Programme: F.Y.B.Sc.

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Paper Title: Introduction and Scope of Microbiology

Unit: 2 - Diversity of Microorganisms

Module Name: General characteristics of cellular microorganisms Part I

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Notes

All living things are made of cells. The smallest unit of life is cell. One of the most important concepts in biology is that a cell is a basic structural and functional unit of life. All living organisms have cellular organization and may contain one or many cells. The organisms with only one cell in their body are called unicellular organisms (E.g. bacteria, blue green algae, some algae, protozoa, etc.). The organisms having many cells in their body are called multicellular organisms (E.g. fungi, most plants and animals).

The Prokaryote/Eukaryote nomenclature was proposed by Edouard Chatton in 1937 to classify living organisms into two major groups:

- **A.** Prokaryotes (bacteria) and
- **B.** Eukaryotes (organisms with nucleated cells).

a) Prokaryotes

Prokaryotes are organisms made up of cells that lack a cell nucleus or any membrane-bound structures known as organelles. Organisms with prokaryotic cells are called prokaryotes. Prokaryotic DNA is found in the central part of the cell: a darkened region called the nucleoid. In prokaryotes, DNA is a single loop. Prokaryotes belong to two taxonomic domains which are the bacteria and the archaea. Most prokaryotes range between 1 µm to 10 µm, but they can vary in size from 0.2 µm to 750 µm. Prokaryotic ribosomes are 70S in size, being composed of 30S and 50S subunits.

b) 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 and DNA is organized into chromosomes. Eukaryotic cells are much larger than prokaryotic cells. Range between 10 to 100 micrometers. Eukaryotic organisms may be multicellular or single-celled organisms. All species of large complex organisms are eukaryotes, including animals, plants and fungi and most species of protist microorganisms. Other than the nucleus eukaryotic cells contain a variety of different compartments with specialized functions separated from one another by layers of membrane such as nucleus,endoplasmic reticulum, ribosomes (80S are made up of

40S and 60S subunits), Golgi apparatus, mitochondria, etc**.** The ability to maintain different environments inside a single cell allows eukaryotic cells to carry out complex metabolic reactions that prokaryotes cannot.