Metabolism and Replication

The Basics of Metabolism

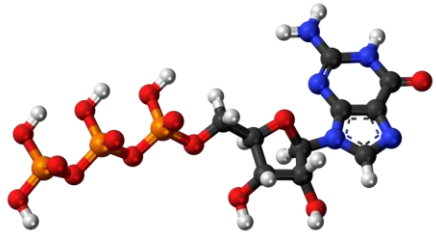
- Metabolism, the system of cellular activity, is driven by chemical reactions when energy is absorbed.
- The chemical reactions follow metabolic pathways.
- The metabolic pathways between the first primitive organisms and the complex organisms of today are the same.

Study Tip

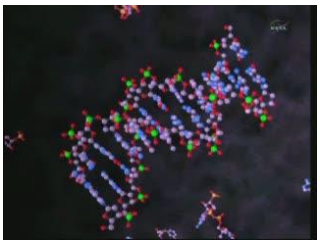
One comes before two. Since RNA is one stranded and DNA is two stranded, we can say that RNA came before DNA.

Development of Metabolism

- The process of metabolism evolved early in Earth's history because the cellular processes between the primitive bacterial organisms and animals are similar.
- How is genetic information preserved?
    - All organisms have molecules called nucleic acids, which contain genetic information passed down during reproduction.
    - There are two types of nucleic acids, DNA and RNA.
    - RNA is believed to be the first nucleic acid on Earth because it was responsible for the packaging of proteins, which help drive cellular processes.



A typical RNA molecule. Its basic structure led many scientists to believe that it was crucial in creating early life on Earth.



A typical DNA molecule. Because of its complex structure, it has believed that DNA has evolved from RNA over time.

RNA World Hypothesis

- RNA delivers genetic information to places in the cell where proteins are made.
- Scientists believe RNA was the first replicator because it induces protein synthesis
- The idea that RNA is the most primitive organic molecule is called the **RNA world hypothesis**, referring to the possibility that the RNA is more ancient than DNA.

Concept Check

- What is metabolism? Describe the two different metabolic pathways.
- How did metabolism evolve early in the Earth's history?
- What does the RNA world hypothesis state?