



Exploring Epigenetics

Teacher Notes: Exploring Epigenetics Overview

This sequence of 3 activities is designed to complement teaching about epigenetics for students of AS/A-level biology. Detailed teacher instructions and student activity sheets are provided for each of the three activities.

Activity 1. The genetic code.

This aims to consolidate knowledge on the structure of DNA, mRNA and a polypeptide chain, as well as the mechanisms of transcription and translation, prior to the teaching of epigenetics.

Activity 2. Modelling gene regulation.

Students produce and evaluate models to show how 3 factors affect transcription, and therefore gene regulation: (i) transcription factors, (ii) DNA methylation, and (iii) histone acetylation.

Activity 3. The Scientific Investigator.

This on-line interactive animation allows students to complete a laboratory investigation into epigenetic changes affected by the environment. They use scientific skills of observation and data interpretation, then synthesise an understanding of how environmental factors influence epigenetic modifications, in turn affecting the heritable phenotype of mice.

Curriculum Links*

Knowledge

16. Biological molecules

- biological molecules are often polymers and are based on a small number of chemical elements
- in living organisms nucleic acids (DNA and RNA), carbohydrates, proteins, lipids, inorganic ions and water all have important roles and functions related to their properties
- the sequence of bases in the DNA molecule determines the structure of proteins, including enzymes

18. Control systems

- stimuli, both internal and external, are detected leading to responses
- the genome is regulated by a number of factors
- coordination may be chemical or electrical in nature



SCoPE



Practical skills (Appendix 5a)

Independent thinking

- solve problems set in practical contexts
- apply scientific knowledge to practical contexts

Use and application of scientific methods and practices

- comment on experimental design and evaluate scientific methods
- present data in appropriate ways

Prior knowledge and skills*

Knowledge

15. Cells

- during the cell cycle genetic information is copied and passed to daughter cells

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Skills

- use theories, models and ideas to develop scientific explanations
- use knowledge and understanding to pose scientific questions, define scientific problems, present scientific arguments and scientific ideas
- use appropriate methodology, including information and communication technology (ICT), to answer scientific questions and solve scientific problems
- analyse and interpret data to provide evidence, recognising correlations and causal relationships
- evaluate methodology, evidence and data, and resolve conflicting evidence
- know that scientific knowledge and understanding develops over time
- communicate information and ideas in appropriate ways using appropriate terminology
- consider applications and implications of science and evaluate their associated benefits and risks

* From Department for Education (April 2014) 'GCE AS and A level subject content for biology, chemistry, physics and psychology', accessible [here](#).

