

Biology:

What is Life? Properties of Life

Cellular Structure: the unit of life, one or many

Metabolism: photosynthesis, respiration, fermentation, digestion, gas exchange, secretion, excretion, circulation – processing materials and energy

Growth: cell enlargement, cell number

Movement: intracellular, movement, locomotion

Reproduction: avoid extinction at death

Behavior: short term response to stimuli

Evolution: long term adaptation

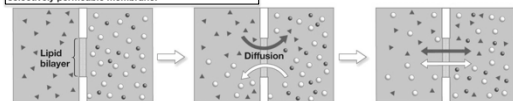
Osmoregulation
Waste elimination

Chapter 42

Diffusion

(a) DIFFUSION

Solute moves from areas of higher concentration to areas of lower concentration—in this case, across a selectively permeable membrane.



1. Start with different molecules on opposite sides of a selectively permeable membrane (a phospholipid bilayer). Purple and white molecules can cross the membrane readily; red molecules cannot.

2. Molecules diffuse across the membrane—each along its own concentration gradient.

3. Equilibrium is established. Molecules continue to move back and forth across the membrane but at equal rates.

Fig 42.1 pg 935

One Big Idea Diffusion

- Diffusion removes concentration gradients
- Diffusion is passive and predictable
 - Many cellular processes take advantage of this
 - Gradients are created to capture energy behind diffusion

Proton Motive Force in Photosynthesis

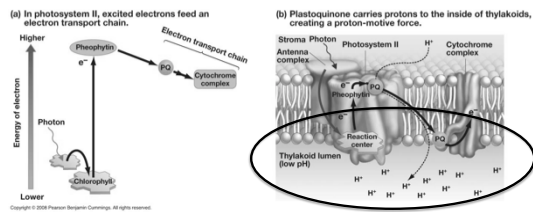


Fig. 10.13 pg 208

The electron transport chain in the mitochondria

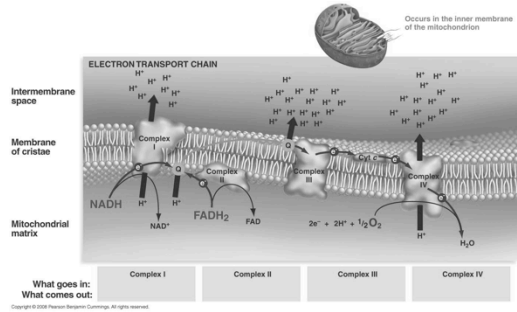
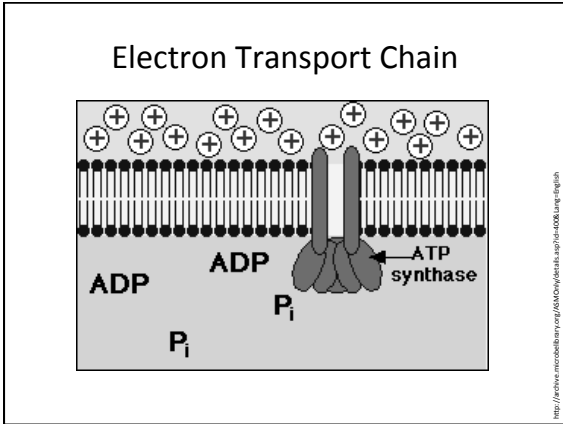


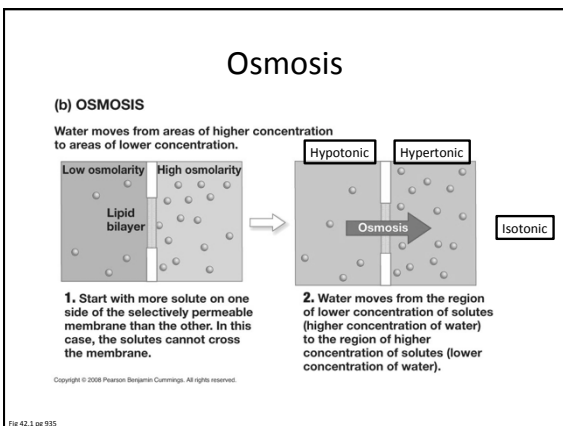
Figure 9.24



One Big Idea

Diffusion

- Diffusion removes concentration gradients
- Diffusion is passive and predictable
 - Many cellular processes take advantage of this
 - Gradients are created in capture energy behind diffusion
- Common solutes
 - H⁺, Na⁺, Cl⁻, K⁺, Ca⁺, macromolecules



