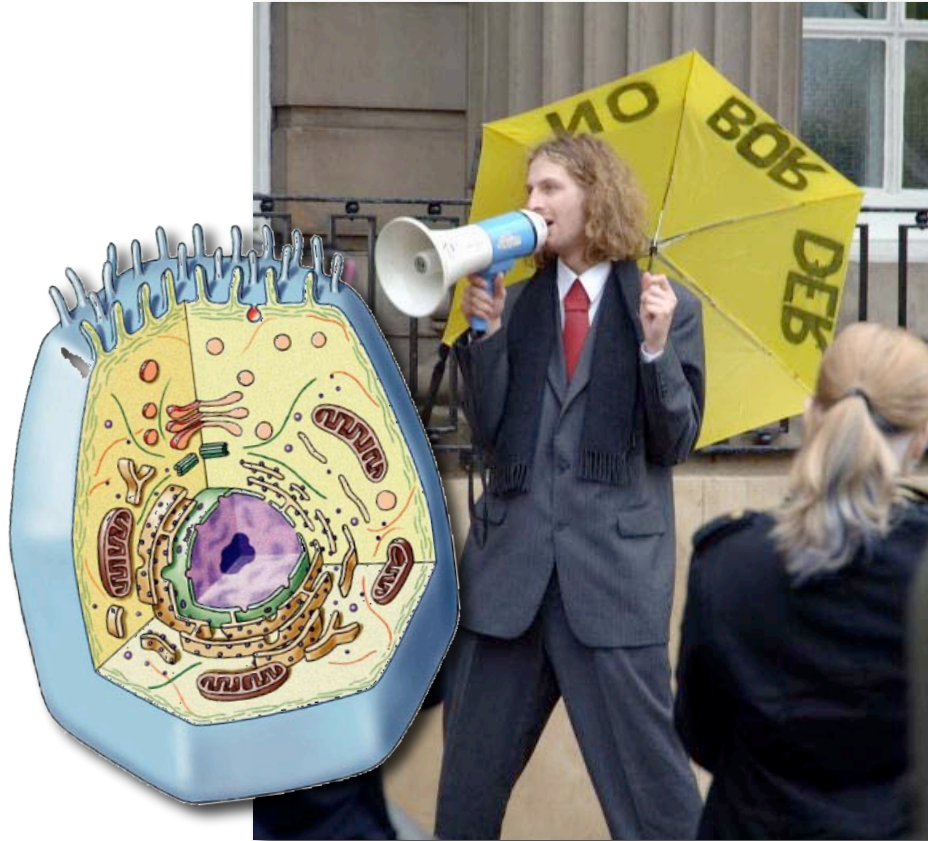


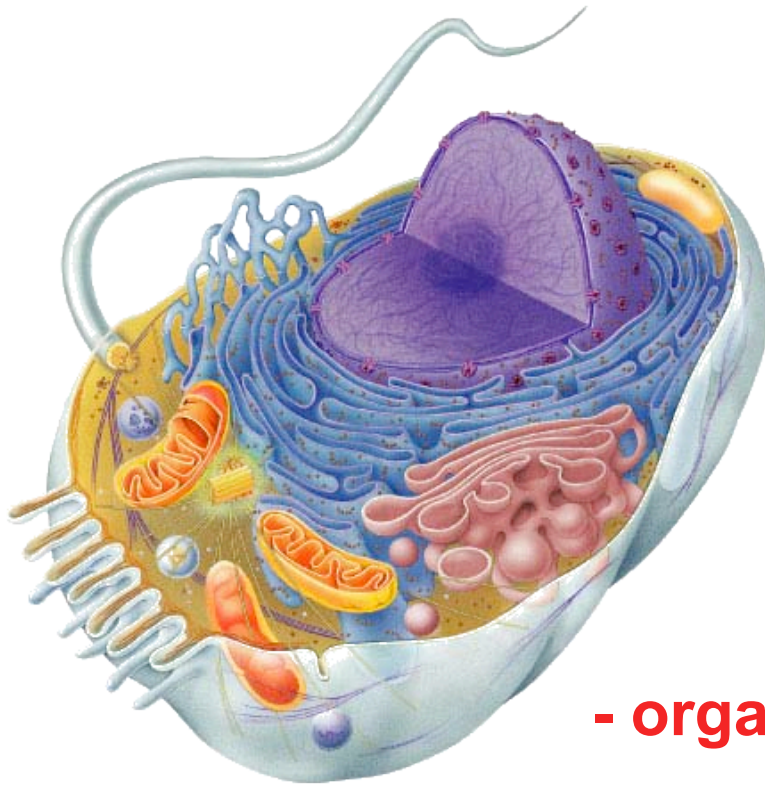
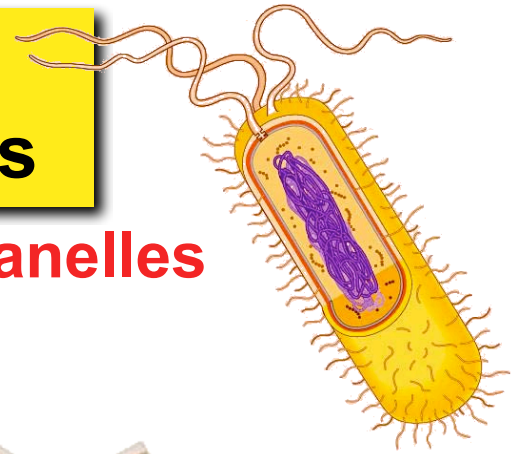
Tour of the Cell 1



Types of cells

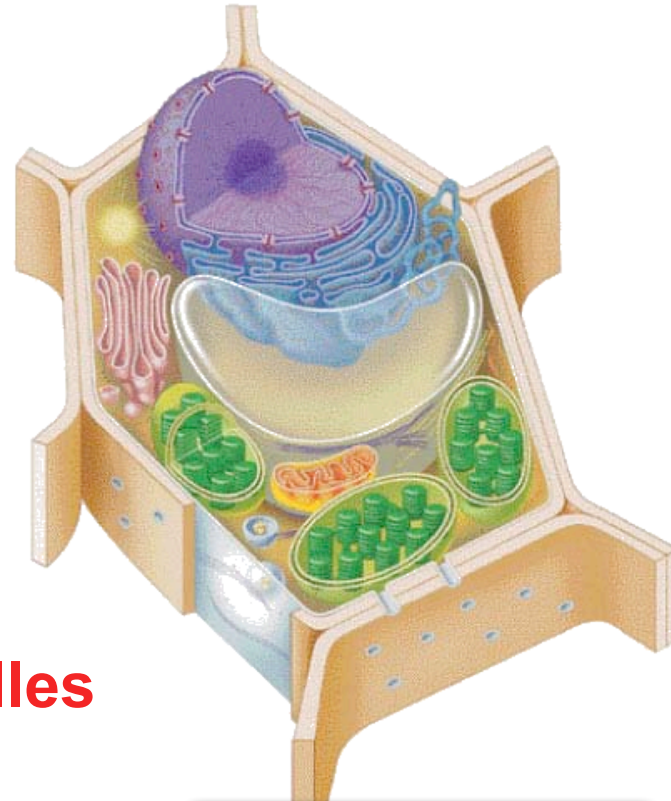
**Prokaryote
bacteria cells**

- no organelles



- organelles

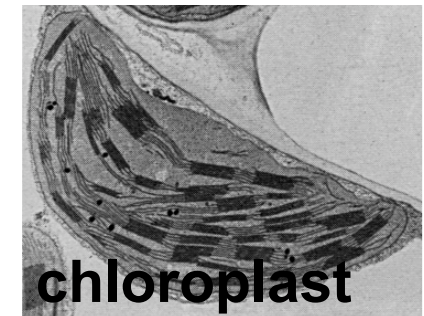
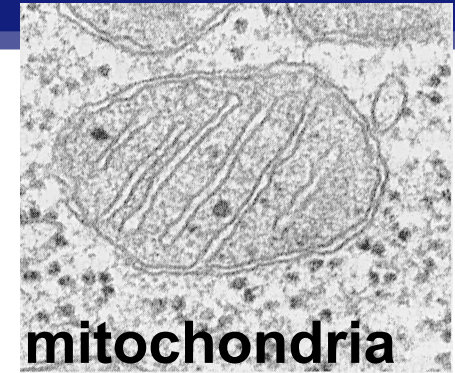
**Eukaryote
animal cells**



**Eukaryote
plant cells**

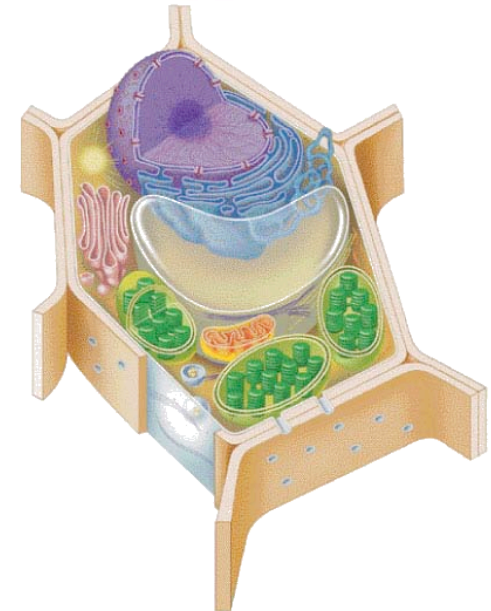
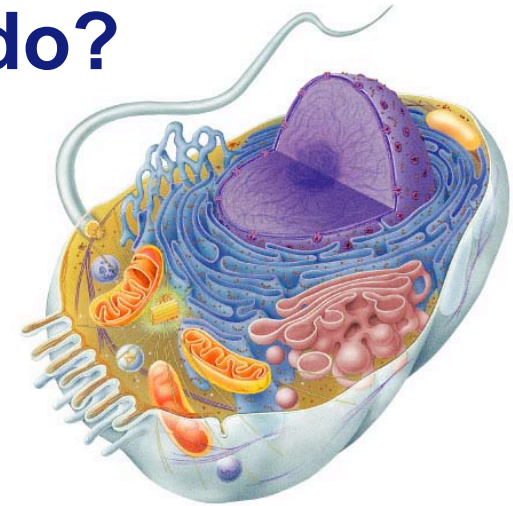
Why organelles?

- **Specialized structures**
 - ◆ specialized functions
 - cilia or flagella for locomotion
- **Containers**
 - ◆ partition cell into compartments
 - ◆ create different local environments
 - separate pH, or concentration of materials
 - ◆ distinct & incompatible functions
 - lysosome & its digestive enzymes
- **Membranes as sites for chemical reactions**
 - ◆ unique combinations of lipids & proteins
 - ◆ embedded enzymes & reaction centers
 - chloroplasts & mitochondria

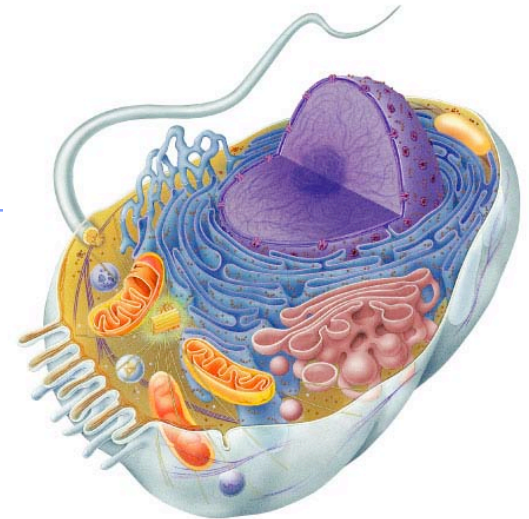
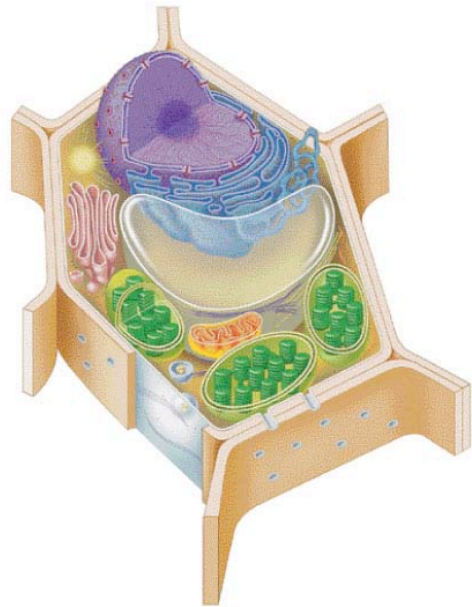


Cells gotta work to live!

