



*** Thanks for signing attendance roster & noting late arrival or early departure time!



BI 121 Lecture 2

I. Announcements Lab 1 Histology today! 130 Huestis (HUE) Fun! Worksheets. Readings: DC, LS, LM? **NB**: UO Biology blog vs. Canvas <http://blogs.uoregon.edu/bi121/fall-2018/>

II. Homeostasis LS ch 1, DC Module 1

A. What? Maintenance of ECF LS p 8

B. Where? ECF = Plasma + Interstitium + ? LS fig 1-4 p 8

C. Homeostatic Balances? LS p 9, DC pp 5-6

D. Why? Cell survival! LS fig 1-5 p 9, DC p 5

E. Physiology in the News H₂O? Are we like watermelons?

F. How are balances maintained? Simplified Homeostatic Model cf: LS fig 1-7 p 14; T°C + BP balance e.g. + vs. - FB

III. Cell Anatomy, Physiology & Compartmentalization LS ch 2

A. How big? What boundaries? Why compartments? pp 19-21

B. Basic survival skills LS ch 1 p 3

C. Organelles ≡ Intracellular specialty shops

Endoplasmic Reticulum (ER), Golgi, Lysosomes,

Peroxisomes & Mitochondria, LS fig 2-1, 2-2, 2-3 pp 20-3

***Maintenance of a relative constancy in the
Internal environment = ECF = fluid outside of cells***

**milieu
interieur?**



Claude Bernard

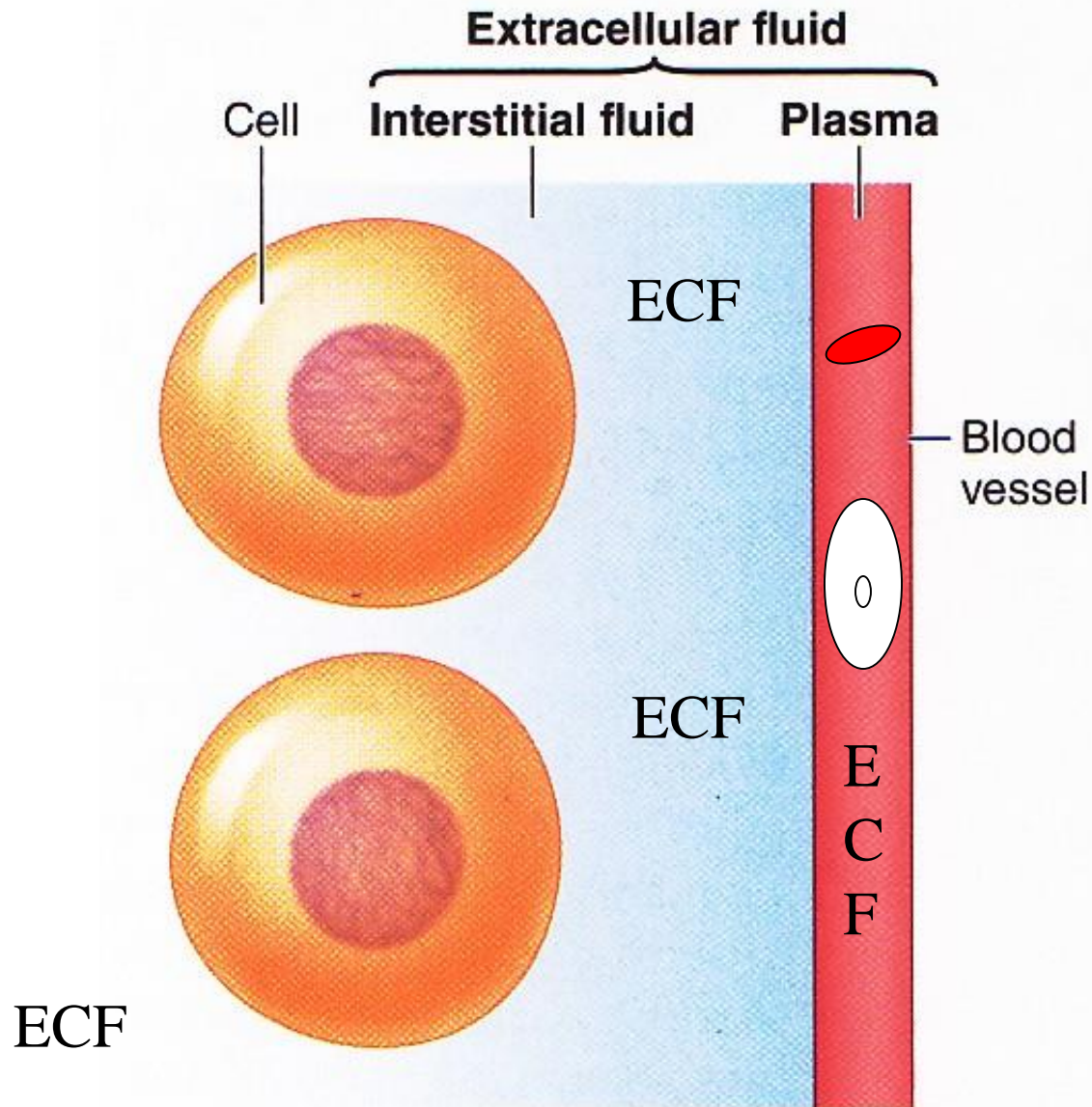


**100 trillion
cells working
intimately**

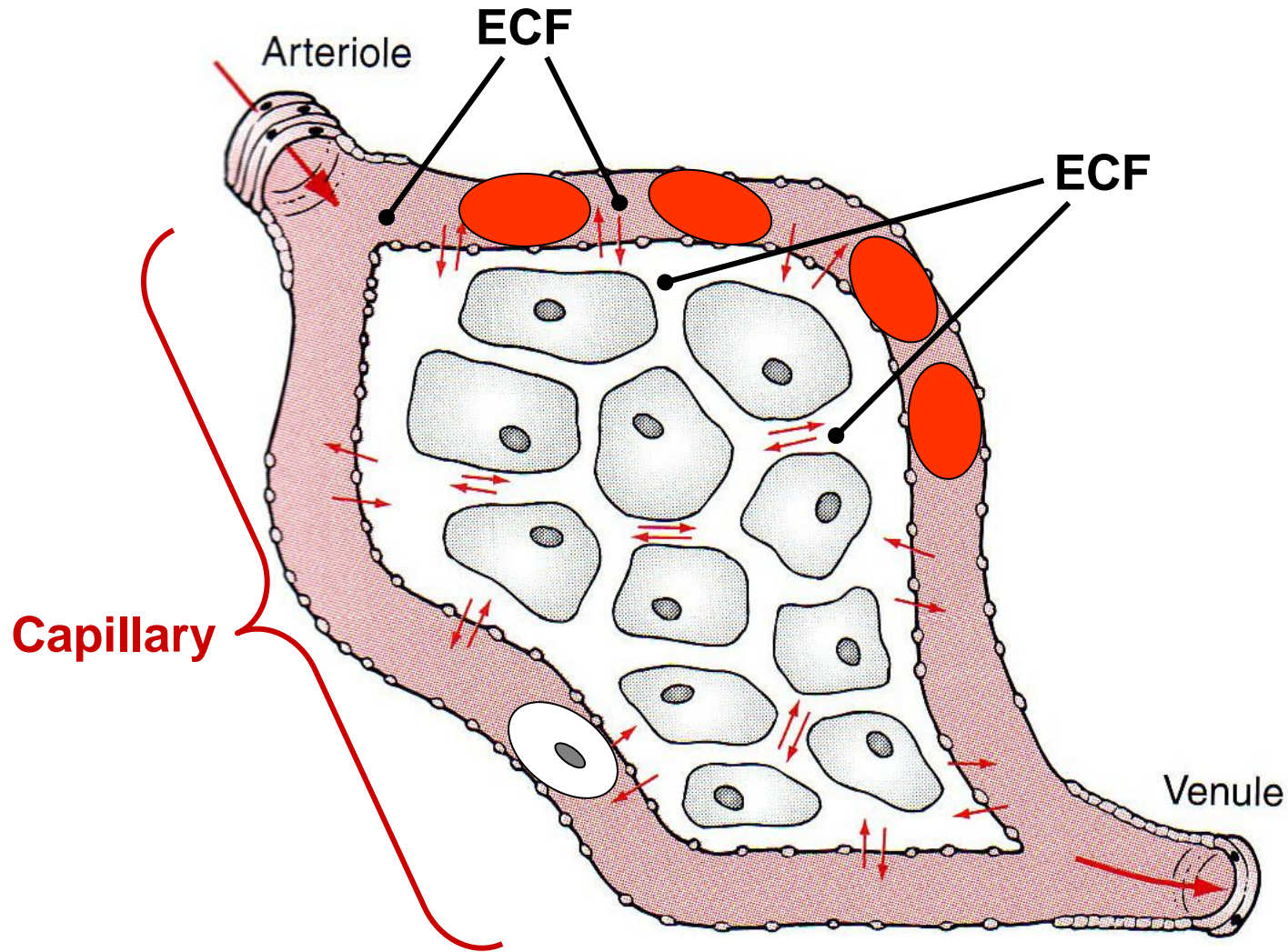


Walter B. Cannon

Where is extracellular fluid?

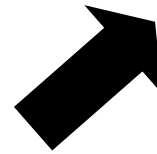


Where is extracellular fluid?



