Biology and Geology ESO 4

KEYWORDS

Chapter 1

asthenosphere: the part of the upper mantle just below the lithosphere
conservative margin: a plate margin where two plates move alongside each other
constructive margin a plate margin where two plates move away from each other
continental drift: Alfred Wegener's theory that originally all of the continents formed part a "supercontinent", but that they have gradually drifted apart
convergent plate boundary: see destructive margin
core: the inner layer of the Earth
crust: the thin, outer layer of rock that forms the continents and the ocean floor
deformation: a change in the shape or size of a part of the Earth's crust due to stress
destructive margin: a plate margin where two plates move towards each other
discontinuity: a place where there is a change in physical properties
divergent plate boundary: see constructive margin
ductile: able to deform or stretch under stress
fault: a break in a rock due to the stress acting on it
fold: where a rock is compressed due to stress but does not break
hotspot: a place where unusually hot magma rises to the surface
island arc: a chain of volcanic islands at a plate margin
lithosphere: the rigid outer layer of the Earth that includes the crust and the top of the upper mantle
mantle the layer of the Earth beneath the crust
mesosphere: the part of the mantle beneath the asthenosphere and down to the core
mid-ocean ridge: a long underwater mountain range formed at a constructive margin
oceanic trench: a deep, steep-sided depression in the ocean, usually formed at a destructive margin when one plate is pushed below another one
Pangaea: Wegener's name for the supercontinent in his continental drift theory; a supercontinent that formed during the Palaeozoic Era
plate boundary: see plate margin
plate margin: the place where two tectonic plates meet
plate tectonics: the theory that the lithosphere is divided into several rigid plates, which are slowly moving
primary waves (P-waves): seismic waves that can pass through both solids and liquids
rift valley: a low area created when two tectonic plates move apart
seafloor spreading: the process by which the ocean floor on either side of a constructive margin slowly spreads apart
secondary waves (S-waves): seismic waves that can only travel through solids
seismic wave: a wave produced by an earthquake
subduction a process in which the edge of one tectonic plate is pushed below another plate
topographic profile: a two-dimensional diagram showing the Earth's relief in a vertical cross-section
volcanic arc: a chain of volcanoes at a plate margin

Chapter 2

absolute dating: a method to determine how many years ago an event happened, how long an event lasted or the age of rocks and organic remains
Cambrian Explosion: a huge increase in the quantity and diversity of life on Earth at the start of the Palaeozoic Era
fossil: the remains or traces of a living thing that lived a long time ago
Geologic Time Scale (GTS): the time scale used for the history of the Earth
geological cross-section: a vertical slice through the Earth, showing different layers of rock
glacial: a colder period within an ice age
ice age a long, cold period when thick ice sheets cover large areas of land
index fossil: a fossil that is characteristic of a particular span of geologic time or a particular environment
interglacial: warmer period within an ice age
relative dating: comparing the ages of different rocks and fossils, without determining their absolute age

Chapter 3

binary fission: a simple process of cell division used by prokaryotes

cell: the basic unit of organisation and structure in living things

cell cycle: the series of events that take place in a cell between the moment it is formed by the division of another cell and when it divides into two daughter cells

centromere: the part of a chromosome where the two sister chromatids join; it is where the mitotic spindle attaches during cell division

centrosome: an organelle in animal cells that produces and organises filaments, and controls the formation of the mitotic spindle in cell division

chromatin: long fibres consisting of DNA and proteins; DNA is in this format while the cell is not dividing

chromosome: a structure of DNA and proteins that forms when a cell is dividing

crossover: the process during meiosis in which some parts are exchanged between the two chromosomes in each homologous pair

cytokinesis: the process by which the cytoplasm divides in two

daughter cell: a cell formed by cell division

diploid cell a cell containing two sets of chromosomes

DNA (deoxyribonucleic acid): a double-stranded molecule that stores genetic information

endosymbiotic theory: a theory that explains how eukaryotes evolved from prokaryotes

eukaryotic cell: a complex cell containing a nucleus and organelles that are surrounded by membranes

eukaryote: an organism with eukaryotic cells

gamete: a sex cell (egg, sperm, ovule or pollen)

germ cell: a special type of diploid cell that produces gametes

haploid cell: a cell containing a single set of chromosomes

histone: a protein found in chromatin

homologous pair of chromosomes: two chromosomes that are similar in size and carry two versions of the same genetic information; one chromosome comes from each parent

interphase: part of the cell cycle in which the cell grows and makes a copy of its DNA

meiosis: a type of cell division in which one diploid germ cell divides twice to produce four haploid gametes that are all genetically different

mitosis: a type of cell division in which two daughter cells are produced that are genetically identical to the original cell

mitotic phase: part of the cell cycle in which the cell divides, forming two new cells

