***KASHIF ANWAR***

***IT-A***

***IT2018/059***

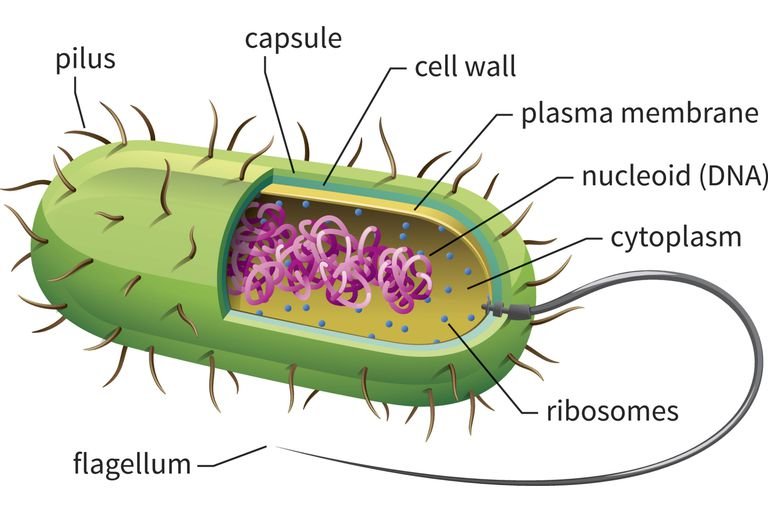
**1. What are Prokaryotes (with example).**

**Ans.**

**Prokaryotes** are 1-celled organisms that do not have a nucleus or any other membrane-bound organelles inside them. The name prokaryote itself actually lets you know that there isn't a nucleus, since pro means before and karyo refers to nucleus.

Prokaryotes are filled with cytoplasm and contain very few and basic internal structures. The genetic information is carried on circular pieces of DNA. There may be only one piece of DNA or many pieces of DNA. The only organelles, or internal structures that exist in prokaryotes are ribosomes, which make proteins needed by the organism.

Prokaryotes include Archaea, bacteria and cyanobacteria.



**Basic structure of a prokaryotic cell**

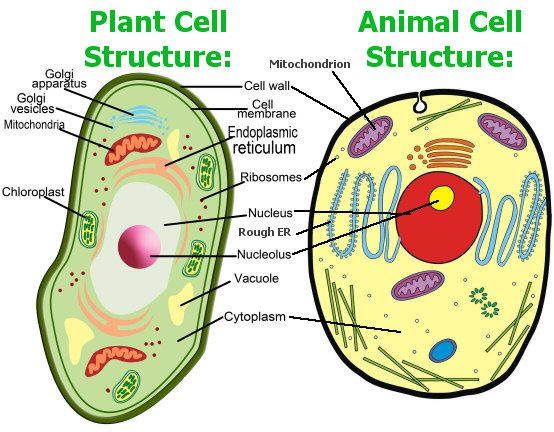
**2. What are Eukaryotes (with example).**

**Ans.**

Eukaryotes are organisms whose bodies are made up of eukaryotic cells. Eukaryotic cells are cells that contain a nucleus and organelles, and are enclosed by a plasma membrane. Organisms with eukaryotic cells are grouped into the biological domain Eukaryota (also sometimes called Eukarya). The other two domains of life, Archaea and Bacteria, have prokaryotic cells, which are simpler and lack organelles except for ribosomes, which make proteins.

There are four types of eukaryotes: animals, plants, fungi, and protists.

