What Prokaryotic and Eukaryotic cells have in common:

- Both have DNA as their genetic material (it’s DNA that tells cells what kind of cells they should be and how to function).
- Both are covered by a cell membrane.
- Both contain RNA.
- Both are made from the same basic chemicals: carbohydrates, proteins, nucleic acid, minerals, fats and vitamins.
- Both have ribosomes (the structures on which proteins are made).
- Both regulate the flow of the nutrients and wastes that enter and leave them.
- Both have similar basic metabolism (life processes) like photosynthesis and reproduction.
- Both require a supply of energy.
- Both are highly regulated by elaborate sensing systems ("chemical noses") that make them aware of the reactions within them and the environment around them.

http://youtu.be/yWy4o_UfZ4A
Prokaryotic and Eukaryotic Differences

Age Differences

Scientists believe that prokaryotic cells (in the form of bacteria) were the first life forms on earth. They are considered “primitive” and originated about 3.5 billion years ago. That’s 2 billion years earlier than eukaryotic cells and billions of years before our earliest ancestors, the hominids.

Here is a brief timeline of the development of life on Earth:

- 4.6 billion years ago the Earth was formed
- 3.5 billion years ago the first life arose: prokaryotic bacteria
- 1.5 billion years ago eukaryotic cells arose
- 0.5 billion years ago the Cambrian explosion – multi-celled eukaryotes arose
- 3 million years ago our earliest ancestors, the hominids, appeared.

There is strong data to suggest that eukaryotic cells actually evolved from groups of prokaryotic cells that became interdependent on each other. You’ll be learning more about this theory later.

Structural Differences

Eukaryotic cells contain two important things that prokaryotic cells do not: a nucleus and organelles (little organs) with membranes around them.

DNA arrangement
Both contain DNA. However, the DNA in eukaryotic cells is held within the nucleus. In prokaryotic cells, the DNA floats freely around in an area called the nucleoid. While eukaryotic cells contain many strands of DNA in the form of chromosomes (the number depending on the organism), prokaryotic cells have only a single loop of DNA.

Presence of organelles
Eukaryotic cells have organelles (little organs) that allow them to perform more complex functions. Prokaryotic cells do not have organelles. We’ll be learning more about organelles later.

Size
Eukaryotic cells are larger than prokaryotic cells. On average, ten times larger.
**Examples Organisms**

Organisms with eukaryotic cells - can be single celled or multicellular
eg. protists, fungi, plants, animals

Organisms with prokaryotic cells - are all single celled
eg. bacteria, blue-green algae, archea

**New Discoveries**

Until recently, it was thought that only eukaryotic cells existed in multi-cell groups like in organs and tissues. But recent discoveries suggest that some prokaryotic cells do too. This is just one more example of how new discoveries are always changing what we know - or think we know.

But that’s what makes science so exciting!

[http://youtu.be/4ASXK6RG_f0](http://youtu.be/4ASXK6RG_f0)
# Compare and Contrast

**Prokaryotic Cells and Eukaryotic Cells**

<table>
<thead>
<tr>
<th>How they are Similar</th>
<th>Prokaryotic Cell – labeled drawing</th>
<th>Eukaryotic Cell – labeled drawing</th>
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<th>Differences</th>
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