




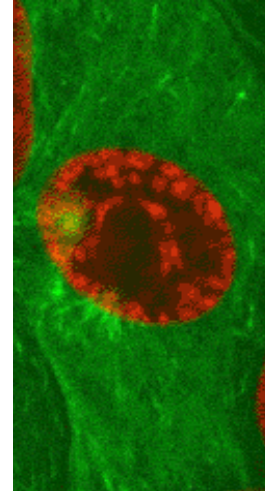
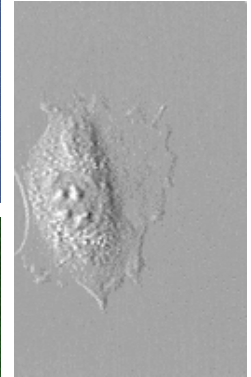
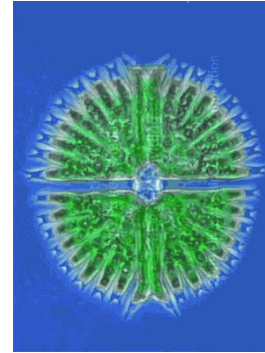
## 1.5.U1

**Cells can only be formed  
by division of pre-existing  
cells.**



## Discuss implications of all cells being formed from preexisting cells.

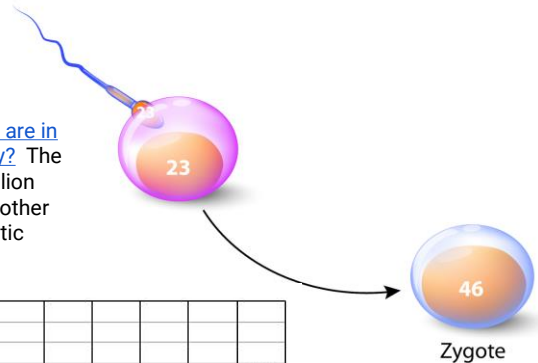
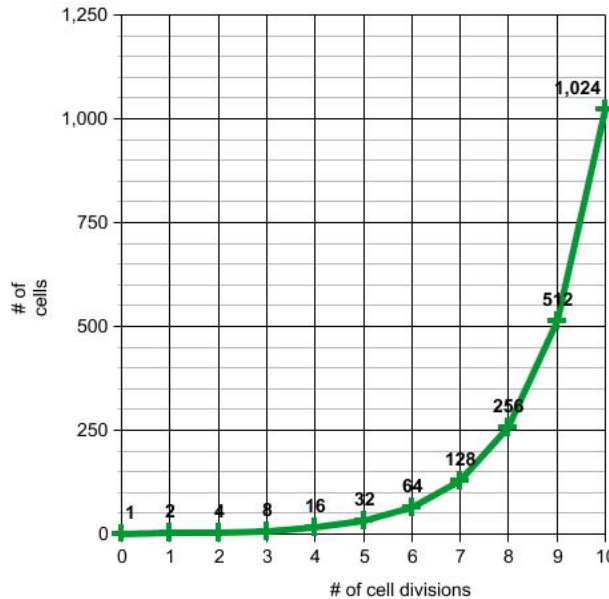
- ⊙ In 1855, after repeated observations, [Rudolf Virchow](#) [proposed that all cells come from other cells](#). His proposal became part of the cell theory.
- ⊙ Humans have observed cells coming from other cells, through fission, mitosis or meiosis.
- ⊙ Scientists have never observed spontaneous generation, and evidence from Pasteur (and others) indicate that spontaneous generation of cells does not now occur on Earth.



# Discuss implications of all cells being formed from preexisting cells.

- ◎ **Implication #1:** We can trace the origin of all the cells in our body back to the first cell; the zygote produced by the fertilization of a sperm and egg.

Just how many cells are in an adult human body? The estimate is 30-40 trillion human cells, plus another 40-50 trillion symbiotic prokaryotic cells!



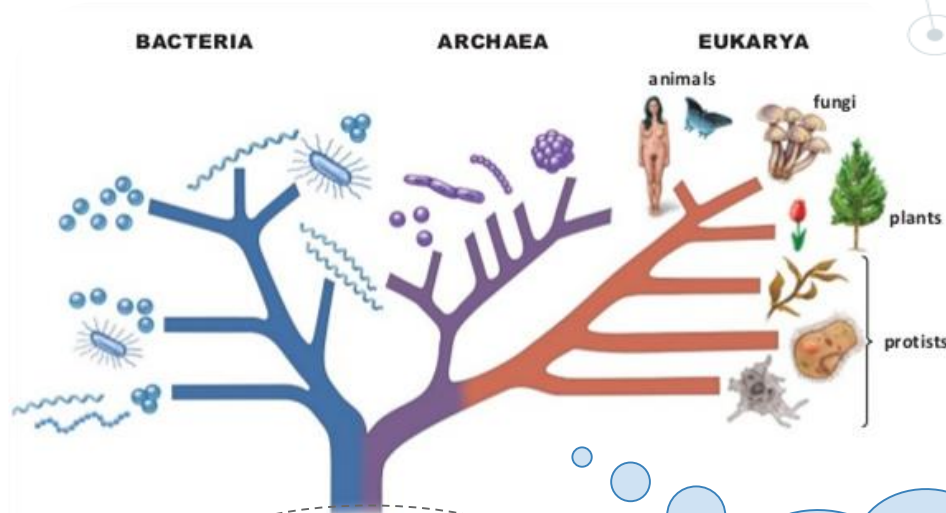
The cells in multicellular organisms are able to specialize for specific functions, through a process called differentiation!

