- Golgi apparatus
 - Discovered by Camillo Golgi.
 - They consist of many flat, disc-shaped sacs or cisternae stacked parallely.
 - The Golgi cisternae are concentrically arranged near the nucleus with distinct convex cis or the forming face and concave trans or the maturing face, which are interconnected.
 - The golgi apparatus principally performs the function of packaging materials.
 - golgi apparatus remains in close association with the endoplasmic reticulum as materials to be packaged in the form of vesicles from the ER fuse with the *ch* face of the golgi apparatus and move towards the maturing face.
 - A number of proteins synthesised by ribosomes on the endoplasmic reticulum are modified in the cisternae of the golgi apparatus before they are released from its trans face.
 - Golgi apparatus is the important site of formation of glycoproteins and glycolipids

Lysosomes

- These are membrane bound vesicular structures formed by the process of packaging in the golgi apparatus.
- The isolated lysosomal vesicles have been found to be very rich in almost all types of hydrolytic enzymes (hydrolases - lipases, proteases, carbohydrases) optimally active at the acidic pH.
- These enzymes are capable of digesting carbohydrates, proteins, line nucleic acids.
- Vacuoles
- Membrane-bound space for
- e for the tyte cytoplasm. Membrane known as tonoplast. Accelory product and other materials not useful for the cell. It contains wate In plant call, the vacuoles are row larg
- ts, the tonoplast facilitates the transport of a number of ions and other
- Stration gradients into the vacuole. rainst co naterials
- the court actile vacuole is important for excretion. In Amoel
- In many cells food vacuoles are formed by engulfing the food particles.
- Ribosome
- first observed under the electron microscope by George Palade.
- They are composed of ribonucleic acid (RNA) and proteins.
- Not Bounded by any membrane.
 - The eukaryotic ribosomes are 80S while the prokaryotic ribosomes are 70S. ($\mathbf{\hat{S}}$ ' stands for the sedimentation coefficient).



- Nucleus \geq
- first described by Robert Brown.
- the material of the nucleus stained by the basic dyes was given the name **chromatin** by Flemming.
- The interphase nucleus has nucleoprotein fibres called chromatin, nuclear matrix and one or more spherical bodies called nucleoli.
- the nuclear envelope is consists of two parallel membranes with a space inbetween called perinuclear space.
- The outer membrane usually remains continuous with the endoplasmic reticulum and also bears ribosomes on it.
- At a number of places the nuclear envelope is interrupted by minute pores. These nuclear pores provide passages for movement of RNA and protein molecules.
- Normally, there is only one nucleus per cell.Some mature cells even lack nucleus, e.g., erythrocytes of many mammals and sieve tube cells of vascular plants.
- The nuclear matrix or the nucleoplasm contains nucleolus and chromatin.
- The nucleoli are spherical structures present in the nucleoplasm. It is non-membrane bound. It is a site for active ribosomal RNA synthesis.
- During cell division, chromatin network condenses into chromosomes.
- Chromatin contains DNA and some basic proteins called histones, some non-histone proteins and also RNA.
- Every chromosome essentially has a primary constriction or the **centremere** on the sides of which disc shaped structures called kinetochores are present



Sometimes a few chromosomes have non-staining secondary constrictions at a constant location. This gives the appearance of a small fragment called the **satellite**.