As long as between/outside cells, **ECF everywhere?**

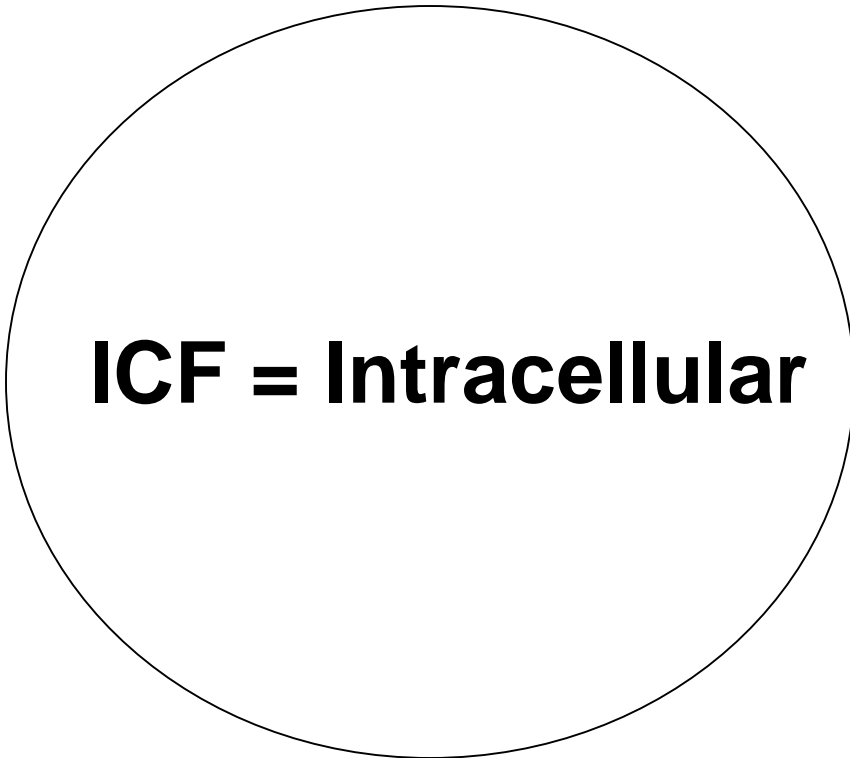
ECF = Extracellular



Plasma 
(within CV System)



Interstitium
(eg, between
muscle cells)



ICF = Intracellular

*Homeostasis
or
Homeokinesis?*

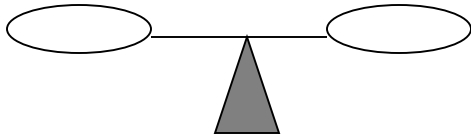


<https://www.khanacademy.org/partner-content/mit-k12/chem-and-bio/v/homeostasis>

Metabolic

ANA-

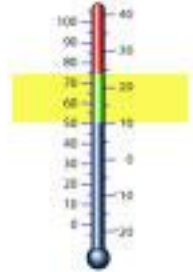
CATA-



H₂O



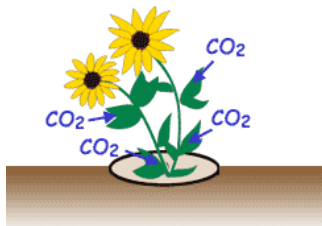
T^oC



Dr. Evonuk's 6 Balances

O₂/CO₂

Carbon Dioxide



Ion^{+/-}

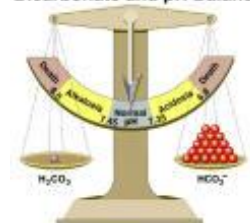


Captain Calcium

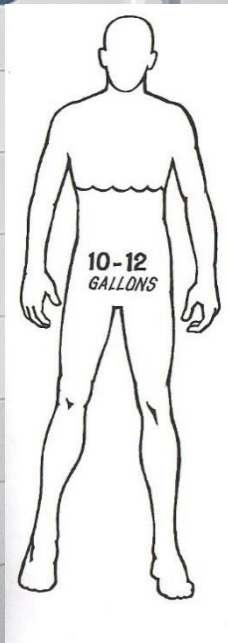


pH

Bicarbonate and pH Balance



No, we're not watermelons,
but H₂O is definitely critical!!



≠

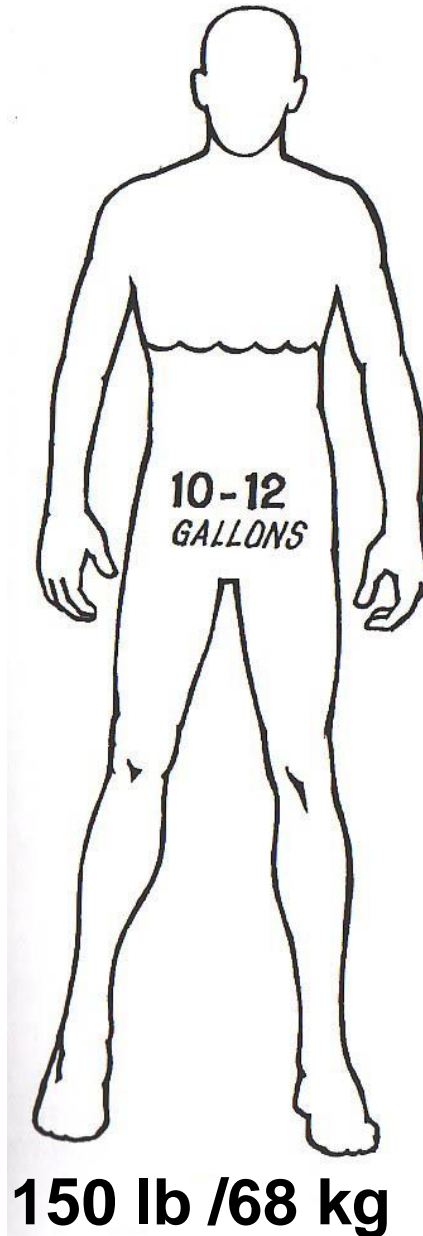


because
you're 98%
water.



Drink about 1 L per 1000 calories energy expenditure!!


Human ~ 2/3 H₂O
~ 60 – 70 %



NB: So 2000 kcal →
drink 2000 mL
≡ 67.63 fl oz
≡ ~ 8 cups!

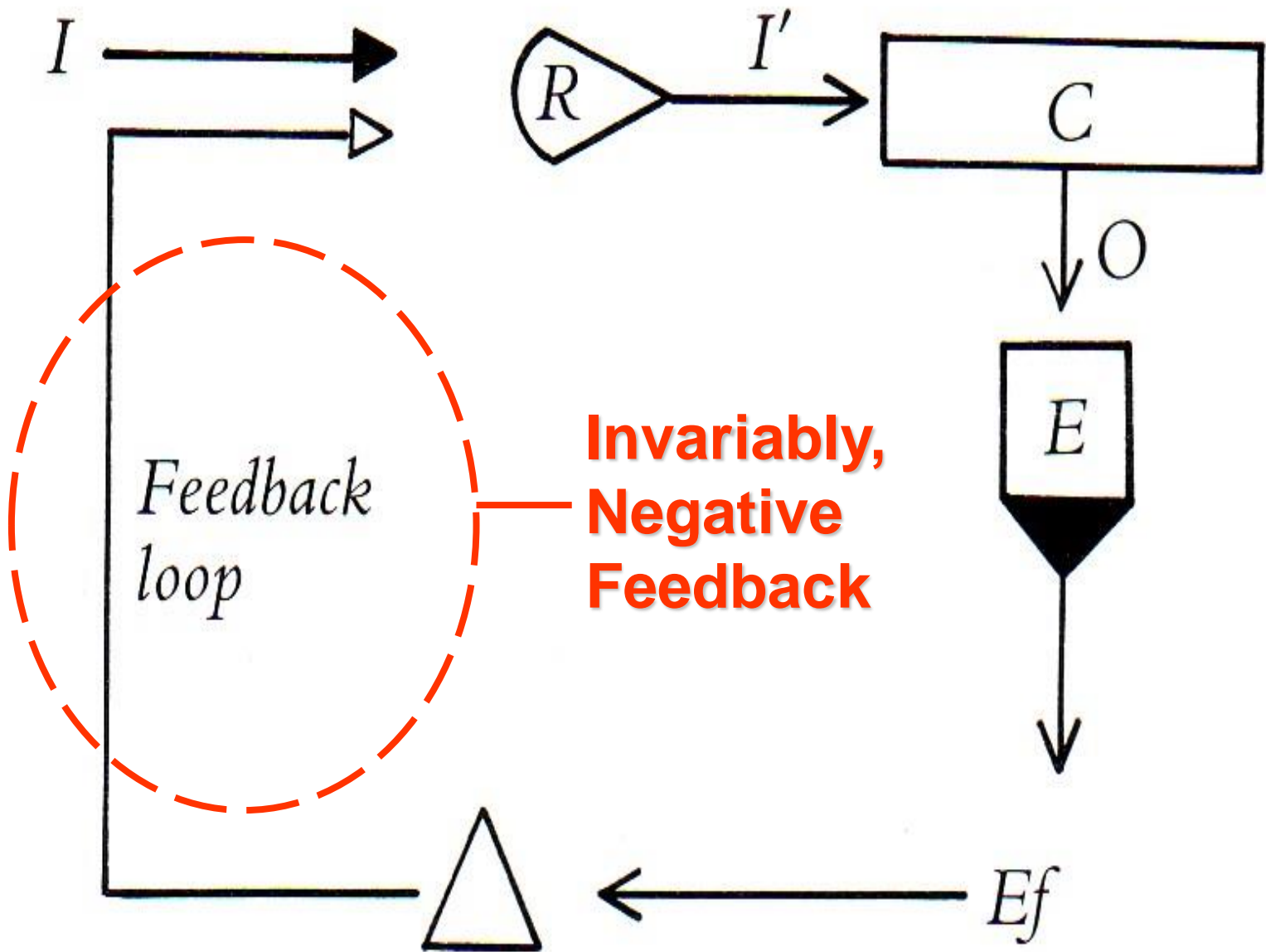
= ~40 – 48 kg H₂O

National Academy of Medicine 2018
~9 ½ cups of fluid per day for women
~12 cups per day for men

A woman with her hair in a ponytail, wearing a light blue tank top, is shown in profile drinking from a blue water bottle. The background is a bright, sunny sky with scattered clouds. The sun is low on the horizon, creating a lens flare effect behind her neck.

That includes all fluids:
water, coffee, tea, juice,
milk, but doesn't
include the 2-3 cups of
liquid you get from
your food!

SOURCE: Dow C. Bodies of water. *Nutrition Action HealthLetter*, Sep 2018, 7-9.



