

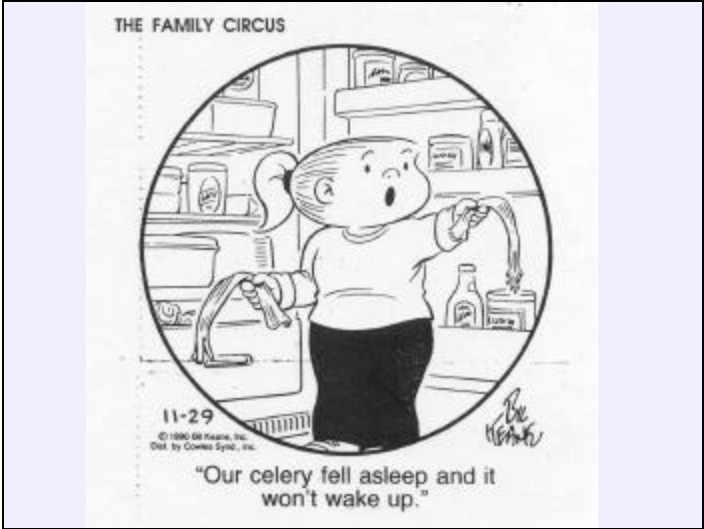
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Human Defenses Against Disease

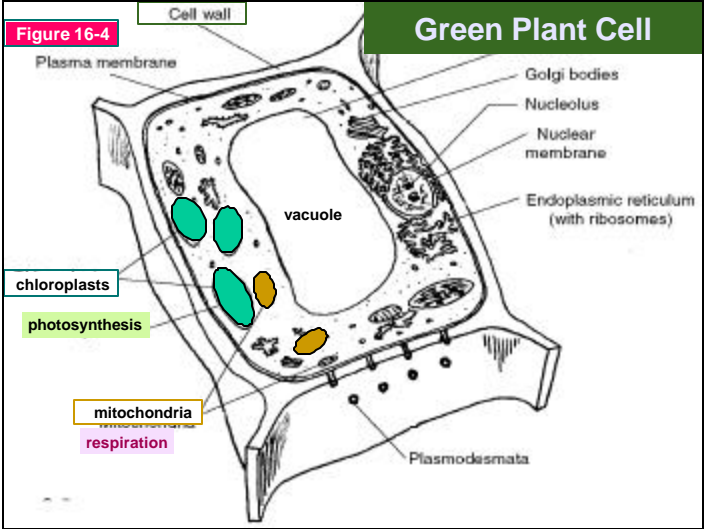
BIO 100 Principles of Biology

Cedarville University

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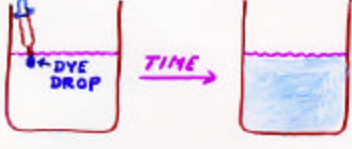


