WJEC Wales Biology GCSE

2.4 (a) to (d) - Variation

Flashcards

What are the two types of variation? (higher)

What are the two types of variation? (higher)

- Continuous
- Discontinuous

What is continuous variation? (higher)

What is continuous variation? (higher)

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

What is discontinuous variation? (higher)

What is discontinuous variation? (higher)

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

What are the two causes of variation within a species?

What are the two causes of variation within a species?

- Genetics
- Environment

What is genetic variation?

What is genetic variation?

- Variation in the genotypes of organisms of the same species due to the presence of different alleles
- Creates differences in phenotypes

What is environmental variation?

What is environmental variation?

- Variations in phenotype that are acquired during the lifespan of an organism
- Due to environmental factors e.g. diet, lifestyle, climate, exposure to light etc.

Illustrate how variation may be due to the interaction of genes and the environment

Illustrate how variation may be due to the interaction of genes and the environment

An individual's genes may make them predisposed to being tall. However, lack of nourishment during childhood may stunt growth.

What creates genetic variation in a species?

What creates genetic variation in a species?

- Sexual reproduction
- Spontaneous mutations

How does sexual reproduction create variation?

How does sexual reproduction create variation?

- Meiosis produces genetically different gametes (haploid)
- During fertilisation, one gamete from each parent fuses to form a zygote (diploid)
- Genetic information from both parents is mixed to form a unique individual

Does asexual reproduction create genetic variation?

Does asexual reproduction create genetic variation?

No

Why does asexual reproduction not create genetic variation?

Why does asexual reproduction not create genetic variation?

It involves mitosis which produces genetically identical daughter cells known as clones.

What is a mutation?

What is a mutation?

A random change to the base sequence in DNA which results in genetic variants

How may a gene mutation affect an organism's phenotype? (3)

How may a gene mutation affect an organism's phenotype? (3)

- **Neutral mutation** does not change the sequence of amino acids. Protein structure and function same. No effect on phenotype.
- Mutation may cause a **minor change** in an organism's phenotype e.g. change in eye colour.
- Mutation may **completely change** the sequence of amino acids. This may result in a non-functional protein. Severe changes to phenotype.

What substances increase the mutation rate of DNA?

What substances increase the mutation rate of DNA?

Mutagens e.g. ionising radiation

How can mutations cause genetic conditions passed on in families?

How can mutations cause genetic conditions passed on in families?

- Mutation results in a harmful allele
- Allele inherited by offspring

How can inheritance be illustrated?

How can inheritance be illustrated?

- Punnett square
- Family tree

What is cystic fibrosis?

What is cystic fibrosis?

A recessive condition resulting in the production of sticky mucus that affects the lungs and digestive system.

What is the genotype of individuals with cystic fibrosis?

What is the genotype of individuals with cystic fibrosis?

Homozygous recessive (ff)

What is the genotype of carriers of cystic fibrosis?

What is the genotype of carriers of cystic fibrosis?

Heterozygous (Ff)

A female who is homozygous recessive for cystic fibrosis (ff) has a child with a heterozygous male (Ff). Draw a punnett square to illustrate this inheritance.

A female who is homozygous recessive for cystic fibrosis (ff) has a child with a heterozygous male (Ff). Draw a punnett square to illustrate this inheritance.

		Female genotype	
		f	f
Male genotype	F	Ff	Ff
	f	ff	ff

What is gene therapy?

What is gene therapy?

A number of techniques used to counteract the effects of a defective allele within DNA.

What are the two types of gene therapy?

What are the types of gene therapy?

- Insertion of a functional allele into DNA which replaces the faulty allele. A healthy dominant allele can counteract the recessive faulty allele.

- ‘Switching off’ the faulty allele

Describe the ethical issues surrounding gene therapy

Describe the ethical issues surrounding gene therapy

- Expensive - money could be better invested elsewhere
- Religious groups do not agree with genetic manipulation
- Health implications - new gene may produce an immune response