The Seybold Report

ISSN 1533-9211

DOI 10.17605/OSF.IO/KCXR9

HISTORY OF THE DEVELOPMENT OF MICROBIOLOGY AND THE STUDY OF THE GENETICS OF MICROORGANISMS

YUSUPOV IBRAGIM MIRSAYDALIEVICH

Associate professor of the Department of General Biology, Kokand State Pedagogical Institute, Uzbekistan.

Annotation

this article examines the history of the development of the science of microbiology, considers the opening, Life of microorganisms, periods of "morphology", "physiology" and "Biochemistry", the importance of the work of Pasteur, Vinogradsky and others, soil microbiology, the study of genetics, genotype and phenotype, phenotypic variability, genotypic variability, mutations, transformation hypothesis, transduction, conjugation, episomes, individual and historical development, diversity, distribution on earth, their relationship with the living environment, etc, scientific points of view are given.

Keywords: morphology, Biochemistry, Microbiology, paleontology, "morphology", "physiology", "biochemistry", Pasteur, Vinogradsky et al, soil microbiology, genetics, genotype, phenotype, phenotypic variability, genotypic variability, mutations, transformation, transduction, conjugation, episomes.

Even before microorganisms were discovered, human yoghurts had made extensive use of their microbiological processes in wine making, bakery. From time immemorial, doctors and naturalists had already begun to look for the reasons for the origin of many infectious diseases. For example, in the work of Hippocrates (460-377 BC)[1], Lucretius (95-50 BC) and other major scientists of the time, it was shown that the causative agent of various infectious diseases depends on living nature[2]. From the very beginning, the peoples of Central Asia had information about smallpox, leprosy and other diseases. Abu Ali ibn Sina (900-1037) said that the causes of these diseases were living beings and that they were spread through water, air[3].

The opening of microorganisms became directly related to the invention of the microscope. Among the first were Ganz and Zachary Jansen, and then the Italian scientist Galileo Galilei (1564-1642) proved that the center of the world was the sun, not the Earth, making the first telescope[4] and K.Microscopes were created and improved by Drebbel[5].

In the 40s of the XVII century, the Roman professor A.Kirchher (1602-1680) observes various objects through a magnifying device and sees extremely tiny "wormholes" [6]. These were microorganisms. But these experiments were random discoveries.

"The period of Morphology"in the development of microbiology. The person who collected even more information about microorganisms became the Dutch scientist Antoni van Levenguk(1632-1723), who ushered in the "age of morphology" of the history of microbiology. He examined samples such as dirty water, decoctions of various substances, dental dirt, and observed microorganisms in them using a 500-fold magnifying microscope he had made. He established the forms of microorganisms in his book Secrets of nature (1665) [7].

The first microscope in Russia was created by Ivan Belyaev[8] and Ivan Kulibin[9].

Russian scientist, military doctor D.S.Samoylovich (1724-1810) had used a microscope to

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/KCXR9

examine the causative agent of smallpox (chuma), suggesting a way to vaccinate people against the disease. His discovery provided the basis for the study of the causative agent of other infectious diseases[10]. The English physician Eduard Djenner (1749-1823) had shown in 1798 that smallpox vaccination was important[11]. Since the second half of the 19th century, much improved microscopes have been created. This allowed the study of the physiology of microorganisms, not only the morphological structure. Since the invention of the microscope, work on microorganisms has been carried out in the history of Microbiology, the 1st period is referred to as the "age of Morphology in the development of Microbiology".

Swedish scientist K.While Linnaeus (1707-1778) placed all living things in a system of ham, he introduced microorganisms into a generation, calling them "disorganized" [12].

Microorganisms, the first systematics of thenng refers to the Danish Muller (1786). He instilled "animalcules"in the system in water and soil and called them "infusions" [13]. Gradually, the study of microorganisms began.