NB: Though most often **negative** feedback, there are exceptions:

Selected +FB eg:

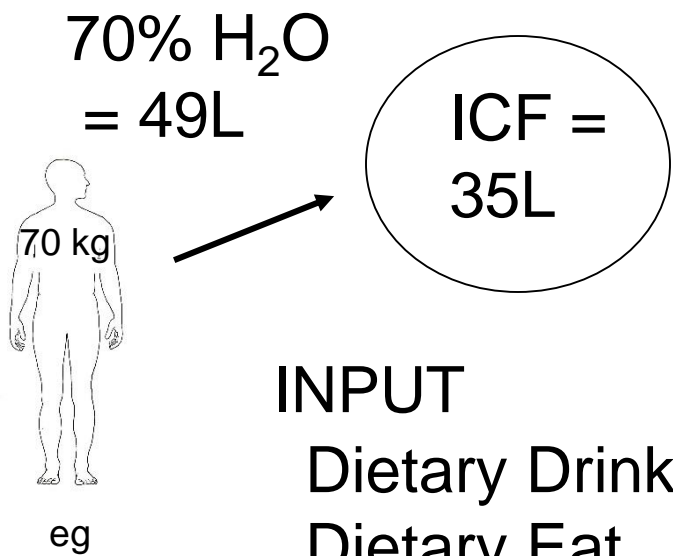
LH Surge + Ovulation

Oxytocin + Uterine Contraction

Blood Clotting Cascade

cAMP Cascade

Na⁺ influx during AP



+ ECF = 14L

[Interstitium = 11L
Plasma = 3L]

INPUT

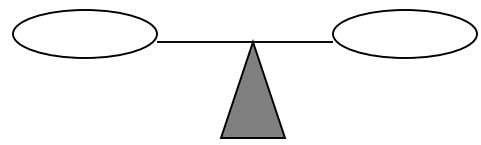
Dietary Drink	1200 mL
Dietary Eat	400 mL
Oxidation	400 mL
Total	= 2000 mL ✓



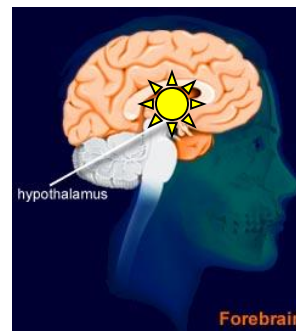
BALANCE!

OUTPUT

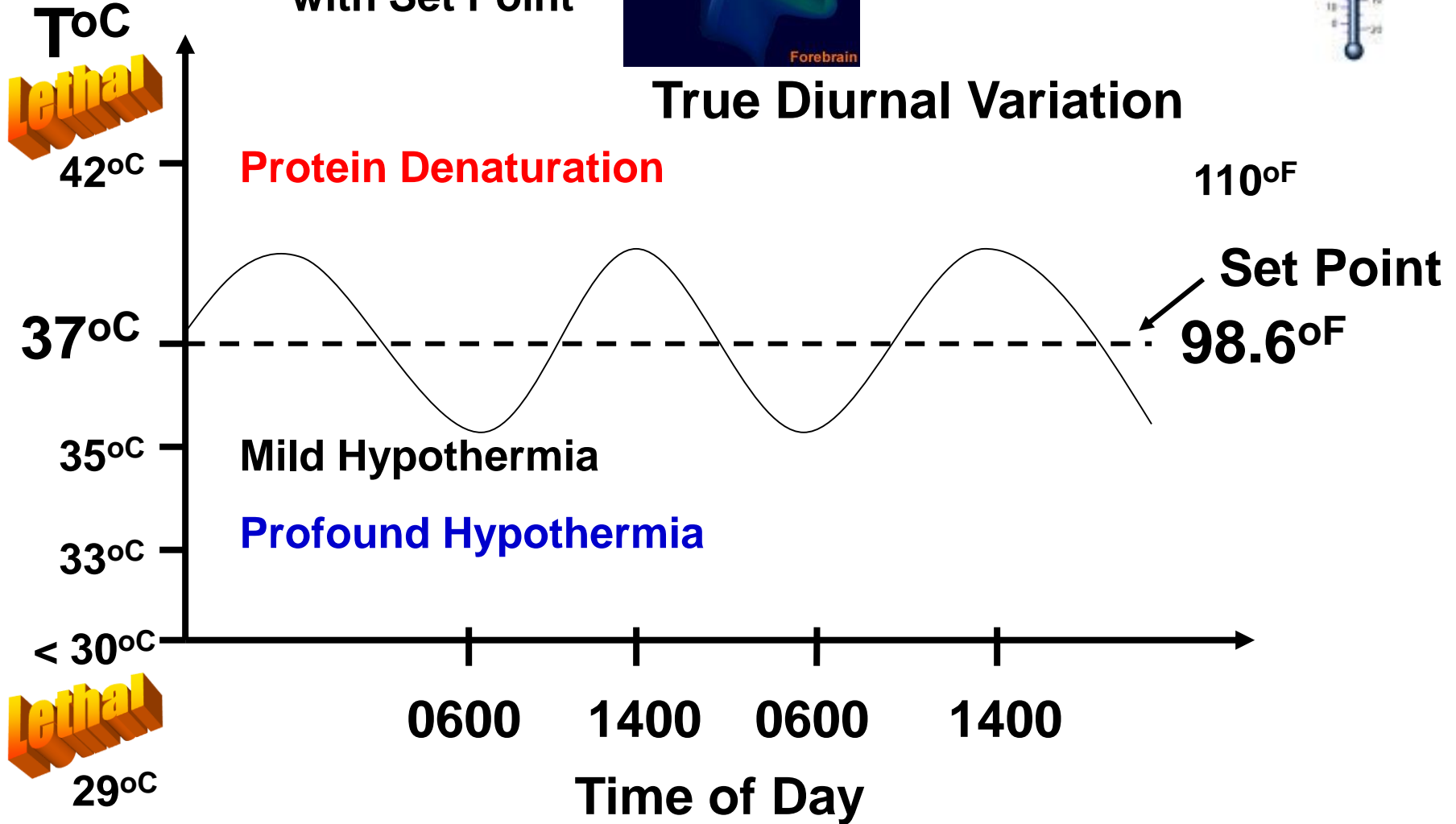
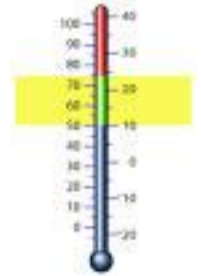
Urine	1000 mL
Sweat + Insensible	900 mL
Feces	100 mL
Total	= 2000 mL ✓



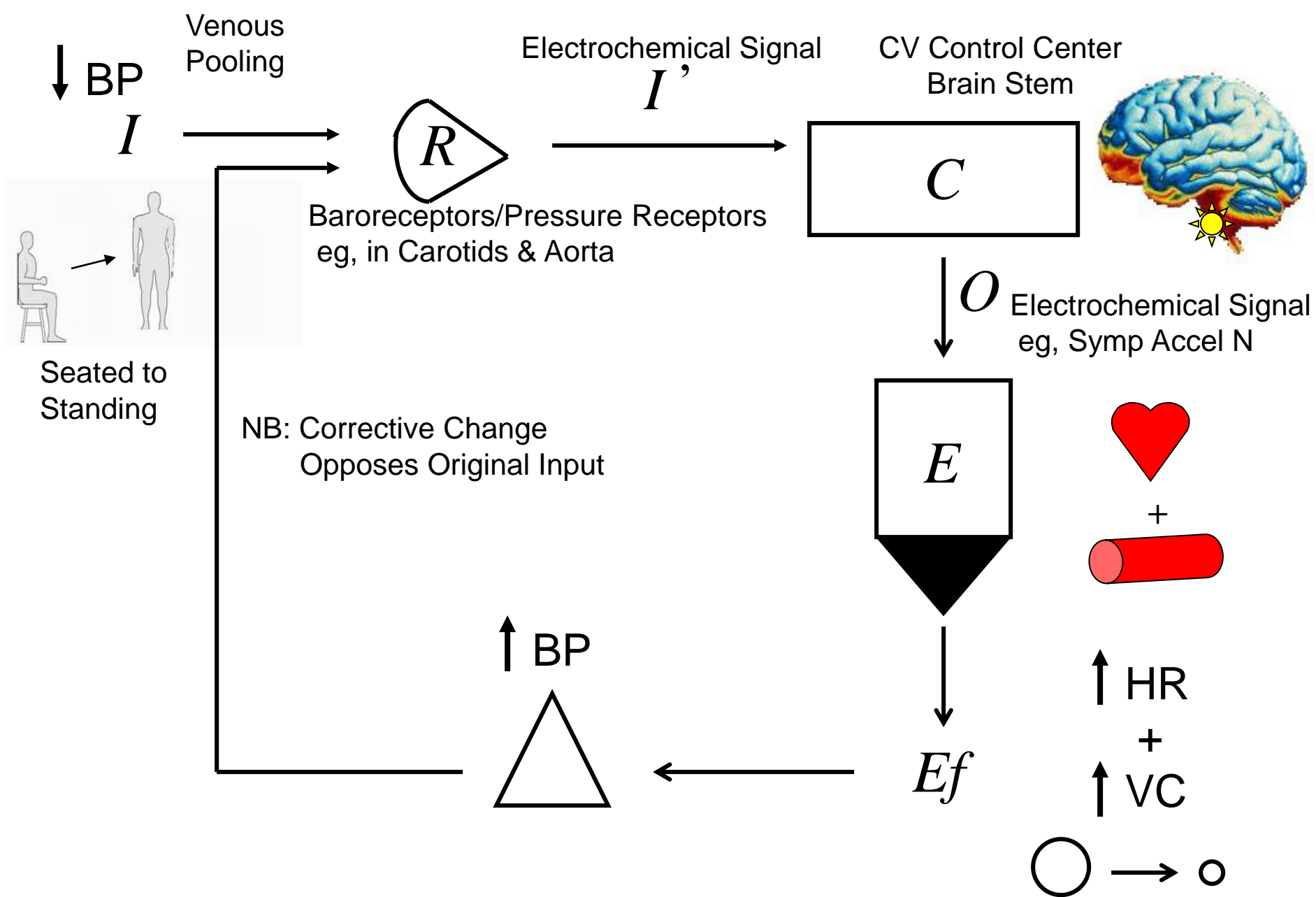
Controller =
Hypothalamus
with Set Point