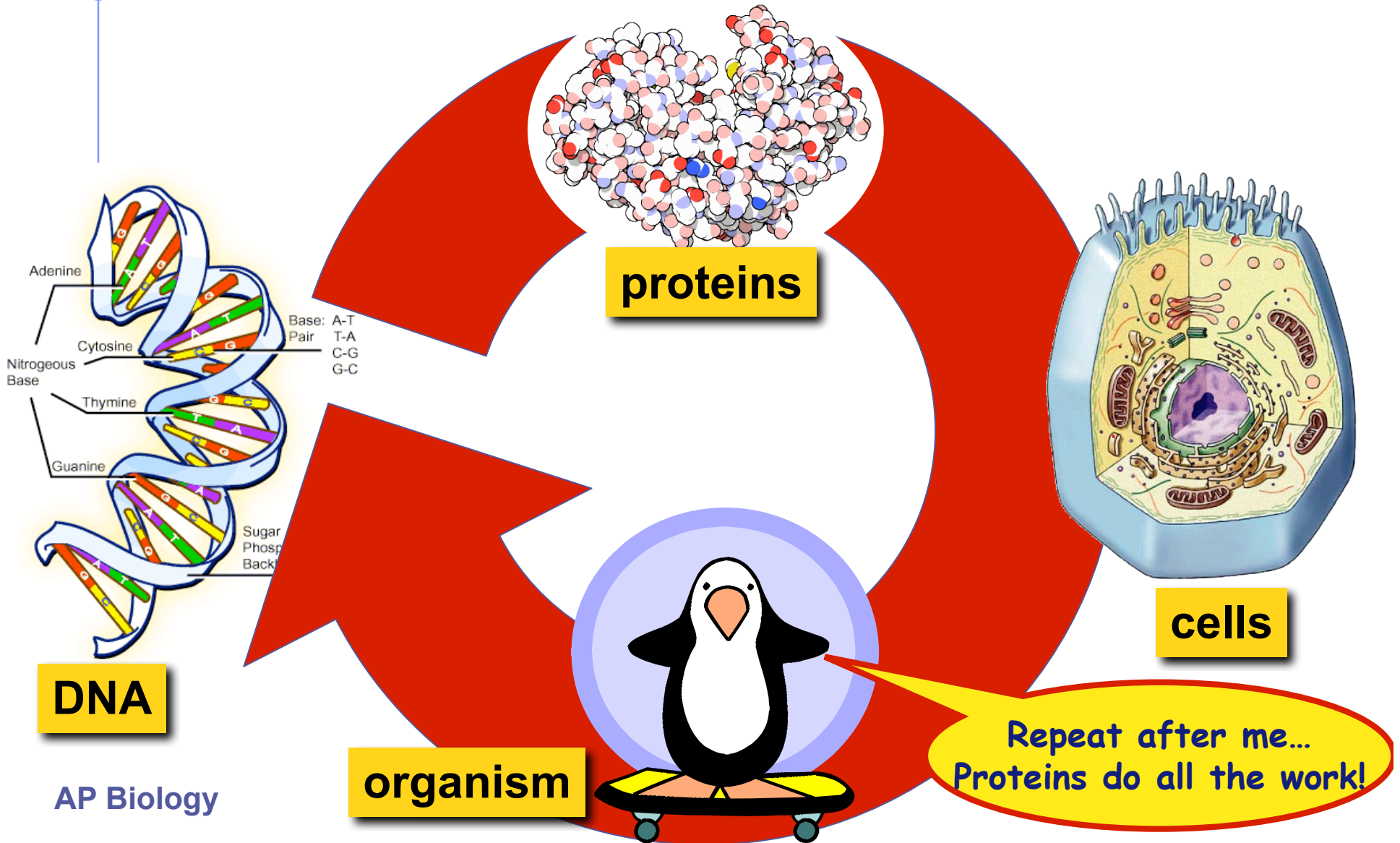
- What jobs do cells have to do?
 - ◆ make proteins
 - proteins control every cell function
 - ◆ make energy
 - for daily life
 - for growth
 - ◆ make more cells
 - growth
 - repair
 - renewal



Building Proteins



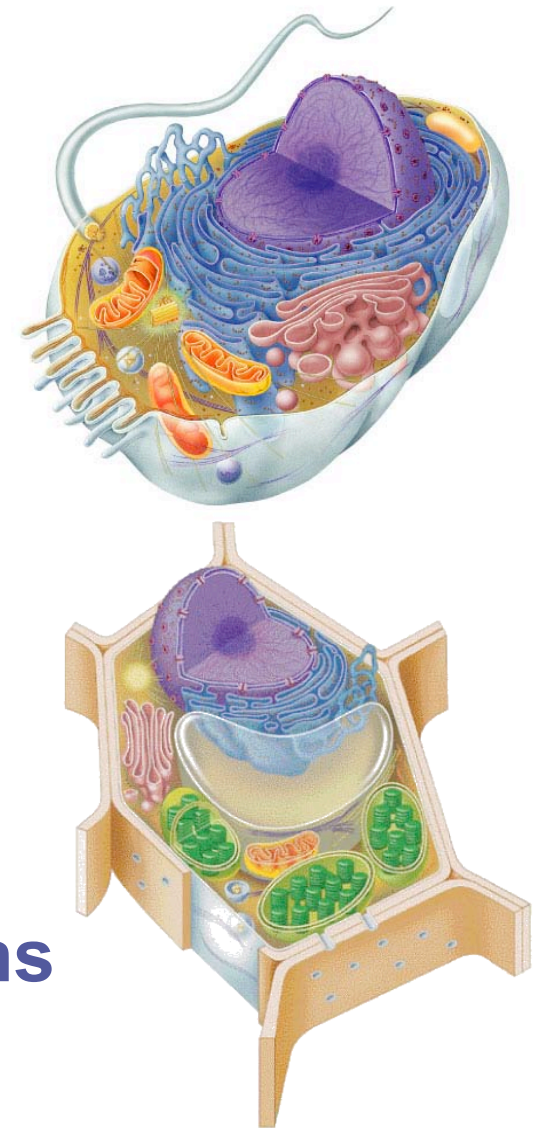
Proteins do all the work!



Cells functions

■ Building proteins

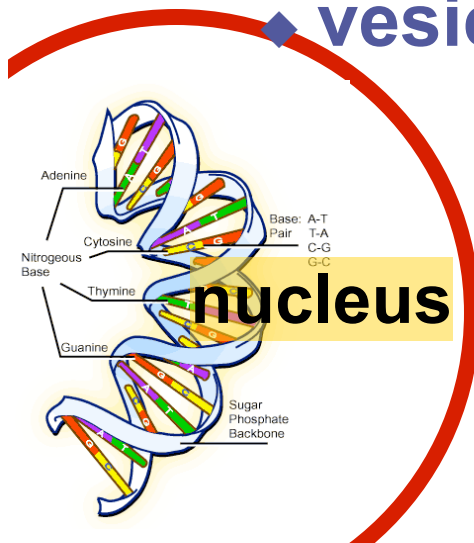
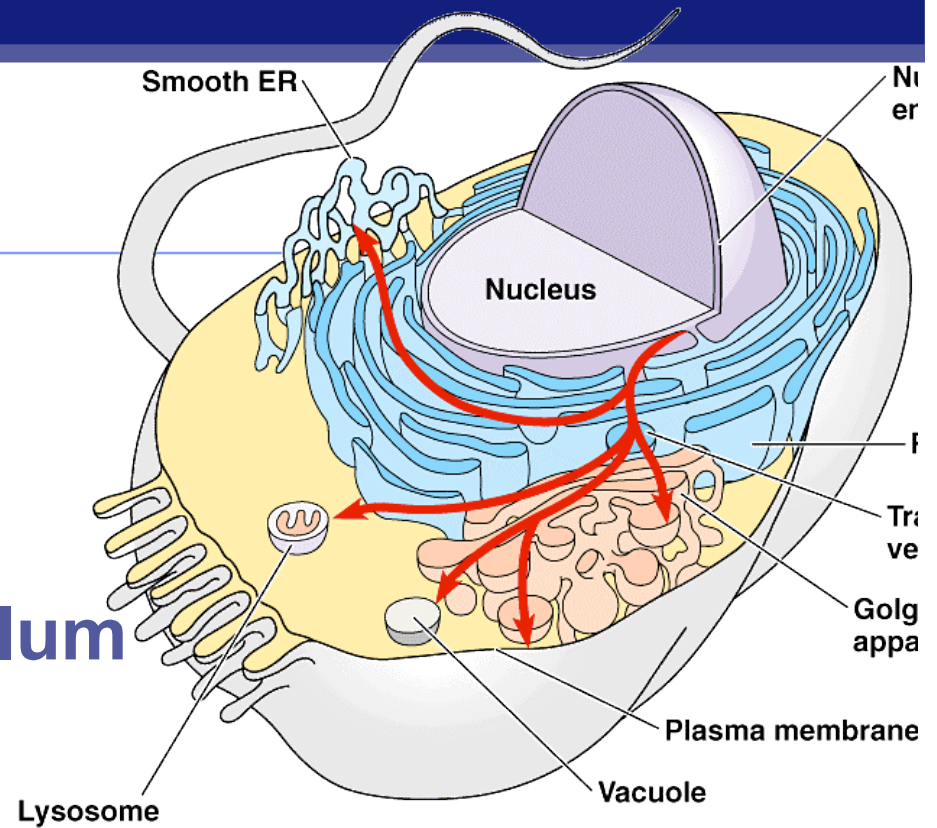
- ◆ read DNA instructions
- ◆ build proteins
- ◆ process proteins
 - folding
 - modifying
 - ◆ removing amino acids
 - ◆ adding other molecules
 - e.g, making glycoproteins for cell membrane
- ◆ address & transport proteins



Building Proteins

Organelles involved

- ◆ nucleus
- ◆ ribosomes
- ◆ endoplasmic reticulum (ER)
- ◆ Golgi apparatus
- ◆ vesicles



