ISSN: 1987-6521, E-ISSN: 2346-7541
DECEMBER 2023 VOLUME 60 ISSUE 04
© THE BALTIC SCIENTIFIC JOURNALS
BLACK SEA
SCIENTIFIC JOURNAL OF ACADEMIC RESEARCH

THE FUNDAMENTAL BIOLOGICAL PROCESSES

Sara Kites
Department of Science, National University, Khartoum, Sudan
Email: sarakites@gmail.com

Received: 08-Dec-2023, Manuscript No. BSSJAR-23-122401; **Editor assigned:** 11-Dec-2023, PreQC No. BSSJAR-23-122401 (PQ); **Reviewed:** 26-Dec-2023, QC No. BSSJAR-23-122401; **Revised:** 02-Jan-2024, Manuscript No. BSSJAR-23-122401 (R); **Published:** 09-Jan-2024, DOI: 10.36962/GBSSJAR/60.4.003

ABOUT THE STUDY

The biological processes that dictate the very essence of life. From the microscopic intricacies within a cell to the grandeur of ecosystems, biological processes encompass a vast array of mechanisms that govern the existence, growth, and adaptation of living organisms. At its core, a biological process is any sequence of events in a living organism that involves a series of chemical reactions or events, leading to a specific outcome. These processes are the fundamental building blocks of life, shaping the characteristics and behaviors of every living entity on Earth. From the simplest unicellular organisms to the complex ecosystems that span continents, the machinery of life operates through an intricate web of interconnected processes.

Cellular respiration: Powering the cellular engines

One of the fundamental biological processes that sustains life is cellular respiration. At the cellular level, organisms extract energy from organic molecules, typically glucose, through a series of metabolic pathways. The most prevalent form of cellular respiration is aerobic respiration, a process that occurs in the presence of oxygen and involves three main stages: glycolysis, the Krebs cycle (or citric acid cycle), and oxidative phosphorylation. In glycolysis, a single molecule of glucose is broken down into two molecules of pyruvate, generating a small amount of ATP (Adenosine Triphosphate) – the cellular energy currency – and NADH. The pyruvate molecules then enter the Krebs cycle, where they undergo a series of chemical reactions, releasing carbon dioxide and producing more ATP and electron carriers (NADH and $FADH_2$). The final stage, oxidative phosphorylation, takes place in the mitochondria and involves the transfer of electrons through a chain of proteins, ultimately generating a large amount of ATP. Cellular respiration is the powerhouse of the cell, providing the energy necessary for cellular activities, growth, and maintenance. Its ubiquity across the living world underscores its fundamental role in the sustainability of life processes. (Kuros et al. 1988).

Photosynthesis

In contrast to cellular respiration, photosynthesis is a process exclusive to autotrophic organisms, such as plants, algae, and some bacteria. This remarkable biological process transforms light energy into chemical energy, synthesizing organic molecules, primarily glucose, from carbon dioxide and water. (Arese et al.2005).

Photosynthesis occurs in specialized cellular structures called chloroplasts, where pigments such as chlorophyll capture sunlight during the light-dependent reactions. These captured photons excite electrons, initiating a chain of events that produce ATP and NADPH. Subsequently, during the light-independent reactions (Calvin cycle), carbon dioxide is fixed and converted into glucose with the help of ATP and NADPH. Beyond its role as a vital energy source, photosynthesis is the foundation of food webs and ecosystems. Plants, as primary producers, generate organic compounds that serve as sustenance for herbivores and, consequently, the entire trophic pyramid. (Williams et al.2005).

ISSN: 1987-6521, E-ISSN: 2346-7541
DECEMBER 2023 VOLUME 60 ISSUE 04

DNA replication

The process of DNA replication is the cornerstone of genetic inheritance, the transmission of genetic information from one generation to the next. This intricate biological process unfolds before cell division, allowing the formation of identical copies of the genetic material. DNA replication is a semiconservative process, meaning that each strand of the parent DNA molecule serves as a template for the synthesis of a new, complementary strand. The enzyme DNA polymerase catalyzes the addition of nucleotides, forming a new DNA strand alongside each template strand. The result is two identical DNA molecules, each containing one strand from the original (Schofield et al. 2005).

Cell cycle

The cell cycle is a highly regulated biological process growth and division of cells. Comprising a series of events, the cell cycle ensures the orderly progression from the birth of a cell to its eventual division into two daughter cells. The cell cycle is divided into distinct phases: G1 (Gap 1), S (Synthesis), G2 (Gap 2), and M (Mitosis). Interphase, encompassing G1, S, and G2, is a period of growth and preparation for cell division. During the S phase, DNA is replicated, ensuring that each daughter cell receives a complete set of genetic information. The M phase, or mitosis, involves the actual division of the cell into two genetically identical daughter cells. Mitosis such as prophase, metaphase, anaphase, and telophase, each marked by specific events such as chromosome condensation, alignment, and separation. (Flajnik et al. 2010).

REFERENCES

1. Kuross, SA., Rank, BH., Hebbel, RP., (1988). Excess heme in sickle erythrocyte inside-out membranes: possible role in thiol oxidation. Blood. 71(4):876-882.
2. Arese, P., Turrini, F., Schwarzer, E., (2005). Band 3/complement-mediated recognition and removal of normally senescent and pathological human erythrocytes. Cell Physiol Biochem.16 (6):133-146.
3. Williams,TN., Mwangi, TW., Roberts, DJ., Alexander, ND., Weatherall, DJ., et al., (2005). An immune basis for malaria protection by the sickle cell trait. PLOS Medicine. 2(5):e128.
4. Schofield, L., Grau, GE., (2005). Immunological processes in malaria pathogenesis. Nat Rev Immunol. 5 (9):722-735.
5. Flajnik, MF., Kasahara, M., (2010). Origin and evolution of the adaptive immune system: genetic events and selective pressures. Nat Rev Genet. 11(1):47-59.

Citation: Kites S. (2023). The Fundamental Biological Processes. GBSSJAR.60(3), 1-2. DOI: 10.36962/GBSSJAR /60.4.003