T_{bC}



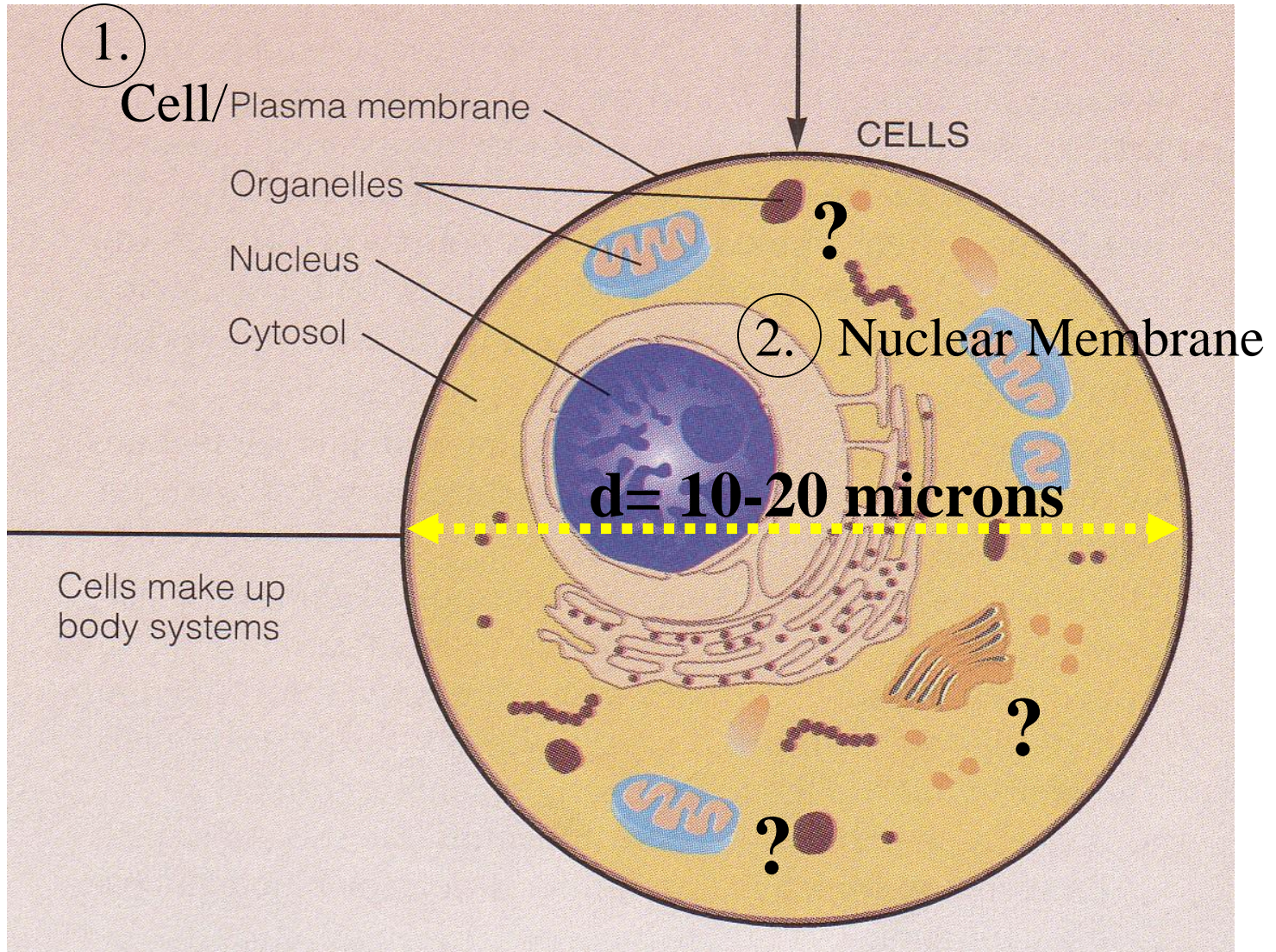
<https://www.khanacademy.org/partner-content/mit-k12/chem-and-bio/v/homeostasis>



Class Discussion + Break!

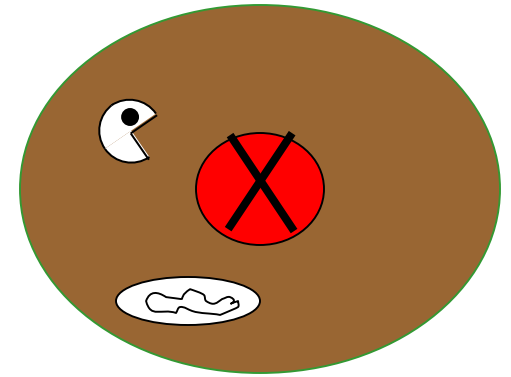


HOW BIG? 100 CELLS LENGTHWISE = 1 mm!!



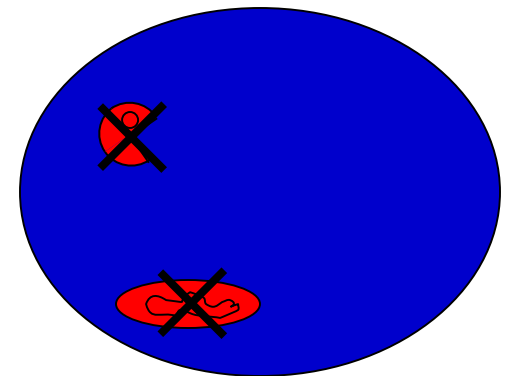
Cytoplasm = Cell - Nucleus

[Extract nucleus; includes organelles]



Cytosol = Cytoplasm - Organelles

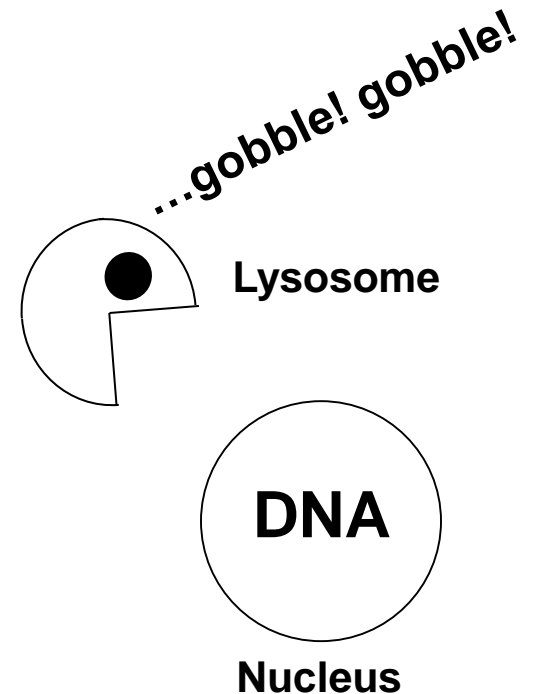
[Extract organelles; complex gel-liquid]



Why Compartments? Advantage?

**Incompatible reactions can
take place**

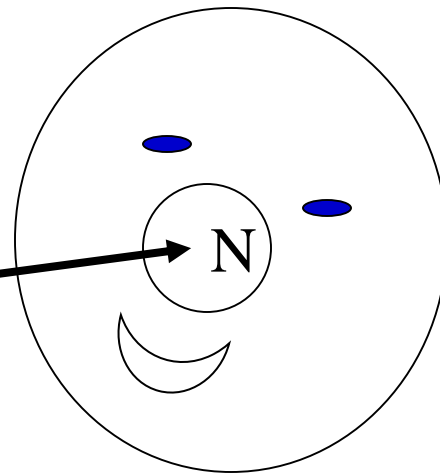
Simultaneously!!



Basic Cell Survival Skills?

- 1. Get food**
- 2. Use food**
- 3. Rid wastes**
- 4. Move**
- 5. Reproduce**

Nucleus or nose?



How to live?

1 e.g. Cell of 100 Trillion!

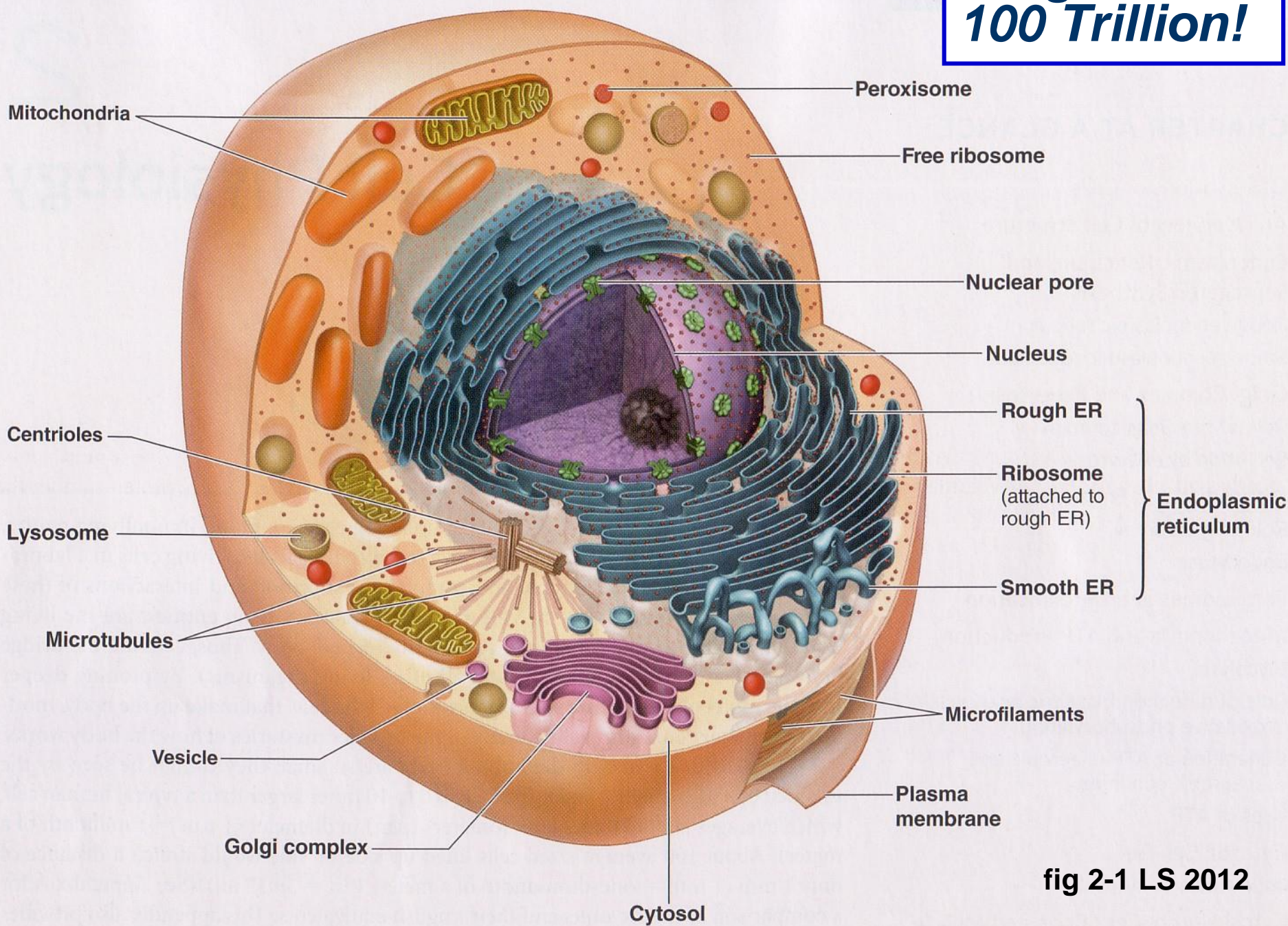


fig 2-1 LS 2012

Rough & Smooth Endoplasmic Reticulum (ER): Protein & Lipid Synthesizing Factories