The Protein Assembly Line

nucleus

ribosome

ER

Golgi apparatus

vesicles

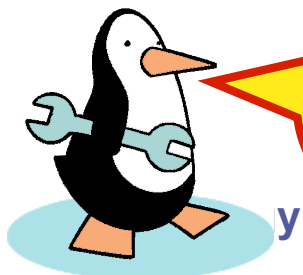
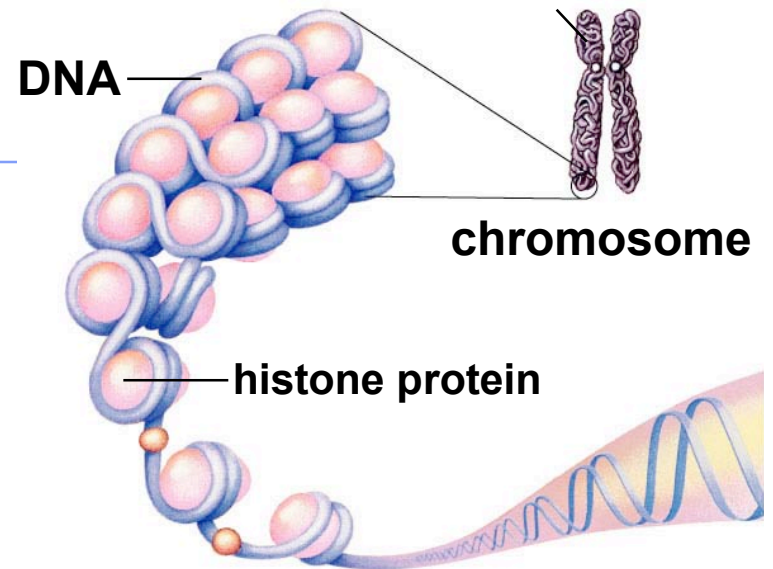
Nucleus

■ Function

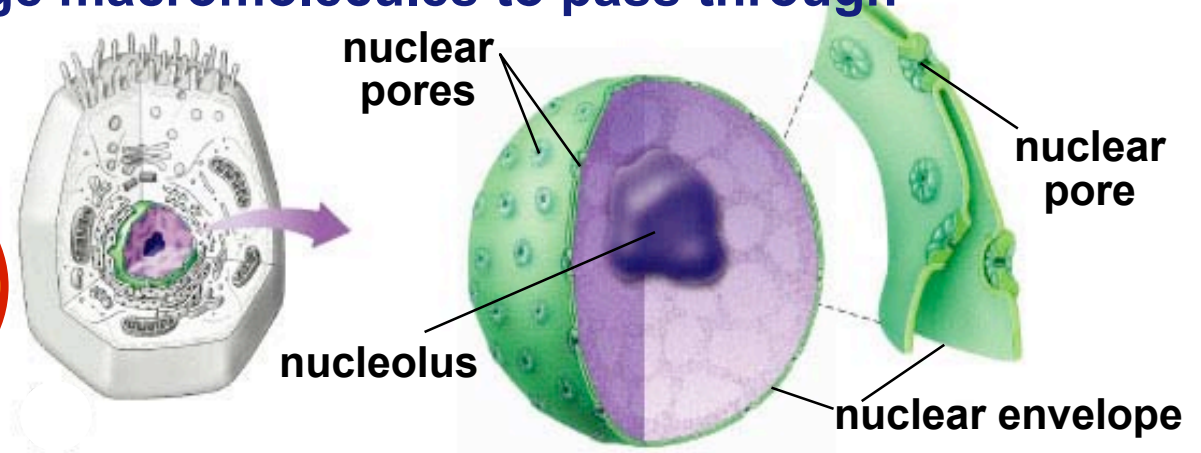
- ◆ protects **DNA**

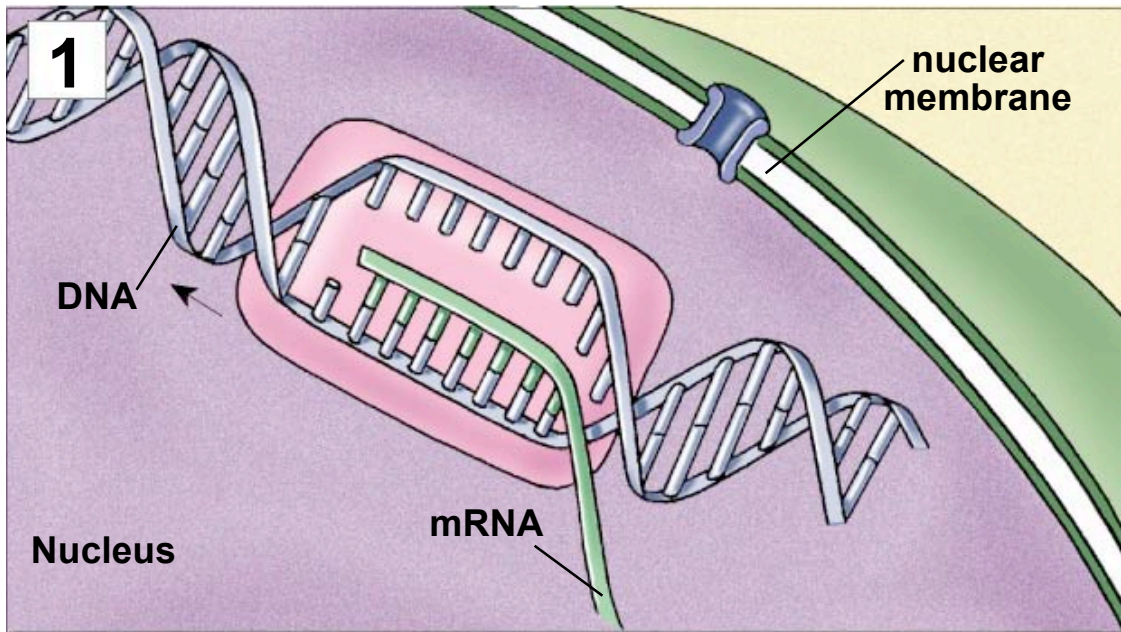
■ Structure

- ◆ **nuclear envelope**
 - double membrane
 - membrane fused in spots to create **pores**
 - ◆ allows large macromolecules to pass through



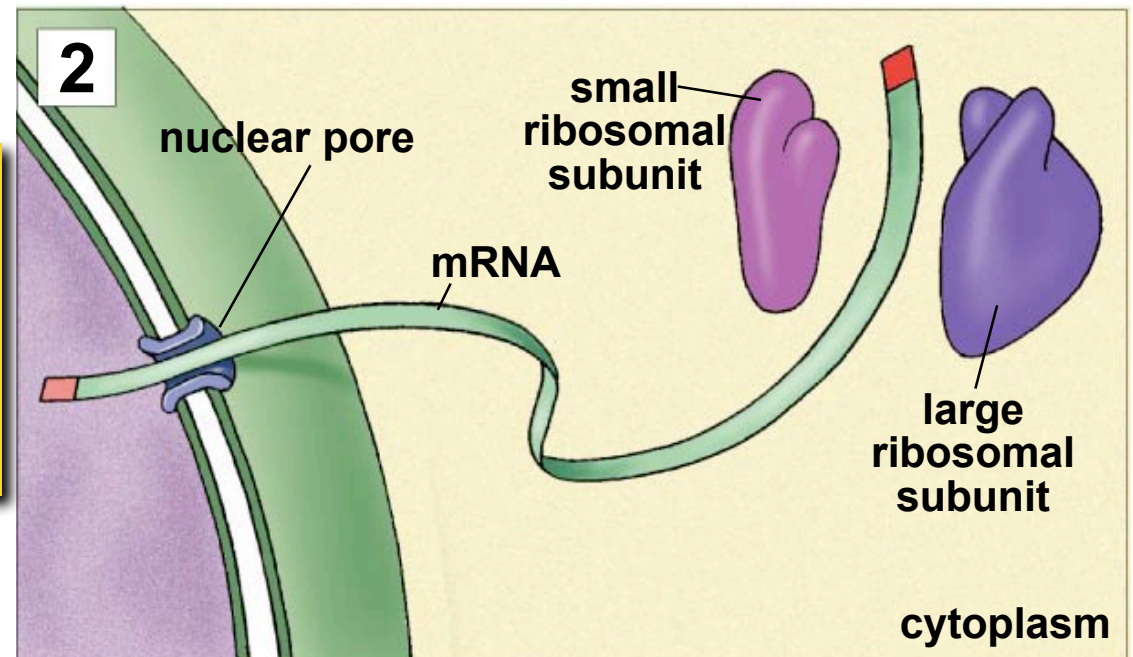
What kind of molecules need to pass through?

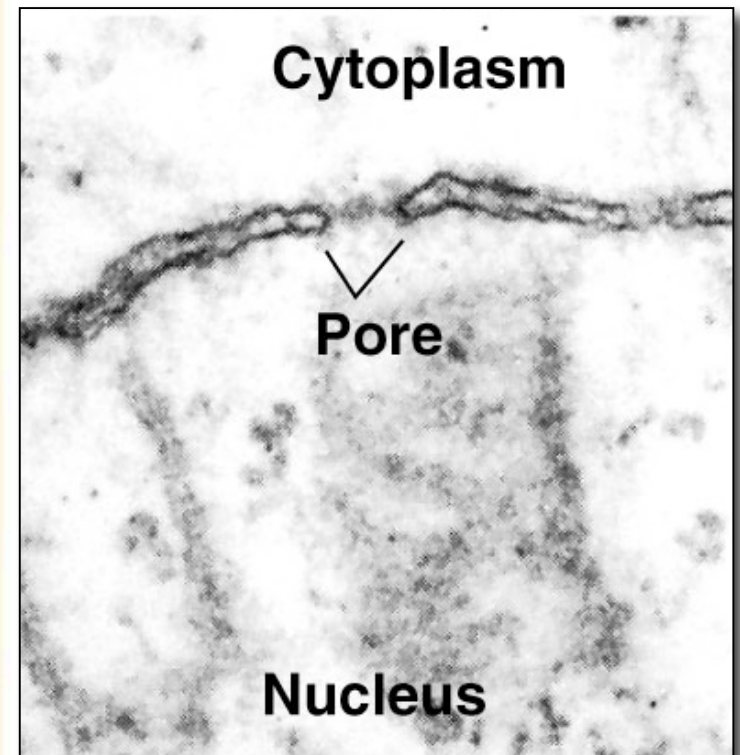
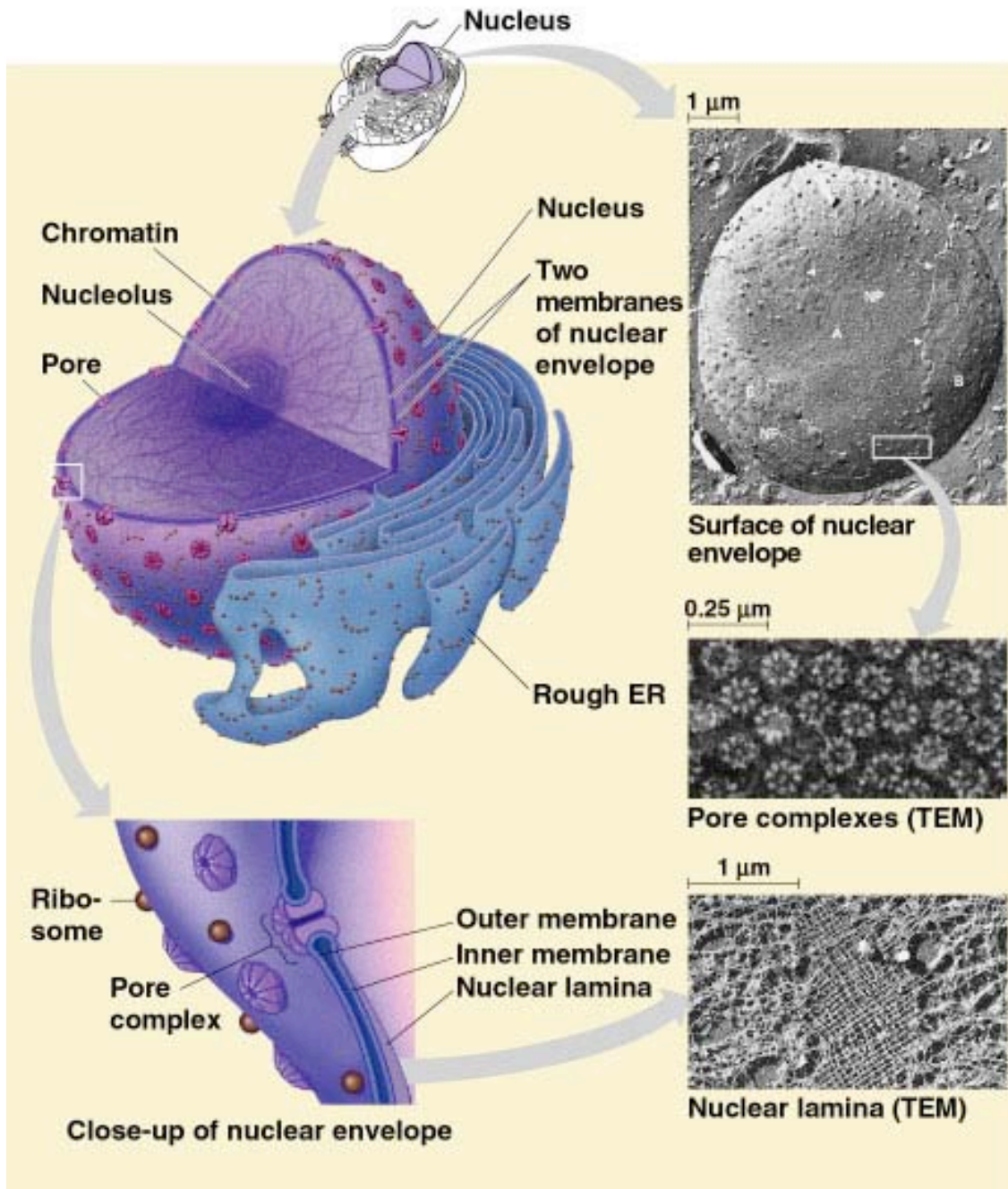




