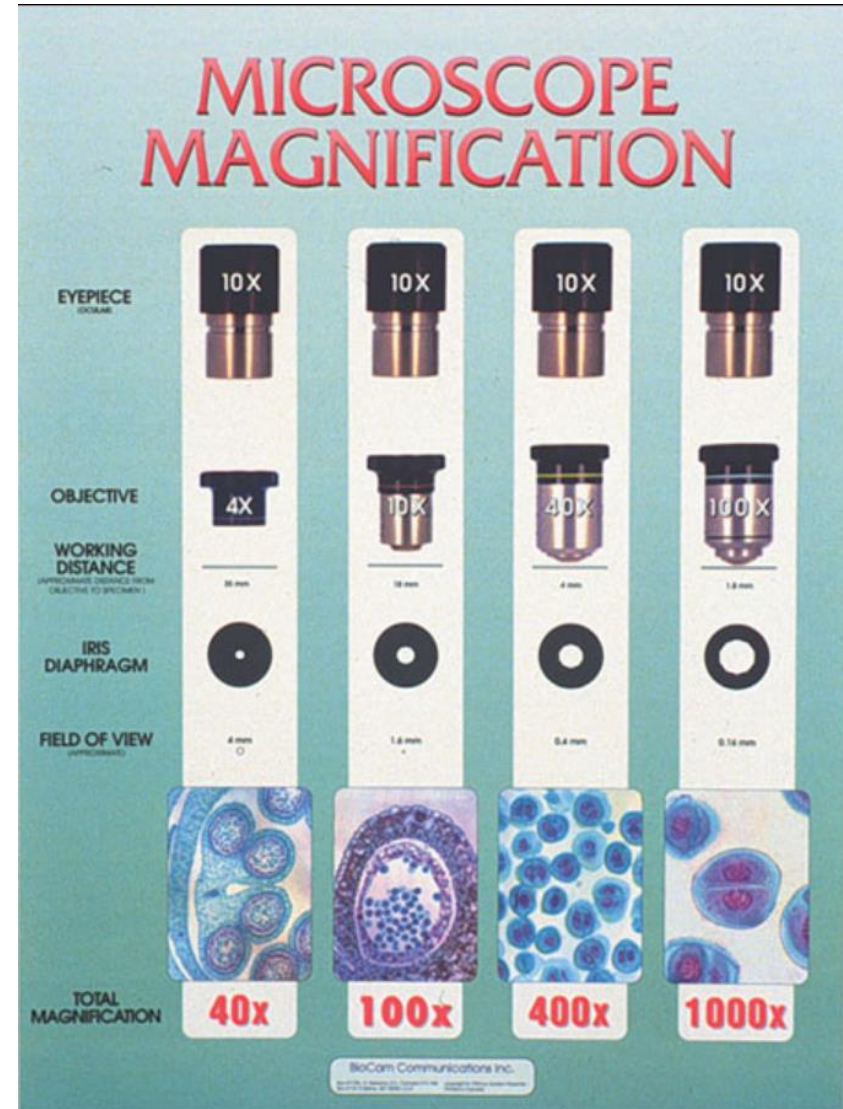
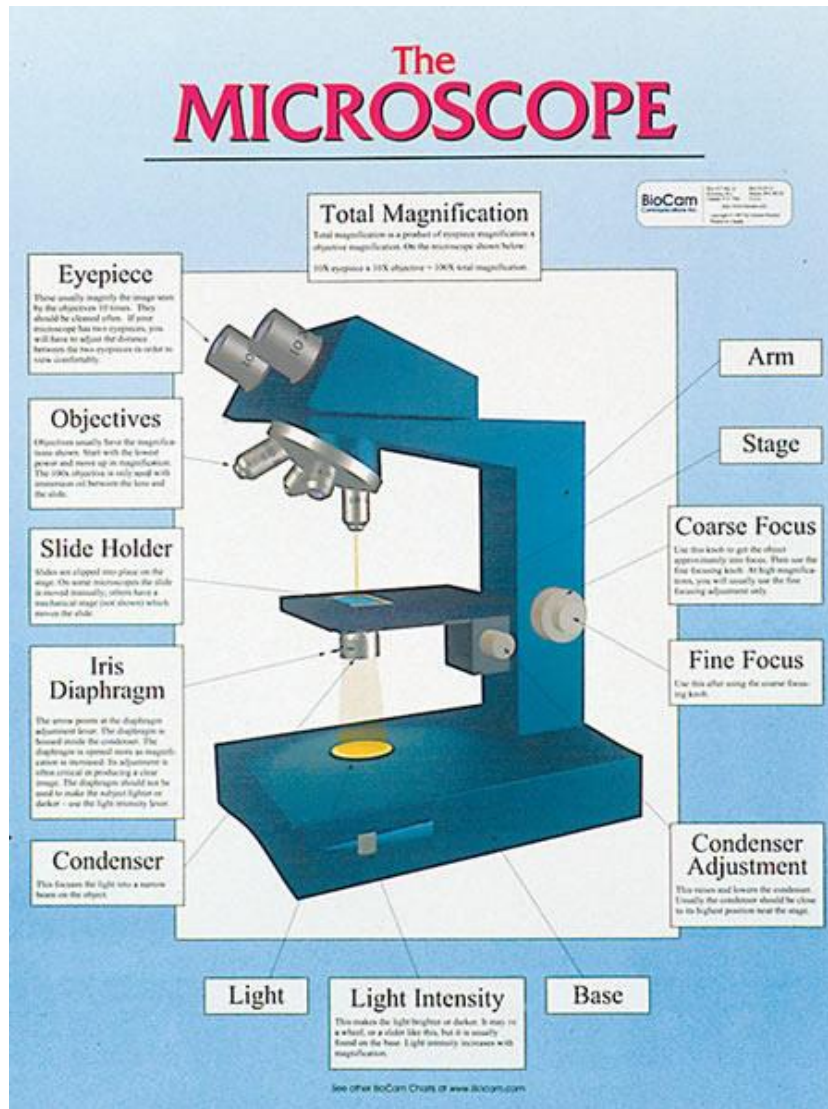
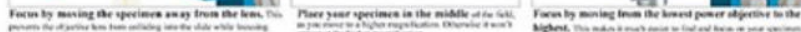
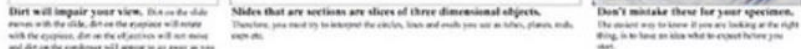


