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THE SCIENCE OF MOLECULAR GENETICS YESTERDAY AND TODAY AS WELL DUTIES AS GAL

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Abstract: This article discusses the completion of human genome sequencing and the new postgenomic era in molecular genetics. The great achievements of molecular genetics, genomics, analysis of life are reported.

Key words : molecular genetics, creative technologies, human genome, postgenomics, genomics.

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Enter. Modern medicine is characterized by the rapid accumulation of new information about the fundamental and systemic foundations of life. Today, a necessary condition for the development of medicine is the high level of development of general biological and ecological sciences such as cytology, genetics, evolutionary theory, parasitology and ecology. Molecular genetics mainly studies the description of general biological laws characteristic of all living organisms. Over the years, many researchers have tried to unravel the processes involved in the human genome. Because the study of a person as a biosocial subject, paying attention to his biological characteristics, is important for the formation of medical thinking in students of medical and biological higher education institutions.

The life forms of any living organism, from bacteria to humans, depend entirely on the cell's chromosomes, but their structure, diversity, preservation and evolution over several generations are determined by the genome.

The genome is the genetic apparatus of the cell, which contains all the information necessary for the development of the organism, its existence in certain environmental conditions, evolution and the transmission of all hereditary characteristics to a number of generations. **Genomics** , the science that studies the molecular structure of the genomes of living organisms, is also developing.

The main part. The basis of the human genome is the DNA molecule, the " ***thread of life*** ", whose double-stranded structure was brilliantly predicted and confirmed by James Watson and Francis. Pieces of this thread make up genes, the coding parts of the genome that determine the structure of all proteins and ribonucleic acids (RNA). Obtaining accurate information about the primary structure of the human genome, that is, its nucleotide sequence, as well as how many genes a person has and how they are organized on chromosomes, has attracted the attention of biologists, physicists, chemists and mathematicians in recent decades. has long attracted and continues to attract.

Molecular genetics is aimed at the study of the material basis of heredity and variability of living beings, the processes of carrying out and changing the transfer of genetic information that occurred at the cellular and molecular level, as well as the method of its preservation.

Molecular genetics emerged as an independent science in the 40s. Due to the introduction of new physico-chemical methods (x-ray diffraction analysis, chromatography, electrophoresis, high-speed centrifugation, electron microscopy, use of radioactive isotopes, etc.) into biology, the 20th century made it possible to study the functions and structure of individual components of the cell and the entire cell as a single system. gave New ideas of physics and chemistry, mathematics and cybernetics entered biology with new methods. Molecular genetics played an important role in the rapid development of the transfer of genetic research from higher organisms (eukaryotes), which are the main object of classical genetics, to lower organisms (prokaryotes) - bacteria and many other microorganisms, as well as viruses.

The advantages of using simpler life forms to solve genetic problems are the rapid generational change of these forms and the possibility of studying a large number of strains at once, which greatly increases the accuracy of genetic analysis. In addition, the relative simplicity of the organization of bacteria and especially viruses facilitates the elucidation of the molecular nature of genetic events.

Molecular genetics studies the molecular basis of genetic processes in simple and higher organisms and does not include the special genetics of prokaryotes, which occupy an important place in the genetics of microorganisms. In its short history, genetics has made great strides, deepening and expanding ideas about the nature of heredity and variation, and becoming the leading and fastest growing branch of genetics. One of the main achievements of molecular genetics made it possible to determine the chemical nature of the gene. Classical genetics (or Mendelism) showed that all the genetic potential of organisms (their genetic information) is determined by discrete units of heredity - localized genes. However, classical genetic methods did not allow to determine the chemical nature of genes, which was noted as early as 1928 and the need to study the mechanism of heredity at the molecular level was justified by the well-known biologist NK Koltsov . The first success in this direction was achieved in the study of genetic transformation in bacteria.

Thus, it was proved that genes consist of DNA. This conclusion is confirmed by experiments with viruses containing DNA: to reproduce the virus, it is enough to insert the viral DNA molecules into a sensitive host cell, all other components of the virus (proteins, lipids) are devoid of infectious properties and are genetically inert.

In 1953, the American scientist J. Watson and the English scientist F. Crick proposed a model of the structure of DNA, its huge molecule is a double helix, a pair of strands formed from nucleotides located aperiodically, but with a certain sequence they said it consists of Each nucleotide of one strand pairs with the opposite nucleotide of the second strand according to the complementarity rule.

After some time, it was found that different RNA molecules have a similar structure, except that they mainly consist of one polynucleotide chain. Chemical and physicochemical methods combined with specific genetic methods (various mutants, transduction, transformation events, etc.) have shown that different genes also differ in the number of base pairs. They also determined a fixed sequence of nucleotides for each gene, which encodes genetic information.

In the spring of 2000, Cambridge scientists announced that they had largely sequenced the human genome. In early 2001, a large team of Celera Genomics scientists encoded the human genome.

In 2005, Mojica and two other groups of researchers investigated the role of the CRISPR/Cas9 system in prokaryotes' adaptive immunity to bacteriophages, the analog of our acquired immunity to viruses.

In 2007, DuPont launched the production of bacteria "inoculated" with killed viruses on the basis of industrial technologies, and resistant strains were created for the preparation of food products.

In 2012 , Martin Jinek et al succeeded in creating a synthetic RNA (sgRNA) by combining tracRNA and crRNA. In 2013, it was found that the resulting system is very simple and can work in cells of all model organisms.

In 2015, a slight modification of *the Cas9 protein reduced the number of system errors to zero (Slaymarker et* al., 2015). This has opened wide opportunities for gene therapy in many diseases.

may replace all traditional, widely used methods of transforming multicellular eukaryotes (agrobacterial transformation, electroparation, ballistic transformation, etc.) - a set of genetic engineering methods that allow the genetic construction allows integration.

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