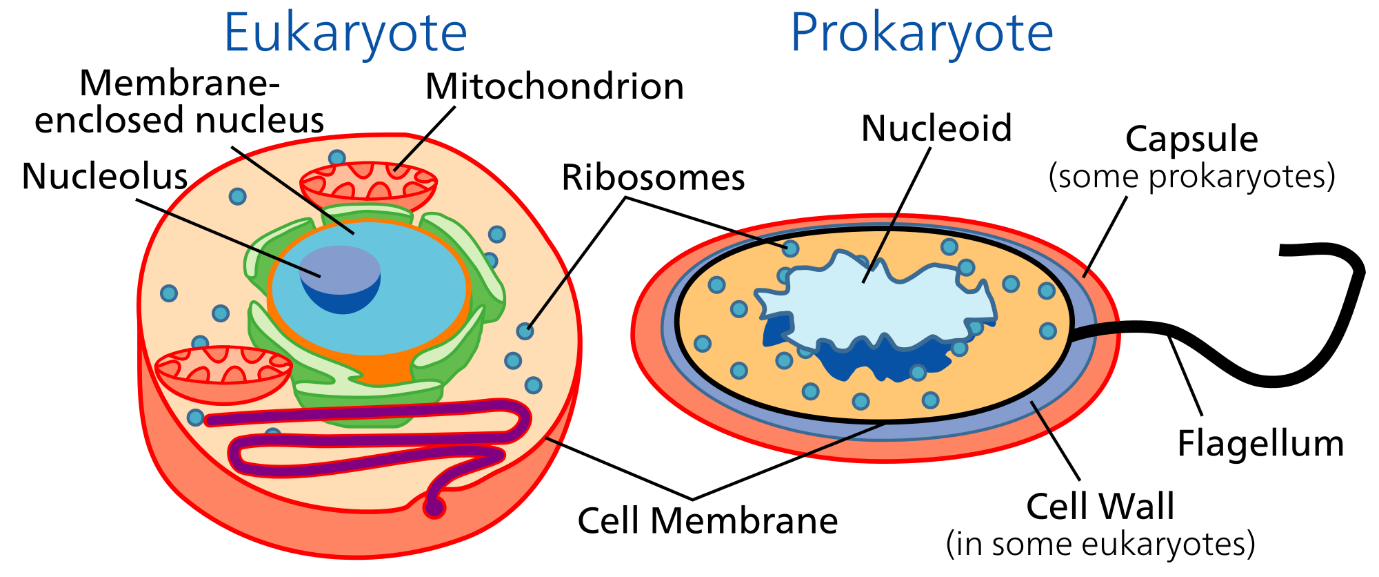
Example : Animals, protozoa, yeast, paramecia, etc.



**Q3. Difference between prokaryotes and eukaryotes.**

**Ans.**

|  |  |
| --- | --- |
| **Prokaryotic Cells** | **Eukaryotic Cells** |
| * Size : 0.5 – 3 μm * Single-Celled * Mode of reproduction : Asexual. * DNA (shape) : Circular * Cell Division : Binary Fission. * Organelles are not membrane bound, if present any. * Well-defined nucleus is absent, rather ‘nucleoid’ is present. * Examples : Archaea, Bacteria. | * Size : 2 – 100 μm * Multicellular * Mode of reproduction : Sexual. * DNA (shape) : Linear * Cell Division : Mitosis (fundamental division). * Organelles are membrane bound and specific with actions. * Well-defined nucleus is present enclosed within nuclear membrane. * Examples : Plants and Animals. |



**Q4. Similarities between prokaryotes and eukaryotes.**

**Ans.**

* Usually, the diameter of prokaryotic cells ranges from 0.1–5.0µm while the diameter of eukaryotic cells ranges from 10-100µm. Despite the difference, both the cells are microscopic and are visible only through light and electronic microscope.
* All prokaryotic cell and unicellular eukaryotic cells have flagella; thin thread like structure attached to the outer surface of the cell. The flagella help in locomotion and chemotaxis.
* Although different in structure, DNA is the genetic material in both types of cells.
* Protein-RNA complex molecules called Ribosomes are present in both the cells. Ribosomes in both the cell carry out same function.
* Cell organelles in prokaryotic cells as well as in eukaryotic cells are held in place by the cytoplasm. The cytoplasm of both types of cells also has similar composition.
* Cell wall is the extra rigid outermost covering of the cell which prevents cell dehydration and provides typical shape to the cell. Such protective layer is present in all prokaryotic cells and eukaryotic plant cells.
* All prokaryotic cells and almost all eukaryotic cells reproduce asexually. Binary fission is the process that prokaryotic cells reproduce through while eukaryotic cells reproduce through mitosis.