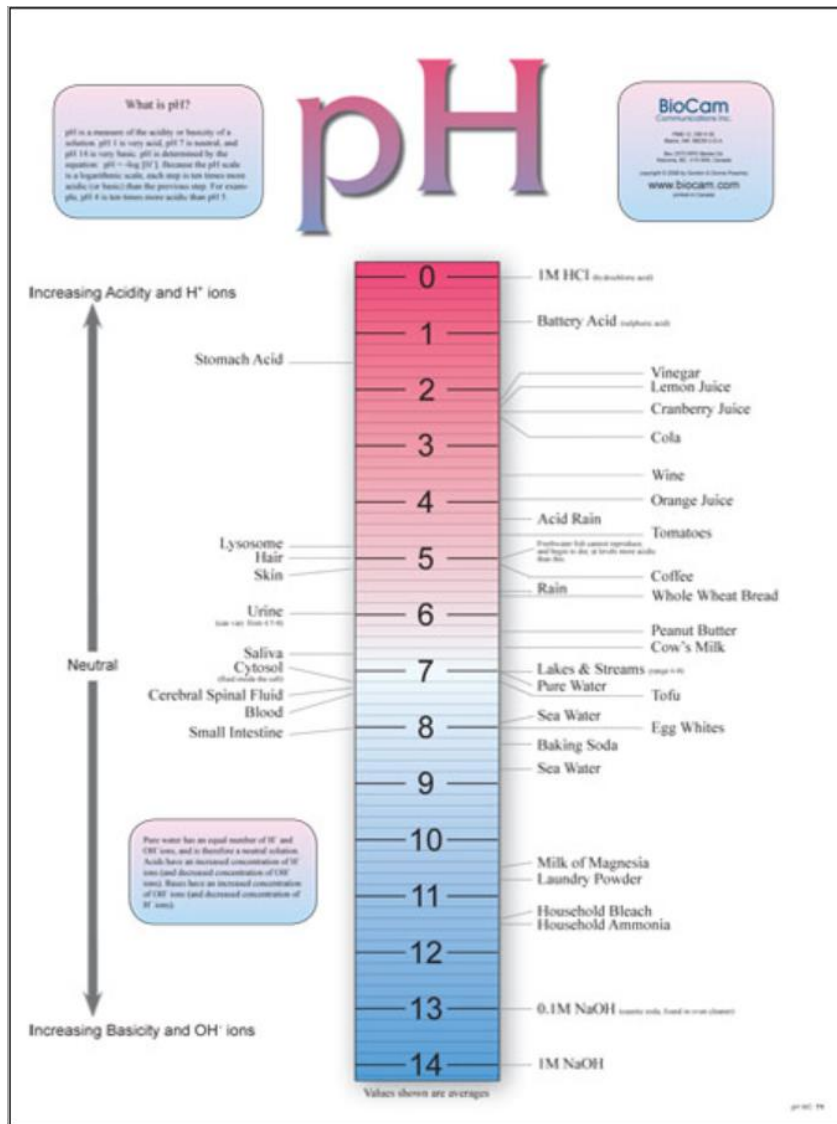
BSC1005L Posters - all posters courtesy of BioCam Charts. They may be accessed at:
http://www.biocam.com/Biocam_wall_charts_gallery.html



[illegible]

These are cells with a nucleus and other membrane-bound organelles.
All the cells shown below are eukaryotes.



