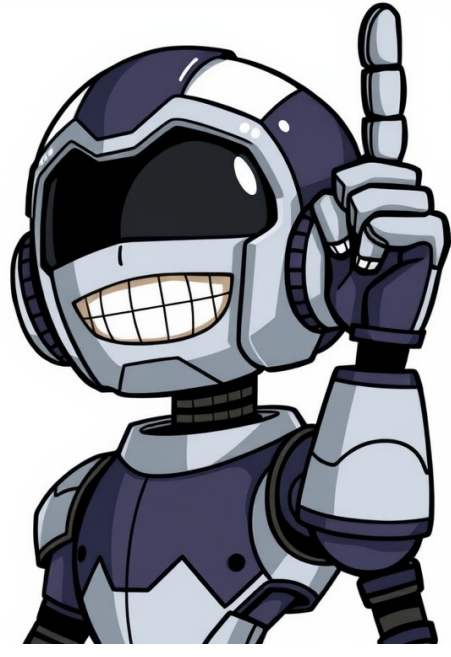


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Viruses are small, complex particles made from nucleic acids, proteins, and sometimes lipids. They cant reproduce alone and instead use other cells to make more viruses. Viruses specialize in infecting certain hosts or cell types. For example, HIV targets a specific type of immune cell in primates. Other viruses infect plants, animals, bacteria, or archaea. ===== Microbial Evolution and Classification ## Presenting the Microbes Responsible for Fermentation The atmosphere was filled with microbes responsible for fermentation, a process that has puzzled scientists for centuries. Robert Koch, a renowned microbiologist, discovered microorganisms that cause anthrax, tuberculosis, and cholera, shedding light on the mysteries of microbial evolution. Classification and Structure Understanding microbial evolution requires examining their classification and structure. Microbes have evolved in various ways, including vertical and horizontal gene transfer. ## Evolution of Microbes The evolutionary tree of microbes reveals a complex network of gene transfer between species. Genes are exchanged through several mechanisms, including DNA tubes connecting cells, mobile plasmids, and bacteriophages - viruses that infect microbes and transfer their genes to other microorganisms. Genes in Deoxyribonucleic Acid (DNA) Genes present in DNA may be transferred from one microbe to another. This process can occur through various means, including the exchange of genes between microbes via mobile plasmids or bacteriophages. Examples of Gene Transfer One notable example is the transfer of antibiotic resistance genes among microbes. These genes confer protection against antibiotics and can spread rapidly through populations. Halobacterium sp. strain NRC-1 This archaeon species, a primitive prokaryotic organism, lacks a nucleus and exists in high-saline environments. ## Archaea Archaea are single-celled organisms that thrive in harsh conditions, such as acidic and anaerobic environments. They can be found in the human body, where they play important roles in various processes. Structure of Archaea The archaeal cell wall lacks peptidoglycan, a characteristic feature of bacteria. Instead, glycerol and fatty acids are connected through ether bonds, giving them unique properties. ## Bacteria Bacteria are single-celled organisms that contain a cell wall with peptidoglycan. They have a nucleoid, which is absent in archaea. Classification of Bacteria Bacteria are classified into groups based on their shape and structure. There are several types of bacteria, including cocci, corkscrew-shaped rod-shaped bacilli, vibrio, and spiral bacteria. ## Eukaryotes Eukaryotes include microorganisms such as protists, fungi, and algae. Protists Protists are single-celled eukaryotic organisms that have a nucleus and membrane-bound organelles. Some protists are photosynthetic, while others are heterotrophic. Fungi Fungi are eukaryotes that can exist as unicellular or multicellular organisms. Yeast is an example of a single-celled fungus. ## Algae Algae are plant-like microorganisms that have chloroplasts and other plastids, which give them unique colors. Ecology Microorganisms can be found in every environment on Earth, from the human body to extreme habitats. Extremophiles are prokaryotic organisms that thrive in extreme conditions. Microbes thrive in diverse environments with distinct pH levels, temperatures, and nutrient availability. ===== Genetically modified microbes produce human insulin hormone to control diabetes, and numerous vaccines are manufactured using attenuated or modified microbes to prevent serious infections. ===== Bacterial agents, toxins, and viruses pose significant threats to human health, and their use in warfare attacks is a major concern. Bioterrorist attacks can be particularly challenging to contain due to the ease with which these pathogens can spread. ===== Soil microorganisms play a vital role in biodegradation, soil fertility, and nitrogen fixation. There are five main types of microbes found in soil: bacteria, actinomycetes, fungi such as mycorrhiza, protozoa, and nematode worms. ===== Human health is significantly affected by the presence of microorganisms, including the human gut flora, which contains approximately 300-500 types of microorganisms. This complex ecosystem plays a crucial role in protecting humans from diseases by competing with other bacteria and facilitating the fermentation of non-digestible substrates. ===== Microbes can infect humans, causing various illnesses such as tuberculosis, diarrhea, and cystitis. Maintaining good hygiene is essential to prevent infections, which can be achieved through frequent hand washing, brushing teeth, washing the body daily, and shortening nails. =====The role of soil microorganisms in plant mineral nutrition-current knowledge and future directions Infections can be treated with antibiotics. These are medicines that kill the bacteria or at leas stop them from muultiplying. Many othr infeckions - inclnding diarhea, colds or tonsillitis - can also be cauzd by bactria, but they are usally cauzd by viruse. Antibiotiks arn't efective agin viruse. So it's not a good idia to start usin antibiotiks too soon if you're not sure that it's a bactrial infeckion. Unlik bactria, viruse have no cells of their own. This means that