Later M.M.Terekhovsky also favored a doctoral dissertation (1770) on the topic "tsarstvo timi infusory Linneya", developed on microorganisms[14]. Studied their microorganisms in various decoctions. Determined the destruction of microorganisms under the influence of temperature, electric current and poison. In 1835, Ehrenburg wrote a scientific work on the topic" infusions are perfect organisms " and divided all bottomless creatures into 22 classes. He included the term infusions in the book and gave them descriptions, called microorganisms in binary nomenclature and divided all bacteria into 3 classes[15].

P. in the middle of the XIX century.F.In the work "Zoology", written by Goryainov, some sections were assigned to microorganisms, and this section was called the "infusions section". K.Negeli (1817-1891) [16] and F.Mines (1828-1898) began to study the nature of some of the bacteri [17].

The periods of "Physiology" and "biochemistry" of the development of microbiology. The second period of study of microorganisms-the"age of Physiology" - began with the work of Louis Pasteur (1822-1895). He identified the biological nature of most bijding processes, namely alcohol, milk and acetic acid bijding as well as other types of bijgings. Each bijection process has been experimentally proven to have its own microorganisms. He again showed that decay processes are also affected by individual microorganisms. This great French scientist studied the disease of anthrax, Thrush, saramas, pasteurellosis, gas gangrene, mulberry silkworm (pebrina), wine and beer spoilage and clarified measures to combat them. Identified anaerobic bacteria that live in an oxygen-free environment. Introduced sterilizing (microbial destruction) methods into laboratory practice. Showed the unfounded nature of Aristotle's and Vergilius ' theories of "spontaneous birth". Based on the fact that if the nutrient medium is thoroughly sterilized, no microorganisms will appear in it. Pasteur observed that chickens did not develop the disease when a weakened bacterial culture was sent to a healthy chicken in the process of studying chicken cholera. He also returned the same work in cattle infected with anthrax and managed to get positive results. It infects animals with anthrax sticks that have been weakened (grown at a temperature of 42-43oc). Found that when vaccinated with a

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/KCXR9

weakened bacterial culture, animals produce immunity to anthrax. Pasteur studied anthrax and opened the mystery of the "Cursed fields" [18].

The importance of the work of Pasteur, Vinogradsky[19] and others. Pasteur's work on the study of fall disease is also of great importance. He was unable to see his microorganisms while researching the droppings of dogs he had knocked down under a microscope. But he found that the "cause" of the disease - causing collapse-lies in the head and spinal cord of the animal. The infected rabbit slowly dried its brain, picked up a weakened sick pathogen, and with it found ways to keep healthy animals from the disease by vaccinating animals. Such vaccinations, called antirabic i.e. anti-drop vaccines, began to be used very widely. These works laid the foundation for the emergence of a new Science Immunology. Louis Pasteur was elected academician of the French Academy of Medicine, corresponding member of the Academy of St. Petersburg and then-honorary academician of chalik.

In Paris, the Pasteur Institute was opened in 1888. In it, subsequently, prominent microbiologists were trained. For example, Mechnikov, Vinogradsky, Gamaleya, Khavkin, Sklifasovsky, etc.

In the 19th century, medicine microbiology developed in many countries. German scientist Robert Koch (1843-1910) made many contributions to the development of medical microbiology[20]. He proposed the use of a solid (dark) nutrient medium to separate the culture of a pure microorganism. Isolated the causative agent of tuberculosis and cholera vibrion in humans and cattle. Improved microscopy techniques, introduced the application of an immersion system to microscopy, and microphotography.

I.I.Mechnikov (1845-1916) created a complete doctrine about phagocytosis and its importance in immunity [21]. It detected antogonism between the bacteria that cause rotting and acidifying milk and added its own xissas to the detection of cholera. Established the first bacteriological station in Russia. Under his leadership, major microbiologists: G.N.Gabrichevsky, A.M.Bezredka, I.G.Savchenko, L.A.Tarasevich, N.F. Gamaleya, D.K.Zabolotny and other scientists have matured.

Considerable work has also been done on soil microbiology. French scholars such as Alphonse Thophile Schloesing[22] (1856-1930) and Charles Achille Müntzn [23] (1846 - 1917) studied the process of nitrification.