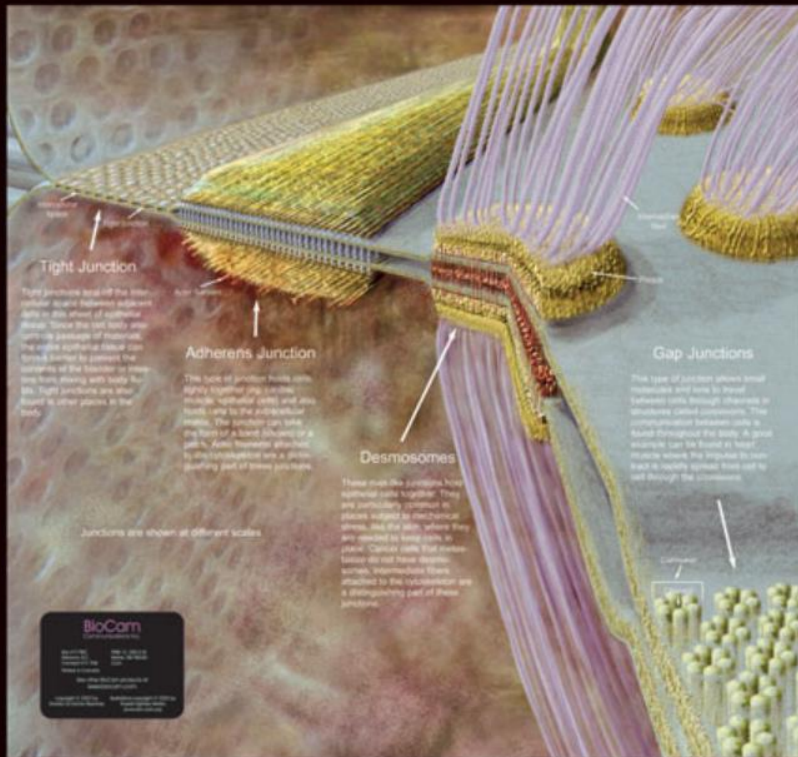


CELL MEMBRANE



Animal Plasma Membrane

(Magnified approximately 1,1 billion times)



Animal Cell Junctions

Cell Membrane 401 40

www.biocam.com

OSMOSIS

BioCam

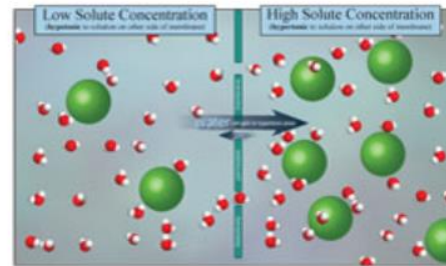
Communications Inc.

1000 N. 10th St.

Ste. 1000, Suite 100

Minneapolis, MN 55412

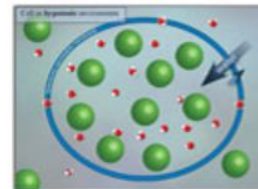
Copyright © 2000 BioCam Communications Inc.



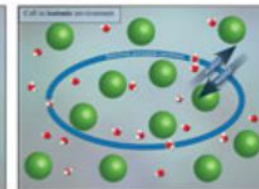
Osmosis is the diffusion of water across a selectively permeable membrane from an area of low solute (high water) concentration to an area of high solute (low water) concentration.

Although water molecules travel in both directions, more water molecules move into the area of high solute concentration than move out, therefore, there is a net movement of water to the area of high solute concentration. Fewer water molecules leave the high solute concentration area because there are fewer water molecules there—they have been diluted down by the solute molecules. Also, bonds have been formed between the water molecules and the solute molecules, making the water molecules unavailable to leave.

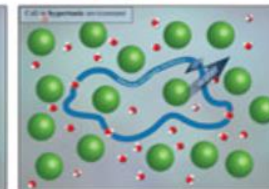
When comparing environments, one that has a higher solute concentration is called hypertonic, while a lower solute concentration is called hypotonic. If the solute concentrations are the same, they are called isotonic.



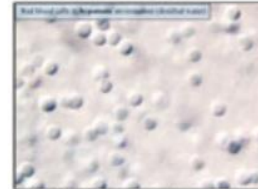
A cell placed in a hypotonic environment swells. Water molecules move in and out of the cell, but more move into the cell.



A cell placed in an isotonic environment maintains its shape. Water molecules move in and out of the cell equally.



