# Golgi Complex

* The Golgi apparatus or the Golgi body or Golgi complex is a cellular organelle present in most of the cells of the eukaryotic organisms.
* It is referred to as the manufacturing and shipping center of the cell.
* Golgi body is involved in the packaging of the protein molecules before they are sent to their destination. These organelles help in processing and packaging the macromolecules like proteins and lipids that are synthesized by the cell and hence act as the 'post office' of the cell.
* Golgi apparatus was discovered in the year 1898 by an Italian biologist Camilo Golgi. In plant it is called Dictyosome.

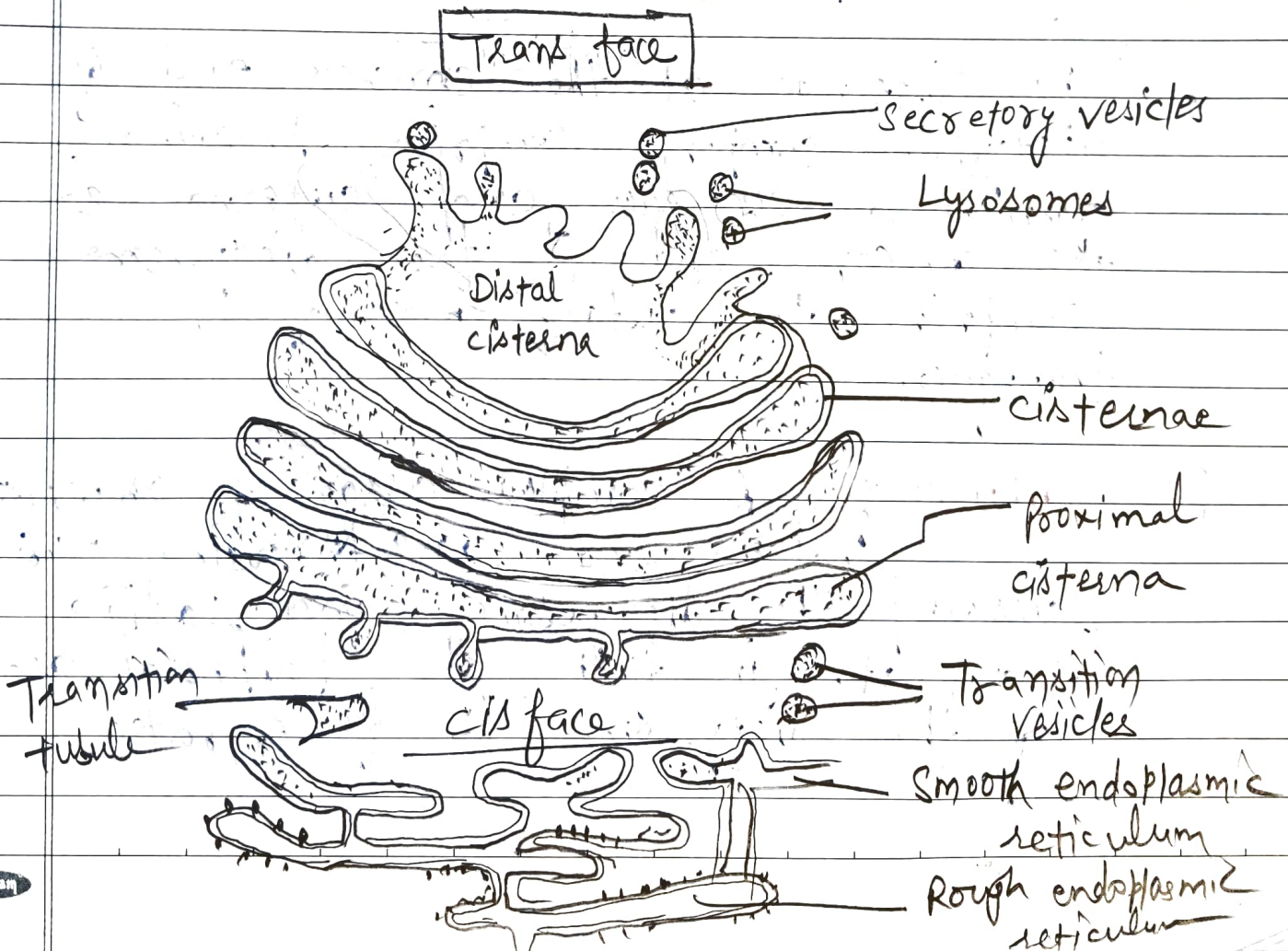
## ⇒ Structure of Golgi apparatus

Under the electron microscope, the Golgi apparatus is seen to be composed of stacks of flattened structures that contain numerous vesicles containing secretory granules.

* The Golgi apparatus is morphologically very similar in both plants and animal cells. However, it is extremely pleomorphic; in some cell types it appears compact and limited, in others it spread out and reticular. Typically, Golgi apparatus appears as a complex array of interconnecting tubules, vesicles and cisternae.

A. Cisternae :- * It is the simplest unit of the Golgi apparatus is the cisternae.

* Cisternae are curved, flattened, plant like or saucer like closed compartments that are held in parallel bundles or stack one above the other.



In each stack, cisternae are separated by a space of 20 to 30 nm which may contain rod like elements or fibers.

* Each stack of cisternae forms a dictyosome which may contain 5-6 Golgi cisternae in animal cells

* Each cisterna is bounded by a smooth unit membrane having a lumen varying in width from about 500 to 1000 nm.

* The margins of each cisterna are gently curved so that the entire dictyosome of the golgi apparatus takes on a bow-like appearance.

* The cisternae at the convex end of dictyosome ~~comprise~~ comprise proximal, forming or cis-face and cisternae at the concave end of the dictyosome comprise the distal, maturing or trans face.

B Tubules :- A complex array of associated vesicles and anastomosing tubules surround the dictyosome and radiate from it. In fact the peripheral area of the dictyosome is fenestrated.

C. Vesicles :- These are of three types :-