S.N.Vinogradsky (1856-1953) studied the process in depth and created the work "soil microbiology". It was honored to open the process of" chemosynthesis " (the formation of organic substances from water and CO2 in the presence of chemical energy). He clearly showed the process of chemosynthesis on the example of nitrifiers, sulfur and iron bacteria. Clostridium pasterianum, an anaerobic bacterium that lives freely in the soil, was also found by Vinogradsky by cellulose-breaking bacteria, and he created many microbiological techniques.

In explaining the role of soil microorganisms in the formation of humus substances and soil structurasiniig I.V.Tyurin, M.M.Kononova et al., B. in the field of study of the ecology of microorganisms.L.Isachenko, Ye.N.Mishustin, N.M.Lazerevs N in determining the activity of

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/KCXR9

various microorganisms in the soil and rhizosphere.N.Khudyakov, N.G.Kholodny, V.S.Butkevich, N.A.Krasilnikov, Ye.F.Berezova, Ya.N.The work of Khudyakov and others is important[27].

Since the end of the XIX century, the microbiology of water and geology, which is a brake of microbiology, began to develop. G.A.Nadson, B.L.Isachenko, M.A.Egunov, V.O.Tauson, W.S.Butkevich, A.E.Criss, A.S.Razumov and others made a significant contribution to the development of this string. G.A.Nadson and his pupil G.S.Fillipov in 1925, yeast fungi were exposed to various rays and received mutants from them[27].

Such great discoveries in Microbiology are closely related to the development of microscopic techniques. In 1873, Ernest Abbe improved the lens system for microscopes[28]. Zsigmondy, left Shott glass in 1900, but remained in Jena as a private tutor to conduct his research. Together with Zeiss, a manufacturer of optical instruments, he developed the crack ultramicroscope[29].

A brief history of fluorescent microscopy. Fluorescence was first described in 1845 by Fredric V. Herschel discovered. He found that ultraviolet light can emit blue light by triggering a solution of quinine (e.g. tonic water). British scientist Sir George G. Stokes further studied this discovery and observed that it represented fluorescent radiation from an object at a longer wavelength than the UV light that initially excited the object.

In the early 1900s, the first use of fluorophores in biological research was for staining tissues, bacteria and other pathogens. This was later transformed into a fluorescent microscope by Carl Zeissy and Carl Reichert.

The fluorescent label was reached by Ellinger and Hirt in the early 1940s. Cloning of the green fluorescent protein (GFP) took place in the early 1990s and was easily applied to fluorescent microscopy.

Finally in 1928-1931, the first electron microscope was created. In 1986, Ernst Ruska, together with Heinrich Rorer and Gerd Binnig, won the Nobel Prize in Physics for his invention of the electron microscope[30]. Electron microscopy has made it possible to see objects ranging in size from 0.02 nm to 7 A and even finer.

In 1934, F.Zernike improved the fazokontrast tamoil[31]. The Van Cittert-Zernike theorem is named in honor of physicists Peter Hendrik van Cittert [31] and Fritz Zernike [32]. Zernike phase contrast transmission is recognized as a means of recording high-contrast high-resolution images using electron microscopy. This imaging mode can be used to describe typical phase objects such as unpainted biological molecules or cryosections of biological tissues.

Microorganisms as an object of research in solving fundamental problems. Microorganisms have a number of advantages as a genetic object. Their chromosome set is haploid, and the mutation under study occurs as early as the first generation. Microorganisms reproduce easily in laboratory conditions and give a huge number of offspring in a short period of time. Thanks to the study of their genetics, the essence of parasexual processes in transformation, transduction, sex in bacteria (conjugation or conjunctions), fungi, unknown to science, was clarified. Among microorganisms, fungi, algae, bacteria and viruses are widely used as genetic

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/KCXR9

objects. The nuclei of fungi and algae are formed, which are separated from the cytoplasm as if they were in higher organisms. Such organisms are called eukaryotes, that is, organisms with a real core. Although bacteria and blue-green algae have chromosomes, they are not separated from the cytoplasm by a separate border. Such organisms are referred to as prokaryotic organisms. Bacterial chromosomes are not visible in light microscopes. With an electron microscope, however, it can be seen that one small chromosome is connected to the cell membrane.