**production of mRNA
from DNA in nucleus**

**mRNA travels from
nucleus to ribosome
in cytoplasm through
nuclear pore**



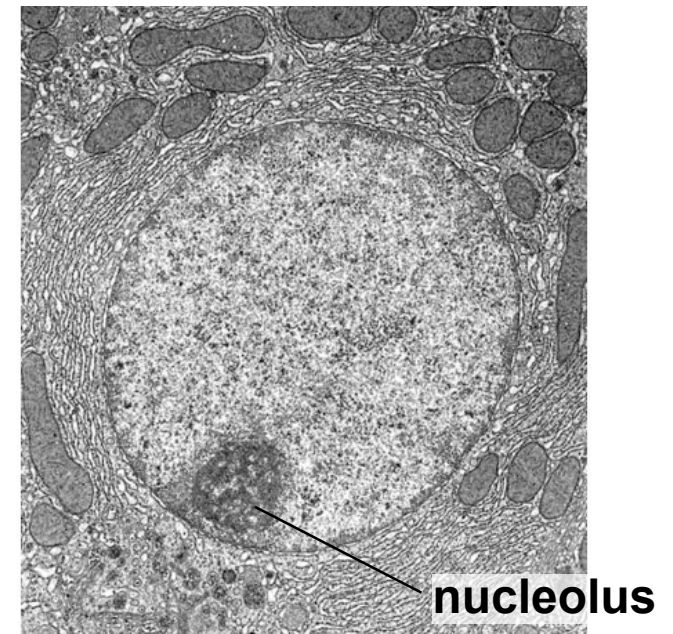
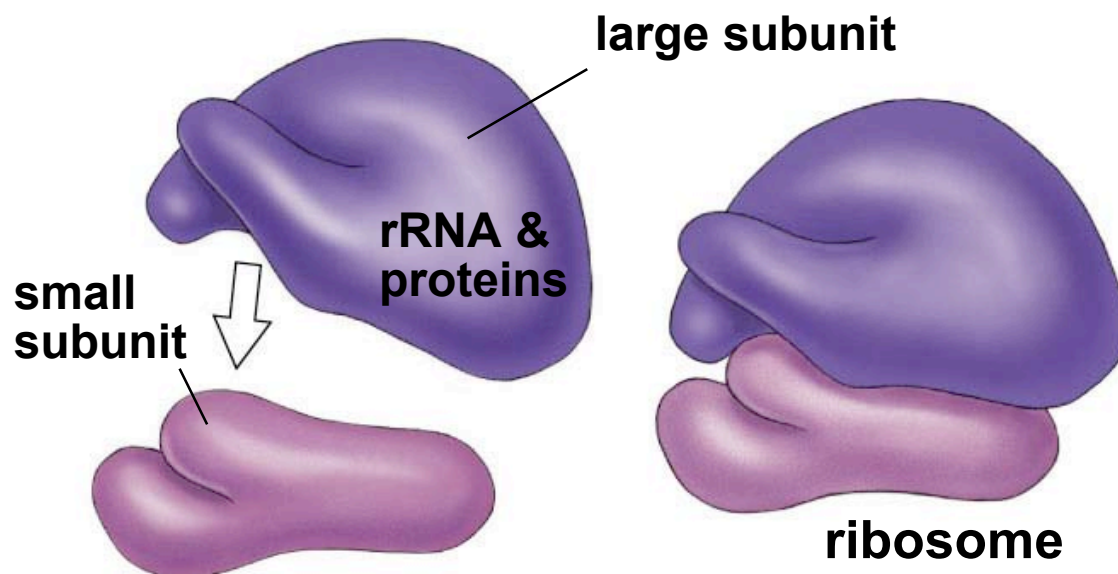


Nucleolus

■ Function

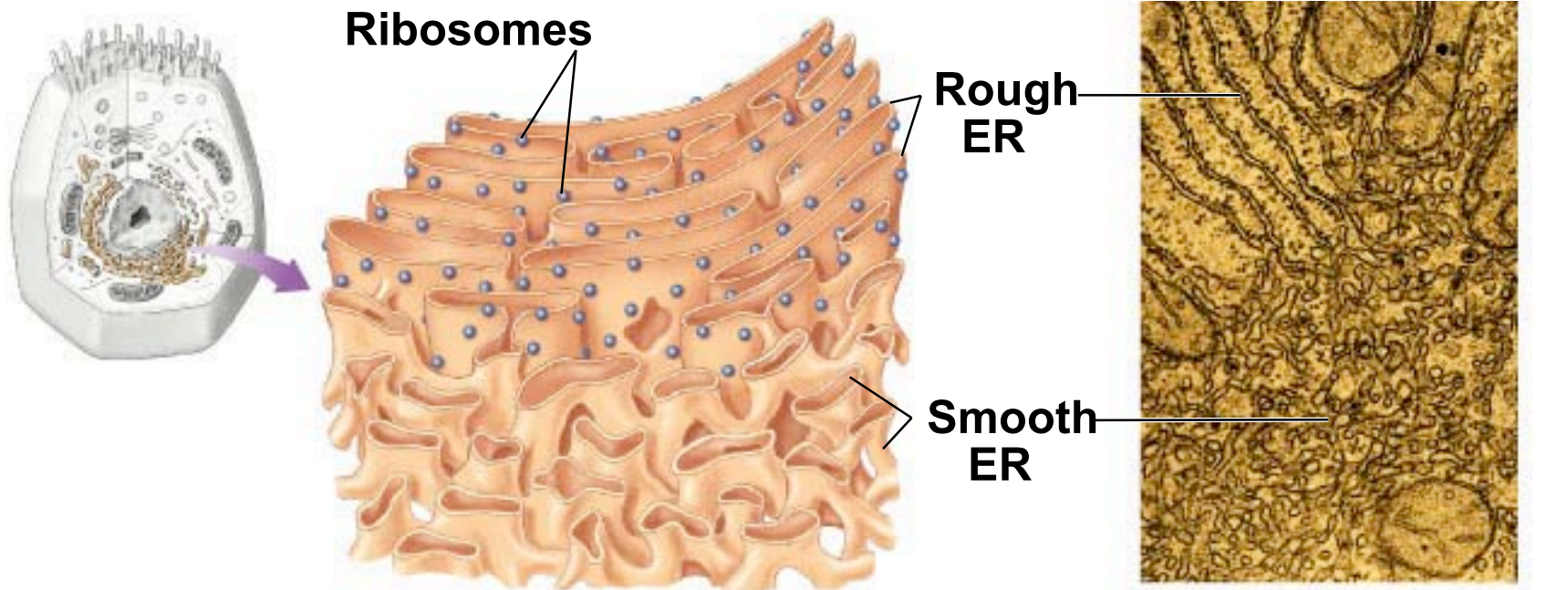
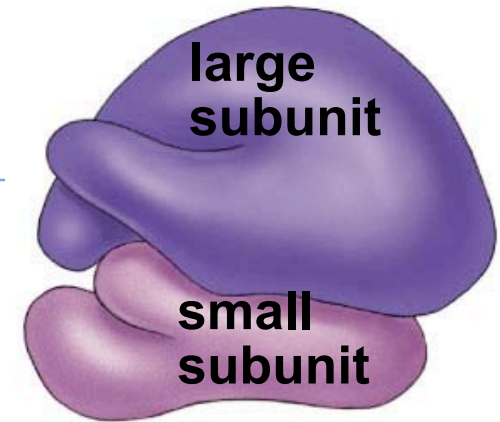
◆ ribosome production

- build ribosome subunits from rRNA & proteins
- exit through nuclear pores to cytoplasm & combine to form functional ribosomes



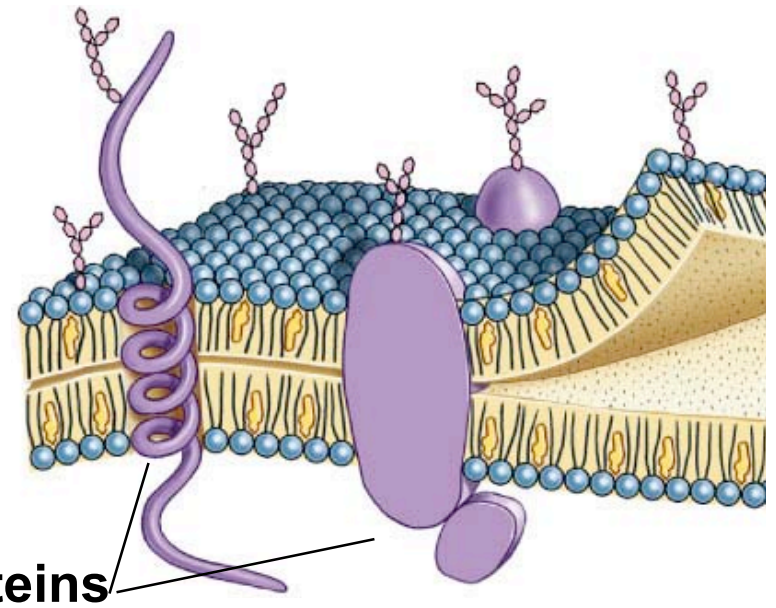
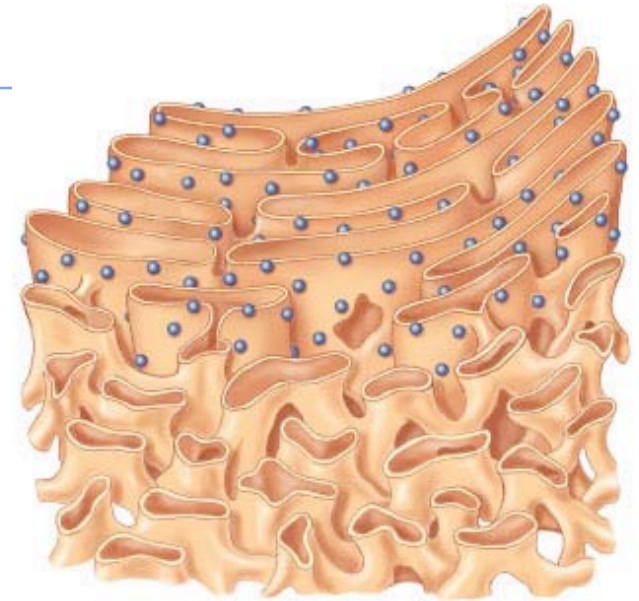
Ribosomes

