

Prokaryotic & eukaryotic cells

All life on Earth consists of either eukaryotic cells or prokaryotic cells. Prokaryotes were the first form of life. Scientists believe that eukaryotes evolved from prokaryotes around 2.7 billion years ago. The primary distinction between these two types of organisms is that eukaryotic cells have a membrane-bound nucleus and prokaryotic cells do not. The nucleus is where eukaryotes store their genetic information. In prokaryotes, DNA is bundled together in the nucleoid region, but it is not stored within a membrane-bound nucleus. The nucleus is only one of many membrane-bound organelles in eukaryotes. Prokaryotes, on the other hand, have no membrane-bound organelles. Another important difference is the DNA structure. Eukaryote DNA consists of multiple molecules of double-stranded linear DNA, while that of prokaryotes is double-stranded and circular. Every living organism falls into one of two groups: eukaryotes or prokaryotes. Cellular structure determines which group an organism belongs to. In this article, we will explain in detail what prokaryotes and eukaryotes are and outline the differences between the two. Prokaryotes are unicellular organisms that lack membrane-bound structures, the most noteworthy of which is the nucleus. Prokaryotic cells tend to be small, simple cells, measuring around 0.1-5 μm in diameter. Examples of prokaryotes : Bacteria and archaea are the two types of prokaryotes. Prokaryotes do not have a nucleus. Instead prokaryote DNA can be found, bundled but free-floating, in a central region called the nucleoid. Prokaryote DNA is usually found as a single chromosome of circular DNA. These organisms also lack other membrane-bound structures such as the endoplasmic reticulum. prokaryotes do not have mitochondria. Mitochondria are only found in eukaryotic cells. This is also true of other membrane-bound structures like the nucleus and the Golgi apparatus (more on these later). Eukaryotes are organisms whose cells have a nucleus and other organelles enclosed by a plasma membrane. Organelles are internal structures responsible for a variety of functions, such as energy production and protein synthesis. Eukaryotic cells are large (around 10-100 μm) and complex. While most eukaryotes are multicellular organisms, there are some single-cell eukaryotes. Examples of eukaryotes: Animals, plants, fungi, algae and protozoans are all eukaryotes. In prokaryotic cells, transcription and translation are coupled, meaning translation begins during mRNA synthesis. In eukaryotic cells, transcription and translation are not coupled. Transcription occurs in the nucleus, producing mRNA. The mRNA then exits the nucleus, and translation occurs in the cell's cytoplasm.

Questions:

Topic 1

- 1) What are the main differences between a eukaryotic and a prokaryotic cell?

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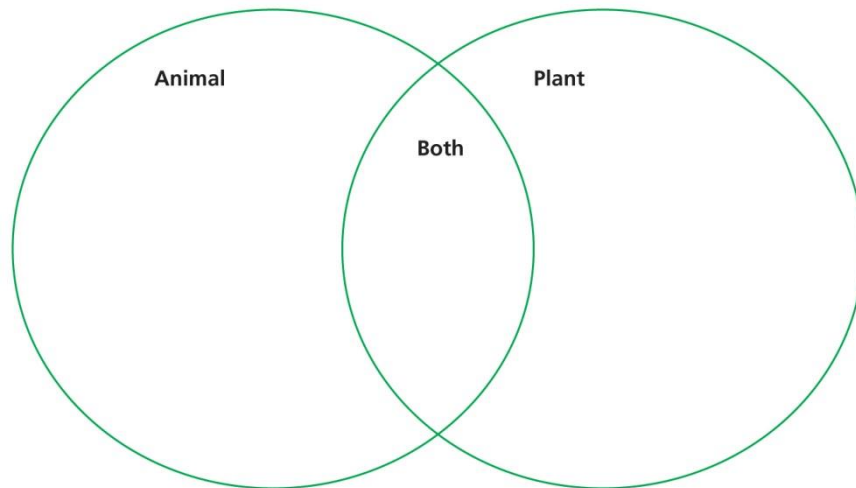
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2) The table below shows the differences between eukaryotes and prokaryotes. Put a tick if an organelle is present and a cross if it is absent.

Structure	Eukaryote	Prokaryote
Mitochondria		
Ribosomes		
Cytoplasm		
Plasmid		

3) Some eukaryotic organelles are found in animals only, some in plants only and some in both. Complete the Venn diagram by putting the organelles into the correct sections.

- chloroplasts cell membrane vacuole
- nucleus cell wall starch grains
- chromosomes mitochondria glycogen



4) What is the job of:

a) the cell surface membrane?

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b) ribosomes?

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5 Microscopes make it possible to see very small objects in much greater detail. The microscope does this by enlarging the object so that it looks bigger. They also allow two objects which are very close together to be seen as separate structures.

a) Copy out the section of the paragraph which is a description of resolution.

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b) Copy out the section of the paragraph which describes magnification.

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c) A specimen is put under a light microscope which has a $\times 20$ magnification eyepiece lens and $\times 40$ magnification objective lens. What is the total magnification of the specimen? Show your working out.

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