Viruses parasitize plant, animal, and bacterial cells. Viruses lack cells. They contain only protein from the outside, DNA as the material basis of heredity in the viral head, and in some cases, PHK.

At present, various antibiotics and chemicals are used in various areas of the national economy. Such substances can be easily determined with the help of microorganisms, whether they have mutagenic properties. When the mutagenicity of a newly obtained antibiotic is determined, it is not used in production.

It will take years to determine the mutagenic properties of chemicals used in various areas of the national economy in high organisms. So microorganisms are also the most favorable object in determining the mutagenicity of chemicals. The reason why microorganisms are a favorable genetic object is that they are rich in various mutations.

Such mutations include: (a) morphological mutants; (B) pigmented mutants; (v) auxotrophic mutants; (g) prototrophic mutants; (d) tiny colonial mutants; (e) various substance-resistant mutation, etc.

Such mutants can be easily produced under laboratory conditions.

Genotype and phenotype. In microorganisms, as in other animals, signs specific to a particular species are passed down from generation to generation. Under the influence of the external environment, morphological, physiological properties inherent in one species can change. For example, Louis Pasteur artificially produced irreversible changes in the causative agent of anthrax disease and developed vaccines that prevent these diseases[34]. N.F.Gamaleya observed changes in the morphology of the plague vibrion when he added lithium chloride to the food environment[35]. These examples show that microorganisms can change their properties depending on the living conditions.

With heredity, variability is two closely related processes, forming a fundamental property inherent in vitality. Currently, the hereditary properties and variability of microorganisms are well studied, although they are facing other organisms.

G.A. Nadson and G.S. Filippov (1925) who succeeded in obtaining New Mutants by exposing X-rays to yeast fungi[36]. They were followed by M.N. Meisel (in 1928-1932) obtained New Mutants by exposing the yeast to chloroform and weak tsian salts.

Microorganisms are important in the study of genetic laws. Because the rapid division of bacteria and the fact that the breed is extremely abundant, small and takes up little space makes them an extremely comfortable object. For example, the intestinal wand (E.soli) divide every

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/KCXR9

15 minutes, with the number of one cell lineage reaching 24 billion at 1 mm3 after 18-24 hours.

Phenotypic (inbreeding) and genotypic (inbreeding) variability are distinguished in microorganisms. These are due to two main characteristics of the cell: genotype and phenotype.

The genotype is a common set (sum) of genes in a cell. It defines a whole group of properties of an organism, different manifestations in different conditions of the external environment. However, the genotype retains its relative constancy under any conditions, a condition that allows the species of microorganisms to be distinguished and distinguished from each other.

The phenotype is a general complex of morphological and physiological properties inherent in each individual. The phenotype is, as it were, an expression of the genotype Kharak-the appearance of the skin - in a certain concrete living environment.

While the genotype is a general property of a cell that can project to the surface, the phenotype is a visible representation of these properties.

Phenotypic variability. Modifications are caused by the action of various factors of the external environment and are usually observed when the microbe grows and multiplies in different food environments. The composition and quality of the food environment, the pH of the environment, changes in temperature, chemicals (colchicine, ethylamine), etc.can cause the origin of modifications. Such changes are non-hereditary (non-hereditary) and disappear with the cessation of the influence of the factor that caused them.

Cells stretch if penicillin is added to the environment, sometimes very altered. The formation of spores in bacteria will also depend on the nature of the environment (dark or bony), its composition, the temperature of cultivation.

When 0.1% pepton is added to the environment, 100% spore is formed after 48 hours, while only vegetative forms are recorded when 2% pepton is added. Many bacteria and fungi, when grown in different food environments and at different temperatures, change the rate of pigment formation. The CHunonchi, an" excellent " Stick (chudesnaya palochka) produces a purplish pigment in the food medium when grown at home temperature (27°C). At 37°C, however, no such pigment is produced. When bacteria are grown in a dark food environment, the type of colonies they form can also vary.