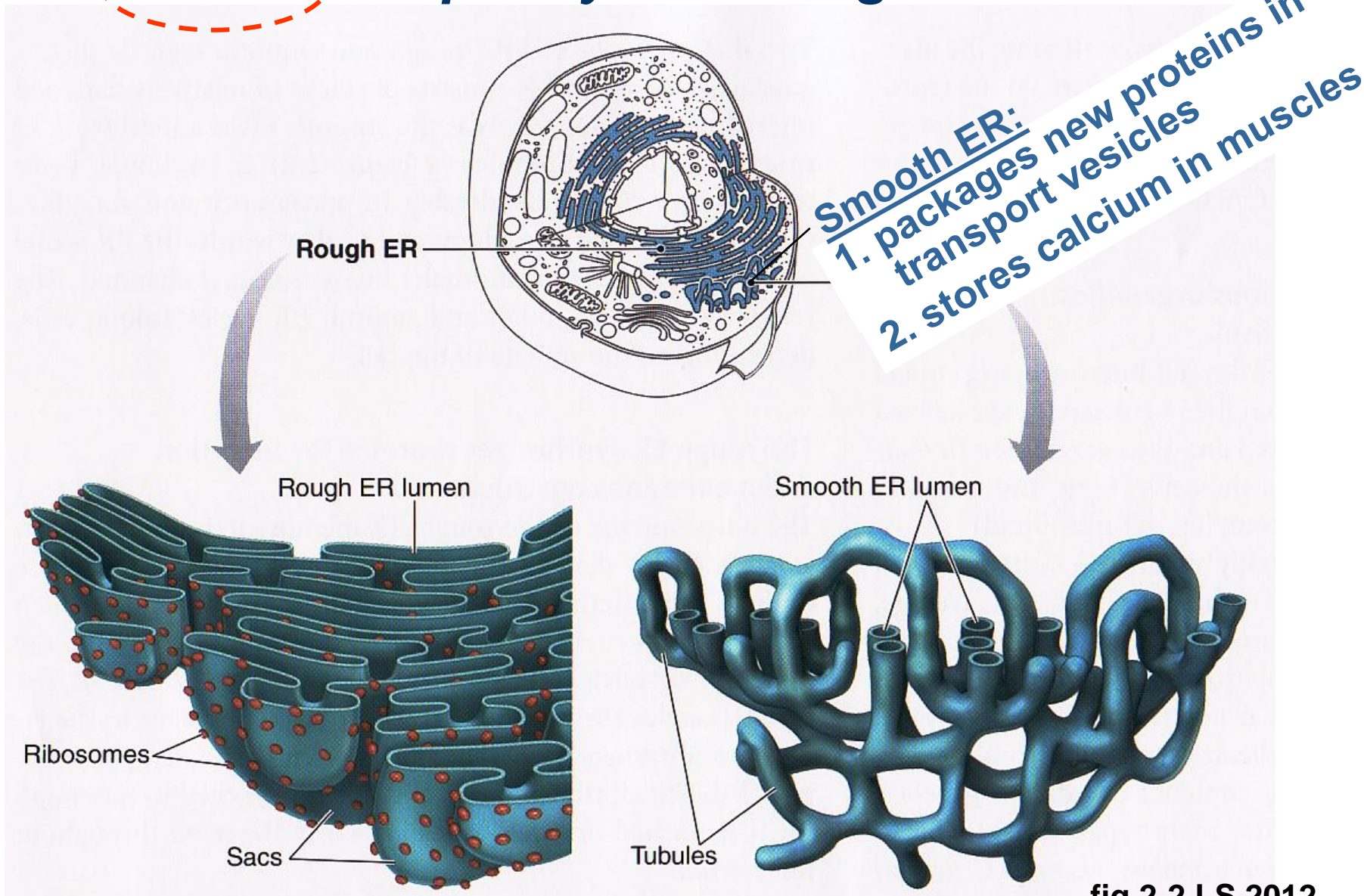
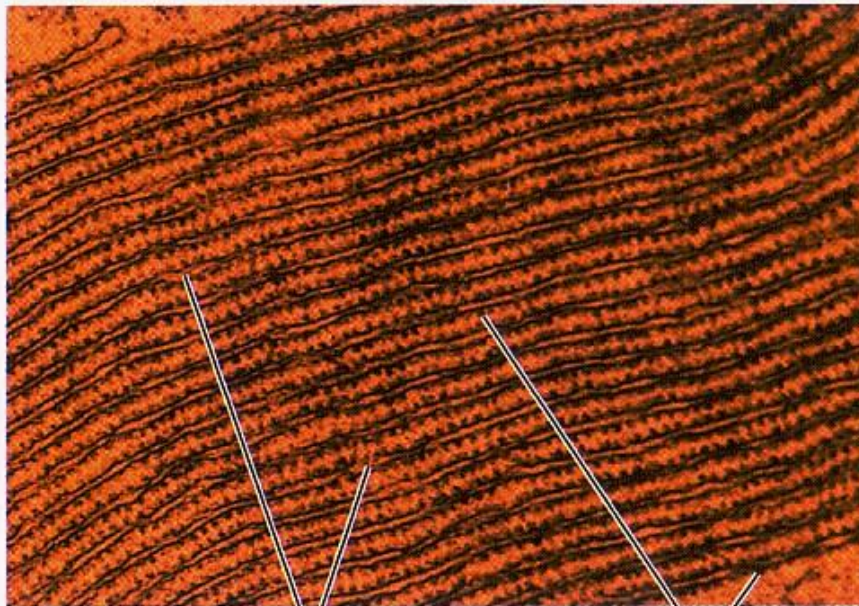