(i) Transitional vesicles :- are small membrane limited vesicles which are thought to form as buds from the transitional ER to migrate and coalesce to cis face of Golgi, where they coalesce to form new cisternae.

(ii) Secretory vesicles :- are varied - sized membrane limited vesicles that discharge from margins of cisternae of Golgi. they often occur between the maturing face of Golgi and the plasma membrane.

(iii) Clathrin - coated vesicles :- are spherical about 50 nm in diameter and with a rough surface. They are found at the periphery of the organelle usually at the ends of single tubules and are morphologically quite distinct from the secretory vesicles. these vesicles play a role in intracellular traffic of membranes and of secretory products.

⇒ Functions of Golgi Apparatus ⇐

1. They are often referred to as the

'Traffic police' of the cell. They play a key role in sorting many of the cell's proteins and membrane constituents.

* To perform this function the Golgi vesicles contain different sets of enzymes in different types of vesicles - cis, middle and trans cisternae - that react with and modify secretory proteins passing through the golgi lumen or membrane proteins and glycoproteins that are transiently in the Golgi membranes as they are en route to their final destinations.

* The Golgi apparatus hence acts as the assembly factory of the cell where the raw materials are directed to the Golgi apparatus before being passed out from the cell.

2. In animals the Golgi apparatus is involved in the packaging and exocytosis of the materials.
   i.e. Zymogen of exocrine pancreatic cells and mucus secreted by goblet cells of the intestine.

3. It is also involved in the formation of certain cellular organelles such as plasma membrane, lysosomes, acrosomes of spermatozoa.

4. They are also involved in the transport of lipid molecules around the cell.

5. The Golgi complex also plays an important role in the production of proteoglycans.

6. It is also major site of synthesis of carbohydrate

7. The Golgi involves in the ~~sulfacti~~ sulfation process of certain molecules

8. The process of phosphorylation of molecules by the Golgi requires the import of ATP into the lumen of the Golgi.

9. In plants, Golgi apparatus is mainly involved in the secretion of materials of primary and secondary cell walls.