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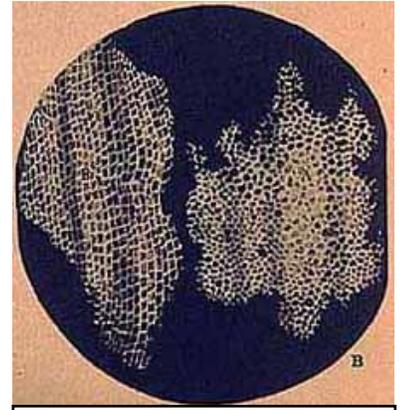
## Cell Notes

In 1665, the English scientist, Robert Hooke, built his own microscope and wrote a book about what he saw while using it. The book, titled *Micrographica*, included the picture to the right, about which Hooke wrote,

“... I could exceedingly plainly perceive it to be all perforated and porous, much like a Honey-comb, but that the pores of it were not regular. . . . these pores, or cells, . . . were indeed the first *microscopical* pores I ever saw, and perhaps, that were ever seen, for I had not met with any Writer or Person, that had made any mention of them before this. . . .”

Hooke discovered and named “cells” while looking at a thin slice of cork under his microscope. The plant cells of the cork reminded him of the small rooms monks lived in which were called, “cells.”

As scientists studied cells more, they came up with a set of basic ideas about cells called the Cell Theory.



Robert Hooke made this drawing of what he saw in his microscope when he looked at a slice of cork.

### The Cell Theory

1. Cells are the basic unit of living things.

- Like a brick is the basic unit of a brick house, or a popsicle stick is the basic unit of a popsicle stick bridge, cells are the basic building block of living things.

2. All living things are made of 1 or more cells.

- If an object is not made of at least one cell, that object is not alive.
- Some organisms’ entire “body” is one cell.
- The smallest thing that can be considered to be alive is a cell.

3. All cells come from cells that already existed.

(How the first cells came to be is a matter of personal belief, but since then, the following rule applies.)

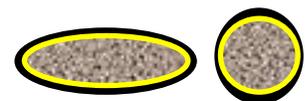
- Living things comes from other living things.

### Two Types of Cells

Scientists studying cells separated them (classified them) into two groups.

**1. Prokaryotic cells** – are cells with no nucleus, and almost no parts inside

- prokaryotic cells are simple, primitive (not-complex) cells
- Archaea & Bacteria are the only types of organisms with prokaryotic cells



Prokaryotic cells  
(no nucleus)

**2. Eukaryotic cells** – are cells with a nucleus and organelles

- eukaryotic cells are a more complex, more advanced kind of cells
- Animals, Plants, Fungi, and Protists all have eukaryotic cells



Eukaryotic cells  
(have a nucleus)



**Organelle** – a part inside a cell. Each has a specific job to do which helps the cell survive.

**Important Organelles and their Jobs**

outside the cell { **cell membrane** – this covering of *all* cells keeps the insides of the cell in, protects the cell, and lets things into and out of the cell

{ **cell wall** – *some* cells have a cell wall to protects the insides and give the cell structure (shape.) Cell walls are found *outside* of the cell membrane. It can be made of different substances.

**cytoplasm** – gel-like goo that fills all cells. Cytoplasm allows materials and organelles to float around in the cell, but doesn't actually move them. The cytoplasm is mostly water.

floating in the cytoplasm { **nucleus** – the nucleus directs all the other cell parts (tells them what to do) and contains the cell's genetic material. Normally, the nucleus is the largest organelle.

{ **mitochondrion** – breaks down food and releases the energy from it for the cell to use

{ **chloroplasts** – take in sunlight, CO<sub>2</sub>, and water to make glucose (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>) through photosynthesis. Only the cells of producers have chloroplasts.

{ **genetic material / chromatin**– All cells contain some type of genetic material that contains the genetic plan (code) that tells how to make that organism. Found in the nucleus (of eukaryotic cells) or in the cytoplasm (prokaryotic cells) Ex. DNA, rNA

{ **ribosomes** – makes protein for the cell. Ribosomes can be found floating in the cytoplasm or sometimes on the ER.

{ **Golgi bodies** – folded membranes that package up materials and carry them out of the cell

{ **endoplasmic reticulum (or ER)** – a long, folded, membrane that moves materials around inside the cell. It can be “rough” if it has ribosomes on it or “smooth” without them.

{ **lysosome** – recycles worn out cell parts and wastes. The lysosome contains powerful chemicals that could breakdown the cell, but also has a thick membrane around it to contain those chemicals.

{ **vacuole** – storage area inside the cell. It can store food, water, or wastes.

**How Cells are Organized**

Cells in a many-celled organism don't work alone. Instead, they are specialized to do certain jobs well. Other forms of cell organization are described below.

animals, fungi, and plants all have these { **tissue** – a group of cells of the same type working together to do a job. Ex. blood, muscle tissue, brain tissue, vascular tissue

{ **organ** – a structure made up of a group of tissues working together to do a job. Ex. heart, lung, brain, leaf, root, stem

{ **organ system** – a group of organs working together to do a specific job. Ex. digestive system, reproductive system, skeletal system

