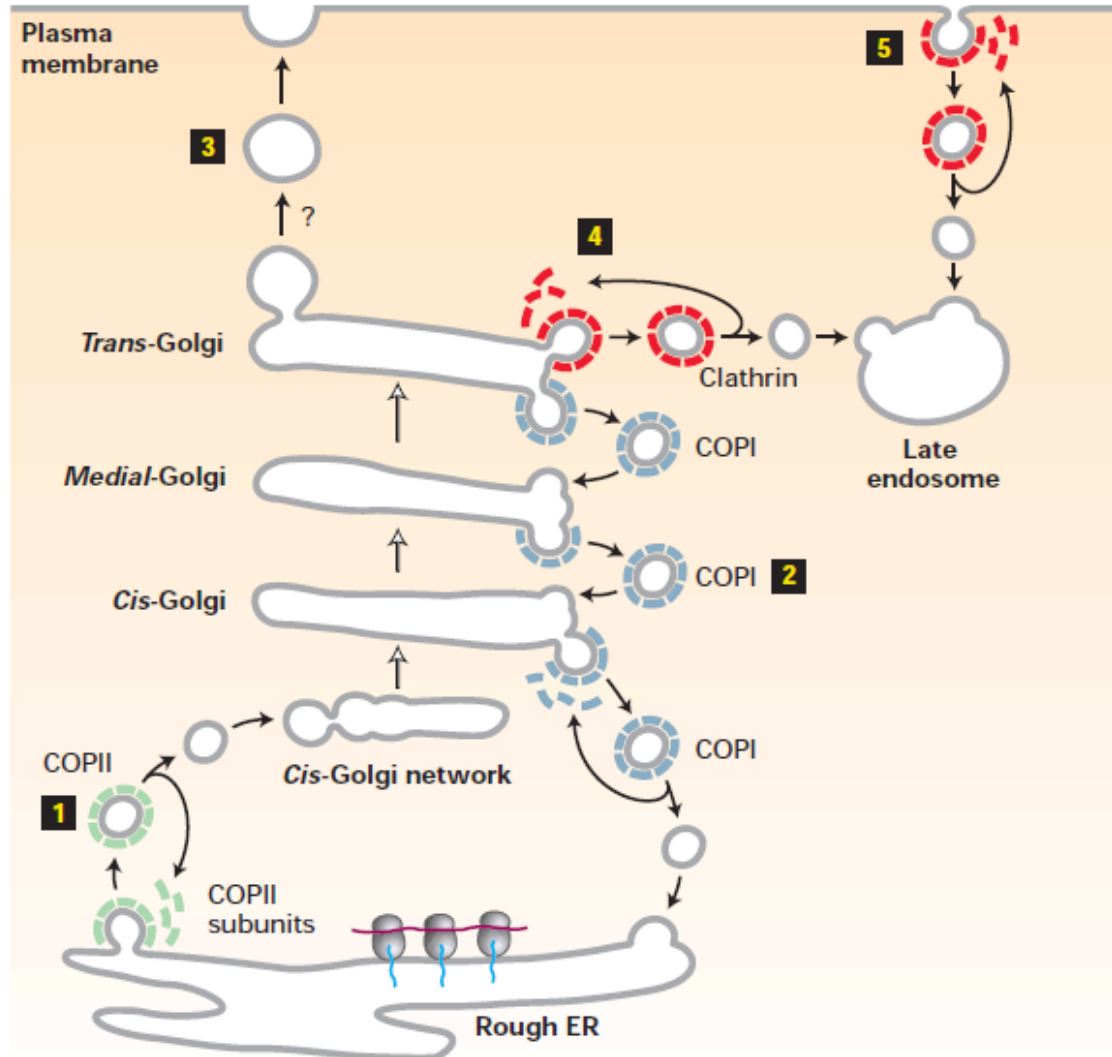


LECTURE 11

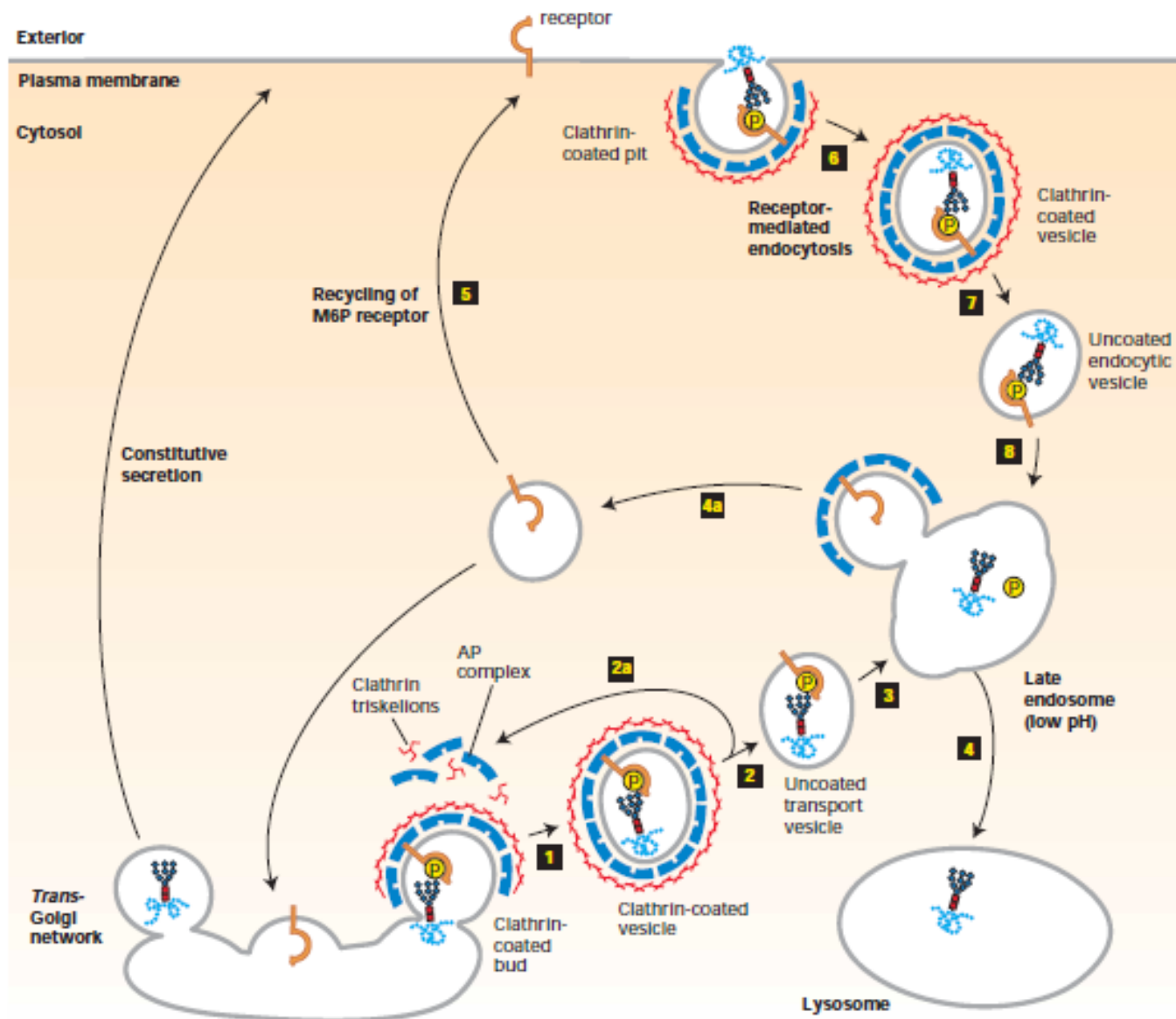
Vesicular traffic in the secretory and endocytic pathways



