CELL BIOLOGY HISTORY

23 Sept 91, rvsd 26 Sept 1994, 20 Sept '95, 25 Sept '96, 24 Sept 01, 24 Sept 02, 24 Sept 03, 21Sept05, 19Sept07, 24Sept08, 22Sept09
B&D p 2-12 , [BKL, 6th: 2-11?], BKH 5th, 1-13, BKH 6th, 1-13, BKHB 7th: 1-5

Dynamic nature of cell. They:
1. grow
2. reproduce
3. become specialized
4. respond to stimuli
5. adapt to environment

Cell biology formed by convergence of :
1. cytology
2. genetics
3. biochemistry

HISTORY OF CYTOLOGY: (see p 5)
First **descriptive** then investigative. It was initially dependant on new **technology**: microscope.

DESCRIPTIVE

Robert Hooke, 1665, Curator of Instruments for Royal Society, viewed thin slices of cork under 30x lens, showed network of tiny compartments, he called *cellulae* (little rooms)

Antonie van Leeuwenhoek 1673 cloth merchant, developed improved simple 300x microscopes, examined everything, illustrated, communicated to **Royal Society**, last quarter of 17th C.

INVESTIGATIVE:

Robert Brown 1833, English botanist, using improved lenses, noted that every orchid epidermis cell had round structure he termed **nucleus**

Matthias Schleiden 1838, German botanist, concluded all plant tissues are composed of cells
Also, the embryonic plant arose from a single cell.

Theodor Schwann 1839, German zoologist, examined cartilage tissue (NOTE: better cellular definition in cartilage), concluded **all animal tissues are composed of cells**
He proposed first two tenets of cell theory, became the unified cell theory:

UNIFIED CELL THEORY (three tenets):
1) **all organisms made of cells**
2) **cell is the basic unit of structure**

Karl Nägeli 1842, observed cell division in pollen
Robert Remak 1855, noted in div. initiated in nucleus
Koelliker 1852, identified four somatic tissue types (epithelial, connective, muscle, nervous)

Rudolf Virchow 1858, German Physiologist, concluded cells arose only by division of preexisting cells: *Omnis cellula e cellula*, adding 3rd tenet of cell theory:
3) **cells arise only from preexisting cells.**

[end day one, 2008]

TECHNOLOGICAL DEVELOPMENTS OF CYTOLOGY: (*cytos* = Gk, hollow vessel)
concerned with cell **structure**, depended initially on light microscope

microtome [“tiny-cut”]invented in 1870, allowed analysis of tissue structure
dyes developed in Germany 2nd half 19th C, specifically stain particular components
optics improvements pushed to limit of resolution:
depends on wavelength = λ = ‘lambda’ (micrometer = micron = 10^{-6} m [nanometer = 10^{-9}])
lambda/2 = theoretical resolution limit. Thus 400-700 nm lambda resolves 200-350 nm.
Cells often 20-40 microns, organelles, 0.2-2 microns.] therefore mag = 1000-1500x
Electron microscope invented in Germany, 1932.
Palade, Sjostrand and Porter used in early 1950s. limit of resol for electron 0.1-0.2 nm
Magnification up to 100,000x.
Scanning tunneling microscope able to resolve general shape of DNA .