A cell placed in a hypertonic environment shrinks. Water molecules move in and out of the cell, but more move out of the cell.



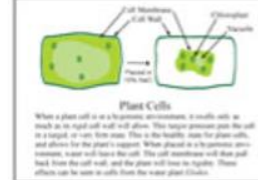
Red blood cells (animal cells) in a hypotonic environment.



Red blood cells are biconcave discs. They maintain this shape in an isotonic environment.

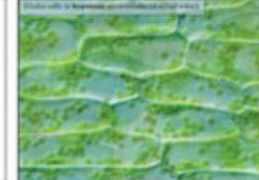


Red blood cells shrivel (crenate) in a hypertonic environment.

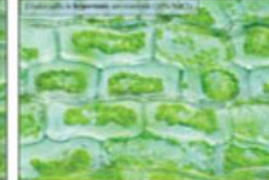


Plant Cells

When a plant cell is in a hypotonic environment, it swells only as much as its rigid cell wall will allow. This water pressure upon the cell is a turgor or turgor force. This is the healthy state for plant cells, and allows for the plant's support. When placed in a hypertonic environment, water will leave the cell. The cell membrane will then pull back from the cell wall, and the plant will lose its rigidity. These effects can be seen in cells from the water plant elodea.



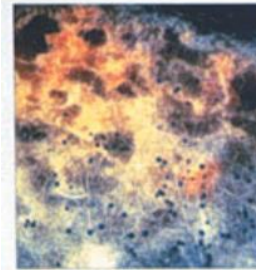
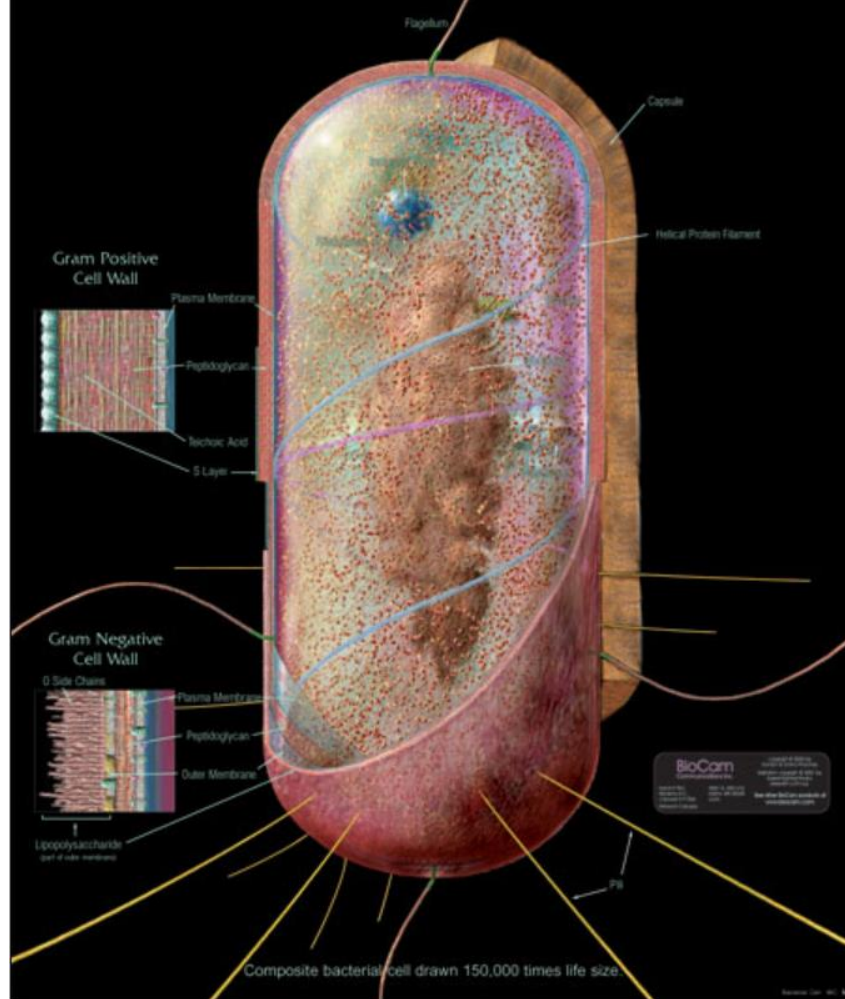
Elodea cells in a hypotonic environment (distilled water).



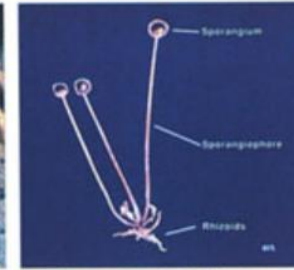
Elodea cells in a hypertonic environment (10% NaCl).