GTPases required in all three processes

- ARF
- Sar
- Dynamin

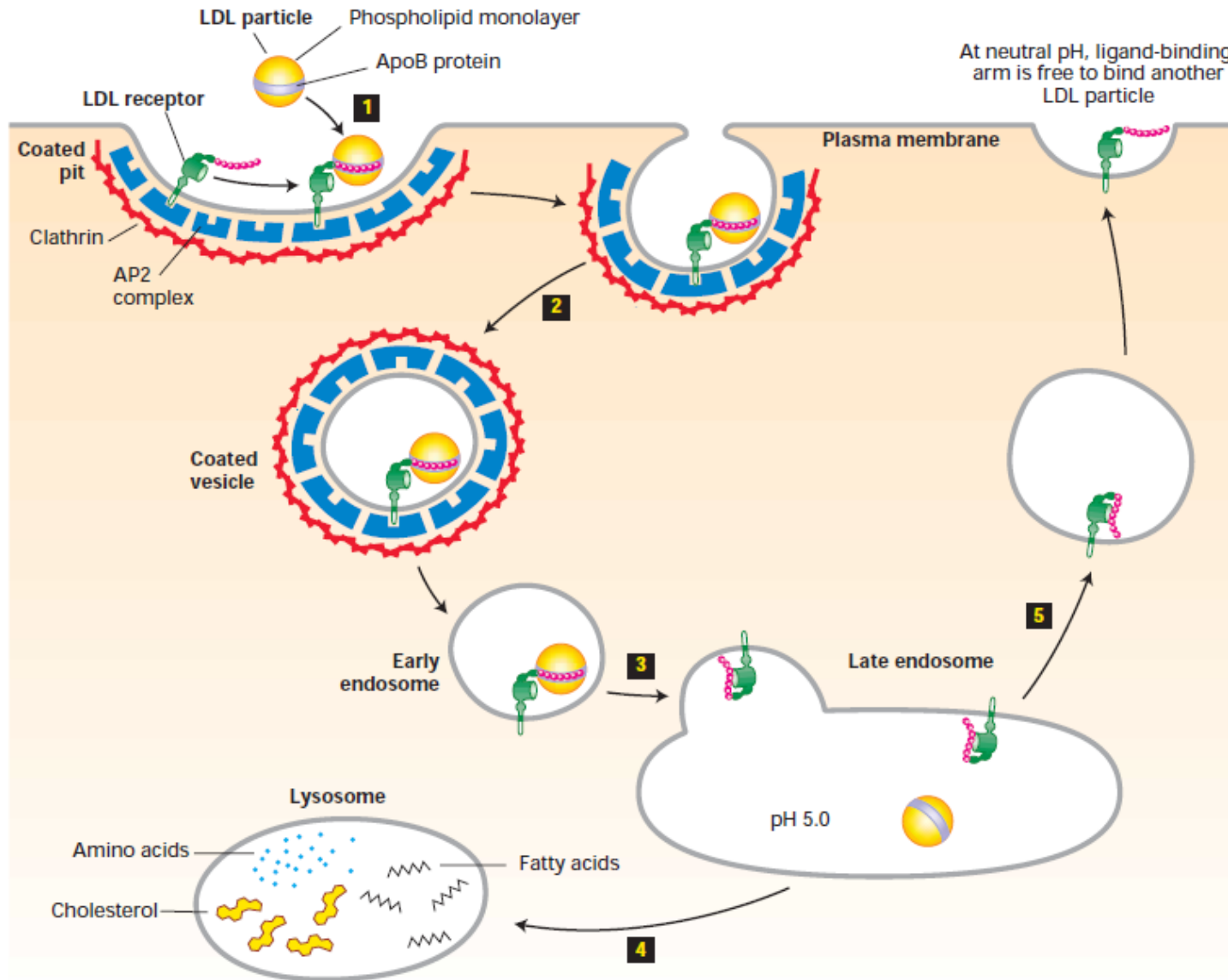
Clathrin-mediated endocytosis



A few cell types (e.g., macrophages) can take up whole bacteria and other large particles by **phagocytosis**, a nonselective actin mediated process in which extensions of the plasma membrane envelop the ingested material, forming large vesicles called phagosomes

All eukaryotic cells continually engage in endocytosis, a process in which a small region of the plasma membrane invaginates to form a membrane-limited vesicle about 0.05–0.1 μm in diameter

Endocytic pathway for internalizing lowdensity lipoprotein (LDL)



Lowdensity lipoprotein (LDL) is one of several complexes that carry cholesterol through the bloodstream

luminal pH is sufficiently acidic to promote dissociation of most endocytosed receptors from their tightly bound ligands.



