

BIO1011

Exam and Study Notes

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Ecology

- Landscape ecology is best described as the study of related arrays of ecosystems
- Temperature has the biggest effect on metabolic rates in plants and animals

Organic Molecules

- Active transport is to move molecules against the concentration gradient
- Endocytosis is the transport of large molecules through cells

Energy Transformations within Cells – Enzymes, Cellular Respiration and Photosynthesis

- The three normal reactants for the enzyme RuBisCO are CO₂, O₂ and RuBP
- The immediate energy source that drives ATP synthesis during oxidative phosphorylation is a difference of hydrogen ion (H⁺) concentration on opposite sides of the inner mitochondrial membrane
- Photosystem II includes (splits water to yield oxygen) ○ Photolysis ○ Release of oxygen
 - Harvesting of light energy by chlorophyll ○ P680
 - Therefore it does not include photophosphorylation
- Photosystem I includes (forms NADPH) ○ Harvesting of light energy by chlorophyll ○ Receiving electrons from plastocyanin ○ P700
 - Passing electrons to ferredoxin ○ Therefore it does not include photolysis
- In fermentation, NADH is oxidised
- The light reactions provide ATP and NADPH to the Calvin cycle, and the cycle returns ADP, Pi, and NADP⁺ to the light reactions
- In mitochondria, chemiosmosis translocates protons from the matrix into the intermembrane space, whereas in chloroplasts, chemiosmosis translocates protons from the stroma into the thylakoid compartment
- Glycolysis produces NADH and pyruvate
- NAD⁺ does not have more chemical energy than NADH
- Functions of the Krebs cycle ○ Production of ATP ○ Production of NADH ○ Production of FADH₂ ○ Release of carbon dioxide
- Cyclic electron flow provides more ATP to the Calvin cycle
- A Barr body is only found on female somatic cells (Barr bodies = number of X chromosomes minus 1)

Cell Biology – Structure, Membrane and Division

- The rough endoplasmic reticulum manufactures the cell membrane
- Crossing over usually contributes to genetic variation by exchanging chromosomal segments between nonsister chromatids and homologues
- Hydrophobic molecules, such as hydrocarbons can cross the lipid bilayer with ease as they can dissolve in the membrane
- Most cells cannot harness heat to perform work because temperature is usually uniform throughout a cell
- A 50% frequency of recombination means that the two genes are located on different chromosomes
- Stability of the plasma membrane is enhanced by cholesterol molecules
- Fertilization is the fusion of gametes
- The result of the operation of an electrogenic pump would be a voltage difference across the membrane
- Endomembrane systems evolved before chloroplasts
- pH in the matrix increases as electrons flow through the mitochondria via the electron transport chain
- Blood is classified as a connective tissue because its cells are widely dispersed and surrounded by a fluid
- Crossing over occurs in prophase 1

Molecular Genetics – How DNA works

- mRNA is synthesised 5' to 3'
- Only in prokaryotes can translation of mRNA begin before transcription is finished
- Transcription happens with RNA polymerase recognising the promoter region
- Synaptonemal complex (protein structure) holds homologous chromosomes tightly together
- DNA and RNA differ in size, nitrogen bases, sugars and strands

Inheritance

- Non disjunction is when homologous chromosomes fail to separate normally which results in one of the below scenarios
 - Monosomic is the chromosome abnormality in which there is an absence of one chromosome from the normal diploid number
 - Trisomic is a chromosome abnormality in which there is one more than the normal number of chromosomes in a cell
 - Aneuploid is when you don't have the same number of chromosomes as a haploid set
- Triploid is when a cell contains three homologous sets of chromosomes

To be continued