Diagram 401 78

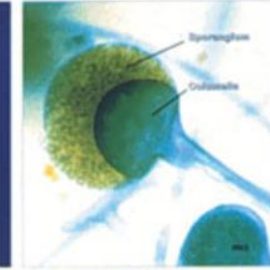
BACTERIAL CELL



Rhizopus stolonifer - Bread Mold
The thick dots are sporangia and the white threads are hyphae.



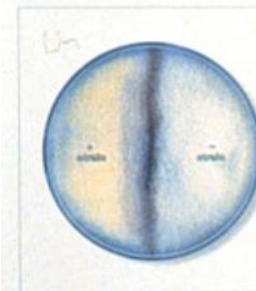
Rhizopus stolonifer - Dark Field Illumination



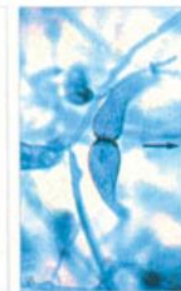
Rhizopus stolonifer - Close-up of sporangium

Asexual Phase

ZYGOMYCETES



Mating strains of *Mucor hiemalis* on an agar plate
Zygospores are formed at the sites where the two strains meet.

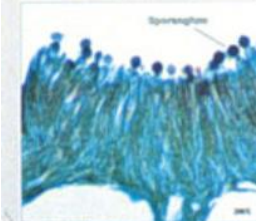


Development of the Zygospore in *Rhizopus stolonifer*

Type of mating strains of *Rhizopus stolonifer* used in 1. Two formed the gametangia in 2. and by 3. have fused to form a mature zygospore.

Type of mating strains of *Rhizopus stolonifer* used in 1. Two formed the gametangia in 2. and by 3. have fused to form a mature zygospore.

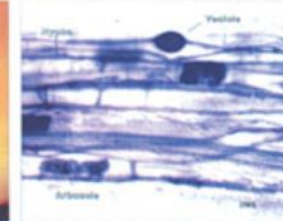
Sexual Phase



Fly Pathogen - *Entomophthora muscae*
This view is of the pathogen on the outer surface of a healthy fly from the outer body cavity in a petri dish. The fly is dead.



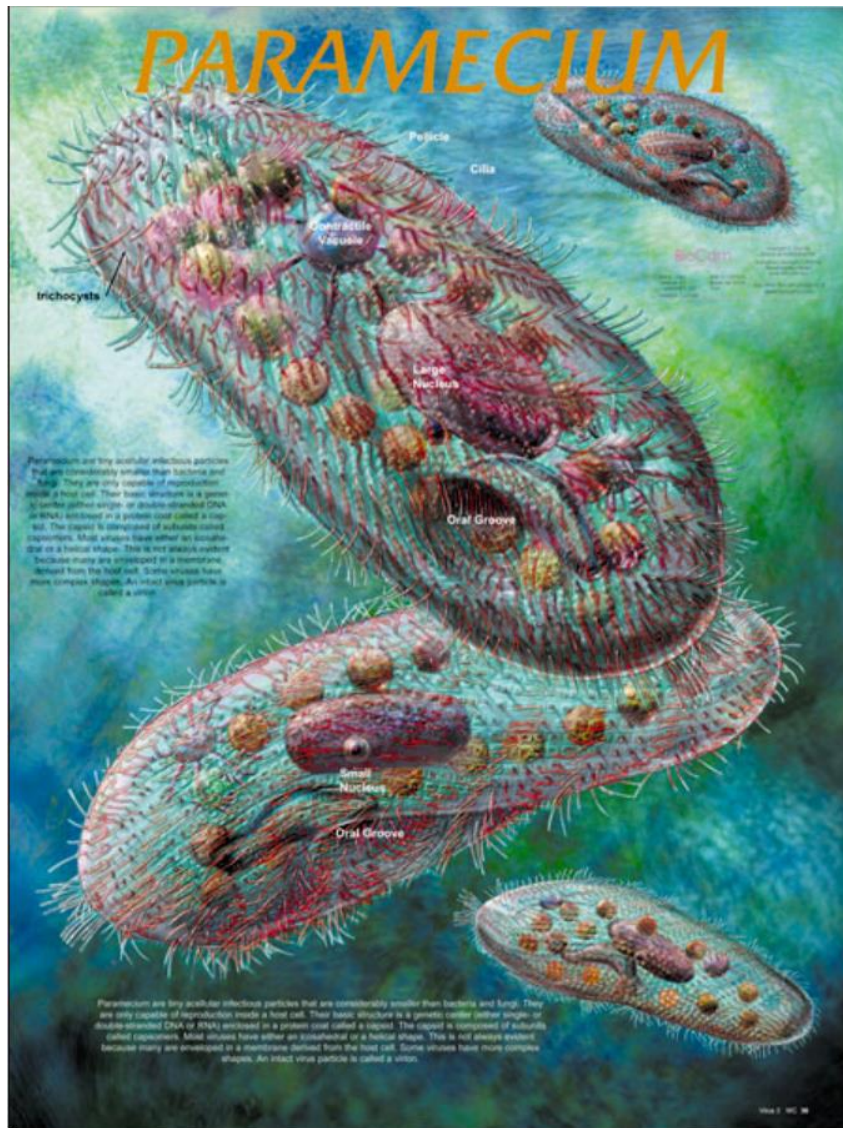
Shotgun Fungus - *Pilobolus crystallinus*
This fungus lives on dung. It shoots its sporangia regularly towards light. The fungus is the spore and completes the cycle when they pass the spore.



