

prokaryotic and eukaryotic cells, and the organelles the microscope actually revealed

The Cell and the Microscope

- a cell is the structural and functional unit of life, capable of independent existence
- it performs all functions of life on its own
- a simple microscope magnifies 50 to 100 times
- a compound (light) microscope magnifies 1000 times or more
- an electron microscope can magnify up to 500,000 times
- cell size varies hugely: mycoplasma is smallest (0.3 micrometre), bacterial cells 3 to 5 micrometres
- the largest cell is the Ostrich egg, nearly 15 cm; nerve cells are the longest cells
- cells have no single typical shape: spherical, rectangular, flattened, polygonal, oval, triangular, conical, columnar, and more

Cell Theory

- proposed by Schleiden (1838): plant tissues are made of different cell types
- and Schwann (1839): cells are bound by a membrane
- animals and plants are made of cells and cell products
- the original theory did not explain how new cells form
- Rudolf Virchow (1855) supplied that: new cells form by division of pre-existing cells, *Omnis cellula-e-cellula*
- **Modern Cell Theory**: all organisms are made of cells; cells arise from pre-existing cells
- the cell is the structural and functional unit of life
- total cell activity gives an organism's activity
- cells transform energy; cells carry DNA and RNA, in the nucleus and cytoplasm
- **totipotency**: a living, nucleated cell's capacity to differentiate and divide into any cell type
- a totipotent cell can build a whole new organism
- embryonic animal cells are totipotent, called **stem cells**

Discoveries That Built Cell Biology *

Robert Hooke, 1665

first used the term 'cell', in Micrographia

Purkinje and Mohl, 1835-37

discovered protoplasm

Robert Brown, 1831

discovered the nucleus

Camillo Golgi, 1898

discovered the Golgi apparatus

Flemming, 1882

studied cell division in detail and coined the term mitosis

C. de Duve, 1955

discovered lysosomes

