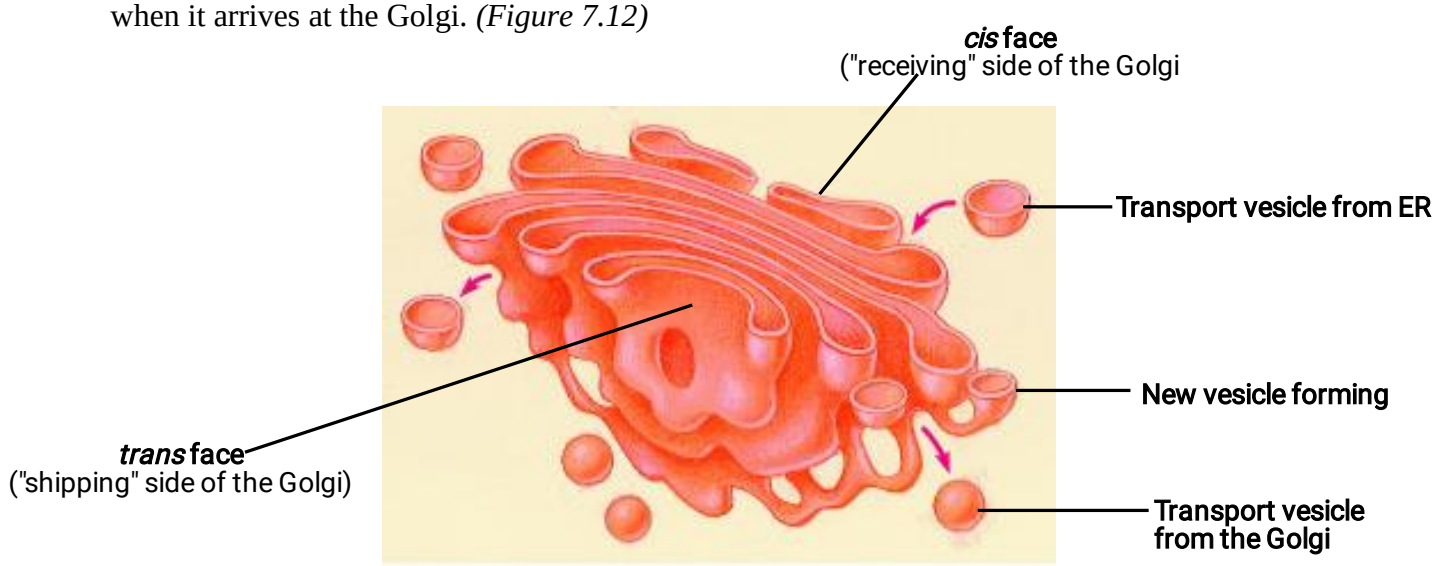
(p.119)**19.** The rough ER is studded with ribosomes. As proteins are synthesized, they are threaded into the lumen of the rough ER. Some of these proteins have carbohydrates attached to them in the ER to form *glycoproteins*. What does the ER then do with these secretory proteins?

Once secretory proteins are formed, the ER membrane keeps them separate from the proteins produced by free ribosomes, that will remain in the cytosol (cytoplasm). These secretory proteins depart from the ER wrapped in the membrane of the vesicles that bud like bubbles from the ER. Such vesicles in transit from one part of the cell to another are called transport vesicles.

(p.119) **20.** Besides packaging secretory proteins into transport vesicles, what is another major function of the rough ER?

Another major function of rough ER is to synthesis more plasma membranes by adding proteins to phospholipids.

(p.120) **21.** The transport vesicles formed from the rough ER fuse with the Golgi apparatus.
Label the diagram below and use it to describe what happens to a transport vesicle and its contents when it arrives at the Golgi. *(Figure 7.12)*

