***Basics of Biology***

***Introduction***

The science of biology is the study of living things and how they

interact with their surroundings.

All living things are made up of cells’. ‘The cell is the basic unit ofstructure and function’. These generalized statements are known as Cell

theory. This theory was forwarded by Mathias Schleiden and Theodor

Schwann in 1838 - 1839.

Today the cell theory includes four more ideas :

l - The cells are the building block of structures in living things

2- The cell is derived from other cells by division

3- The cell contains information that is used as instructions for growth,

development and functioning

4- The cell is the functioning unit of life; the chemical reactions of life

take place within cells.

The idea and concept of cell biology evolved during the 19th century

as a result of gradual advancement in the field of microscopy and biochemistry.

Today the study of the structure of cells (cytology) is part of a major

branch of biology known as cell biology. Due to its wide application many new branches have sprung up in biology. Some of the new branches related to cytology are, Cytotaxonomy, Cytogenetics, Cell physiology, Cytochemistry, Molecular Biology, Cytopathology and Cytoecology.

The cells exist in a wide variety of forms, from single cell in free-living organisms to those in complex biological organisms.

All biological systems, are composed of the same types of chemical molecules and utilize similar principles in replication, metabolism, and, in higher organisms, the ability to organize at the cell levels.

***\*Prokaryotes***

Prokaryotes are organisms made up of cells that lack a cell nucleus or any membrane-encased organelles. This means the genetic material DNA in prokaryotes is not bound within a nucleus. Additionally, the DNA is less structured in prokaryotes than in eukaryotes. In prokaryotes, DNA is a single loop. In Eukaryotes, DNA is organized into chromosomes. Most prokaryotes are made up of just a single cell (unicellular) .

***\*Eukaryotes***

Eukaryotes are organisms made up of cells that possess a membrane-bound nucleus (that holds genetic material) as well as membrane-bound organelles. ***Genetic material*** in eukaryotes is contained within a nucleus within the cell and DNA is organized into chromosomes. Eukaryotic organisms may be multicellular or single-celled organisms. All animals are eukaryotes.

***An important feature*** of the eukaryotic cell is its ability to differentiate and produce a variety of cells, each carrying out a specialized function. Animal cells become specialized by concentrating specific organelles and greatly developing specific cellular activities which can generally be found to more limited extents in all animal cells. Thus, living organisms formed from cells are highly complex and organized and perform ***a variety of functions*** :

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| **Function** | **Specialized Cell(s)** |
| Movement | Muscle and other contractile cells |
| Form adhesive and tight junctions between cells | Epithelial cells |
| Synthesize and secrete components of the extracellular matrix | Fibroblasts, cells of bone and cartilage |
| Convert physical and chemical stimuli into action potentials | Neurons and sensory cells |
| Synthesis and secretion of enzymes | Cells of digestive glands |
| Synthesis and secretion of mucous substances | Mucous-gland cells |
| Synthesis and secretion of steroids | Some adrenal gland, testis, and ovary cells |
| Ion transport | Cells of the kidney and salivary gland ducts |
| Intracellular digestion | Macrophages and some white blood cells |
| Lipid storage | Fat cells |
| Metabolite absorption | Cells lining the intestine |