BB101
Prof. Sanjeeva Srivastava
Feb 16, 2024

Summary of today's session – Lecture 12 – Metabolism & Evolution

Dear Students,

In today's class, we discussed few fundamental concepts related to Metabolism and Evolution.

Summary:

Section 1: Metabolic Pathways:

- Represented as rail or road maps with dots symbolizing metabolites, lines connect compounds that can be interconverted.
- Metabolism defined as an organism's chemical reactions, emerging from orderly arrangements or interactions of its components.
- Key concepts: catabolism (breaking down energy sources) and anabolism (using energy to build biomolecules).
- Various energy currencies discussed: adenylate pools, ion gradients, NAD, and NADP.
- Stages of cellular respiration explained: glycolysis, TCA cycle, and proposed linkage between NADH oxidation and ADP phosphorylation via a proton gradient.
- Warburg effect: high glycolysis rate in cancer cells linked to lack of oxygen due to rapid cell division.

Section 2: Evolution

- Darwin's work, "On the Origin of Species," discussed as transformative for biology.
- Darwin's experiences during the Voyage of the Beagle led to understanding of how new species originate from accumulation of adaptations.
- Natural selection presented as mechanism for evolutionary change.
- Examples such as beak variation in Galápagos finches used to illustrate natural selection.
- Hardy-Weinberg law introduced to assess population evolution.
- Convergent and divergent evolution compared.
- Supporting evidence for evolution highlighted: homology, evolution of drug-resistant bacteria.
- Significance of bioinformatics and sequence alignment in understanding evolutionary relationships emphasized.

Summary:

• A comprehensive overview provided on metabolic pathways, cellular respiration, the Warburg effect.
• Darwinian evolution, natural selection, and supporting evidence for evolutionary theory discussed.

• Lecture concluded by highlighting importance of bioinformatics and sequence alignment in evolutionary studies.

Resource Update:

The course handout and reference materials have been updated and are accessible through the provided Google Drive link:
https://drive.google.com/drive/folders/1FgzzCom1n6WKIgheQrFLA1U8rkJuISGT

Best wishes,
Sanjeeva