How Inverts Osmoregulate

- Contractile vacuoles
- Protonephridia
- Metanephridia

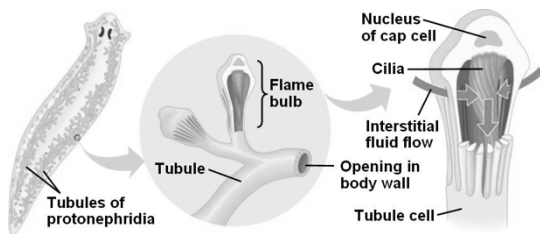
- Each is uniquely suited for situation / taxa

Contractile Vacuole in *Paramecium*

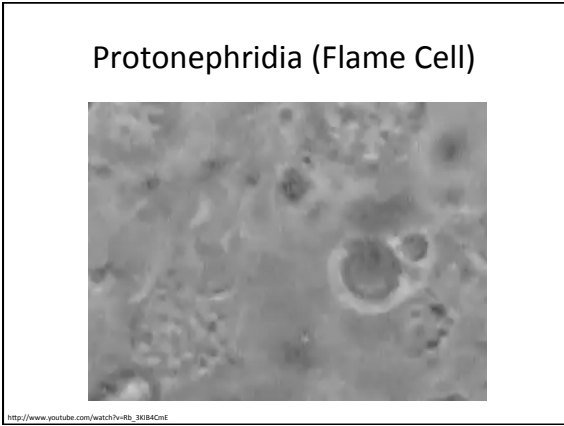


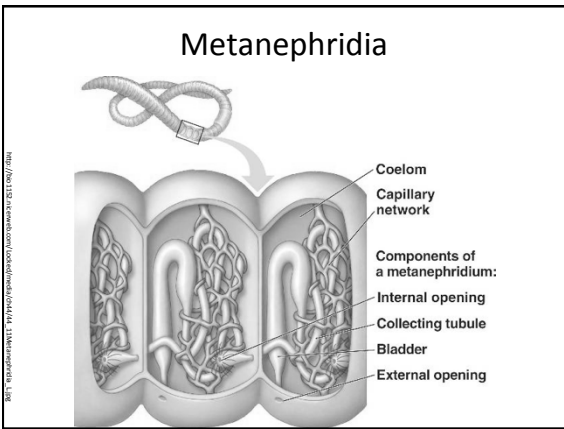
<http://www.youtube.com/watch?v=498W6N8M&feature=related>

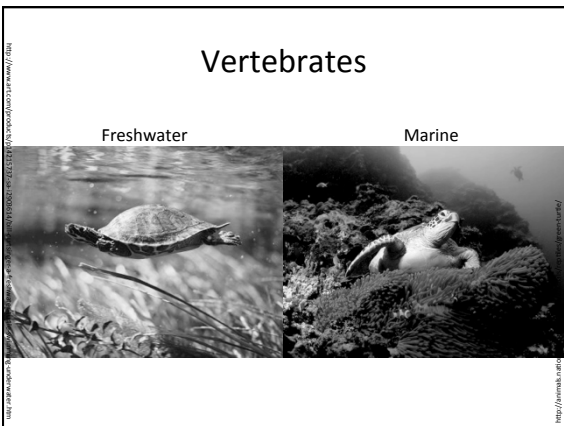
Protonephridia (flame cell)



<http://osmoregulation-apbio3.wikispaces.com/Other+Animals>







Osmoregulation in Water

Freshwater vertebrates:

Tissue is **hypertonic** compared to the water

Gain water by osmosis

Lose electrolytes through diffusion



<http://fishbase.com/ucbio/eve/goldfish/>

Saltwater vertebrates:

Are **hypotonic** compared to the water

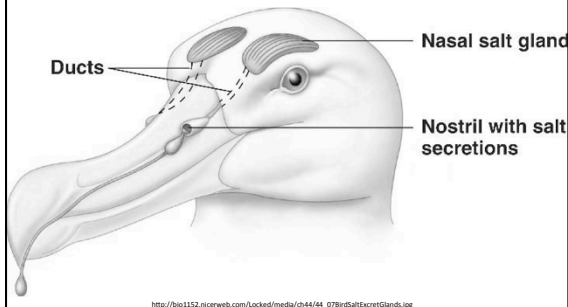
Lose water by osmosis

Gain electrolytes through diffusion



<http://fishforum.com/>

One strategy for removing salt



http://bio1152.nicerweb.com/Locked/media/d44/44_078inr5SaltExcretGlands.jpg

Where?

- Where would all of this osmosis and diffusion happen in fish?
- Where is most of the exposed surface area of a fish?



The Gills!

<http://cookingwithscott.com/oct%2013%20fishgills20trip.htm>
