

Inheritance, variation and evolution

Reproduction

Sexual vs asexual, meiosis

- Gametes fuse, variety
- One parent, clones
- Meiosis halves chromosomes
- Fertilisation restores number

Pros and cons Triple only

- Variation
- Faster, one parent
- Malaria, fungi, plants

DNA and genome

- Double helix
- Gene codes for protein
- Human genome uses

DNA structure Triple only

- Nucleotides: sugar, phosphate, base
- Bases A, C, G, T
- Three bases, one amino acid

Protein synthesis and mutations Triple only Higher tier

- C-G, T-A pairing
- Ribosomes, carrier molecules
- Mutation changes protein shape
- Non-coding DNA switches genes

Genetic inheritance

- Alleles
- Dominant, recessive
- Punnett squares
- Family trees

Inherited disorders

- Polydactyly
- Cystic fibrosis
- Embryo screening

Sex determination

- XX female
- XY male
- 1 : 1 ratio

Development of understanding

Darwin Triple only

- Observations
- Origin of Species 1859
- Gradual acceptance

Lamarck Triple only

- Inheritance of acquired changes
- Rarely true

Wallace and speciation Triple only

- Joint writings 1858
- Warning colouration
- Steps to new species

Mendel and genes Triple only

- Units passed on
- Chromosomes observed
- DNA structure

Evidence for evolution

- Genes
- Fossils
- Antibiotic resistance

Fossils

- How formed
- Record incomplete

Extinction

- New predators, diseases
- New competitors
- Environmental change
- Catastrophic event

Resistant bacteria

- Mutation
- Survive and reproduce
- MRSA
- Reduce misuse

Variation and evolution

Variation

- Genetic
- Environmental
- Both

Mutations

- Source of variants
- Most no effect
- Rare new phenotype

Evolution

- Natural selection
- Survive and breed
- New species

Selective breeding

- Choose parents
- Many generations
- Inbreeding

Genetic engineering

- Gene from another organism
- GM crops
- Human insulin

Steps of genetic engineering Higher tier

- Enzymes isolate gene
- Vector: plasmid or virus
- Insert into cells

Cloning Triple only

- Tissue culture
- Cuttings
- Embryo transplants
- Adult cell cloning

Classification

Linnaean system

- Kingdom to species
- Carl Linnaeus

Binomial names

- Genus
- Species

Three-domain system

- Archaea
- Bacteria
- Eukaryota

Evolutionary trees

- Classification data
- Fossil data
- Common ancestors