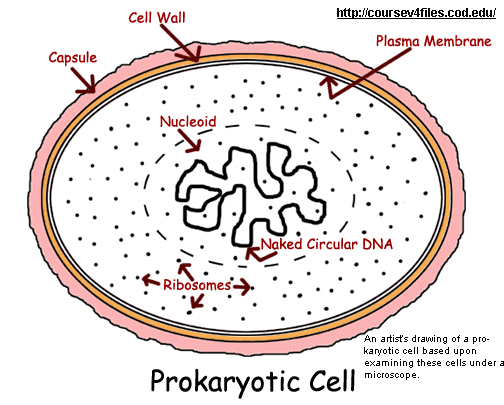
A living cell is a complex, multi-functional unit. Even the simplest cell performs a large array of different tasks and functions. Cells come in two basic types. Prokaryotic cells are found in bacteria, including both Archaebacteria and Eubacteria, and the blue-green algae. Eukaryotic cells are found in animals, plants, Fungi and protists.

**Cell structure**

<http://www.cod.edu/people/faculty/fancher/cellstructure.htm>

(Text adapted)

Here is a labeled diagram of a simple prokaryotic cell:

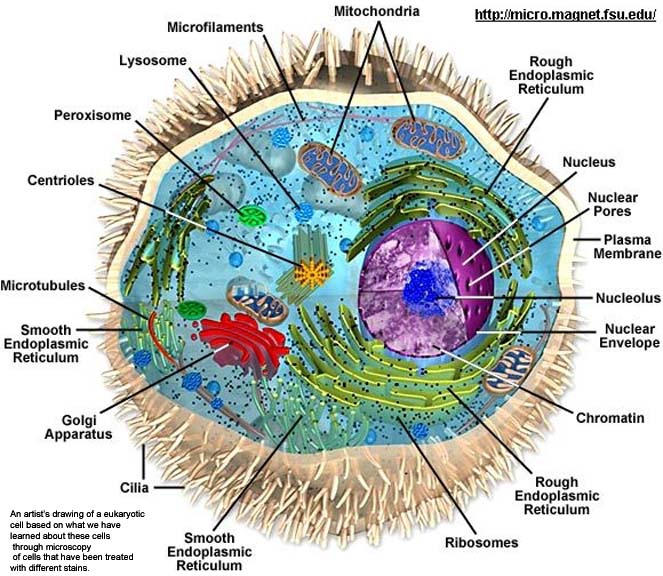
The structures shown here are:

1. The plasma membrane, which serves as a diffusion barrier between the cell and its environment. All living cells have plasma membranes. It prevents the loss of cellular materials. It also prevents many substances from diffusing into the cell. And it also controls the movements of various substances and objects into and out of the cell.
2. The cell wall, which is very different from the plasma membrane. Cells with cell walls also have plasma membranes. One of the primary functions of the cell wall is physical support. Some kinds of bacterial cell walls also have other functions.
3. The capsule, which is not found in all prokaryotic cells. The capsule is composed of rather amorphous polysaccharide material similar to mucous. This material is hygroscopic, meaning that it has a great capacity to retain water. Water is a vital component of any living cell, and this layer around the cell can be very advantageous for the cell.
4. The nucleoid, which is an essentially imaginary "structure." This is the central region of the cell, where the DNA is largely located. This is the region in the cell in which the functions of a eukaryotic cell's nucleus occur.
5. The naked, circular DNA, which is characteristic of prokaryotic cells, mitochondria and chloroplasts. This DNA is structurally identical to the DNA found in a eukaryotic cell's nucleus, except that instead of being like a long string, with two ends, it's formed into a closed circle. This DNA molecule, which is not properly called a chromosome, carries all of the essential genes for the cell.

Not pictured here are plasmids. These are much smaller circles of DNA, carrying only a very few genes each. The genes on plasmids are "luxury" genes--the cell doesn't need any of them for normal functions of life. Genes carried on plasmids are often things like antibiotic resistance genes. The F factor which determines the role of the cell in sexual reproduction is also often a plasmid gene.

1. Ribosomes are another essential component for any living cell. Each cell contains many ribosomes. The function of a ribosome is to make protein, following instructions sent from the DNA's genes.

And the cytoplasm is the fluid substance that fills the interior of the cell. The complexity of cytoplasm is mostly water, but contains a large assortment of molecular and structural components.