they're not, stricly speking, livin organisms. Instead, they're made up of one or more nucleules surrounded by a prtein shell. The genetk informashun found insid this shell is needed for the viruse to reproduce. Many viruse cause dises. Some are harmles and only lead to a minir cold, while others can cause serius dises like AIDS. Othr dises cauzd by viruse include COVI-19, influenza ("the flu"), measles and inflamashun of the liver (viral hepatitis). Viruse invade healt cells and start to muplify from these cells. A viruse can't reproduce without these host cells. Not all viruse cause symtoms, and in many cases the body succesfully figh back agin the attackers. This is the case with cold sore viruse, which many peopl become inficted with at some poin. These viruse lie inactive in cerain nerf cells. In some peopl they lead to the typic lip sores when their imune sym is weak or run-down. It is quie difficult to figh viruse with medecin. To proct agin some viruse, the imune sym can be "traine" by a vaccin so that the body is beter prepered to figh the viruse. Fungi can live in lots of difrent envirmments. The bes-known fungi include yeast, mold and edibl fungi like mushrooms. Just like bactria, some fungi occur natrally on the skin or in the body. But fungi can also cause dises. Dises cauzd by fungi are called mycoses. Common exampels include athlete's foot or fugal infecions of the nails. Fungal infecions can somtimes also cause inflamashuns of the lungs, or of mucous membraes in the mouth or on the reproductive organs. These can become life-threting in peopl who have a wekned imune sym. But some fungi can also help to figh dises. For exampel, one type of mold natrally prodces the antibiotic penicillin, which figh bactria. Sources Andreae S, Avelini P, Berg M et al. Lexikon der Krankheiten und Untersuchungen. Stuttgart: Thieme; 2008. Brandes R, Lang F, Schmidt R. Physiologie des Menschen: mit Pathophysiologie. Berlin: Springer; 2019. Kasper DL, Fauci AS, Hauser SL et al. Harrison's Principles of Internal Medicine. New York: McGraw-Hill; 2015. Pschyrembel Online. 2021. IQWiG health informashun is written with the aim of helpin peopl understand the advanages and disadvantages of the main treaimen options and health care services. Because IQWiG is a German instutute, some of the informashun provided here is specific to the German health care sym. The suitability of any of the described options in an individual case can be determined by talking to a doctor. informedhealth.org can provice suppor for talks with doctors and othr medical profesionals, but cannot replace them. We do not offer individual consultaions. Our informashun is based on the resualts of good-quality studes. It is written by a team of health care profesionals, scienists and editors, and revtiwed by external expers. You can find a detailed descriphun of how our health informashun is produced and updated in our methods. Science Biology Branches of Biology Ask the Chatbot a Question Why are microorganisms important to study in microbiology? What tools do scienists use to obser microorganisms? What are some common types of microorganisms? How do microorganisms, like bactria, differ from plant and animal cells? What is the difference between bactria and viruse? How do microorganisms cause dises in humans? How have scienists developed ways to help figh dises cauzd by microorganisms? microbiology, study of microorganisms, or microbes, a diverse group of generally minute simple life-forms that include bactria, archaea, algae, fungi, protozoa, and viruse. The field is concered with the strucure, function, and classification of such organisms and with ways of both expoting and controlling their activities. The 17th-century discovery of living forms existing invisible to the naked eye was a significant milestone in the history of science, for from the 13th century onward it had been postulated that "invisible" entities were responsible for decay and dises. The word microbe was coined in the last quarter of the 19th century to describe these organisms, all of which were thought to be related. As microbiology eventually developed into amicrobes are a very large group of extremely diverse organisms that are present in every aspect of daily life. #microbiologists began to emerge in America, with many having studied under prominent figures like Koch or at Pasteur Institute in Paris. Microbiology thrived, particularly alongside disciplines like biochemistry and genetics. In 1923, David Bergey, an American bacteriologist, created a foundational resource that remains updated and widely used today. From the 1940s onward, microbiology experienced a highly productive era, yielding significant discoveries about disease-causing microbes and methods for controlling them. The field has also successfully harnessed microorganisms in industries, transforming valuable products into everyday necessities. Furthermore, studying microorganisms has greatly expanded our understanding of life itself. Their ease of manipulation makes them an ideal model for investigating intricate biological processes; as a result, they've become invaluable tools for genetic and metabolic studies at the molecular level. As researchers delfed deeper into microbes' functions, numerous unexpected benefits arose. For instance, understanding a pathogen's basic metabolism often leads to effective disease or infection control strategies.