l'm not robot



According to the CBSE Syllabus 2023-24, Chapter 6 has been revised and is now titled "What Is Evolution?" This chapter delves into the scientific theory of evolution, which studies the diverse forms of life, their characteristics, and changes over generations. Biologists utilize this theory to analyze genetic variations within populations. on Earth remains a topic of debate, with various theories attempting to explain its emergence. Darwin's Theory of Evolution proposes that all species are connected and evolve progressively over time. Key features of his theory include: * All organisms reproduce and multiply rapidly * No two individuals are identical, exhibiting unique traits * Certain characteristics are consistently passed from parents to offspring * Reproduction rates vary among living species A Brief History of Evolution suggests that the first cellular forms and invertebrates, followed by jawless fish and subsequent transitions to land-dwelling creatures. This process resulted in the emergence of modern primates, such as gorillas and chimpanzees, about 23-5 million years ago. Evidence indicating life forms have arisen at various instances in Earth's history * Embryological support proposed by Ernst Heckel, but later disapproved by Karl Ernst von Baer * Divergent evolution refers to the development of similar structures in different directions due to adaptations to distinct needs (homologous structures) * Convergent evolution, such as the appearance of resistant cells or entities within a population over time. Examples include the emergence of resistant bacteria in response to antibiotics. Evolution: A Study of Changes in Species Over Time Evolution is a long-term process that has shaped the diversity of life on Earth, with evidence suggesting it occurs over years rather than centuries. This concept is supported by various observations, indicating that evolution is not a directed process, but rather a stochastic one, driven by chance events and genetic mutations. Adaptive Radiation refers to the evolution of specific species in distinct geographical regions, leading to radiating into new areas. Examples include Australian marsupials and Darwin's finches, which have adapted to survive in hostile environments through inherited genetic traits. Two key concepts in the Darwinian theory of evolution are branching descent augusts that species evolve from a common ancestor, while natural selection explains how individuals with favorable traits are more likely to survive and reproduce. The Hardy-Weinberg principle states that allele frequencies in a population remain stable over generations, with genetic recombination, mutation, and natural selection can affect this principle. Evolutionary biology is the study of evolutionary processes, which have produced the diversity of life on Earth. Life emerged on planet Earth approximately 3.5 billion years ago, with an estimated 15 million species evolving over time. The origin of life remains a unique event in the history of the universe, with various theories attempting to explain its emergence. The Big Bang Theory suggests that life arose from hydrogen gas expansion and supernova events, while Panspermia proposes that life seeds exist throughout the universe and can be propagated through space. The concept of life's origins is no longer mere speculation, thanks to decades of scientific discovery. The theory of spontaneous generation posited that life emerged from decaying matter, but Louis Pasteur disproved this idea, demonstrating that life arises from pre-existing life. The chemosynthetic theory proposes that the first forms of life could have originated from non-living organic molecules, such as RNA and protein, with chemical evolution preceding the formation of life. This theory was supported by Russian scientist A.I. Oparin and English scientist J.B.S. Haldane. In 1953, American scientist S.L. Miller recreated ancient conditions in a laboratory, using an electric discharge to combine simple molecules into more complex ones necessary for life. His experiment demonstrated the feasibility of natural processes assembling simple molecules into those needed for life. The theory of evolution proposes that organisms gradually change from simple ancestral types. This concept was introduced by Charles Darwin and Alfred Russel Wallace in the 19th century, building upon the idea of natural selection. According to this theory, organisms produce more offspring than can survive, and those better equipped to thrive reproduce more successfully, passing their traits to the next generation. Evidence supporting organic evolution comes from various fields of biology, including: * Palaeontological evidence: Fossils in different sedimentary layers reveal extinct organisms, such as dinosaurs, and demonstrate that new forms of life have emerged over Earth's history. * Embryological evidence: Ernst Haeckel's observations of certain features during embryonic development suggest that different species share a common ancestor. natural selection. Most adult vertebrates lack a certain developmental stage, yet all vertebrate embryos share this trait. For instance, human embryos, like those of other vertebrates, develop gill slits behind their heads - although only fish use these as functional organs in adulthood. Morphological evidence supports evolution: despite species and groups being distinct from one another, they retain common characteristics. This morphological evidence for evolution comes from two key sources: divergent evolution and convergent evolution. Divergent evolution comes from two key sources: divergent evolution and convergent evolution and convergent evolution. cheetahs, and humans sharing similarities in their forelimb bone patterns. Convergent evolution leads to analogous structures that have the same forms or functions but were not present in their last common ancestor; for example, both sharks and dolphins have similar body shapes despite being distantly related. Molecular evidence also supports common ancestry - biochemical similarities among diverse organisms point to shared ancestry, just like structural similarities do. Adaptive radiation is another key concept: it's a rapid increase in the number of species from a single common ancestor, characterized by great ecological and morphological diversity, which occurs due to natural selection. The Galapagos finches are an example of adaptive radiation - they arose from a single species that reached this land accidentally and have since developed different eating habits and beak types. The Darwinian Theory of Evolution is based on two key concepts: branching descent adaptive radiation - they arose from a single species that reached this land accidentally and have since developed different eating habits and beak types. develop from a single common descendant, becoming geographically adapted to a new environment, resulting in reproductive isolation and the emergence of new species. Natural Selection explains how populations adapt and change over time - individuals with traits better suited to their environment, resulting in reproduce and leave more offspring. Several theories about the mechanism of evolution have been proposed, including Lamarck's theory of mutation. Darwin's theory of mutation. Darwin discussed variation without understanding its sources. Genetic progress revealed these sources, modifying Darwin's original theory into Neo-Darwinism or the Modern Synthetic Theory. The Hardy-Weinberg Principle mathematically describes gene frequency consistency and change over generations. Factors influencing this principle include mutation, genetic drift, natural selection, genetic recombination, and gene flow. These factors contribute to changes in gene frequency, potentially leading to the emergence of new species through founder effects. Evolution refers to gradual changes ago, with simple molecules giving rise to complex ones. This process led to the formation of simple cells and ultimately, diverse plant and animal species. Human-like apes also belong to this order. Over time, human ancestors evolved and became more distinct. The first human ancestors originated in Africa, eventually migrating to Europe, Asia, and beyond. Man's evolution occurred through stages: Dryopethicus, Australopithecus, Homo habilis, and finally, Homo erectus. Homo sapiens is currently the only surviving member of the human tribe, but a few thousand years ago there was another species that existed alongside modern humans - Neanderthals, Denisovans and Homo floresiensis. Today, scientists regard Neanderthals as more like a sub-group of humans rather than an entirely different species.

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