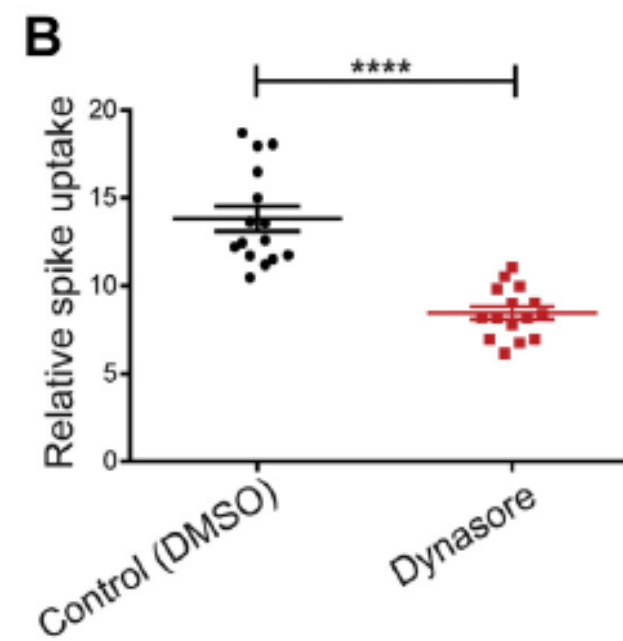
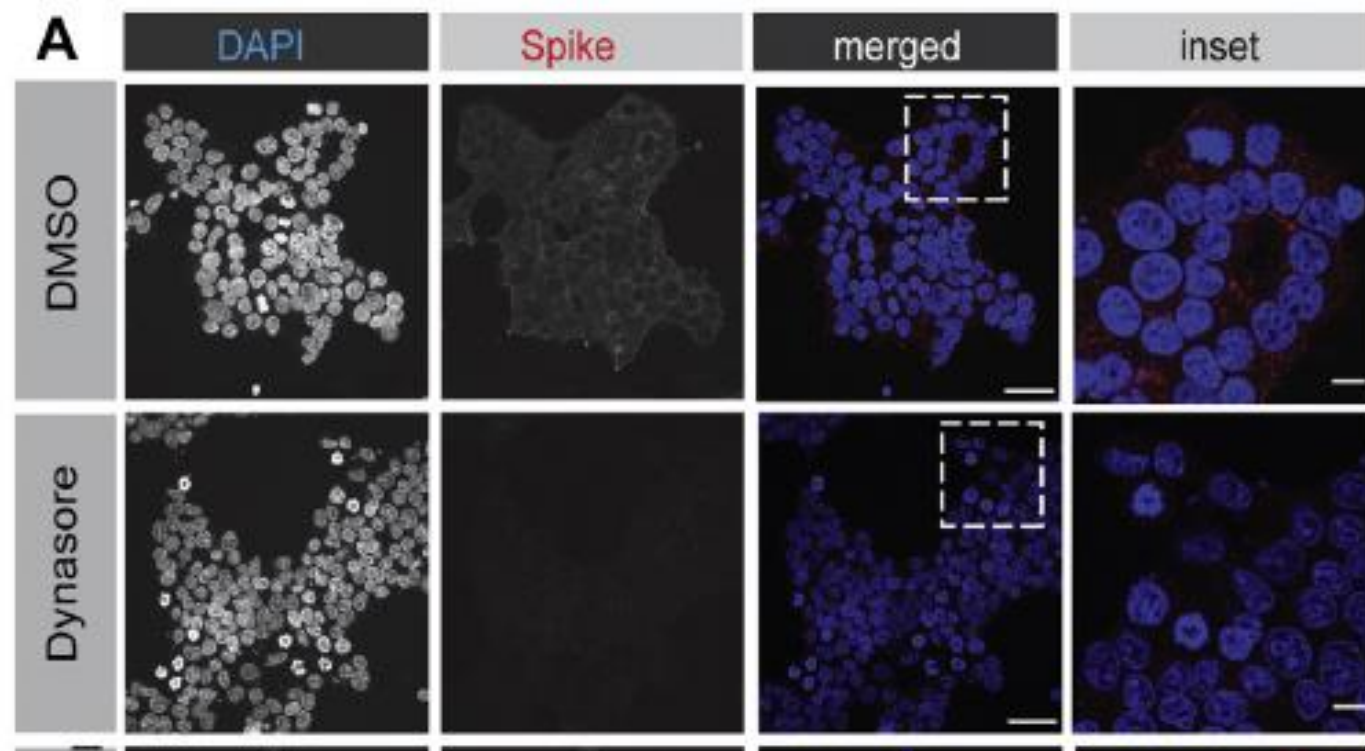
SARS-CoV-2 infects cells after viral entry via clathrin-mediated endocytosis

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<https://doi.org/10.1016/j.jbc.2021.100306>

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Edited by Phyllis Hanson



Undigested glycolipids and extracellular components that would normally be degraded by lysosomal enzymes accumulate in lysosomes as large inclusions.

