

Edexcel IAL Biology A-level

3.17-3.21 - Development and Inheritance

Flashcards

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Why is cell differentiation important?

Enables the formation of specialised tissues with specific functions e.g.
muscle tissue



What are embryonic stem cells?



What are embryonic stem cells?

Stem cells found in very early embryos that are unspecialised and capable of differentiating into any cell type



What is the function of embryonic stem cells?



What is the function of embryonic stem cells?

Enable the growth and development of tissues in human embryos



Where can embryonic stem cells be collected from?



Where can embryonic stem cells be collected from?

- Donor stem cells removed from embryos grown in vitro
- Patient's own stem cells removed from the umbilical blood before birth



What are adult stem cells?



What are adult stem cells?

Stem cells that can differentiate into a limited range of cell types e.g. bone marrow stem cells



Describe the potential uses of stem cells
in medicine



Describe the potential uses of stem cells in medicine

- Treat disease e.g. heart disease, type 1 diabetes
- Used to repair damaged tissue e.g. brain damage
- Used in scientific research
- Growing organs for transplants



What are the ethical issues related to the use of stem cells in medicine?



What are the ethical issues related to the use of stem cells in medicine?

- The embryos used to provide stem cells are destroyed which is seen as unethical and a waste of potential human life
- Could lead to the 'farming' of embryos for stem cells
- May lead to the reproductive cloning of humans



What is a pluripotent stem cell?



What is a pluripotent stem cell?

A type of stem cell which can differentiate into any type of cell in the body



What is a totipotent stem cell?



What is a totipotent stem cell?

A type of stem cell which can differentiate into any type of cell in the body or into cells which make up extra-embryonic tissues like the placenta



What is a morula?



What is a morula?

A cluster of **16** cells formed from divisions of the zygote (fertilised egg)



What is the blastocyst?



What is the blastocyst?

A structure formed from further division and cleavage of the **morula** around 5 days after fertilisation. It contains an outer layer, fluid cavity and an inner cell mass



What is gene expression?



What is gene expression?

The synthesis of active functional products through the transcription and translation of a gene



What is pre-mRNA?



What is pre-mRNA?

The direct product of transcription before splicing occurs



How is pre-mRNA converted to mature mRNA?



How is pre-mRNA converted to mature mRNA?

Post-transcriptional modifications and splicing alter the structure of the mRNA molecule to remove introns



What is mature mRNA?



What is mature mRNA?

The product of splicing which includes only exons. This is then used in translation to produce functional polypeptides

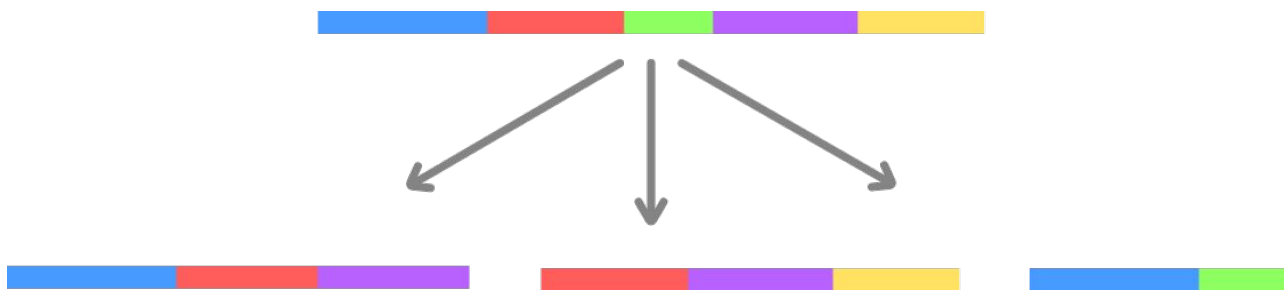


How can one gene give rise to multiple polypeptides?



How can one gene give rise to multiple polypeptides?

Through **alternative splicing** where different exons are joined together in different orders to produce different mRNA molecules



Define genotype



Define genotype

The genetic constitution of an organism



Define phenotype



Define phenotype

The expression of an organism's genetic constitution, combined with its interaction with the environment



What are epigenetic modifications?



What are epigenetic modifications?

Modifications which cause changes in gene expression that are not due to alterations in the nucleotide base sequence of DNA

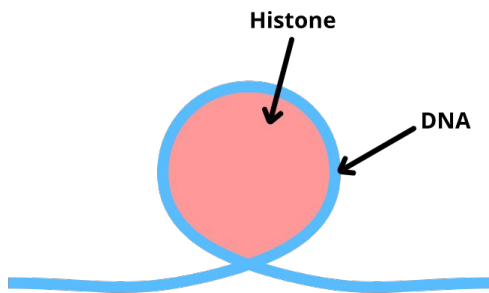


What are histones?



What are histones?

Proteins which help to package DNA tightly in the form of chromatin. The DNA coils around the histone proteins



Describe two types of epigenetic modifications



Describe two types of epigenetic modifications

DNA methylation - The addition of methyl groups to cytosine bases in DNA. This typically downregulates transcription

Histone acetylation - The addition of acetyl groups to histone proteins which make them bind less tightly to DNA molecules and hence allow for increased transcription



Describe briefly what happens to epigenetic modifications after cell division



Describe briefly what happens to epigenetic modifications after cell division

Many epigenetic modifications are lost during cell division. Some specific epigenetic modifications are retained during the production of new histones. Each new DNA strand gets a mix of old and new histones, which means that some modifications are retained



What is polygenic inheritance?



What is polygenic inheritance?

The control of a trait by multiple **genes**



What is multiple allele inheritance?



What is multiple allele inheritance?

How multiple different versions of the **same gene** affect a trait



What type of variation does polygenic inheritance give rise to?



What type of variation does polygenic inheritance give rise to?

Continuous variation



What is continuous variation?



What is continuous variation?

- Variation that cannot be categorised
- Produces a continuous range (e.g. height, weight)



What is discontinuous variation?



What is discontinuous variation?

Variation that can be categorised into distinct groups e.g. eye colour, blood group