Eukaryotic cells, while very similar in function to prokaryotic cells, are much larger and more complex. They are typically characterized by the presence of a prominent, more or less central nucleus. Viewed through a light microscope, this nucleus is by far the most striking visible feature of the cell. Eukaryotic cells are found in animals, plants, Fungi and protists, and there are structural differences among these four groups. Here's a labeled diagram of a typical eukaryotic animal cell.

As you can see from comparing these labels, there are several features which are common to both prokaryotic and eukaryotic cells. Recall that these cells perform the same kinds of functions. The eukaryotic cell is much larger than the prokaryotic cell, and this larger size means that there's a lot more space inside the cell. In order to make the huge space relatively as efficient as the small space, a lot of compartmentalization and internal specialization is required.

1. The plasma membrane for a eukaryotic cell is the same kind of structure, and has the same function as the plasma membrane of a prokaryotic cell.
2. Endoplasmic Reticulum (ER) is a system of membrane-enclosed channels which ramifies throughout the cytoplasm of the cell. "Endo" means "inside," "plasmic" refers to the cytoplasm, and "reticulum" means "network." ER interconnects with the plasma membrane and the nuclear envelope. ER has several functions. It helps to compartmentalize the cell, and it serves as routes for the transport of materials from one part of the cell to another. It comes in two types--smooth and rough. The difference is that rough ER has ribosomes all over its outer surface. And smooth ER is responsible for generating new layers for Golgi bodies.
3. Vacuoles are small, varied membrane "bubbles" found throughout the cytoplasm. Vacuole is a very general term, and there are quite a few different kinds of vacuoles, including food vacuoles, contractile vacuoles, and the very specialized central vacuoles found only in plant cells.
4. Each cell contains a number of Golgi bodies. "Golgi" is the name of the person who first described these structures. Their function is to process materials manufactured by the cell, then package those products into small structures called "Golgi vesicles." The materials arrive at the Golgi bodies from the smooth endoplasmic reticulum.
5. Mitochondria are very complex, double-membrane-bound organelles. Their function is to perform the aerobic portions of aerobic cellular respiration, the essential energy-producing process of the cell. This is the same function performed by the mesosomes in many prokaryotic cells. Mitochondria contain their own naked, circular DNA and their own ribosomes.
6. Ribosomes perform precisely the same function in eukaryotic cells as they perform in prokaryotic cells. Eukaryotic ribosomes are larger and more complex than prokaryotic ribosomes, but they are very similar.
7. The centrioles are a pair of structures composed of microtubules. The primary function of centrioles is to generate the cell's cytoskeleton. The cytoskeleton is a system of microtubules and microfilaments which runs all through the cell, particularly just under the plasma membrane. Microtubules and microfilaments are responsible for all kinds of movement functions. One of the important functions that centrioles perform is the generation of cilia and flagella for cells. These are surface features that cells use for movement.
8. The nucleus of the cell is a chamber specialized in DNA functions. It's enclosed by a double layer of membrane called the nuclear envelope. The function of the nuclear envelope is to confine the materials necessary for DNA and RNA synthesis inside the nucleus, and controlling movement into and out of the nucleus.
9. The nucleus contains several--generally two to four--dense structures called nucleoli (singlur "nucleolus"). Assembly of ribosomes takes place in nucleoli.
10. The nucleus of a eukaryotic cell contains a number of chromosomes, which are composed of DNA and histone proteins. The number, shape and arrangement of genes on chromosomes is characteristic of the species from which the nucleus came. Chromosomes carry the information archive of the cell. Each gene is a set of instructions for the construction of a specific protein.
11. Nuclear pores perforate the double nuclear envelope. These pores do have structures in them which open and close to control movement through the pores. The nuclear pores are important for ribosomes to leave the nucleus. Though ribosomes are constructed in the nucleus, they must move to the cytoplasm in order to function.
12. The nucleoplasm fills the interior of the nucleus. This is very similar to cytoplasm. It's mostly composed of water, containing a complex assortment of materials. Nucleoplasm would be distinct from cytoplasm due to the high concentration of materials like nucleotides, which are used to make DNA and RNA, and the suite of enzymes which control the DNA and RNA construction reactions.

This diagram and list are not exhaustive. There are other structures which have been identified within cells.