Why Are Cells So Small?

- Cells are so small that you need a microscope to examine them. Why?
- To answer this question we have to understand that, in order to survive, cells must constantly interact with their surrounding environment.
- Gases and food molecules dissolved in water must be absorbed and waste products must be eliminated. For most cells, this passage of all materials in and out of the cell must occur through the plasma membrane.
- Each internal region of the cell has to be served by part of the cell surface. As a cell grows bigger, its internal volume enlarges and the cell membrane expands.
- Unfortunately, the volume increases more rapidly than does the surface area, and so the relative amount of surface area available to pass materials to a unit volume of the cell steadily decreases.
- Finally, at some point, there is just enough surface available to service all the interior; if it is to survive, the cell must stop growing.
- The important point is that the surface area to the volume ratio gets smaller as the cell gets larger.
- Thus, if the cell grows beyond a certain limit, not enough material will be able to cross the membrane fast enough to accommodate the increased cellular volume. When this happens, the cell must divide into smaller cells with favorable surface area/volume ratios, or cease to function.
- That is why cells are so small.

Types of solutions

- A hypertonic solution means the environment outside of the cell has more dissolved material than inside of the cell. If a cell is placed in a hypertonic solution, water will leave the cell. This can cause a cell to shrink and shrivel.
- An isotonic solution is a solution in which the amount of dissolved material is equal both inside and outside of the cell. Water still flows in both directions, but an equal amount enters and leaves the cell.
- A hypotonic solution means the environment outside of the cell has a lower concentration of dissolved material than the inside of the cell. If a cell is placed in a hypotonic solution, water will move into the cell. This causes the cell to swell, and it may even burst.