Mannose 6-phosphate as the lysosomal sorting signal

Lacking the M6P sorting signal, the lysosomal enzymes are secreted rather than being sorted to and sequestered in lysosomes.

Lysosomes

The major function of lysosomes is to degrade extracellular materials taken up by the cell and intracellular components under certain conditions.

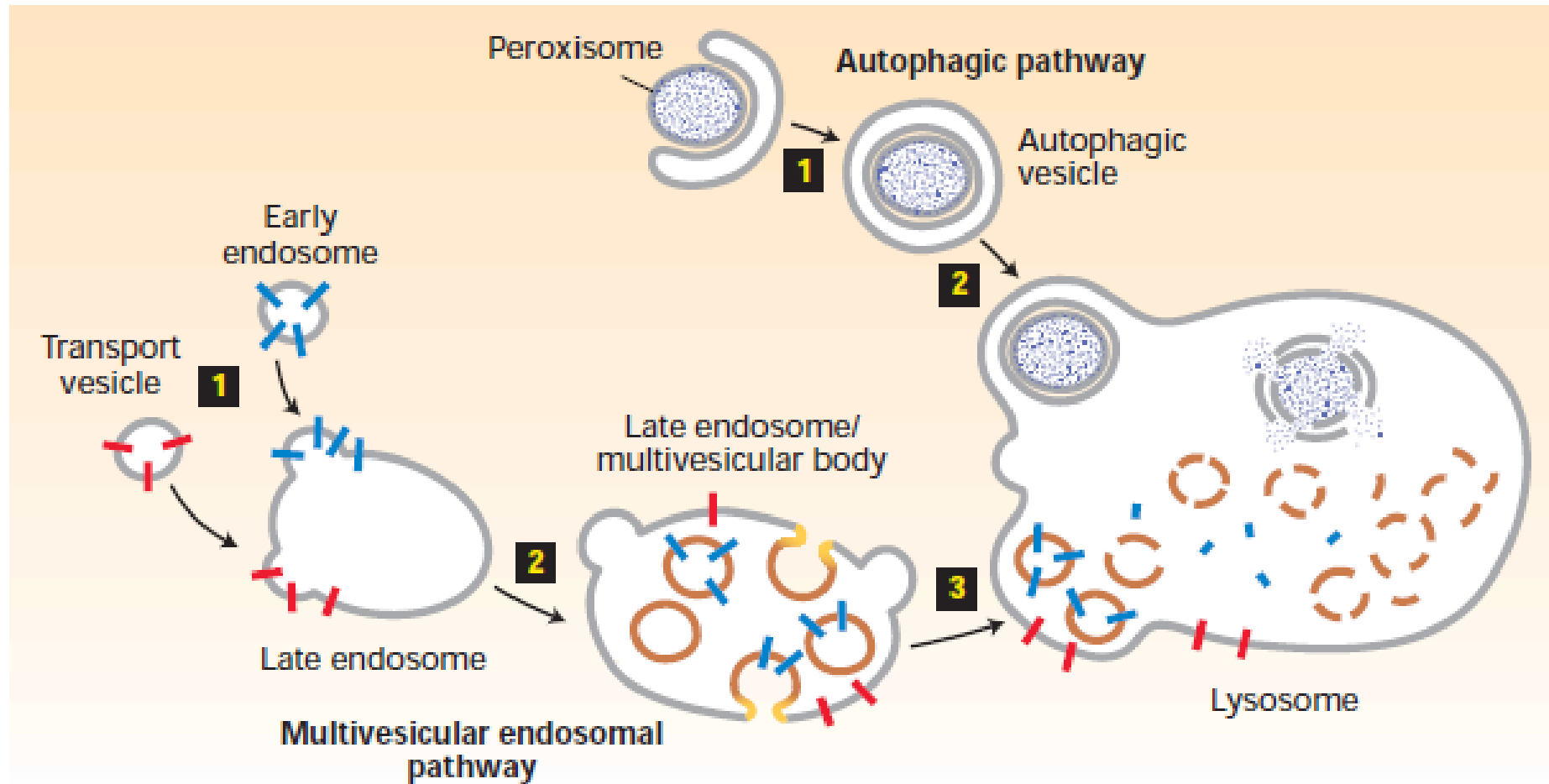
Materials to be degraded must be delivered to the lumen of the lysosome where the various **degradative enzymes** reside