Some colonies are smooth, rounded in shape, with a flat edge, shiny, monoecious, small, these are S-forms. Others are vulgar, dull, often not clear, the edge is uneven, in the wrong shape, dry, these are K-forms. There will also be intermediate forms of colonies, namely slugs (M-form), dwarfs (C-form). The formation of colonies of different shapes by a species of bacteria is called dissociation (separation).

In microorganisms, one mutation per million cells can occur. Examples include antibiotic resistance, tryptophan synthesis specificity, phage resistance, colony shape changes, pigment formation changes, or capsule formation becoming encapsulated, changes in hivchin formation, etc. Used in bakery-taking new strains of digane yeasts, taking large amounts of antibiotic synthesis-containing strains, taking vitamin B12, strains synthesizing oils and lipids, taking lactic acid-forming strains, or taking active preventive (prophylactic) forms against

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/KCXR9

dysentery, paratyphoid and typhoid, among others, are examples of mutations.

Transformation, transduction and conjugation in bacteria. The hereditary trait ofing the transition from the donor chromosome to the recipient cell is called transformation. The transformation goes through a small plot (recon) of DNA. The Recon contains a pair of nucleotides, which can be exchanged with other elements during recombination.

Frederick Griffith (1928) had conducted such an experiment: infecting mice with a small number of non-capsular type II pneumococci with no pathogenicity. The same culture has a pathogenicity, with capsular Type III pneumococcal culture (which was killed by heat exposure before the culture) added. As a result, tap II was known to have the pathogenicity of pneumococci and was encapsulated in a capsule. Hence, the characteristic features of Type III pneumococci passed through transformation to type II pneumococci. Mycobacteria forming a white colony, mycobacteria forming a yellow colony, have been found to have the property of producing a yellow colony under the influence of DNA si[37].

In 1944, O.Everi and K.Mac Leoid, M.The Mac Carti have also found that bacterial properties are transmitted through DNA. It was later revealed that DNA also affects other properties [38]. For example, hay Bacillus, meningococci, pneumococci, streptococci and others can be modified through a transformation agent-DNA. The transforming activity of DNA is extremely high, usually after 10-15 minutes a change occurs in it and stops after 2 hours.

A transformation cell occurs in a certain physiological state (i.e., during the time the cell is ready) without always occurring. Under the influence of high temperatures, ultraviolet rays, chemical mutagens, the transforming nature of DNA decreases. For example, if tansformative DNA is affected by HNO3, it loses its activity. Activity decreases as the temperature rises to 80-100°C. The most favorable temperature is 29-32°C. Hence, transformation activity is influenced by the composition of the environment, temperature, physiological state of the recipient, and polymerization (double helix) of the transforming DNA.

For example, let a strain of streptomycin-insensitive pneumococci obtained as donors have mannitine cleavage properties, whereas a recipient does not. Of these, it is possible to obtain such intermediate formsthat both of the above properties can occur in them. In a transformation, one property is replaced by a second one. For example, strains that are extremely sensitive or insensitive to antibiotics can also be obtained. Hence, the formation of the transformation consists of two periods, namely adsorption of DNA into the microbial cell and transfer to the cell.

Transduction. The transfer of the Donor bacterial property through the bacteriophage to the recipient bacterium is called transduction. For example, bacteriophages can be transmitted to the recipi-ent bacterium by hiccups, feeding control genes, enzymes cyste-masi, antibiotics, and genes that determine acid tolerance, virulence, capsu-La generation, and other trait-determining genes.

In 1952, Martha Chase and Alfred Hershey determined in an experiment whether phages reproduce within a bacterial cell depends on the protein molecule in it or the DNA molecule

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/KCXR9

[39]. To do this, the phage protein is stamped with the radioactive isotope of sulfur, S35, since the amino acids methionine and cysteine, which are part of the protein, contain sulfur. The DNA molecule, on the other hand, is stamped with the radioactive isotope of phosphorus, P32. 99% of the phosphorus in the phage is in the U DNA molecule. In order to stamp phages with the above radioactive isotopes, phages feed the bacteria that must enter with such a nutrient that radioactive isotopes are added. After that, the stamped phages were infected with bacteria that were not S35 and P32 in their cell. In the new phage generations formed, only the radioactive isotope P32 of DNA-tagging phosphorus is conserved, while S35 is not found. So it turns out that the increase in phages depends on phacate DNA. In 1969, for this discovery, Alfred Hershey was awarded the Nobel Prize.