- **Function**
 - ◆ protein production
- **Structure**
 - ◆ rRNA & protein
 - ◆ 2 subunits combine



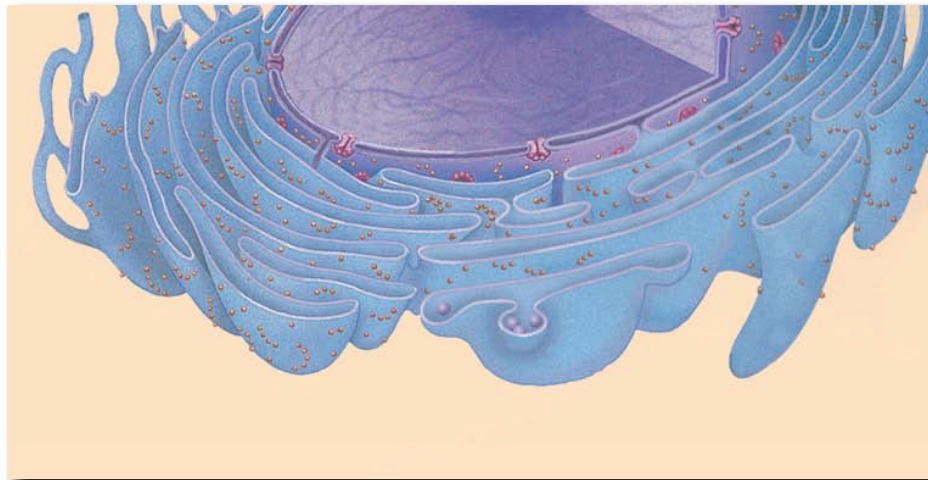
Types of Ribosomes

- **Free ribosomes**
 - ◆ suspended in cytosol
 - ◆ synthesize proteins that function in cytosol
- **Bound ribosomes**
 - ◆ attached to **endoplasmic reticulum**
 - ◆ synthesize proteins for export or for membranes

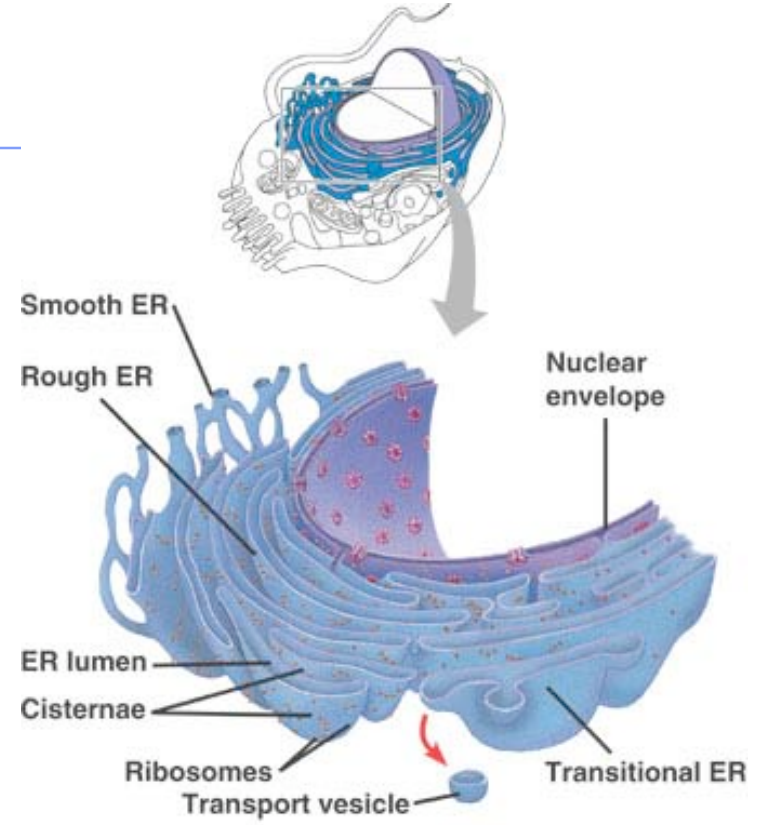
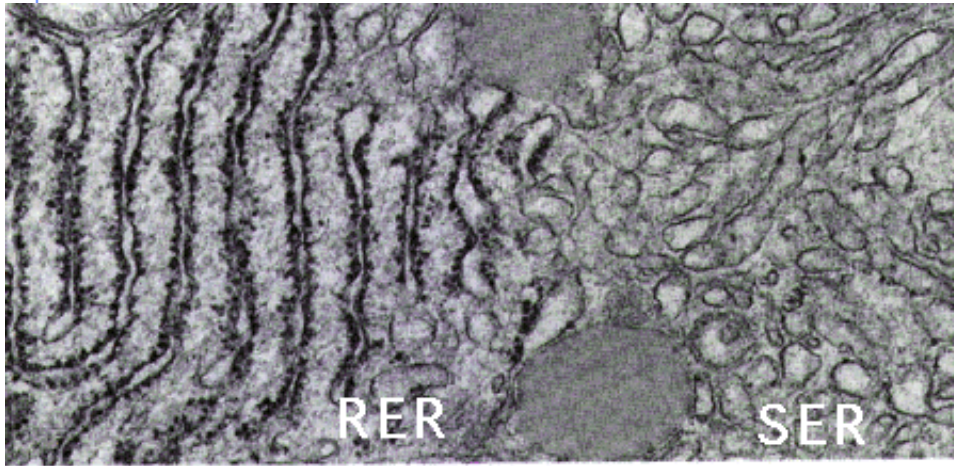


Endoplasmic Reticulum

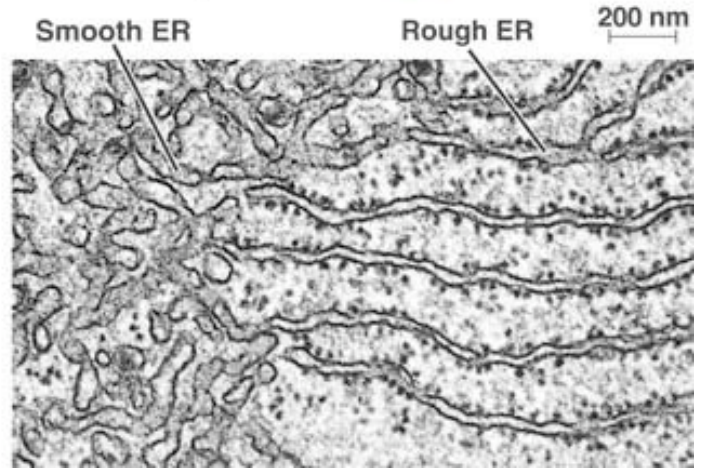
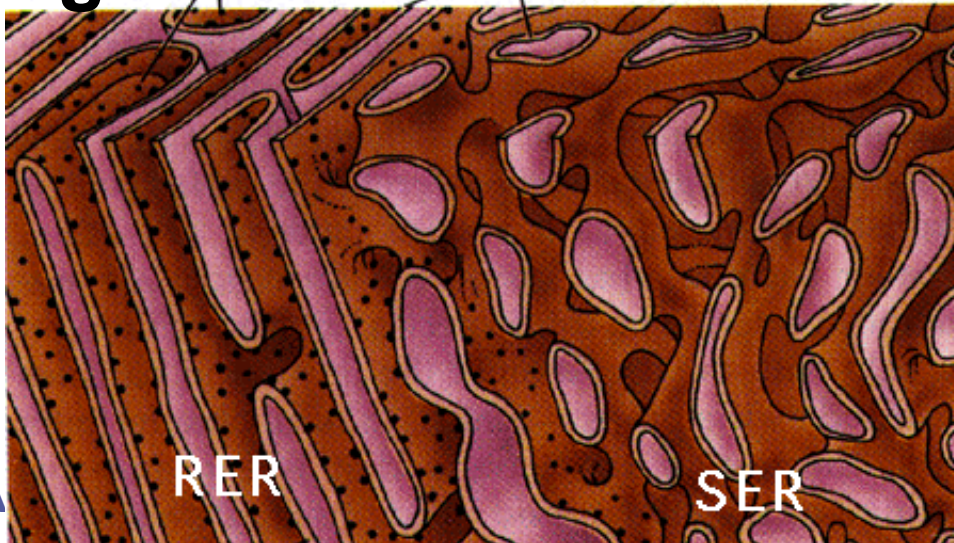
- **Function**
 - ◆ processes proteins
 - ◆ manufactures membranes
 - ◆ synthesis & hydrolysis of many compounds
- **Structure**
 - ◆ membrane connected to nuclear envelope & extends throughout cell



Types of ER



rough Ribosomes Membranes **smooth**

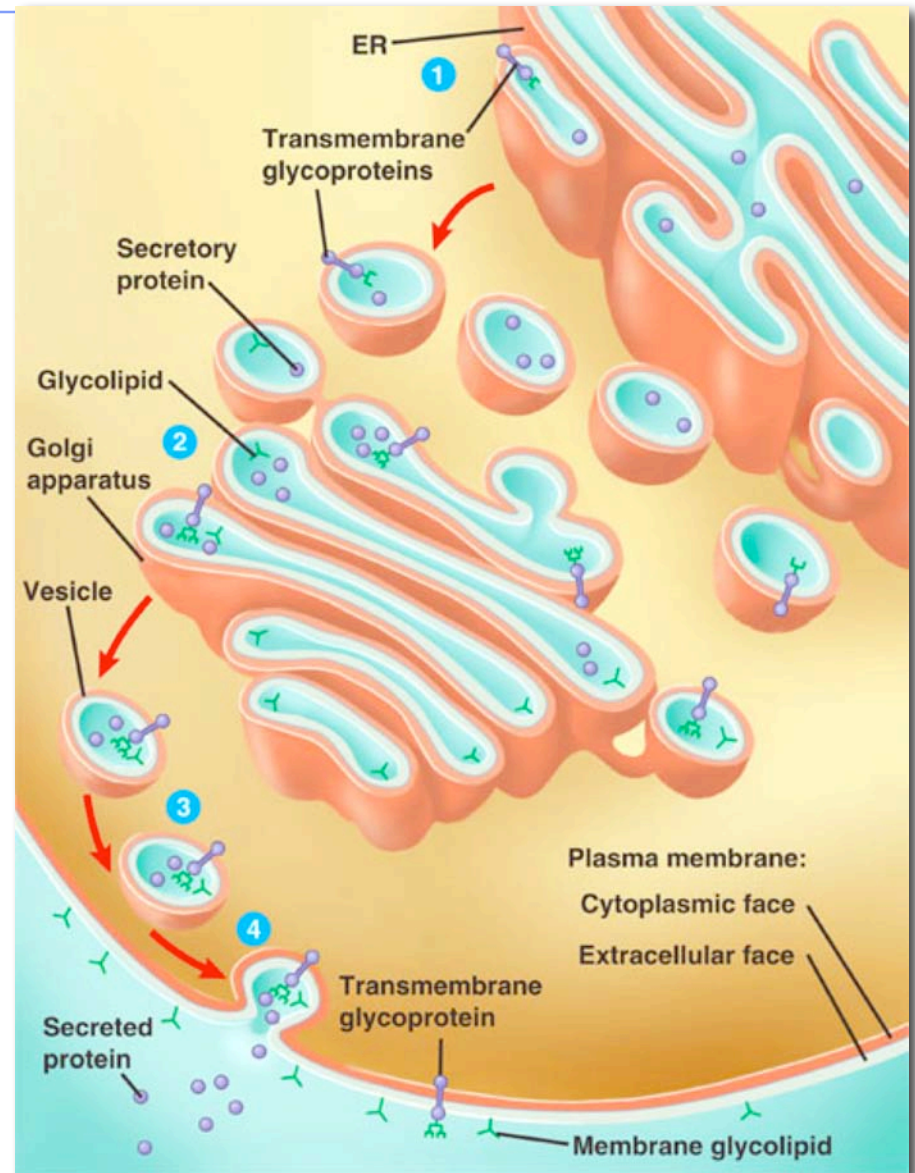


Smooth ER function

- Membrane production
- Many metabolic processes
 - ◆ synthesis
 - synthesize lipids
 - ◆ oils, phospholipids, steroids & sex hormones
 - ◆ hydrolysis
 - hydrolyze glycogen into glucose
 - ◆ in liver
 - detoxify drugs & poisons
 - ◆ in liver
 - ◆ ex. alcohol & barbiturates