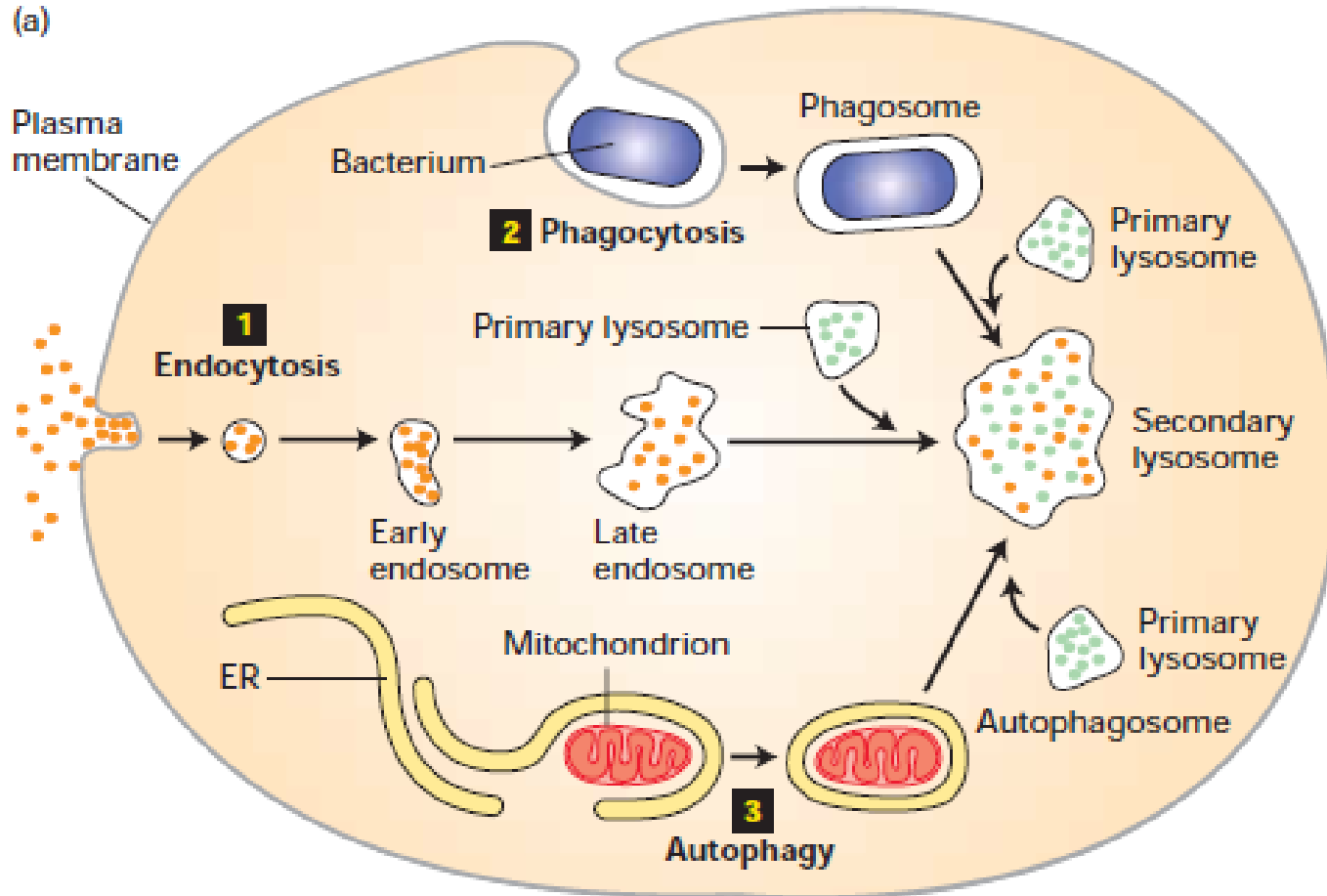
The sorting of proteins in the endosomal membrane determines which ones will remain on the lysosome surface (e.g., pumps and transporters) and which ones will be incorporated into internal vesicles and ultimately degraded in lysosomes.