The first to introduce a transduction cell was N. in 1902.Zinder and Dj.Ledeberg determined [40]. The transfer of genes from one bacterial cell to another through phages is called transduction. Genes that have passed through phages to a second bacterial cell attach to the chromosome of the same bacterium and alter its heredity. Traduction can be observed in the following experiment. A filter is installed on the underside of a special U — shaped glass tube that does not pass bacteria. On one side of the same tube is placed the type 22A of the typhoid-causing bacterium in mice and the type 2a on the other side. These bacteria do not mix with each other because there is a filter in the middle of the container. The type 22A of the bacterium is a mutant and the gene that controls the synthesis of the amino acid tryptophan is mutated, meaning it cannot synthesize tryptophon. Thanks to this, it is necessary to definitely add the amino acid tryptophan to their food when these bacteria are artificially grown. The second type of bacterium (2A) is also a mutant, in which the gene that controls the synthesis of the amino acid histidine is mutated. Therefore, when artificially growing these bacteria, histidine should be added to their feed. Both of these species are mentioned above, in a container with a filter between known time when artificially grown they were transferred to containers separately, and it was observed that some of them survived even when tryptophan was not added to the bacterial feed of species 22A. This means that some bacterial cells have the ability to synthesize tryptophan, which cells have begun to produce bacteria similar to themselves. The ability of bacteria to synthesize tryptophan occurs as a result of the transfer of a gene that performs the synthesis of this amino acid through phage from type 2a bacteria to 22A bacteria. So, when phage kills the bacterium in which it lives, its DNA is broken into small pieces by attaching one of these fragments, that is, a fragment with a gene that performs tryptophan synthesis, to its DNA and attaching it to that bacterial DNA when it enters the second bacterial cell. As a result, this bacterial property becomes able to synthesize altered tryptophan, meaning that a transduction event occurs.

This work is usually done by moderate bacteriophages.

3 types of transduction are known:

1. In the case of nospecific transduction, different fragments of DNA are observed to pass through the motile bacteriophages to the recipient cell. In this case, the DNA fragment carried by the bacteriophage can be attached to the homologous plot of the recipient cell DNA si.

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/KCXR9

2. In specific transduction, a bacteriophage donor cell carries a specific gene in DNA into a recipient cell. In this, transducting bacteriophage DNA si binds to certain genes of bacterial cell DNA si (donor). Each bacteriophage particle carries one or more closely located genes.
3. In abortive transduction, the DNA fragment (fragment) of the donor cell carried by the bacteriophage does not fuse into the recipient cell DNA Si and localizes autonomously in the cytoplasm of the recipient cell, thus fulfilling its function. When the cell divides, this fragment (DNA) passes to one of the daughter cells and the other cell is freed from it.

Transduction has been found in bacterial representatives such as batsillus, Pseudomonas, salmonella, intestinal wand.

Conjugation. Microbiologists discovered the phenomenon of cone-gation in bacteria at the end of the 19th century, which they called "conjunctions" to distinguish it from conjugation in other organisms. Genetic analysis of conjugation was carried out by Lederberg and Tatums in 1946. They observed this phenomenon in an electron microscope, and it was found that one of the cells to be conjugated is oblong, the other is Oval. The oblong cell is the male cell and is defined as F+ (donor), while the Oval cell is the female and is defined as F- (recipient). At the time of conjugation, these converge, forming a cytoplasmic bridging between them. Through the resulting bridgehead, genetic factors flow from the donor cell to the recipient cell in a certain order. Conjugation was studied much more deeply in salmonella, intestinal wand, and Pseudomonas, with F+ and F - cells defined as follows. Which of the two cells is the donor depends on whether the cell has f factorniig. The cell it has is called" F+ - cells". Factor F is defined as an "F - Cell" if it is a colon.