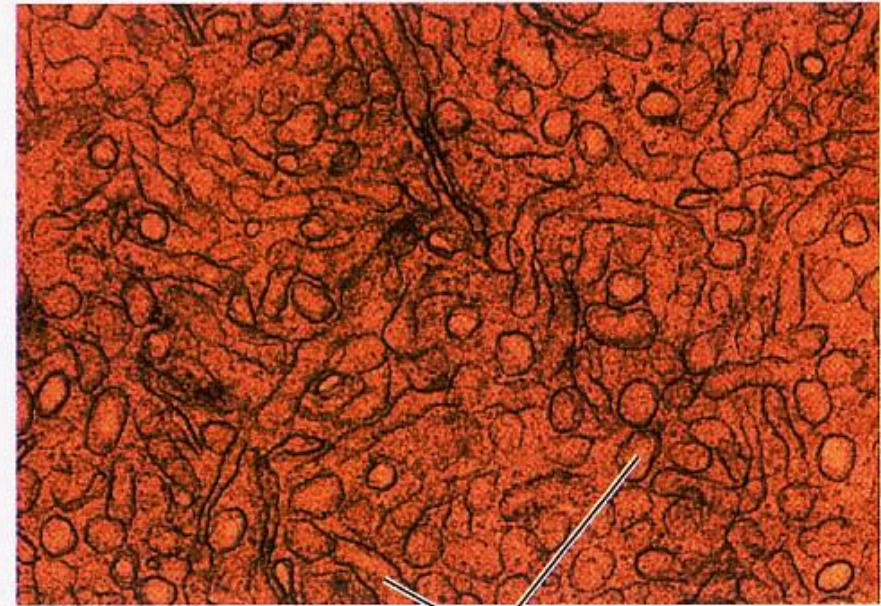
fig 2-2 LS 2012

Electron Micrographs of Rough vs. Smooth ER



Rough ER lumen

Ribosomes



Smooth ER lumen

Secretion of Proteins Produced by ER

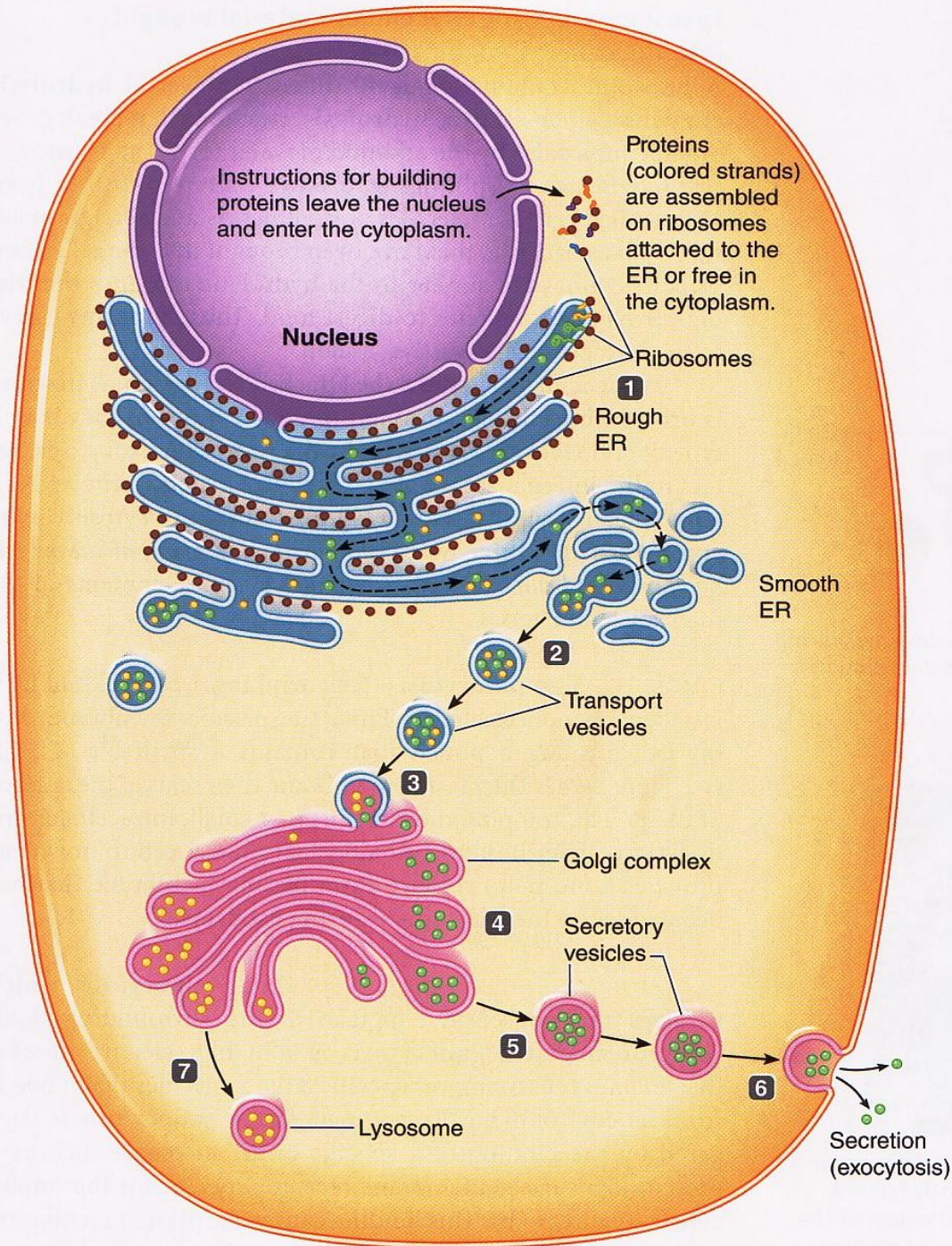
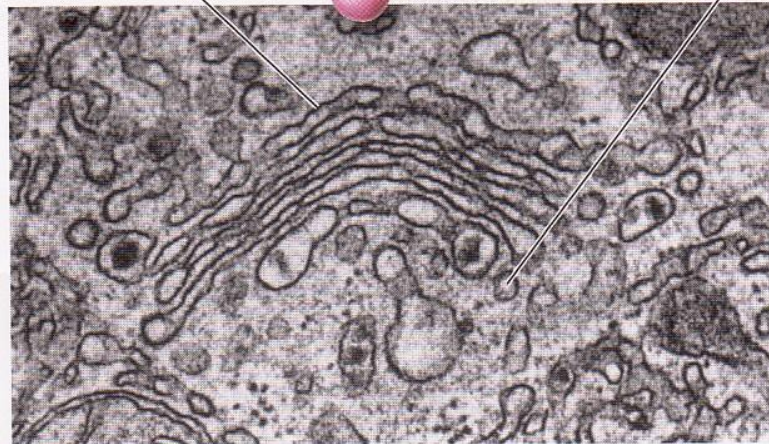
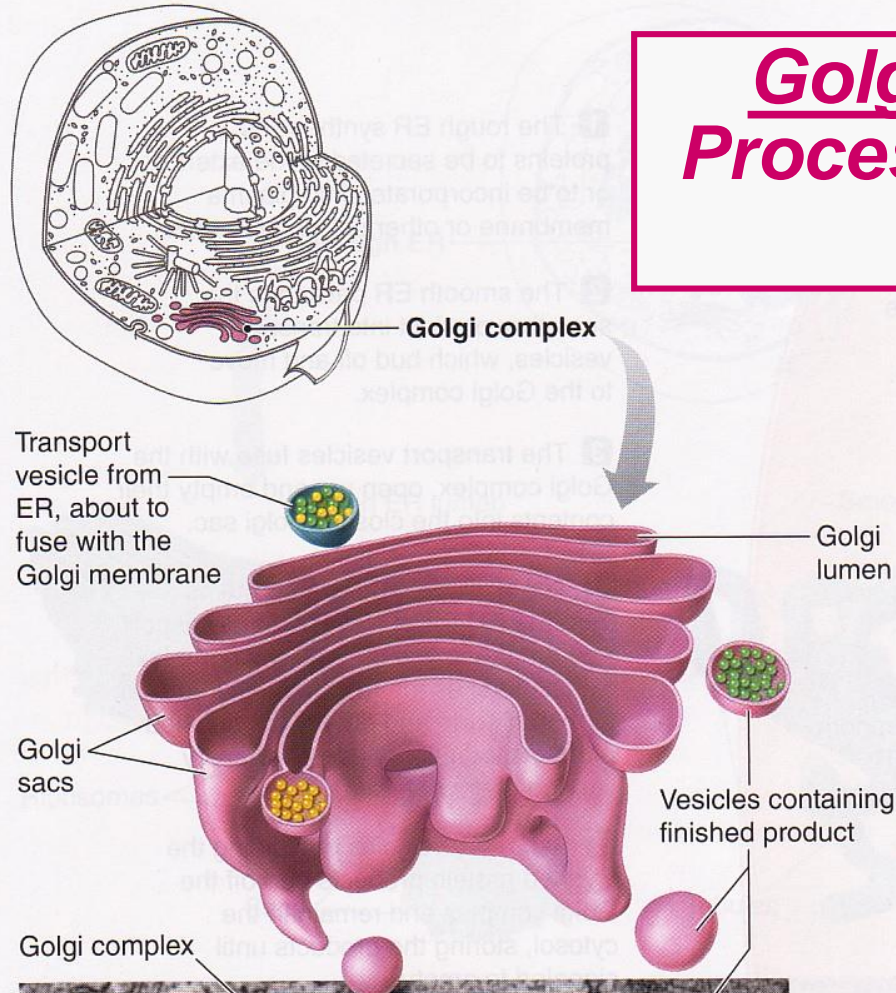


fig 2-3 LS 2012

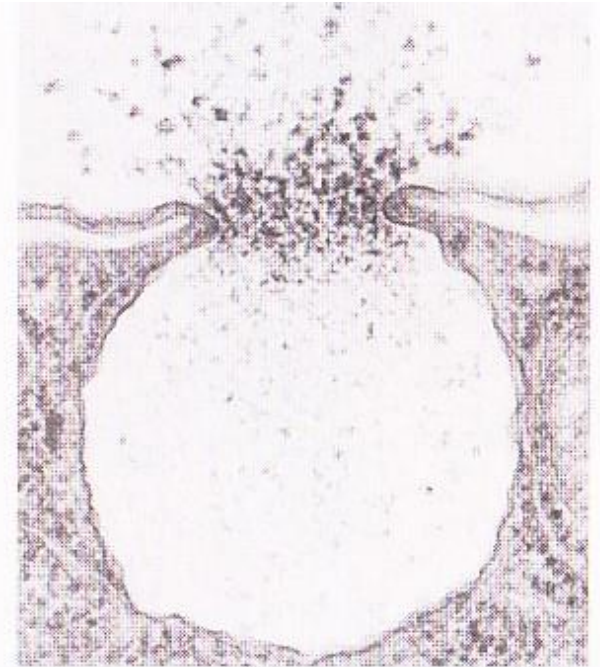
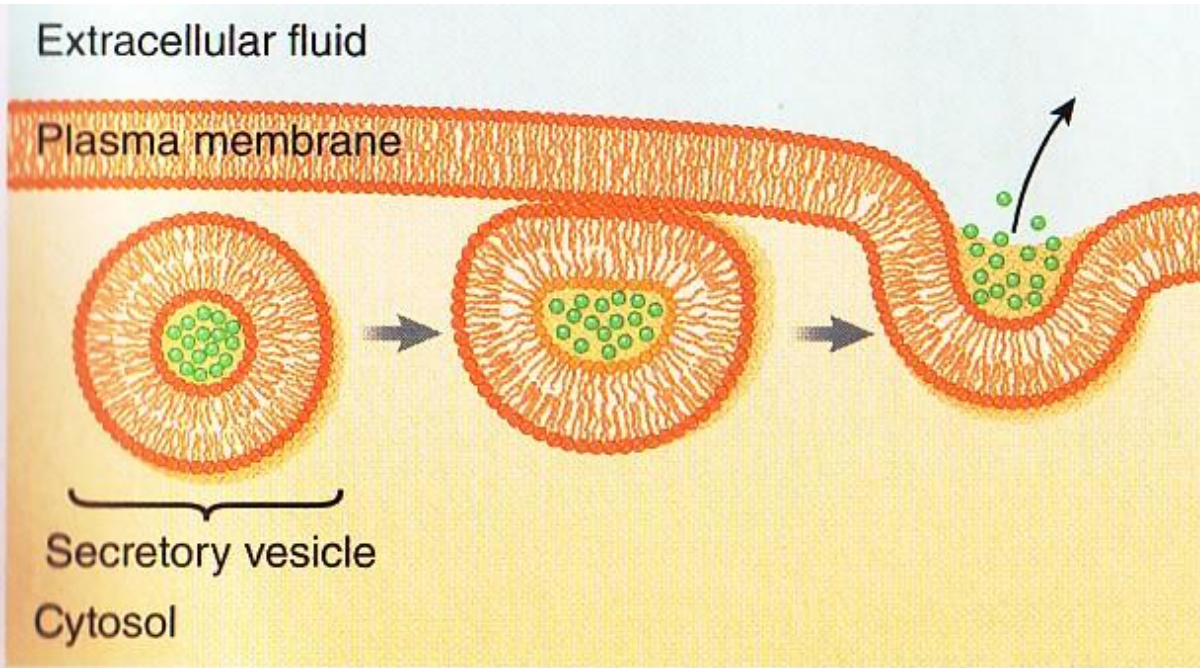
Golgi Complex: Final Processing, Packaging & Distribution



