Cell Structure

Parts of a Cell

Cell Wall. The cell wall (a) encloses and protects the cell contents and plays a vital role in cell division and cell expansion. Composed of overlapping cellulose microfibrils, other polysaccharides and varying amounts of lignin, the cell wall is a relatively rigid structure in mature cells. It may vary in thickness and has pits that that function in communication between cells. The region between the primary walls of adjacent cells, the middle lamella (b), is composed of a cementing substance called pectin.

Other substances that may be present in the cell wall are gums, resins, silica, calcium carbonate, waxes and cutin, and both structural protein and enzymes (which are also proteins). There may be intercellular spaces (c) between walls of bordering cells.

Pits. Primary pit fields (d) are thin areas in the cell wall with tiny strands of cytoplasm, called plasmodesmata (s), connecting one cell with another. Pits are important in facilitating the flow of water and mineral nutrients between conducting cells in the xylem vascular tissue (see 11).

Plasma Membrane. A semipermeable membrane (e) encloses the cytoplasm within a cell. It is composed of variable amounts of fat type molecules (lipids) and proteins, and has within it channels for the movement of ions such as potassium (K^+), calcium ($Ca\ 2^+$), and hydrogen (H^+).

Cytoplasm. The cytoplasm (cytosol, f) is a liquid, gel-like substance and contains several types of organelles; smooth (g) or rough endoplasmic reticulum (h), rough referring to attached ribosomes (i) on the ER (endoplasmic reticulum) and free ribosomes.

Vacuole. In a mature plant cell, one large vacuole usually occupies most of the space within the cell. It is surrounded by a single-layered membrane, the tonoplast (j), and contains cell sap composed of water, sugars, and various organic and inorganic solutes. It may, in some cells such as in beet roots and flower petals, contain water-soluble pigments. The vacuole functions in regulation of osmotic balance and turgidity of the cell, and it stores secondary metabolites.

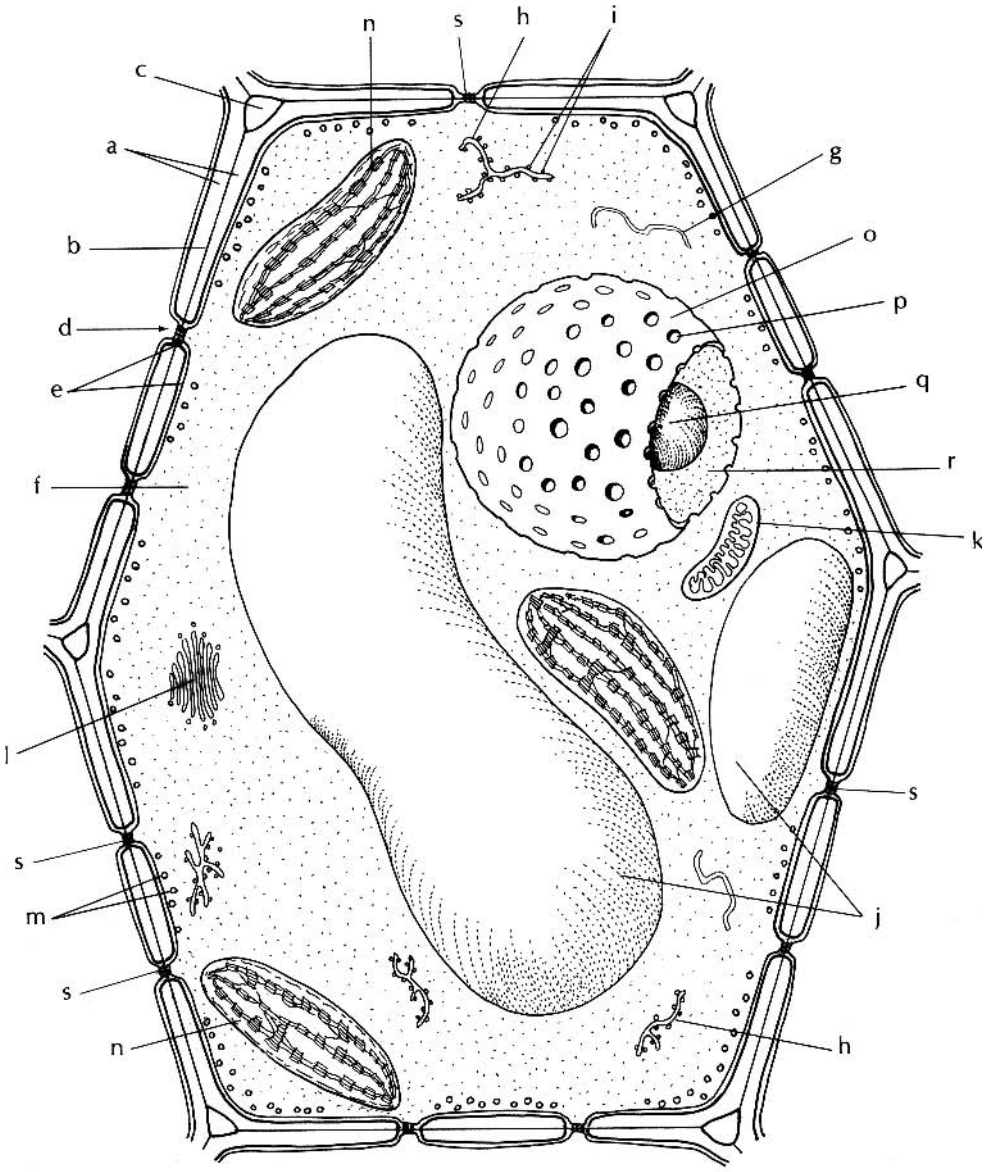
Organelles. Within the cytoplasm are mitochrondria (k), dictyosomes (Golgi bodies), microbodies, and microtubules (m). Microtubules are represented by an array of parallel tubular tracks and facilitate movement of proteins and organelles within the cell. The ER is a system of tubes and sacs, that work with dictyosomes to produce and secrete compounds and deliver specific proteins and membrane lipids to their proper locations within a cell.

Also, there may be plastids such as chloroplasts (n), leucoplasts, and chromoplasts; and non-living substances of water-soluble products or reserve substances such as oil droplets, protein bodies, and crystals (see 3).

Nucleus. The nucleus is enclosed by a double membrane (o) that has pores (p) in it to allow communication with the cytoplasm (f). Within the nucleus are chromosomes, which contain DNA needed to create proteins within the cell. Chromosomes are only visible during cell division (see 6 and 7). Also present in the nucleus are one or more nucleoli (q) containing RNA. The rest of the nucleus is filled with nucleoplasm (r). The information needed to create the entire plant is within the nucleus, mitochondria, and chloroplasts of each cell.

COLOR CODE

tan:	cell wall (a), middle lamella (b), dictyosome (l)
colorless:	intercellular space (c), pit field (d), plasma membrane (e), vacuolar membrane (j)
purple:	smooth ER (g), rough ER (h)
black:	ribosome (i)
green:	chloroplast (n)
blue:	mitochondrion (k)
orange:	mitrotubules (m)
red:	nuclear membrane (o), pore (p)
gray:	nucleolus (q)
pink:	nucleoplasm (r)
yellow:	cytoplasm (f), plasmodesmata (s)



Generalized Plant Cell
diagram

http://www.springer.com/978-0-387-28870-3

Botany Illustrated
Introduction to Plants, Major Groups, Flowering Plant Families
Glimn-Lacy, J.; Kaufman, P.B.
2006, XIV, 278 p. 130 illus., Softcover
ISBN: 978-0-387-28870-3