The F+ Factor belongs to the conjugative plasmids, which is known as Halic DNA (64 x 106 a. m.e.) state. F ensures that the plasma has 1-2 sexual fimbriums above the cell, merging with the donor cell. F-plasmid localizes autonomously in the cytoplasm, but it has the property of attaching with a bacterial chromosome.

As a result of the integration, the F-plasmid combines with a bacterial chromasome to make the HFR strain specific. Usually when "F" bacteria are transmitted with the HFR strain, the F Factor is not given (genes in the bacterial chromasome are transferred at a very high frequency).

At the beginning of conjugation, F+ or Hfr-containing donor cells, fuse with the recipient cell. A conjugate bridge is then formed between the cell and a genetic source is given from the donor cell to the recipient cell, with either an F-plasmid or a chromasome.

At the time of conjugation, double-stranded DNA is broken into separate strands and usually only one strand of DNA is given, while the second strand is converted into a double-stranded plasmid using DNA-polymerase in a recipient cell, with the transition starting from one side of the chromasome and then moving to other parts as well. It is possible to stop the passage of a genetic source by shaking pairs of conic-gated bacteria. Sometimes such a feature of the male cell can be transferred to the female cell and be seen in the next generation. In the absence of halacitation, the passage of the genetic source at the end of the commutation stops. The conjugate bridge between is broken because it is less robust. The violation of the bridge does

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/KCXR9

not affect the life activity of the cell.

As a result of spontaneous cessation of conjugation in an F+ recipient cell, only F + passes to a certain genetic information of the cell. Thus as a result of conjugation, the recipient cell F becomes merozygote (meaning"partial zygote"), the recipient-the full genome of the cell, and the donor the partial genome of the cell).

As a result of the crossover (alternating maturation of chromasomes), genes are replaced and a combination of a genetic source is formed. In the next generation, various recombinates are now formed.

The study of the genetics of microorganisms is important. Because in order to get antibiotics, vitamins, hormones, enzymes, lysine and glyuta-min and other substances from amino acids, New-new strains with high activity are needed.

Bacteria, species and actinomycetlir are affected by radioactive rays and chemical mutagens, changing the structure of DNA in their cells so that their activity can be directed to the side of the synthesis of substances useful to humans. Currently, with a good knowledge of the physiological nature of bacteria, their modification and, in this way, their large-scale use in technological processes in agriculture, medicine, food industry are important issues facing microbiologists.

Episomes. Episomes are a set of tiny genes that are free of chromasomes. They are found free in the cytoplasm or added to the bacterial chromasome.

Episomes are involved in the interbreeding of bacterial factors such as pinkness (f), drug tolerance (R), bacteriocinogenicity, cholinocinogenicity, and others. The antibiotic resistance factor (K-factor) of episomas was first identified by Japanese scientists.

Bacteriocinogenicity is understood as the property of synthesizing substances against antibiotics in a bacterial cell, these substances are called bacteriocins. For example: intestinal wand E. soli-colicin, so on. Cerlusa-erotsin, Bac. Megaterium-megacine, E. Restis-testicine, Staphylococcus aureus-staphylacococcus synthesizes. They adsorb into the bacterial cell and cause bacterial destruction. Bacteriocins act only on bacteria that stay close to the prodrug.

Due to the favorable conditions for the development of Microbiology in Uzbekistan, areas related to its theoretical and practical issues are developing further: the food industry, the canning industry, the dairy processing industry, the brewing industry, the production of various amino acids, proteins, antibiotics and vitamins. Employees of the Institutes of microbiology and Botany of the Academy of Sciences of Uzbekistan academician A.M.Muzafarov, M.I. Mawlony, A.G'.Kholmurodov, S.A.Askarova, professors I.J.Jumaniyozov, K.D. Davrav, S.S.Ramazonova, S.M.Khojiboeva, J.Safiyazov, J.Kutliev, A.S. Rasulov, H.O.Berdikulov, R.Shoyokubov, J.Toshpolatov, Z.Ahmedova and head-to-head are adding a great deal to the development of science. Scientists at Tashkent State University named after Mirzo Ulugbek O.G.Yolkina, K.Yu. Musaev, F.G.Akhmedova, Ya.F.Nizametdinova, M.L.Mansurova, I.A. Muzafarova, S. at Tashkent Technical University.X.Abdurazzokova, SH.I. Hakimova, M.Kil and others are adding their own merits in the development of microbiology scienc