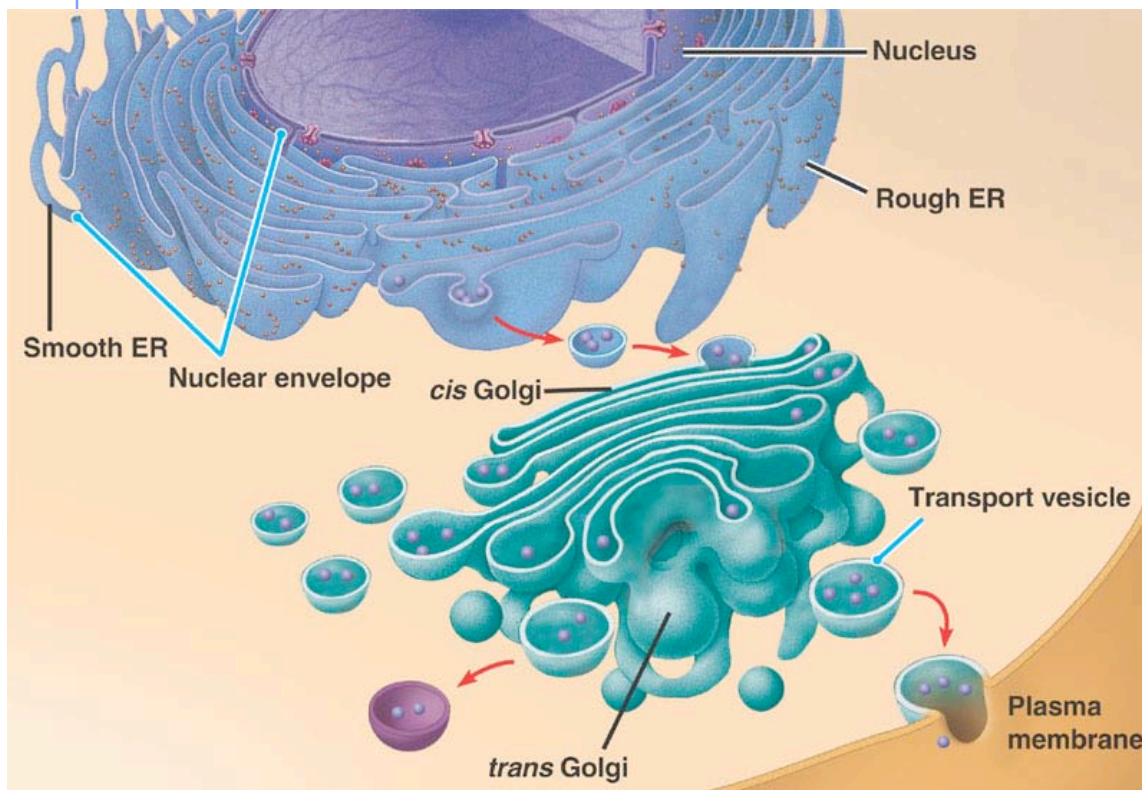
Membrane Factory

- **Build new membrane**
 - ◆ **synthesize phospholipids**
 - builds membranes
 - ◆ **ER membrane expands**
 - bud off & transfer to other parts of cell that need membranes

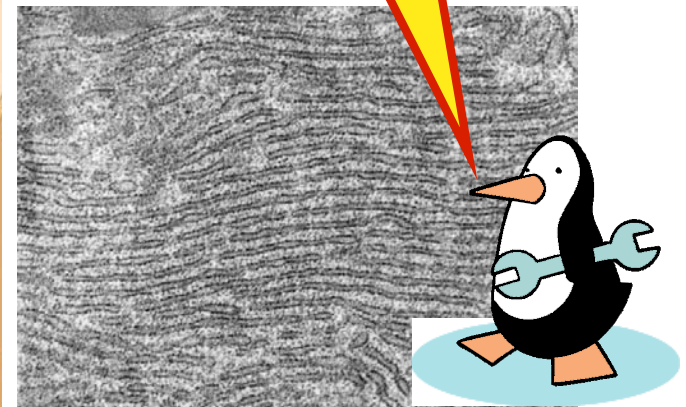


Rough ER function

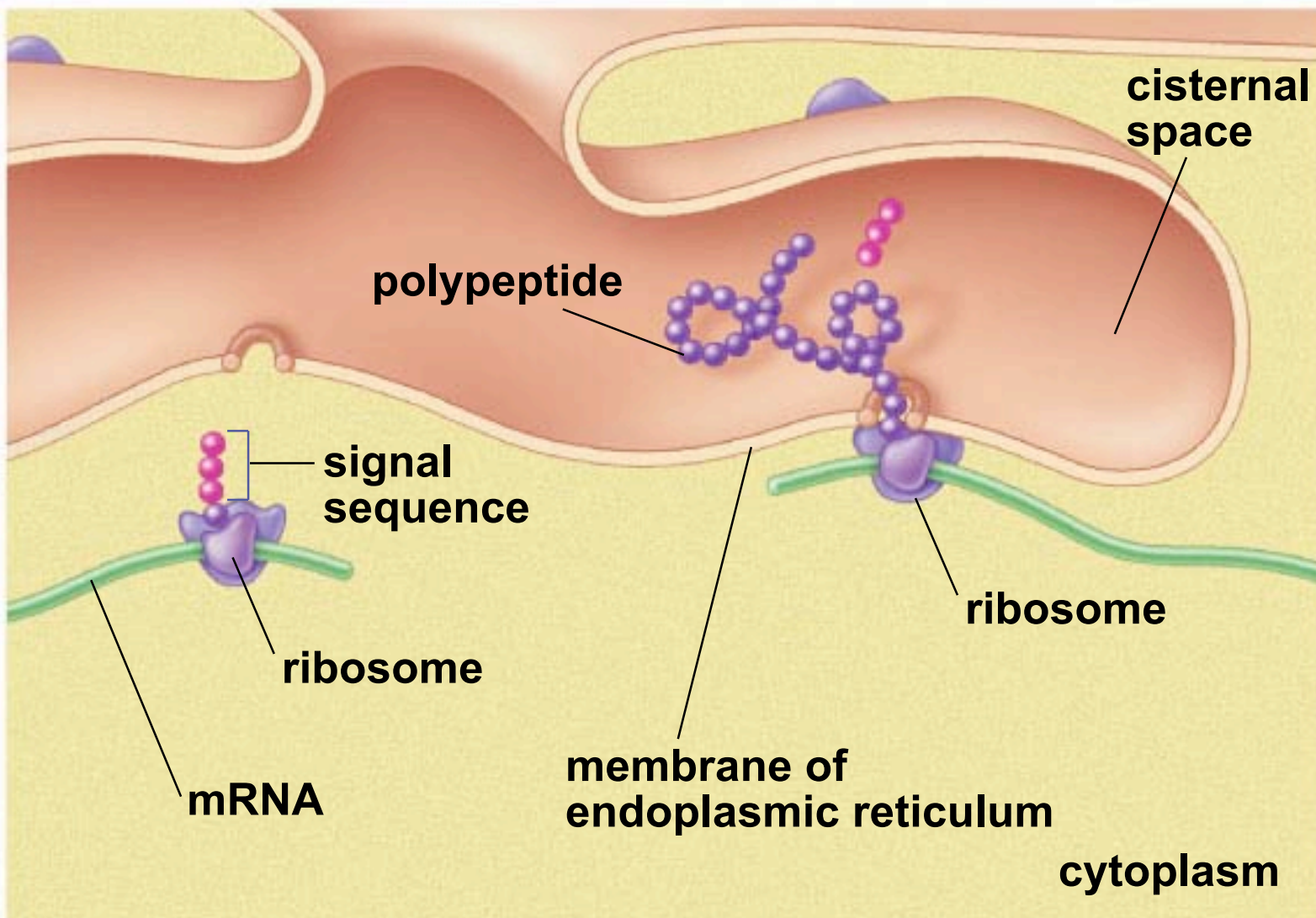
- Produce proteins for export out of cell
 - ◆ protein secreting cells
 - ◆ packaged into transport vesicles for export



Which cells have lot of rough ER?



Synthesizing proteins



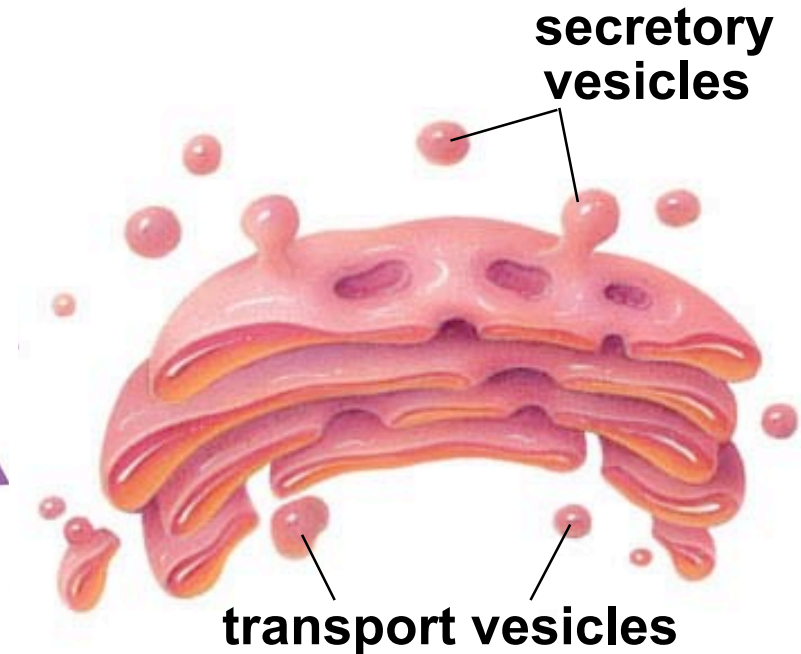
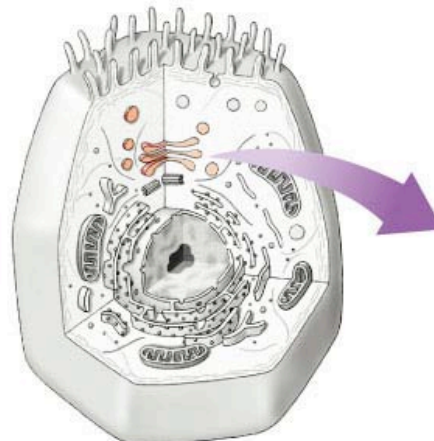
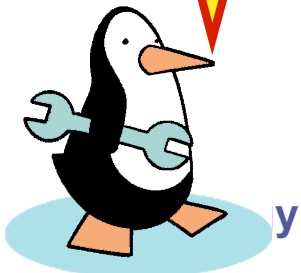
Golgi Apparatus