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Diffusion

DIFFUSION = MOVEMENT OF DISSOLVED OR SUSPENDED PARTICLES AWAY FROM AN AREA OF HIGH CONCENTRATION



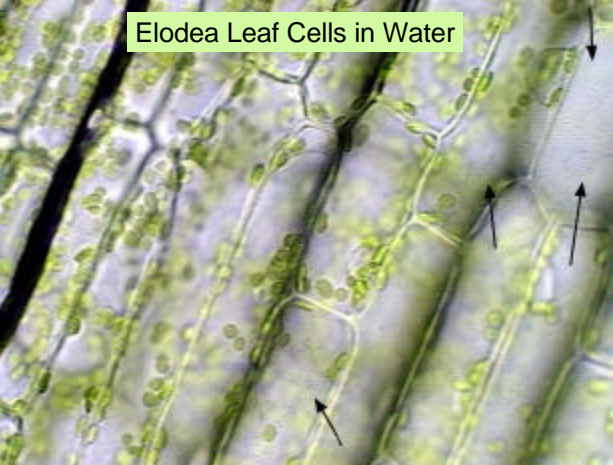
- DRIVING FORCE:
- KINETIC ENERGY
- 2ND LAW:
ORDER → DISORDER
PURITY → IMPURITY

OSMOSIS -- diffusion of water...
across a differentially permeable membrane

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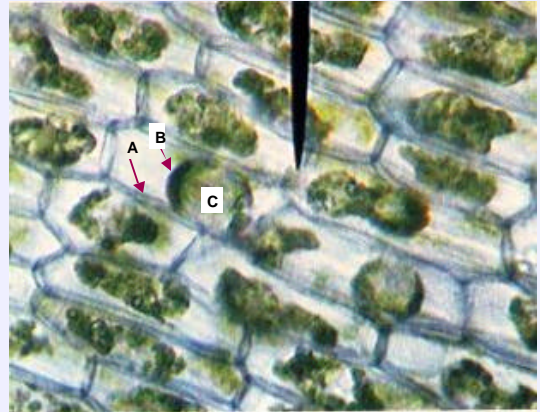
Elodea Leaf Cells in Water



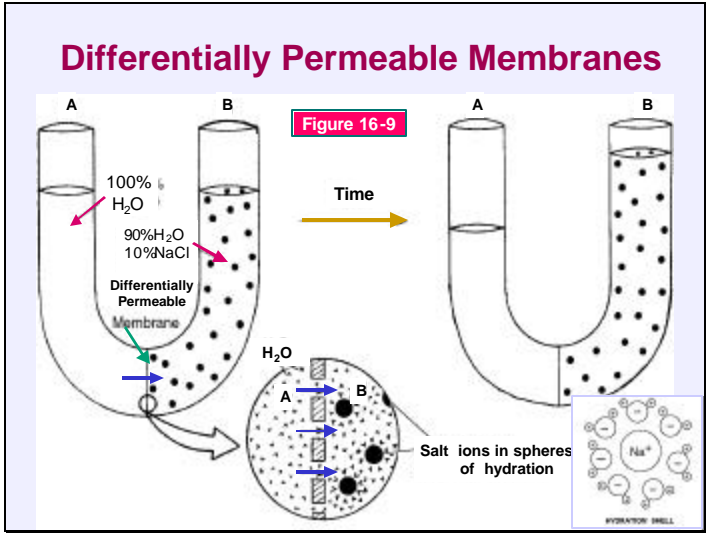
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Addition of 10% NaCl (sodium chloride)



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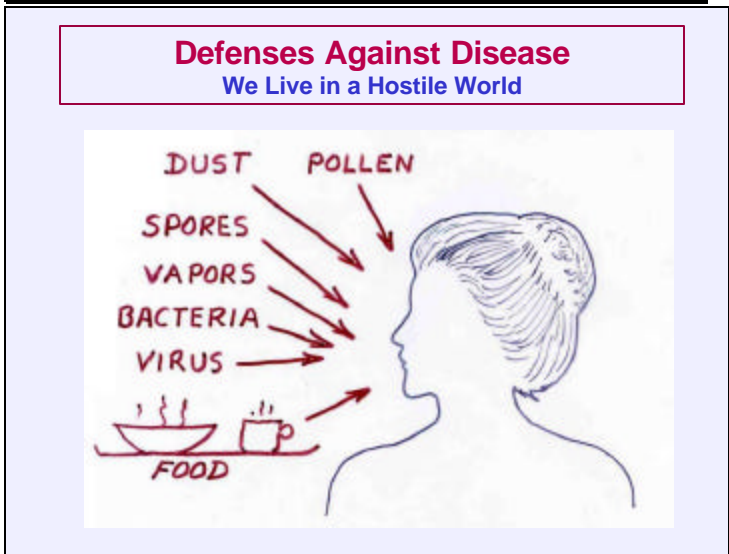
How Salty Water Affects Cells

A.
 $H_2O = [>]$
 $H = [>]$
 $SALTS = [+]$

B.
 $SALT$
 $Na^+ Cl^-$
 $[+ \quad -]$

- H₂O IN HIGH CONC. IS "FREE" TO DIFFUSE ACROSS CELL MEMB. TO SUSTAIN CYTOPLASM
- SALT IONS LOWER WATER CONCENTRATION AND FREEDOM OUTSIDE CELL MEMBRANE
- WATER DIFFUSES OUT OF CELL

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Defenses Against Disease
We Live in a Hostile World

A Living Cell

Solution is not to "keep everything out of cells."