**Q5. Unicellular organisms are not always Prokaryotes. Justify with example.**

**Ans.**

We know that, all the prokaryotes are unicellular organisms. But unlike prokaryotes, eukaryotes can be both unicellular and multicellular. Since, eukaryotes can be unicellular too, opposing the common belief of being only multicellular. For example, Euglena is unicellular eukaryote, with well defined organelles.

Thus, an unicellular organism can be either prokaryote or eukaryote.

Other example of unicellular eukaryotes : Protozoa, Algae, etc.

**Q6. What is a model organism? (With example)**

**Ans.**

A model organism is a species that has been widely studied, usually because it is easy to maintain and breed in a laboratory setting and has particular experimental advantages. Model organisms are widely used to research human disease when human experimentation would be unfeasible or unethical.

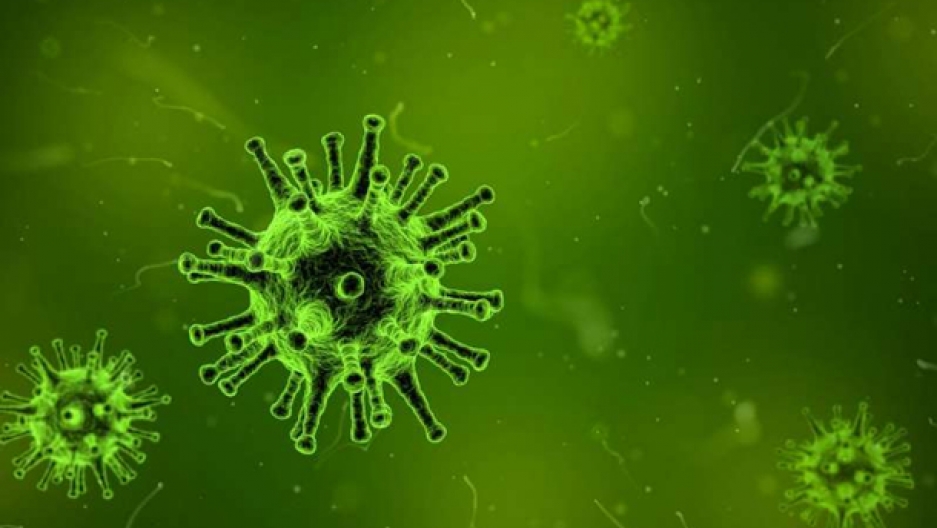
Examples include baker's yeast (Saccharomyces cerevisiae), the fruit fly (Drosophila melanogaster) and the nematode worm (Caenorhabditis elegans).