The delivery of bulk amounts of cytosol or entire organelles to lysosomes and their subsequent degradation is known as *autophagy* (“eating oneself”).

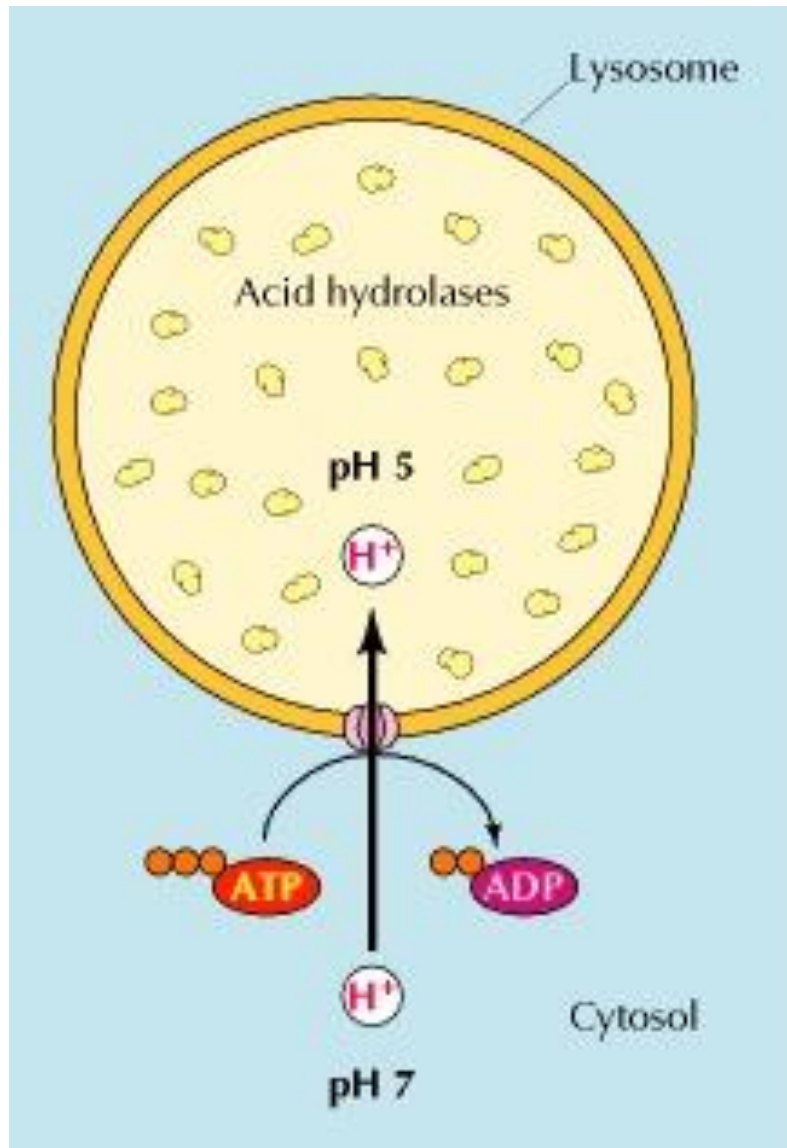
Autophagy is often a regulated process and is typically induced in cells placed under conditions of starvation or other types of stress, allowing the cell to recycle macromolecules for use as nutrients.

Lysosomal processes





All the lysosomal enzymes work most efficiently at acid pH values and collectively are termed *acid hydrolases*.



The acidic internal pH of lysosomes results from the action of a proton pump in the lysosomal membrane, which imports protons from the cytosol coupled to ATP hydrolysis.

Phagocytosis
Endocytosis
Autophagy