

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

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

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

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