

The development of understanding of genetics and evolution

Triple only

What did Darwin propose, and where did he publish it?

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Why was Darwin's theory only gradually accepted?

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What did Lamarck suggest?

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What was Wallace's contribution?

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Describe the steps that give rise to new species.

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What was Mendel's key observation?

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Why was Mendel's work not recognised until after his death?

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Describe how the gene theory developed after Mendel.

It challenged the idea that God made all species, there was insufficient evidence at the time, and the mechanism of inheritance was not known until 50 years later.

Evolution by natural selection, in *On the Origin of Species* (1859). Individuals vary; those most suited to the environment survive to breed and pass on their characteristics.

He independently proposed natural selection, published joint writings with Darwin in 1858, and is best known for work on warning colouration and speciation.

That changes in an organism during its lifetime can be inherited. In the vast majority of cases this cannot occur.

In the mid-19th century, his breeding experiments on plants showed that inheritance of each characteristic is determined by 'units' passed on unchanged.

Isolation, genetic variation from mutations, different selection pressures in different environments, alleles passed on, until populations cannot interbreed to produce fertile offspring.

Late 19th century: chromosome behaviour seen. Early 20th: chromosomes and 'units' behave similarly, so genes are on chromosomes. Mid-20th: DNA structure determined.

When he published, the behaviour of chromosomes had not been observed, so his 'units' could not be linked to anything in cells. Few scientists read or understood his work.

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What evidence supports the theory of evolution?

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What are fossils and how may they form?

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Why is the fossil record incomplete?

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What is extinction?

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How do antibiotic-resistant bacteria arise and spread?

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How can the development of antibiotic resistance be reduced?

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What is MRSA, and why do new antibiotics not solve the problem?

Remains of organisms from millions of years ago, found in rocks. They form when decay conditions are absent, by mineral replacement, or as preserved traces.

Characteristics are passed on in genes, the fossil record, and how antibiotic resistance evolves in bacteria.

When there are no remaining individuals of a species still alive. Factors include new predators, diseases or competitors, environmental change, or a single catastrophic event.

Early life forms were soft-bodied and left few traces, and many traces were destroyed by geological activity.

Do not prescribe antibiotics inappropriately (such as for viral infections), complete the course, and restrict agricultural use.

Mutation produces a resistant strain; antibiotics kill other bacteria, so the resistant ones survive, reproduce and spread because people are not immune.

MRSA is resistant to antibiotics. New antibiotics are costly and slow to develop, so unlikely to keep up with new resistant strains.