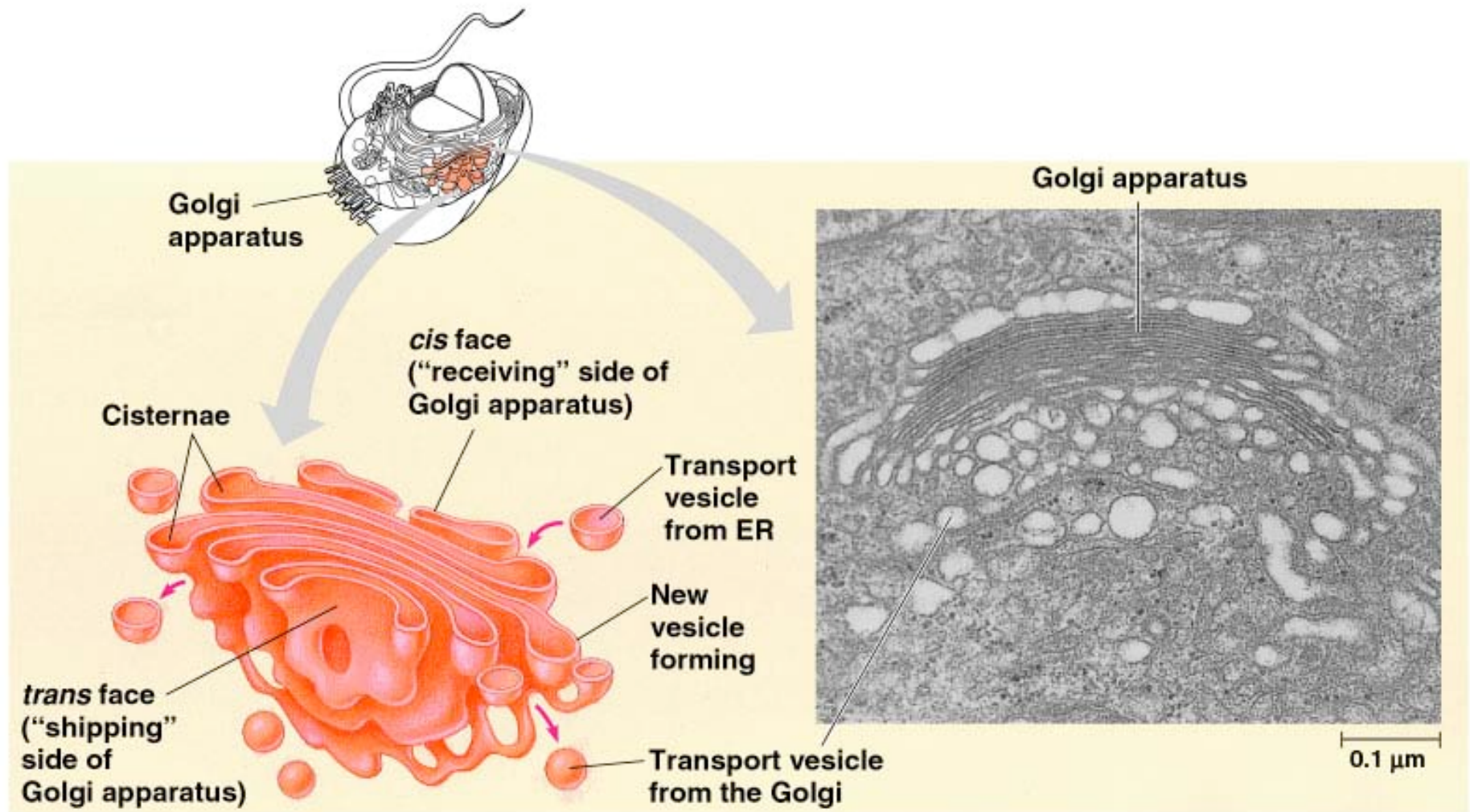
■ Function

- ◆ finishes, sorts, tags & ships cell products
 - like “UPS shipping department”
- ◆ ships products in vesicles
 - membrane sacs
 - “UPS trucks”

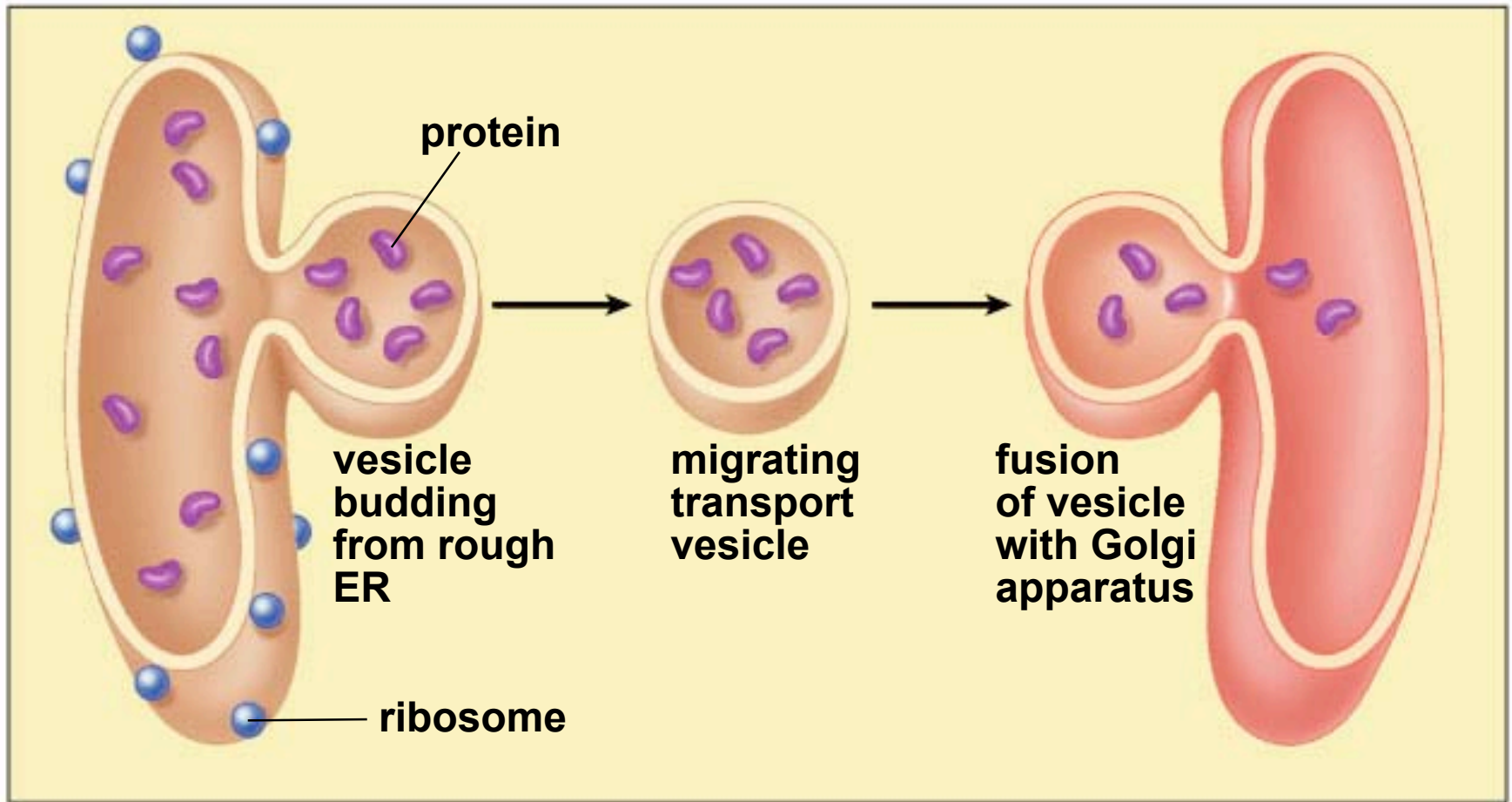
Which cells
have lots
of Golgi?