**Q7. Write about classification of microorganisms (diagram only).**

**Ans.**

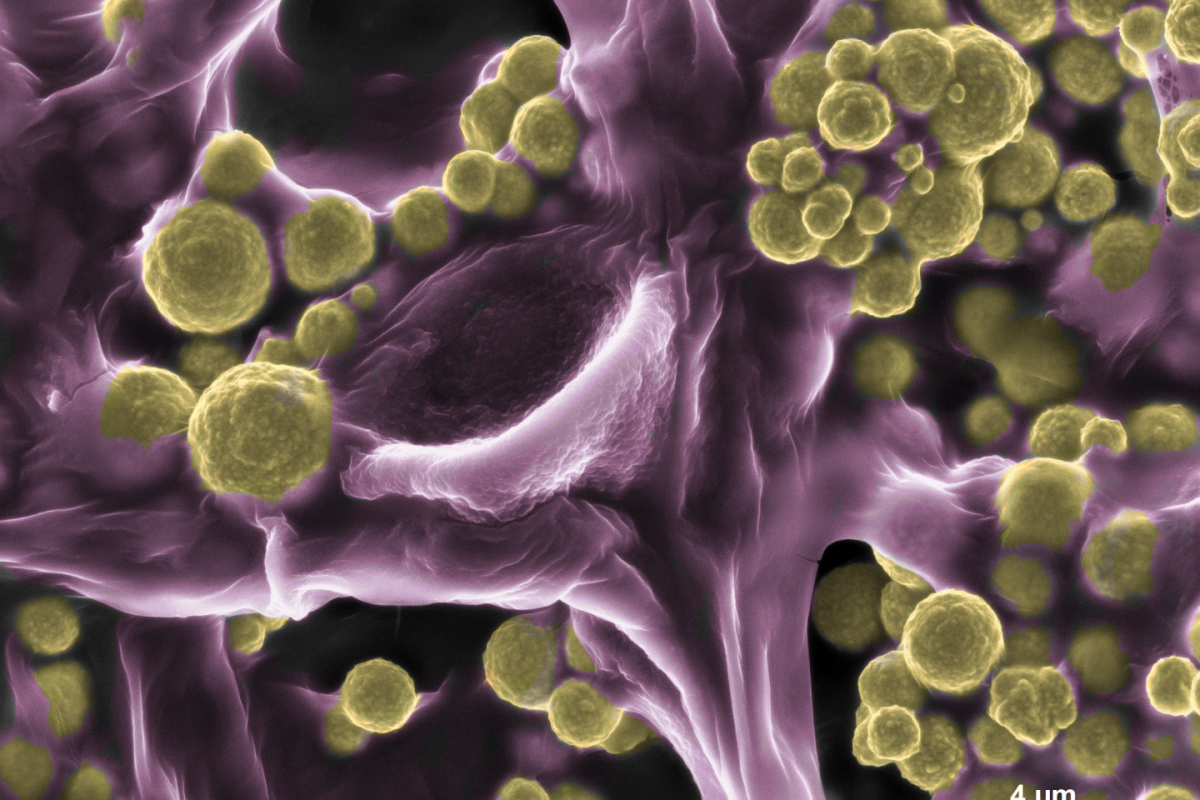
**Microorganisms :**

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**virus**

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**Protozoa**

****

**fungi**

****

**multicellular animal parasites (helminths )**



**Bacteria**



**Archaea**

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**algae**

**Q8. Explain using graph**

**a) Lag phase**

**b) Log phase**

**c) Stationary phase**

**d) Death phase of microorganisms.**

**Ans.**

The bacterial growth curve represents the number of live cells in a bacterial population over a period of time.

* **Lag Phase:** This initial phase is characterized by cellular activity but not growth. A small group of cells are placed in a nutrient rich medium that allows them to synthesize proteins and other molecules necessary for replication. These cells increase in size, but no cell division occurs in the phase.
* **Exponential (Log) Phase:** After the lag phase, bacterial cells enter the exponential or log phase. This is the time when the cells are dividing by binary fission and doubling in numbers after each generation time. Metabolic activity is high as DNA, RNA, cell wall components, and other substances necessary for growth are generated for division. It is in this growth phase that antibiotics and disinfectants are most effective as these substances typically target bacteria cell walls or the protein synthesis processes of DNA transcription and RNA translation.
* **Stationary Phase:** Eventually, the population growth experienced in the log phase begins to decline as the available nutrients become depleted and waste products start to accumulate. Bacterial cell growth reaches a plateau, or stationary phase, where the number of dividing cells equal the number of dying cells. This results in no overall population growth. Under the less favorable conditions, competition for nutrients increases and the cells become less metabolically active. Spore forming bacteria produce endospores in this phase and pathogenic bacteria begin to generate substances (virulence factors) that help them survive harsh conditions and consequently cause disease.
* **Death Phase:** As nutrients become less available and waste products increase, the number of dying cells continues to rise. In the death phase, the number of living cells decreases exponentially and population growth experiences a sharp decline. As dying cells lyse or break open, they spill their contents into the environment making these nutrients available to other bacteria. This helps spore producing bacteria to survive long enough for spore production. Spores are able to survive the harsh conditions of the death phase and become growing bacteria when placed in an environment that supports life.

