

Combined Science (TRILOGY) GCSE Biology

Success Criteria: Variation and evolution



<i>I can...</i>	
Describe simply how the genome and its interaction with the environment influence the development of the phenotype of an organism.	
State that differences in the characteristics of individuals in a population is called variation.	
Describe how variation between individuals may be due to: <ul style="list-style-type: none"> • the genes they have inherited • the conditions in which they have developed (environmental factors) • a combination of both genes and environment. 	
State that there is usually extensive genetic variation within a population of a species.	
Define a species as a group of similar individuals that are able to reproduce and produce <u>fertile</u> offspring's.	
Understand that mutations (changes in DNA) occur randomly and continuously in a population.	
Explain that although mutations occur continuously, most have no impact to the phenotype (silent mutation), however, rarely a mutation will lead to a new phenotype.	
Describe evolution as a change in the inherited characteristics of a population over time	
Explain how evolution occurs using 'natural selection'. Random mutation = new allele (variation) which provides an advantageous characteristic Individual with the advantageous allele survives long enough to reproduce and passes on advantageous allele to offspring.	
Explain that if two populations of one species separately evolve that they become so different in phenotype and can no longer interbreed to produce fertile offspring they have formed two new species.	
Explain that all species of living things have evolved from simple life forms that first developed more than 3 billion years ago	
Explain how evolution occurs through natural selection of variants that give rise to phenotypes best suited to their environment.	
Understand that if one species becomes so different in phenotype that it can no longer interbreed to produce fertile offspring's that have formed a new species how new species form.	

Evidence for evolution, fossils, and extinction.

<i>I can...</i>	
<p>Explain that the theory of evolution by natural selection is now widely accepted. Evidence for Darwin's theory is now available as it has been shown that characteristics are passed on to offspring in genes</p>	
<p>Define fossils as the 'remains' of organisms from millions of years ago, which are found in rocks.</p>	
<p>Describe how fossils are formed from parts of organisms that have not decayed because one or more of the conditions needed for decay are absent. Parts of the organism are then replaced by minerals as they decay. Fossils preserve traces of organisms, such as footprints, burrows and rootlet traces.</p>	
<p>Use information to describe how fossils help us to determine how much or how little different organisms have changed as life developed on Earth.</p>	
<p>Explain that many early forms of life were soft-bodied, which means that they have left few traces behind which means scientists cannot be certain about how life began on Earth.</p>	
<p>Understand evolutionary relationships when presented as evolutionary trees</p>	
<p>State that extinction occurs when there are no remaining individuals of a species still alive.</p>	
<p>Describe factors which may contribute to the extinction of a species eg. new disease, new predator, new competitor, loss of habitat etc</p>	
<p>Describe how bacterial antibiotic resistance occurs (random mutation)</p>	
<p>Explain how the rise in antibiotic resistance is evidence for evolution by natural selection (bacteria with the resistant gene survive, reproduce and pass on the advantageous allele)</p>	
<p>Explain why antibiotic resistance is concerning/dangerous for humans</p>	
<p>Describe steps taken to reduce antibiotic resistance:</p> <ul style="list-style-type: none"> • doctors should not prescribe antibiotics inappropriately, such as treating non-serious or viral infections, • patients should complete their course of antibiotics so all bacteria are killed and none survive to mutate and form resistant strains • the agricultural use of antibiotics should be restricted. 	

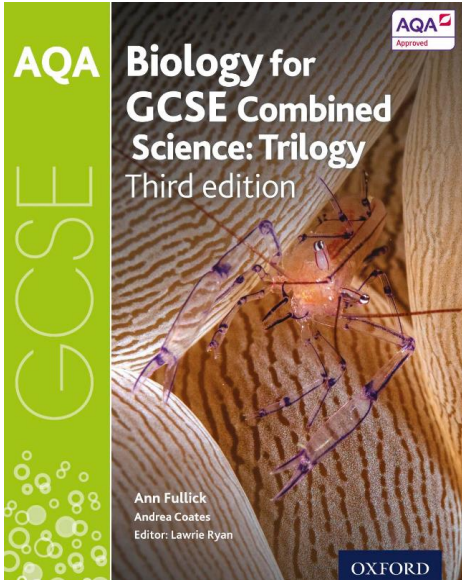
Classification

<i>I can...</i>	
State that living things can be classified into groups depending on their structure and characteristics.	
Define artificial classification as grouping organisms based on one/few easily identifiable characteristic (eg. black colour – not useful for biological purposes, does not show evolutionary relationships)	
Define natural classification as grouping organisms based on many shared characteristics (eg. All mammals grouped together – warm blooded vertebrates, covered in hair, birth to live young etc. useful for biological purposes, shows evolutionary relationships)	
Identify the hierarchy of natural classification taxa (groups) first proposed by Carl Linnaeus kingdom, phylum, class, order, family, genus and species. (KIPCOFaGS)	
Understand the binomial naming system of organisms (binomial = two parts) using the genus followed by the species. Eg. Homo sapien (Homo = genus, sapien = species)	
Describe the impact of developments in biology on classification systems. Examples of developments are: microscopes, EM microscopes, understanding of biochemical processes, genetics and sequencing.	
Understand how scientific methods and theories develop over time. As our understanding of internal cell structures and biochemical processes advance, new models of classification can be proposed.	
Explain how due to evidence from chemical analysis there is now a 'three domain system' developed by Carl Woese. In this system organisms are divided into: <ul style="list-style-type: none"> • archaea (primitive bacteria usually living in extreme environments) • bacteria (true bacteria) • eukaryota (which includes protists, fungi, plants and animals). 	
Use and interpret evolutionary trees to show how organisms are believed to be related.	

- 4.6.2.1 Variation
- 4.6.2.2. Evolution

Additional support:


Access the appropriate textbook on kerboodle.com, create your own revision notes of the key points of the topic and attempt the summary questions.

Combined science GCSE textbook

Variation and Evolution

Pages 178-182

Evidence for Evolution

Pages 190-198

Classification

Pages 198-202

Write your own summary notes (bullet points of the key ideas /keywords list with definitions/ annotated diagrams/ mind-maps or flash cards) to go over the main content of the topic.

Attempt the textbook summary questions.

Utilise online revision resources to support your class notes, such as...



Attempt past paper questions using www.physicsandmathstutor.com and self-mark your answers using the official exam mark schemes.


Extension work/extra challenge:

Ask your teacher for extension tasks...

- Sexual Selection: How did the Peacock get his tail?
- Cultural evolution