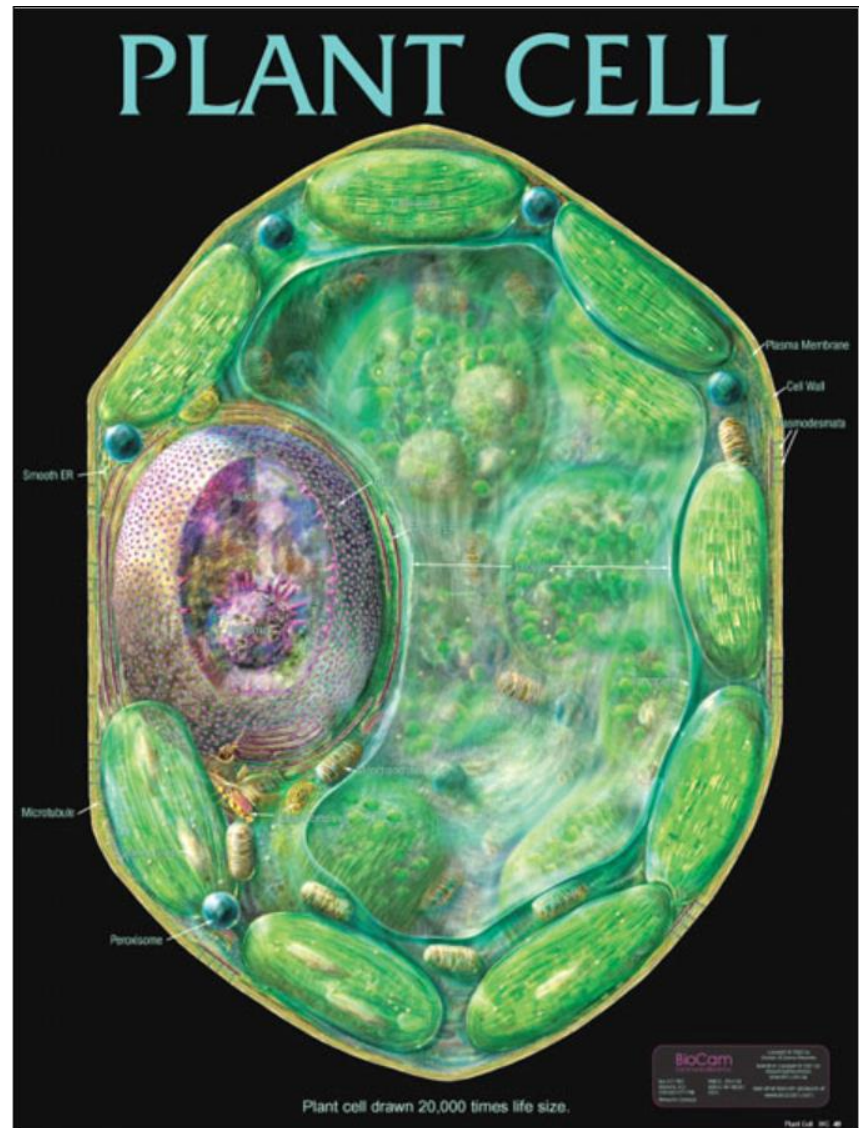
Endomycorrhiza
These zygospores live within the roots of some plants, where they establish a symbiotic relationship with them. They can be identified by their characteristic structure.

