Faculty Name: Dr. Kumari Sushma Saroj

Department: Zoology

College: Dr. L. K. V. D College, Tajpur, Samastipur

Class: B.Sc Part –II (Hons. & Sub.)

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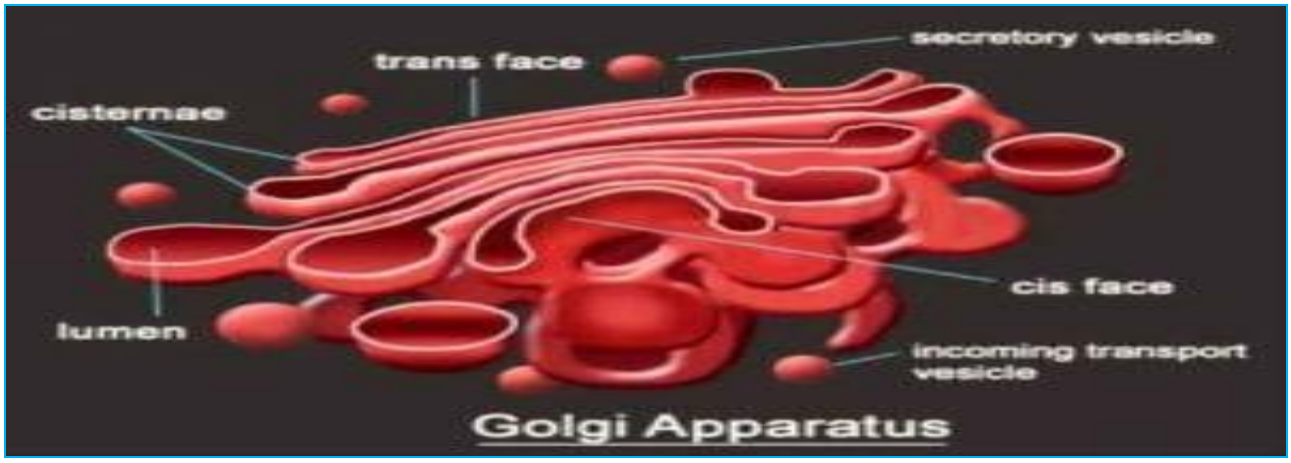
Topic: Golgi apparatus

Golgi apparatus

- Camillio Golgi in 1873 discovered and developed the siliver chromate method.
- Holmgren (1900) described a clear system of clear canals which he called trophospongium
- Due to their presumed high lipid contents Golgi apparatuses were called lipochondria .
- They were also called dictosomes.

Golgi Apparatus Structure

The **cis face** of the organelle is closest to the endoplasmic reticulum. The **trans face** is the side furthest from the nucleus, which secretes vesicles to various parts of the cell. Further, **there are a number of lumens and cisternae** through which products flow. These appear as a series of flattened sacs stack on each other, much like the endoplasmic reticulum.



Fig; **Golgi apparatus**

- Occurs in all cells except the prokaryotic cells (viz mycoplasmas , bacteria & BG algae) and Eukaryotes cells of certain fungi , sperms cells of bryophytes and pteridiophytes cells of matures sieve types of plants and mature sperm and red blood cells of animals.
- In the cells of higher plants , the Golgi bodies or dictyosomes are usually found scattered through but the cytoplasmin animal cells the golgi apparatus in a localized organelle.
- In the cells of ectodermal or endodermal origin ,the Golgi apparatus remains polar and occurs in between the nucleus and the periphery.

Morphology

- According to D.J. Morre (1977) it is the simplest unit of the Golgi apparatus is the cistern.
- Flattened sac or cisternae:- Diameter- 1μm , flattened , plate like or saucer – like closed compartments.

- Cisternae are separated by a space of 20 to 30 μm .each cisternae is bounded by a smooth unit membrane (7.5 nm thick) , having a lumen varying in width from about 500 to 1000nm.
- The convex end of the cisternae comprise proximal, forming or cis –face.
- The concave end of the dictyosome comprise the distal maturing or trans-face.
- The forming or cis face of Golgi is located near to either the nucleus or a specialized portion of rough ER. That lacks bound ribosomes and is called transitional ER.
- Trans- face of Golgi is located near the plasma membrane.
- This polarization is called cis- trans axis of the Golgi apparatus.

Tubules : 30 to 50 nm diameter.

Vesicles :-

1. Transitional vesicles – are small membrane –limited vesicles which are thought to form as belbs from the transitional ER to migrated and converge to cis face of Golgi, where they coalesce to form new cisternae.
2. Secretory vesicles – varied sized membrane vesicles which discharge from margins of cisternae of Golgi . They often , occur between the maturing face of Golgi and the plasma membrane.
3. Clathrin – coated vesicles – spherical proturberances, diameter- 50μm , with a rough surface. It plays an important role in intra – cellular traffic of membranes and of secretary products.

- The GERL(Golgi + smooth ER + Lysosomal) region is found to be involved in the origin of primary lysosomes and of melanin granules in the processing

condensing and packaging of secretary material in endocrine and exocrine cells and in lipid metabolism (Novikoff 1976).

- GERL is also a region of sorting of cellular secretary proteins.

Zones of Exclusion:-

- G.B is surrounded by differentiated region of cytoplasm where ribosomes, glycogen and organelles such as mitochondria and chloroplasts are scarce on absent.(Morre 1971)
- It is associated with microtubules (Porter 1966), Centrioles (Bainton and Farquhar 1966), and regions of centriole formation.

Origin of G.B.

I. Individual stacks of cisternae may arise from the pre- existing stacks by division of fragmentation.

II. The alternative method of origin of Golgi is based on de novo formation.

Functions:-

- It is referred as the “traffic police” of the cell.
- They play a key role in sorting many of cells proteins and membrane constituents and in directing them to their proper destinations.
- Involved in the process of pancreatic hormone insulin: preproinsulin → proinsulin → insuline.
- Involved in subcompact metallization with a division of labour has been proposed between the is region and the trans region in which the most refined proteins are further separated for their delivery to the various cell compartments.

- It is involved in the packaging and exocytosis of the –

I. Zymogen of exocrine pancreatic cells.

II. Mucus secretion by goblet cells of intestine.

III. Lactoprotein secretion by mammary gland cells.

IV. Secretion of compounds of thyroxine hormone by thyroid cells.

V. Secretion of tropocollagen and collagen.

VI. Formation of melanin granules and other pigments.

VII. Formation of yolk and vitelline membrane of growing primary oocytes.