. The cells are rather large, spherical, solitary, or in small-cell, irregular colonies. Distributed mainly on soil and in fresh water bodies. Rod nostoc is characterized by slimy or gelatinous colonies of various sizes and shapes: from microscopic small to large, reaching the size of a plum. The mucus contains a mass of known strands, irregular or radially diverging from the center of the colony. Reproduction is by means of homogony. Nostoc are able to fix atmospheric nitrogen. In the water bodies of northern and temperate latitudes, the largest nostoc is widespread - plum-like (Nostoc pruniforme). The genus Anabaena is usually represented by single or collected in irregular clusters of threads. Filaments are symmetrical, of the same width throughout, and consist of rounded or barrel-shaped vegetative cells with intermediate heterocyst. Straight or curved threads. Anabaena species are found both in benthos (bottom) and in plankton. Genus Oscillatory (oscillator). Its species often form blue-green films that cover damp ground, underwater objects, or float as thick leathery cakes on the surface of stagnant bodies of water. The long filaments of the oscillatory are composed of cylindrical cells, exactly the same, with the exception of the apical cells, which may differ somewhat in shape from the rest. The threads show a kind of oscillatory movement, accompanied by the rotation of the thread around its own axis and its translational motion.

Conclusion

The main task of modern taxonomy is to create a natural (phylogenetic) system that would reflect the real-life kinship (genealogical) relationships between groups of living organisms. The development of such a system should be carried out on the basis of the integrated use of morphological, physiological, embryological, biochemical, genetic, ecological, paleontological and other research methods. Understood by most modern biologists, the system of living nature is an improved and, in fact, a compromise version of the classical systems of the 19th century. It is not surprising that

it is constantly discussed, refined and changed. Fundamentally important for the formation of a system of living organisms was the establishment in the middle of the twentieth century of the fact of a sharp difference between bacteria, cyanobacteria (blue-green algae) and recently discovered archaebacterial from all other living beings. They do not have a true nucleus, and the genetic material in the form of a circular DNA molecule lies freely in the so-called nucleoplasm, without forming real chromosomes. Bacteria and archaea are also distinguished by the absence of a mitotic spindle, microtubules, and an atypical structure of flagella. These organisms are called prokaryotes, or prenuclear organisms. The key events in the history of the development of life are considered the transition to the eukaryotic type of cellular organization, the emergence of multicellularity, the emergence of humans.

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