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/KCXR9

References

1. https://en.wikipedia.org/wiki/Hippocrates
2. https://ru.wikipedia.org/wiki/Лукреций
3. Abu Ali ibn Sino (900-1037)
4. https://en.wikipedia.org/wiki/History_of_the_telescope
5. https://en.wikipedia.org/wiki/Cornelis_Drebbel
6. https://ru.wikipedia.org/wiki/Кирхер, Афанасий
7. https://en.wikipedia.org/wiki/Antonie_van_Leeuwenhoek
8. https://ru.wikipedia.org/wiki/Беляев, Иван Дмитриевич
9. https://ru.wikipedia.org/wiki/Кулибин, Иван Петрович
10. https://lumenvita.uz/articles/istoriya-vakczinaczii/
11. https://en.wikipedia.org/wiki/Edward_Jenner
12. https://en.wikipedia.org/wiki/Carl_Linnaeus
13. https://en.wikipedia.org/wiki/Otto_Friedrich_Müller
14. https://ru.wikipedia.org/wiki/Тереховский, Мартын Матвеевич
15. https://en.wikipedia.org/wiki/Christian_Gottfried_Ehrenberg
16. https://repository.tma.uz/xmlui/bitstream/handle/1/5569/OQUV%20дарслиги %20%202022%20opr.pdf?sequence=1&isAllowed=y
17. https://en.wikipedia.org/wiki/Carl_N%C3%A4geli
18. https://ru.wikipedia.org/wiki/Кон, Фердинанд Юлиус
19. https://uz.wikipedia.org/wiki/Louis_Pasteur
20. https://ru.wikipedia.org/wiki/Виноградский, Сергей Николаевич
21. https://en.wikipedia.org/wiki/Robert_Koch
22. https://ru.wikipedia.org/wiki/Мечников, Илья Ильич
23. https://www.wikidata.org/wiki/Q29791134
24. https://en.wikipedia.org/wiki/Achille_M%C3%BCntz
25. https://az.wikipedia.org/wiki/Martin_Beyerink
26. https://de.wikipedia.org/wiki/Hermann_Hellriegel
27. https://elib.buxdu.uz/index.php/pages/referatlar-mustaqil-ish-kurs-ishi/item/13886-mikrobiologiyaning-qisqa-ha-rivojlanish-tarixi
28. Yusupov Ibragim Mirsaydalievich Umumiy Mikrobiologiya 5110400-Biologiya o'qitish metodikasi Darslik Toshkent-2020 18-22-betlar.
29. https://www.britannica.com/biography/Ernst-Abbe
30. https://www.flickr.com/photos/zeissmicro/6892932822
31. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6325693/

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/KCXR9

32. https://www.news-medical.net/life-sciences/History-of-the-Electron-Microscope.aspx
33. https://onlinelibrary.wiley.com/doi/abs/10.1111/jmi.12250
34. Yusupov Ibragim Mirsaydalievich Umumiy Mikrobiologiya 5110400-Biologiya o'qitish metodikasi Darslik Toshkent-2020 101-115-betlar.
35. https://en.wikipedia.org/wiki/Louis_Pasteur
36. https://en.wikipedia.org/wiki/Nikolay_Gamaleya
37. https://uz.wikipedia.org/wiki/Radiatsion_genetika
38. https://en.wikipedia.org/wiki/Griffith%27s_experiment
39. https://en.wikipedia.org/wiki/Avery%E2%80%93MacLeod%E2%80%93McCarty_experiment
40. https://en.wikipedia.org/wiki/Hershey%E2%80%93Chase_experiment
41. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5055593/