

#64462 Biology, Ecology

1. Compare the phosphorylation of photosynthesis & cellular respiration.
2. Outline the mechanism of cellular respiration.

Answer:

1. In **photosynthetic photophosphorylation**, the energy of light is used to create a high-energy electron donor which shuttles its electrons through a series of photosystems and electron carriers, in turn producing a proton-motive force which can be used directly to create ATP. Water is split into oxygen to get protons and electrons to serve this purpose. This occurs in the thylakoid membrane within chloroplasts.

In **oxidative phosphorylation**, the energy of an oxidized substrate is used to fuel the electron transport chain, this time passing electrons through a series of complexes in the inner mitochondrial membrane, and once again producing a proton motive force that can be used to create ATP through a different ATP synthase. This time, oxygen serves as the electron acceptor and is reduced to produce water. This occurs in the inner membrane of the mitochondria.

2. The overall mechanism of cellular respiration involves four subdivisions:

- glycolysis, in which glucose molecules are broken down to form pyruvic acid molecules;
- the Krebs cycle, in which pyruvic acid is further broken down and the energy in its molecule is used to form high-energy compounds such as NADH;
- the electron transport system, in which electrons are transported along a series of coenzymes and cytochromes and the energy in the electrons is released;
- chemiosmosis, in which the energy given off by electrons is used to pump protons across a membrane and provide the energy for ATP synthesis.

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