Dr. Don Fawcett & R. Bollender/Visuals Unlimited

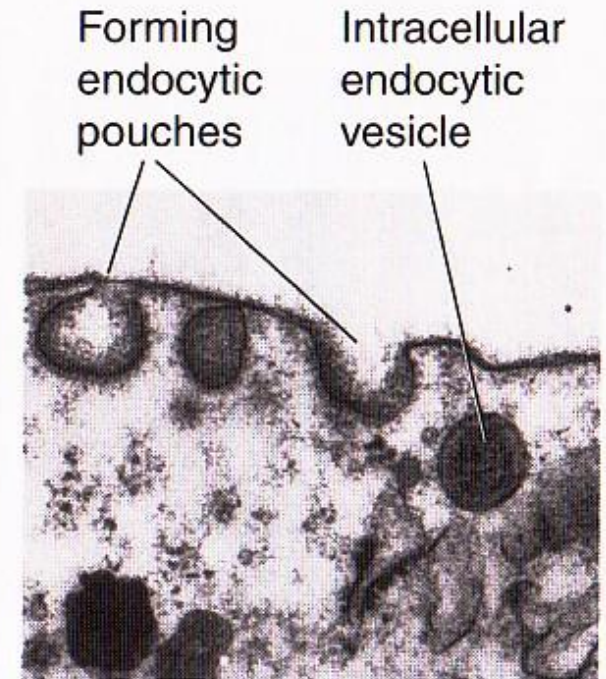
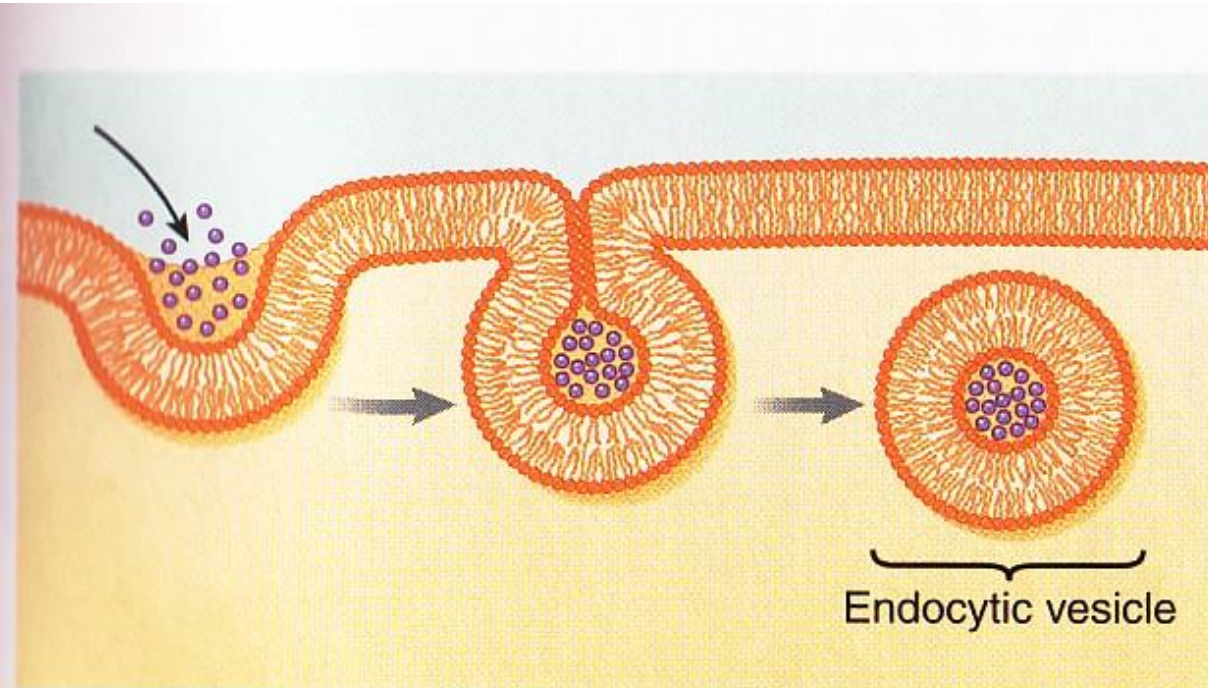
fig 2-4 LS 2012

Exocytosis: Primary Means of Secretion



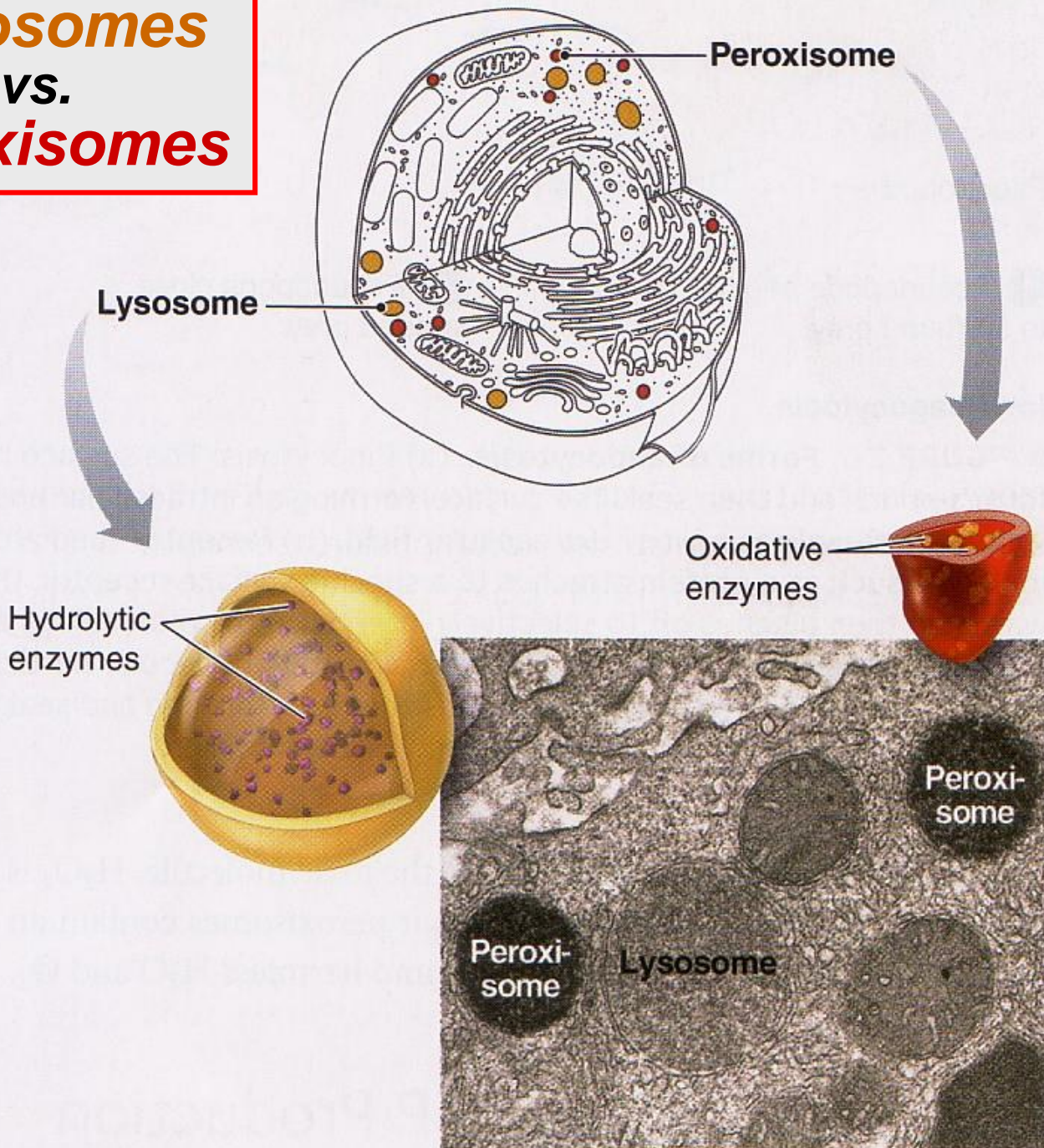
(a) Dr. Birgit Satir, Albert Einstein College of Medicine

Endocytosis: Primary Means of Ingestion



(b) © Don W. Fawcett/Photo Researchers, Inc.