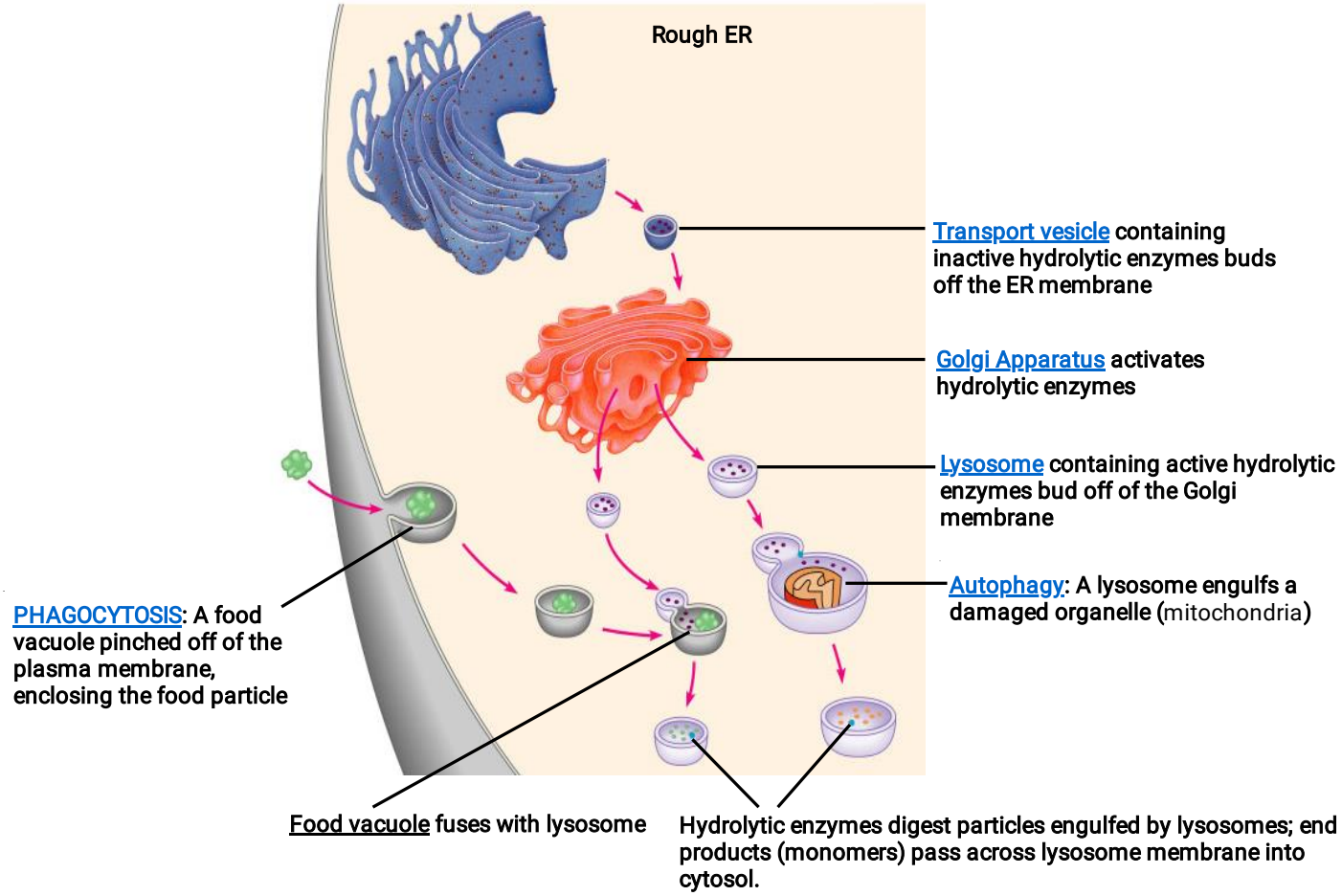


When it arrives at the Golgi Apparatus, the transport vesicle fuses with the *cis* face of the Golgi releasing its contents (proteins) that are modified and temporarily stored until released from the trans face of the Golgi Apparatus.

(p.121)**22.** What is a *lysosome?* What do they contain? What is their pH?

A lysosome ia a membrane-bound sac of hydrolytic enzymes that the cell uses to digest macromolecules. The pH of a lysosome is about a 5 (acidic).

(p.122)**23.** One function of lysosomes is INTRAcellular digestion of particles engulfed by *phagocytosis*. What does the prefix intra mean? Label the diagram below and use it to describe this process of intracellular digestion. What human cells carry out phagocytosis? *(Figure 7.14)* 2016 Noble Prize



(p.122)**24.** Two genetic diseases we will be studying this year are Adrenoleukodystrophy (ALD) and Tay-Sachs disease. What happens in Tay-Sachs disease and explain the role lysosomes play in this genetic disorder.

