5.2.2 RESPIRATION

Mitochondria

- Double membrane
  - Inner membrane folded into cristae
    - High surface area
    - Electron transport proteins embedded by cristae
      - Site for oxidative phosphorylation
        - ATP synthesis
- Mitochondrial matrix
  - Site for Krebs cycle and Link reaction
  - Contains DNA, lipids and proteins

Glycolysis

- Phosphorylation of glucose
  - Produce hexose biphosphate
    - Splits into 2 x triose phosphate (TP)
      - Oxidation of TP into pyruvate
        - Pyruvate actively transported into the matrix
        - Final products = 2 x NADH, 4 x ATP and 2 x pyruvate
        - Produces 4 x ATP
        - NAD accepts H forming NADH
  - Phosphates come from ATP hydrolysis
- Occurs in cytoplasm
- Anaerobic respiration only involves glycolysis
  - No O_2
  - Low ATP yield
  - Animals produce lactate
  - Plants and microorganisms produce ethanol + CO_2
  - Need to re-oxidise NAD to be reused

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5.2.2 RESPIRATION

Link reaction

- Pyruvate is oxidised to acetate
  - Reduced NAD (NADH) is formed
- Acetate + coenzyme A = acetyl CoA
- 1 x CO_2 is lost

Krebs cycle

- Acetyl CoA (2C) + Oxaloacetate (4C) = Citrate (6C)
- Citrate undergoes a series of oxidation–reduction reactions
  - Loses 2 x CO_2
  - Produces 1 x ATP by substrate-level phosphorylation
  - FAD and NAD are reduced (by accepting H)
- Forms 3 x NADH and 1 x $FADH_2$
- Donate electrons (e) and protons (H+)
- Oxaloacetate is regenerated
- Krebs cycle begins again

Oxidative phosphorylation

- Electron transport chain (ETC)
- Energy released
- Pump H+ across inner membrane
- H+ move back via ATP synthase
- Chemiosmotic theory

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