(mitotic) spindle: a network of filaments that forms during cell division

multicellular: consisting of more than one cell

organelle: a specialised structure in a cell that performs a specific function

prokaryote: an organism with a prokaryotic cell

prokaryotic cell: a simple cell without a nucleus; the genetic material is found in the cytoplasm

ribosome: an organelle in a cell that consists of ribosomal RNA and proteins, and is involved in making proteins

sister chromatids: the two copies in a duplicated chromosome

stem cell: a cell that can produce other types of cell when it divides

unicellular: consisting of only one cell

zygote: a fertilized egg

Chapter 4

allele: one of the possible versions of a gene
carrier: an individual that has one recessive allele for a trait or a disease
cross-breed: to breed one variety of an organism with a different variety
dominant allele: an allele that always determines the physical characteristic even if there is only one copy of it
gene: a section of DNA that contains the genetic information to produce a particular protein or proteins; these proteins may determine one or more of an organism's characteristics
genotype: a statement of the alleles that an individual has
heterozygous: with two different alleles for a characteristic
homologous pair of chromosomes: two chromosomes that are similar in size and carry two versions of the same genetic information; one chromosome comes from each parent
homozygous: with two alleles for a characteristic that are the same
(be) inherited: to be passed on from one generation to the next
phenotype: an individual's physical characteristics
recessive allele: an allele that does not determine the physical characteristic if a dominant allele is present
self-pollinate: to pollinate a plant with pollen from the same plant
sex chromosome: a chromosome that determines gender (X or Y chromosome in mammals)
sex-linked gene: a gene on one of the sex chromosomes
species: a group of similar organisms that produce offspring that can reproduce

Chapter 5

allele: one of the possible versions of a gene
base: a molecule containing nitrogen that forms part of a DNA or RNA molecule; adenine, guanine, cytosine, thymine (in DNA) or uracil (in RNA)
base pair: two bases held together by hydrogen bonds
carrier: an individual that has one recessive allele for a trait or a disease
chromosome: a structure of DNA and proteins that forms when a cell is dividing
chromosome mutation: a mutation involving a whole section of chromosome
clone: an identical genetic copy of a piece of DNA, a cell or an organism [to clone: to make identical copies]
codon: a three-letter sequence of bases that gives the code for an amino acid
crossover: the process during meiosis in which some parts are exchanged between the two chromosomes in each homologous pair
DNA (deoxyribonucleic acid): a double-stranded molecule that stores genetic information
DNA-polymerase: an enzyme that helps DNA nucleotides to join onto a DNA strand
embryonic stem cell: a cell found in an embryo, which can divide to produce any type of cell
gene: a section of DNA that contains the genetic information to produce a particular protein or proteins; these proteins may determine one or more of an organism's characteristics
gene expression: the process used to make a protein using the genetic code
gene mutation: a permanent change in the sequence of bases in the DNA that forms a gene
gene splicing: removing parts of an mRNA molecule that do not contain useful information
genetic code: the complete set of rules that cells use to translate genetic information into amino acids
genetic disease: a disease that is caused by a change in a DNA sequence away from the "normal" sequence
genetic disorder: see genetic disease
genetic engineering: direct modification of genes
genetic sequencing : determining the sequence of bases (A, T, G, C) in a piece of DNA

genetically modified organism (GMO): an organism that has had its DNA modified in a way that does not occur naturally

genome: an organism's complete set of DNA

genotype: a statement of the alleles that an individual has

messenger RNA (mRNA): a copy of a gene that is transported to the ribosomes where it is used to assemble a protein

nucleotide: a unit of a DNA or RNA molecule consisting of a sugar, a phosphate and a base

plasmid: a piece of DNA found outside of the chromosomes – normally a circular piece of DNA in a bacterium

polymerase chain reaction (PCR): a method of making large numbers of copies of DNA fragments in the laboratory

polypeptide chain: a chain of amino acids

recombinant DNA: a DNA molecule that is formed from more than one source (for example, when a gene is inserted into a larger piece of DNA)

ribosomal RNA (rRNA): RNA in the ribosomes that is involved in making proteins

ribosome: an organelle in a cell that consists of ribosomal RNA and proteins, and is involved in making proteins

RNA (ribonucleic acid): a single-stranded molecule that transfers genetic information to the ribosomes and uses it to make proteins

RNA-polymerase: an enzyme that helps RNA nucleotides to join onto a DNA strand

start codon: a codon in an mRNA molecule that gives the instruction to start the process of translation

stop codon: a codon in an mRNA molecule that gives the instruction to stop building the polypeptide chain

transcription: the stage of gene expression in which a copy of the gene is made from the DNA in the cell's nucleus

transfer RNA (tRNA): an RNA molecule that collects amino acids and takes them to the ribosomes to be used to make proteins

transgenic organism: an organism with DNA from another species inserted into its DNA

translation: the stage of gene expression in which information in the mRNA molecule is used to assemble a protein from amino acids