In Tay-Sachs disease a lipid-digesting enzyme located in the lysosome is missing or inactive (*B*-hexsoaminidase), the brain becomes impaired by an accumulation of fats/lipids in the brain.

(p.123) **25.** There are three main types of vacuoles. Briefly describe each by giving at least 3 functions/materials store there.

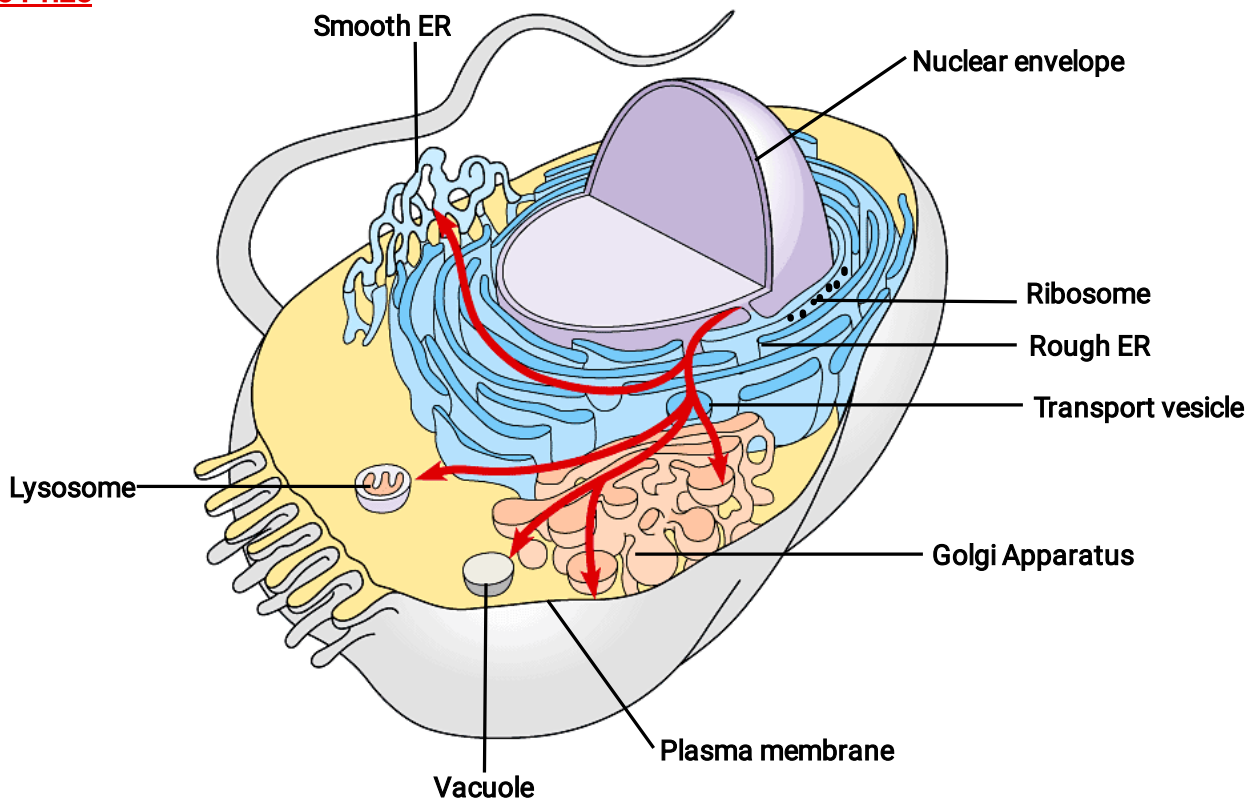
food vacuoles - formed by phagocytosis and contained food particles

contractile vacuoles - found in many freshwater protists (single-celled organisms) and pumps excess water out of the cell

central vacuoles in plants - usually the largest compartment in plant cells and functions in the storage of cell sap, proteins, K^+ and Cl^-.

(p.119,123) **26.** Label the diagram below and use it to explain how the elements of the endomembrane system function together to secrete a protein and to digest a cellular component. *(Figure 7.16)*

2013 Noble Prize (See #23) 1999 Noble Prize



The red arrows show some of the pathways of membrane migration. Proteins produced by ribosomes on the rough ER enter the rough ER where protein folding takes place. Transport vesicles carry the proteins to the Golgi Apparatus where they fuse and enter the organelle. Here, the new proteins are modified and stored and exported from the cell via a transport vesicle.