Examples

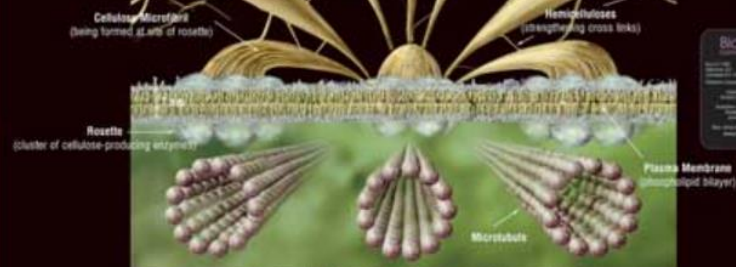
PARAMECIUM



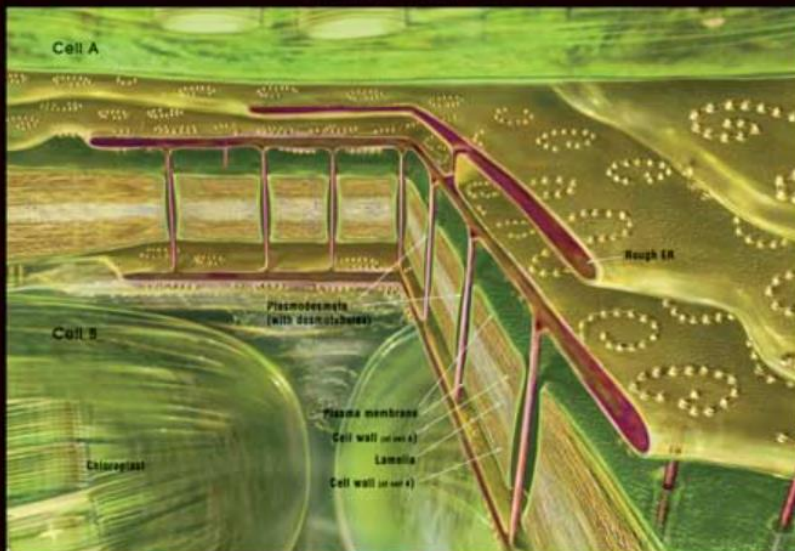
PLANT CELL



CELL WALL



Plant Cell Wall - Synthesis of Cellulose



Two Adjacent Plant Cells

3D Model of DNA

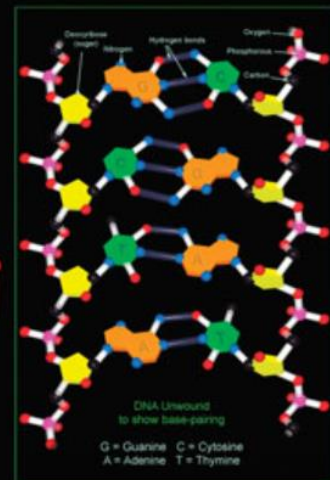
There is an imaginary line between the two molecules. From the middle and move your hand along until you see a new dimensional image of the molecule.



DNA

These two coils have been added to the illustration to highlight the helical structure.

This shows a short segment of DNA with 17 base pairs. The average human gene would have 3000 base pairs. The entire human genome would have 3 billion base pairs.

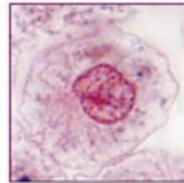




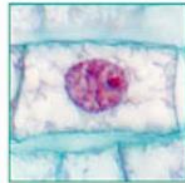
Interphase

Most cellular metabolic activity takes place during interphase. During this time the following events happen:

- Most cells increase in size.
- Cell organelles such as ribosomes, mitochondria, endoplasmic reticulum, and centrioles are duplicated.
- DNA is synthesized and chromosomes are duplicated. Each chromosome and its duplicate are attached to a region called the centromere. Together they are considered as two chromosomes completing two parts called sister chromatids. They are not visible until the chromosomes tightly coil (condense) during mitosis.



Animal Cell
(Thelazia barmani)



Plant Cell
(Allium cepa)

The diagram of mitosis are of a cell with two pairs of chromosomes (2n=2). Photographs show cells magnified 1000 X.

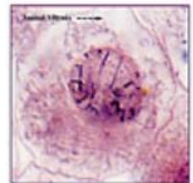
MITOSIS

BioCam
Downloaded from
www.biocam.com
BioCam is a registered trademark of
BioCam Inc. All rights reserved.
© 2008 BioCam Inc.



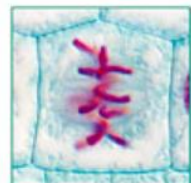
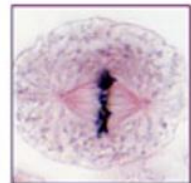
1. Prophase

Chromosomes condense and become visible. The nuclear membrane and nucleolus disappear. A spindle apparatus begins to form. In animal cells, centrioles pair near the outer end of the spindle. The later part of this phase is also called prokaryotic.



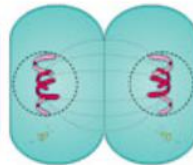
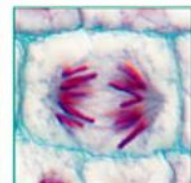
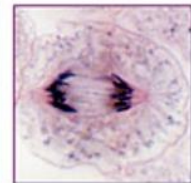
2. Metaphase

Chromosomes align themselves in a plane which is perpendicular to the center of the spindle. This plane is called the metaphase plate.