Chapter 6

allele: one of the possible versions of a gene

analogous features: similar features that dissimilar species have developed separately

bipedal: mainly walks on two legs

evolution: the change in the characteristics of a species over many generations

evolutionary tree: a diagram showing how species are related to one another based on their common ancestors

gene flow: the process by which alleles are transferred from one population to another

gene pool: the combination of alleles within a population

genetic drift: the random change in the frequency of alleles from one generation to the next

gradualism: the idea that evolution occurs gradually, as a result of an accumulation of small changes

hominids: the group consisting of all modern and extinct great apes (modern humans, bonobos, chimpanzees, gorillas and orangutans, as well as their ancestors)

homologous features: complex physical features that various species may have inherited from a common ancestor

(be) inherited: to be passed on from one generation to the next

natural selection: the process by which organisms pass on beneficial characteristics

phylogenetic tree: see evolutionary tree

population: a group of organisms of the same species that live in the same area

punctuated equilibrium: the idea that species are stable for millions of years, but rapid changes occur during relatively short periods, producing new species

vestigial structures: features that a species doesn't use which are similar to functioning organs in other species

species: a group of similar organisms that produce offspring that can reproduce

Chapter 7

abiotic factors: the non-living things in an ecosystem
aquatic ecosystem: an ecosystem in water
autotroph: an organism that converts inorganic molecules into organic matter, usually by photosynthesis
biocenosis: the living part of an ecosystem
biodiversity: the number of organisms and variety of different species in an area
biomass: the amount of matter stored in the bodies of organisms
biotic factors: the living things in an ecosystem
biotope: the non-living part of an ecosystem
carnivore: an animal that eats other animals
commensalism: a symbiotic relationship in which one species benefits and the other is unaffected
community: see biocenosis
consumer: see heterotroph
decomposer: an organism that breaks down organic matter from dead organisms into inorganic nutrients
ecological niche: the position and function of a plant or animal in an ecosystem
ecosystem: all of the organisms living in an area, as well as the physical environment where they live
ecotone: a transitional area between two different ecosystems
endemic: not found anywhere else
food chain: a sequence of organisms that eat each other
food web: a diagram showing all of the things the organisms in a community eat and are eaten by
freshwater ecosystem: an ecosystem in a river, lake or reservoir
habitat: the physical place where a plant or animal lives within an ecosystem
herbivore: an animal that eats plants
heterotroph: an organism that eats organic matter (other living things)
intraspecies relationship: a relationship between organisms of the same species
interspecies relationship: a relationship between organisms of different species
limiting factor: a factor that limits the amount, growth or distribution of an organism within an ecosystem even if all other factors are favourable
marine ecosystem: an ecosystem in the sea or ocean
mutualism: a symbiotic relationship in which both species benefit
omnivore: an animal that eats plants and animals
parasitism: a symbiotic relationship in which one species benefits and the other is harmed
phytoplankton: autotrophic plankton including algae and seaweed spores
plankton: microorganisms and other tiny organisms floating in aquatic ecosystems
producer: see autotroph
productivity: the rate at which energy is added to the bodies of organisms in the form of biomass
resilience: how easily an ecosystem can be restored after a disturbance
symbiotic relationship: a relationship between two different organisms living closely together
terrestrial ecosystem: an ecosystem on land
tolerance range: the range of conditions (for a specific factor, such as temperature) that an organism can survive in
zooplankton: heterotrophic plankton including protozoa and tiny invertebrates

Chapter 8

biodegradable: can be broken down naturally (e.g. by microorganisms) into substances that are not harmful

biogeochemical cycle: a cycle in which an element constantly moves through the biosphere, geosphere, hydrosphere and atmosphere

desertification: land degradation in dry areas due to natural causes and human activities

energy recovery: converting waste into heat, electricity or fuel

eutrophication: an excess of nutrients in an aquatic ecosystem

harmful algal bloom: a rapid increase in the population of algae or cyanobacteria in an aquatic ecosystem

natural resources: materials and substances that occur naturally and can be used for economic gain

nutrient cycle: see biogeochemical cycle

overexploitation: using a renewable resource unsustainably

overpopulation: too many people living in an area for the quantity of resources available

pollution: the introduction of harmful substances into the natural environment

recycle: to collect used products, and turn them into new ones

reuse: to use something again, instead of throwing it away

sustainable development: achieving human and economic development by using natural resources sustainably: without damaging the environment or preventing future generations from also using them

sustainable use: using in a way that does not damage the environment or prevent future generations from using it

waste management: collecting, separating, storing, transporting, processing, treating and disposing of waste