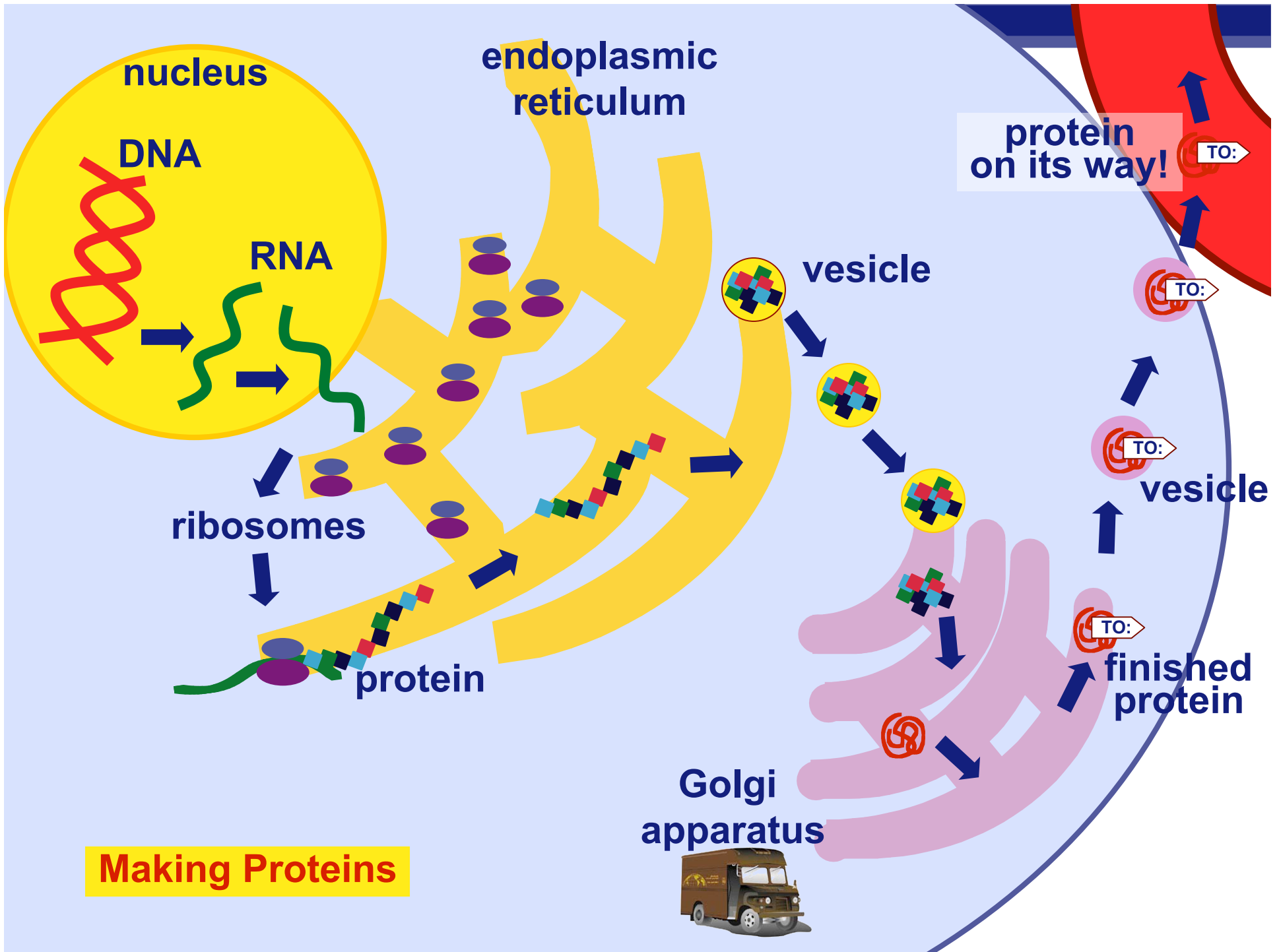


Golgi Apparatus



Vesicle transport

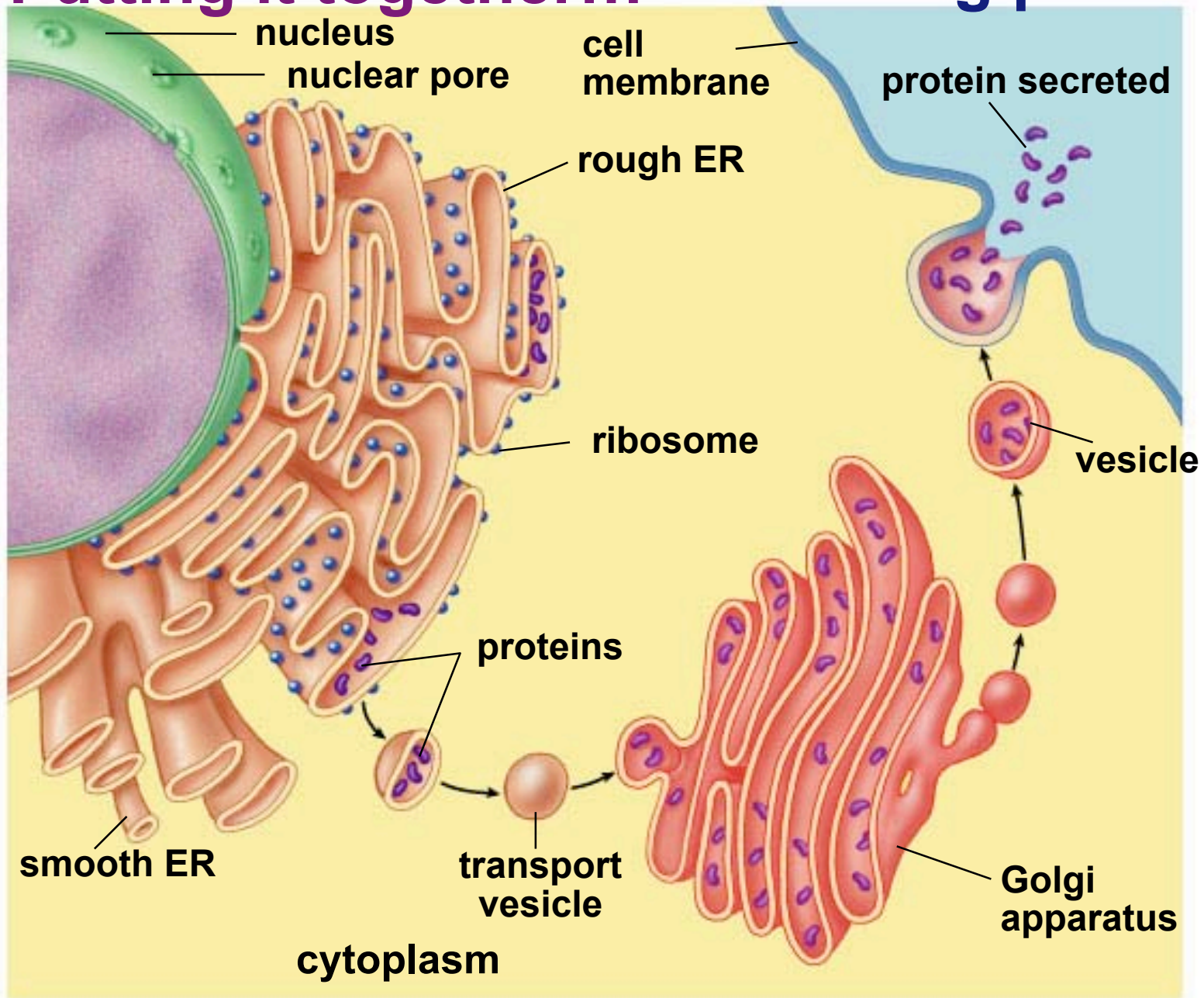


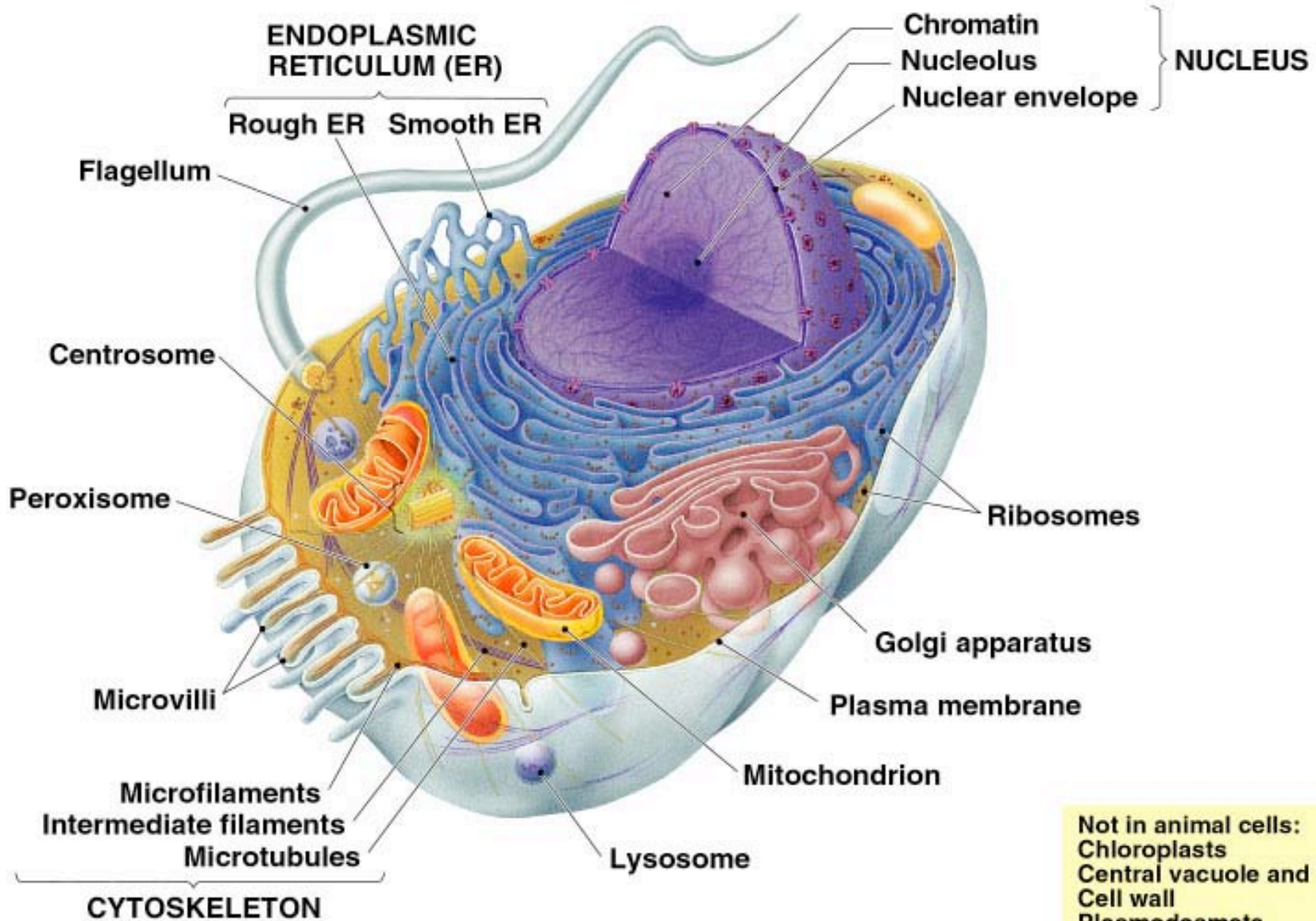


Making Proteins

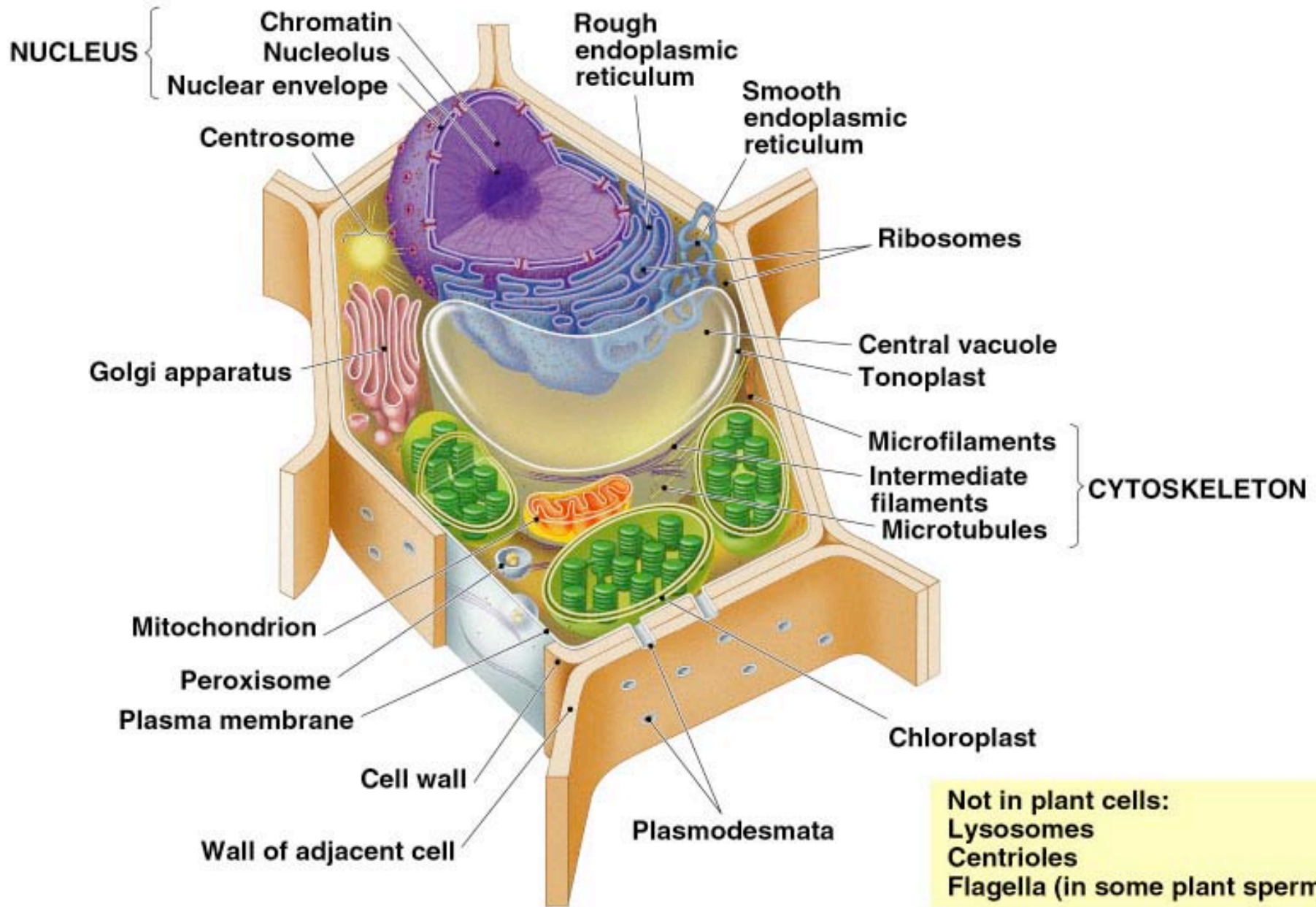
Putting it together...

Making proteins





Not in animal cells:
 Chloroplasts
 Central vacuole and tonoplast
 Cell wall
 Plasmodesmata



Any Questions!!

