

A significant similarity is the fact that both prokaryotes and eukaryotes use the same genetic material (DNA) and genetic code to store and translate genetic information. But this genetic information is arranged very differently within the two types of cell. In eukaryotes the DNA is packed into chromatins and sequestered within a double membrane bound organelle, known as the nucleus, and is easily seen using a microscope. On the other hand, prokaryotes lack this distinct nucleus and nuclear membrane but instead have a nucleoid, which is an irregularly shaped region within the cell where the genetic information is localised in the form of a, usually circular, double strand of DNA.

Prokaryotes and some eukaryotes are also known to have additional small satellite structures of DNA called plasmids. Both prokaryotes and eukaryotes also contain ribosomes which are the organelles responsible for accurately translating this linear genetic code (via messenger RNA) into a linear sequence of amino acids to produce a protein. This is because all cells require the continued synthesis of new proteins for growth and repair. These ribosomes are different in size though: whilst prokaryotes have ribosomes of size 70S, those found in eukaryotes are larger at 80S.

One of the most noticeable differences between the two types of cell is the abundance of membrane bound organelles, or subcompartments, which carry out specialised reactions within their boundaries, found in eukaryotes compared to prokaryotes. Particularly as two of these organelles, the mitochondria and the chloroplasts found in plant cells, are believed to have been descendents of, and so derived from, endosymbiotic bacteria. These organelles contain 70S ribosomes, the same as prokaryotes, and perform metabolic processes which are similar to those that occur across the cell membrane in prokaryotes. This is evidence of the higher order of complexity found in eukaryotes suggesting that prokaryotes are indeed the oldest of the types of cell and the precursor to the eukaryote.

Previously, prokaryotes were considered to lack membrane bound organelles, but is now known that they are found in some groups of prokaryotes and that these systems are usually devoted to special metabolic processes such as photosynthesis or chemolithotrophy. This leads to the fact that prokaryotes have a far greater diversified metabolism than eukaryotes because in addition to the photosynthesis of organic compounds, prokaryotes may also obtain energy from chemicals such as hydrogen sulfide.

It was also thought that, whereas the interior of a eukaryotic cell is a dense network of structural proteins, collectively termed the cytoskeleton, within which is embedded a large number of organelles, there was no cytoskeleton within prokaryotic cells. However, recent research has shown that prokaryotes do, indeed, have a cytoskeleton, albeit a very primitive form. Besides homologues of actin and tubulin – the helically arranged building blocks of flagellums flagellin is one of the most cytoskeletal proteins and is found in bacteria