Lots and lots of cell division!



# Discuss implications of all cells being formed from preexisting cells.

- ◎ **Implication #2:**  
The origins of all cells can be traced back through billions of years of evolution to “LUCA” the last universal common ancestor of all life on Earth.



All organisms are classified into three domains; bacteria, archaea and eukarya.

LUCA, the last universal common ancestor.

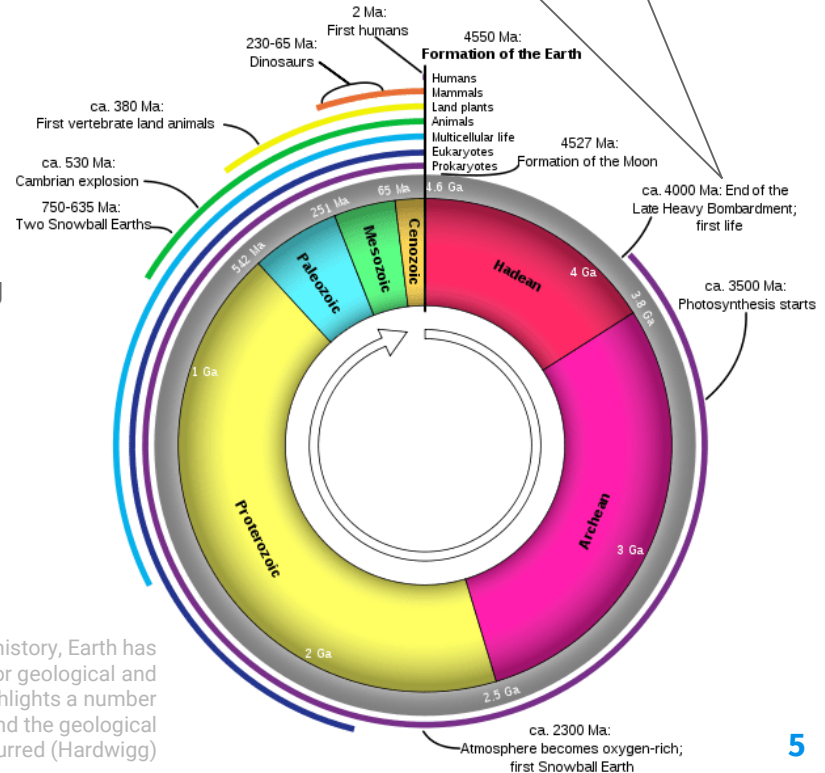
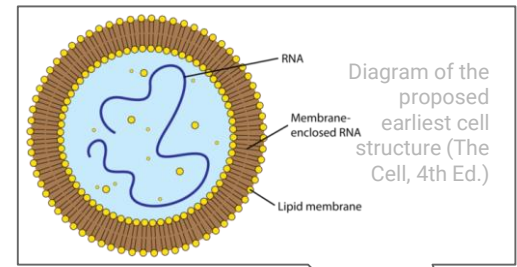
LUCA should not be assumed to be the first living organism on Earth. LUCA is estimated to have lived some 3.5 to 3.8 billion years ago. Read more about LUCA [here](#) or [here](#)!

Cladograms are tree diagrams that show the most probable sequence of divergence between groups of organisms that have evolved from a common ancestor.

# Discuss implications of all cells being formed from preexisting cells.

## ◎ Implication #3: There must have been a first cell that arose from non-living material.

- Life first emerged at least 3.8 billion years ago, approximately 750 million years after Earth was formed.
- How life originated and how the first cell came into being are matters of speculation, since these events cannot be reproduced in the laboratory. Nonetheless, several types of experiments provide important evidence bearing on some steps of the process. [Read more here!](#)
- The first cells were likely some sort of membrane surrounding a self replicating molecule like RNA.



During its dramatic 4.5 billion year history, Earth has gone through a series of major geological and biological changes. The timescale highlights a number of notable prehistoric events and the geological periods in which they occurred (Hardwigg)

## Explore more...

- ◎ If you want to read more about the earliest cells, check out these articles:
  - [Researchers may have solved origin-of-life conundrum](#)
  - [Building blocks for 'RNA world' made from simple ingredients](#)
  - [The end of the RNA world is near, biochemists argue](#)
  - [Scientists take big step toward recreating primordial 'RNA world' of 4 billion years ago](#)
  - [Studying how the first biomolecules self-replicated](#)
  - [Chemists may be zeroing in on the chemical reactions that sparked the first life](#)
  - [Ancient rocks show life could have flourished on Earth 3.2 billion years ago](#)
  - [World's oldest fossils found in Greenland](#)