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Defenses Against Disease
We Live in a Hostile World

Cells must be receptive to substances from the environment.

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Defenses Against Disease
We Live in a Hostile World

A Living Cell

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Defenses Against Disease

Three Lines of Biological Defense:

1. Physical Barriers
2. General Responses
3. Immune System Responses

But, are Biological Defenses the Only Ones?

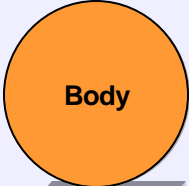
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BIOLOGY IS RELEVANT – IN FOUR AREAS:


1. Knowing Yourself – “Why I am the way I am”

Three Dimensions




Body

Natural Sciences
(e.g. biology)



Soul

Human Sciences
(Humanities)




Spirit


Theological Sciences
(e.g. syst. Theol.)

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Defenses Against Disease






Body

Natural Sciences
(e.g. biology)



Soul

Human Sciences
(Humanities)



Spirit

Theological Sciences
(e.g. syst. Theol.)

Peace with God:
“when I kept silent about my sin,
my body wasted away.” Ps. 32:3:

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Biological Defenses

FIRST LINE Physical Barriers

SKIN
 MUCOUS MEMBRANES - Secrete enzymes, antibiotics
 CILIATED EPITHELIUM - "sweep out" debris

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Biological Defenses

FIRST LINE Physical Barriers

SKIN
 MUCOUS MEMBRANES - Secrete enzymes, antibiotics
 CILIATED EPITHELIUM - "sweep out" debris

SECOND LINE General Responses

1 RECOGNITION: Complement System

Blood plasma proteins:

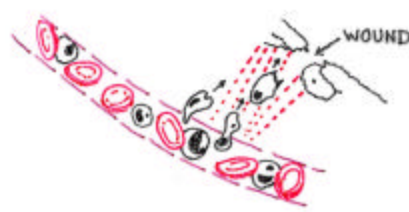
- a. produce gradient ("radar tracking")
- b. mark "enemy" cells

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Biological Defenses

2. MOBILIZATION: Inflammatory Response (Histamines)

Capillary walls dilate
 Phagocytes follow "radar"



3. DESTRUCTION: By Phagocytes (Neutrophils, Fig 17-7)

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Biological Defenses

C. Third Line of Defense -- Immune System:

1. Recognition: "Self" versus "Enemy"

**SEE SEPARATE PDF FILE
OF THIS COPYRIGHTED SLIDE**

**Tomorrow's Lecture continues from
here; note most of tomorrow's slides
follow this slide**

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Biological Defenses

C. Third Line of Defense -- Immune System:

1. Recognition: "Self" versus "Enemy"

2. Destruction: by B-cells and T-cells

Fig. 17- 8

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Biological Defenses

C. Third Line of Defense -- Immune System:

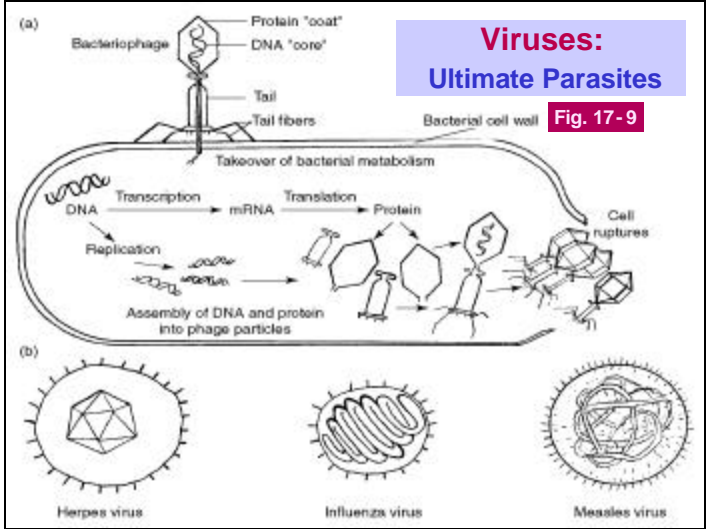
1. Recognition: "Self" versus "Enemy"

2. Destruction: by B-cells and T-cells

Fig. 17- 8

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