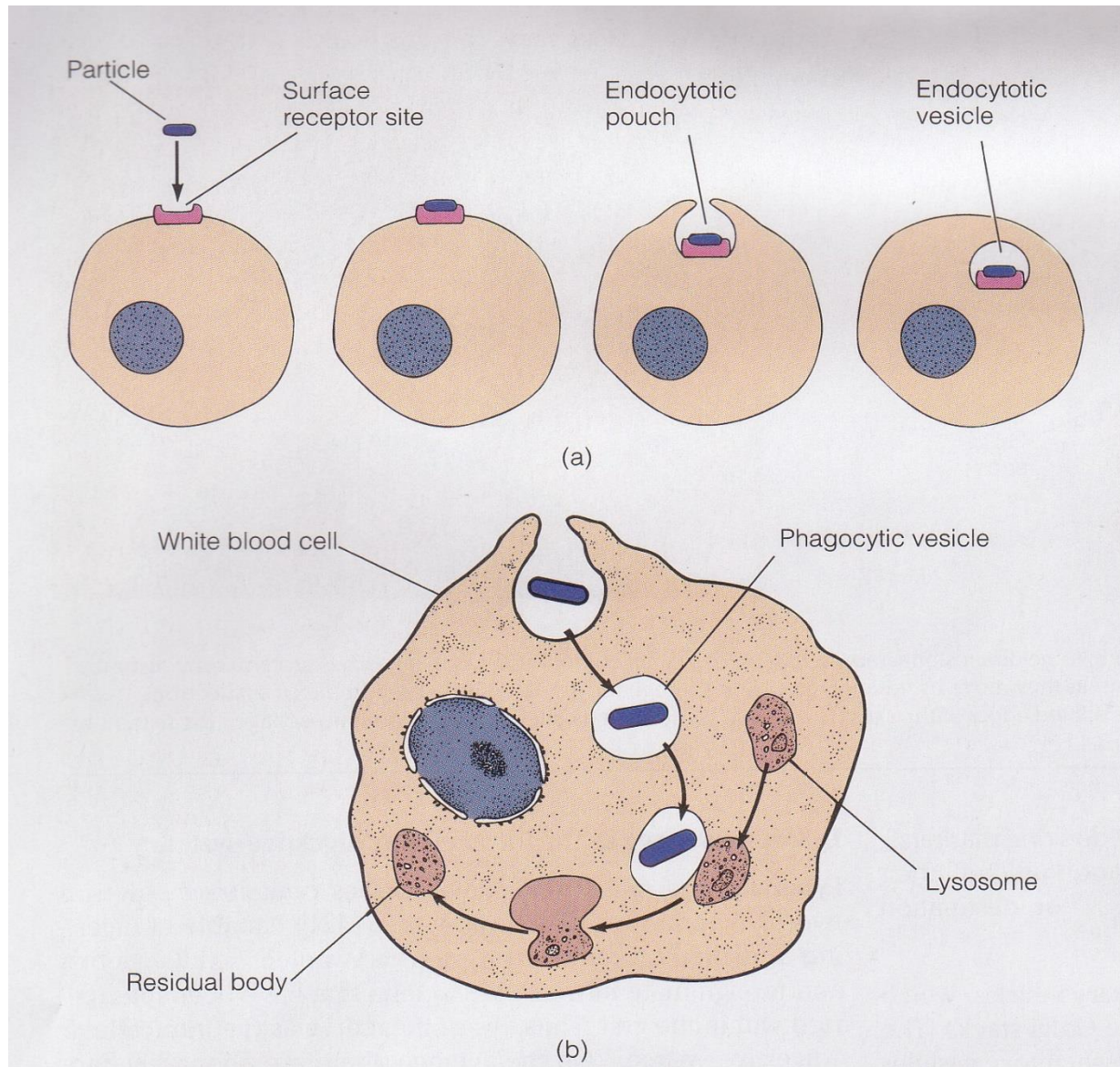
Lysosomes vs. *Peroxisomes*

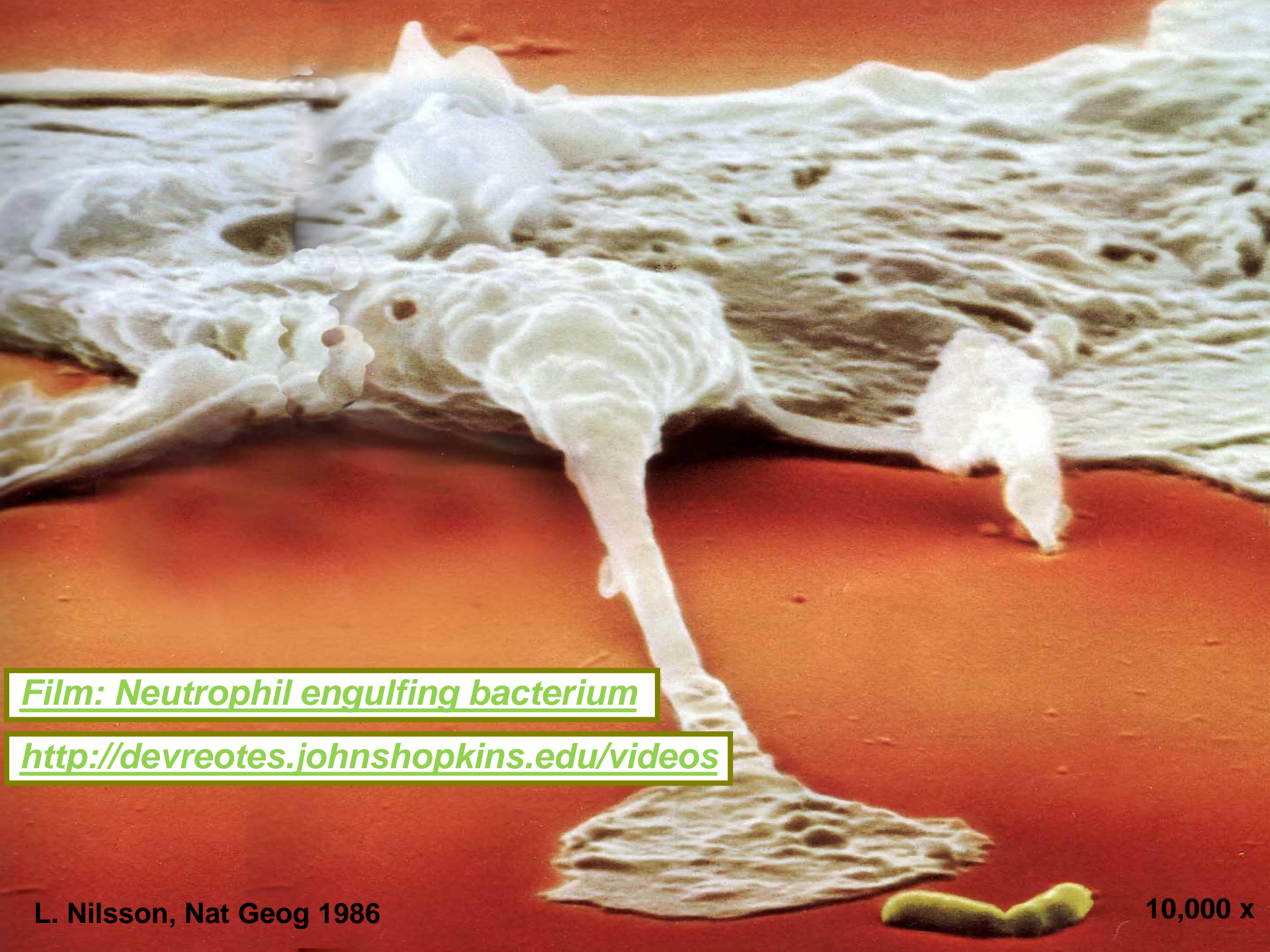


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fig 2-6 LS 2012

Phagocytosis: Cell Eating!

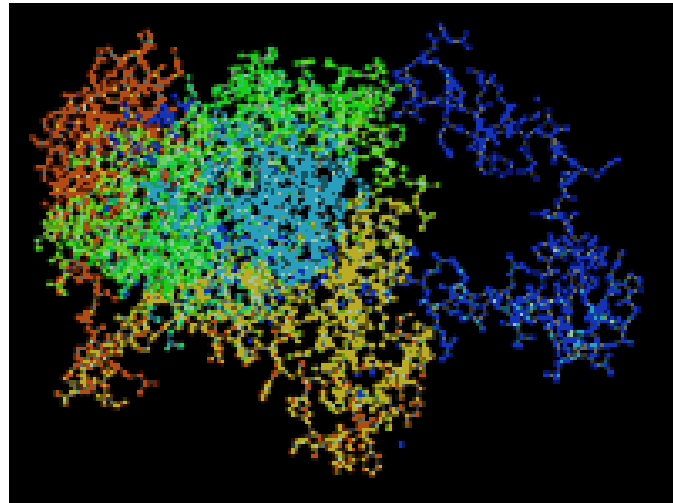




Film: Neutrophil engulfing bacterium

<http://devreotes.johnshopkins.edu/videos>

Catalase Enzyme Reaction in Peroxisomes Neutralize Toxin at Production Site!



Mitochondria: Energy Organelles

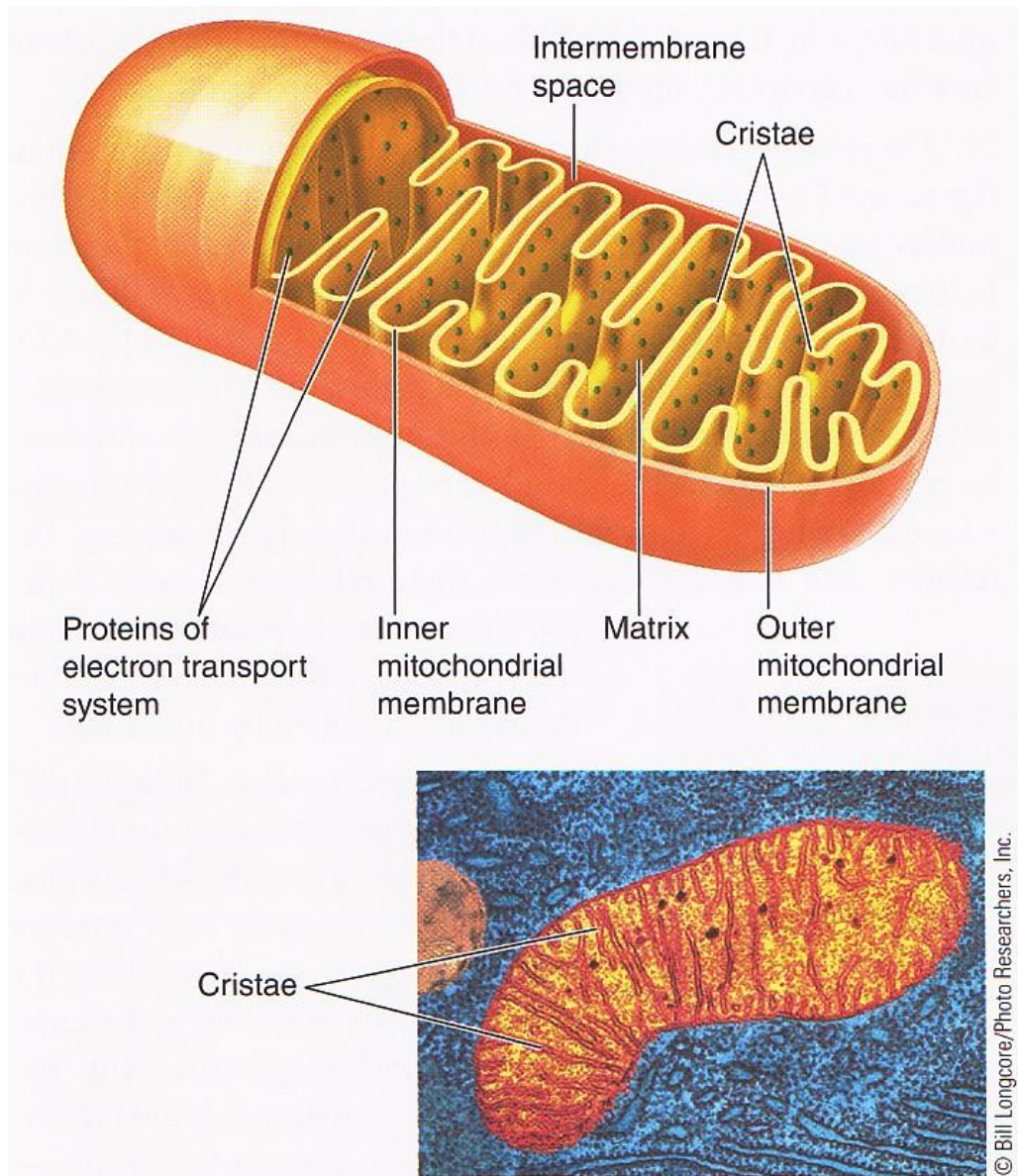


fig 2-8 LS 2012