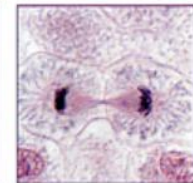
3. Anaphase

Sister chromatids split at the centromeres and travel towards opposite ends of the spindle. Each chromatid is now considered a full chromosome.

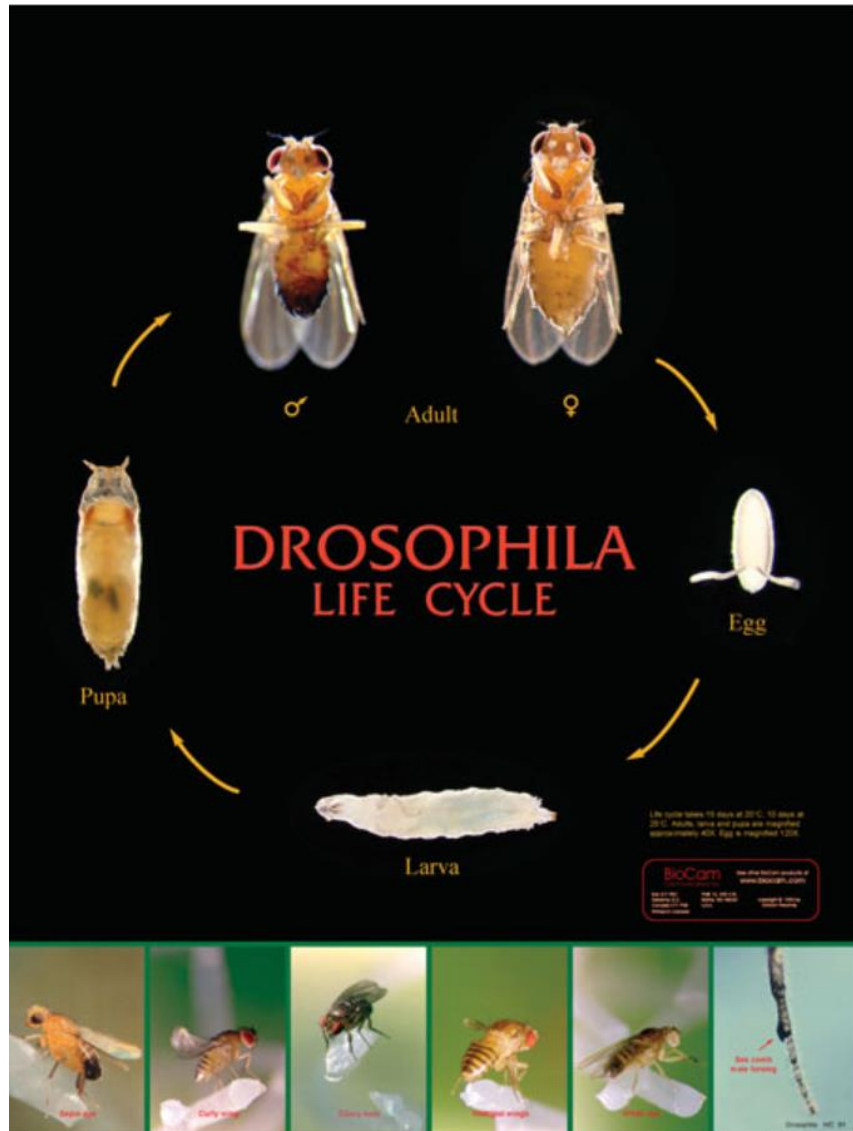


4. Telophase

Chromosomes arrive at the ends of the spindle and the spindle apparatus begins to disassemble. Two nuclear membranes are formed around the chromosomes and the chromosomes uncoil. Centrioles at each end begin to form a cleavage furrow (in animal cells) and a cell plate (in plant cells).



© 2008 BioCam Inc.



GENETICS I

Essential Terminology



Gene, Allele, and Locus

A gene is the basic unit of heredity. It is a segment of DNA on a chromosome and carries the instructions to build an RNA molecule. The RNA molecule can then use these instructions to build proteins. Each gene is found at a specific place, or locus, on its specific chromosome. Variations of a gene are called alleles.

Heterozygous and Homozygous

Homozygous individuals have two identical alleles for the same gene, while heterozygous individuals have different alleles for the same gene.

Genotype and Phenotype

A genotype describes the genetic makeup or constitution of an individual. The phenotype describes the physical characteristics or traits of an individual. In the flowers shown below, two purple-flowered plants can have different genotypes (PP and Pp), but they will have the same phenotype of purple flowers.

Dominant and Recessive

A dominant allele is the one which is expressed in a heterozygous individual, while a recessive allele is not expressed. Only an individual homozygous for two recessive alleles would express the recessive trait. In pea plants, the dominant allele is usually chosen as uppercase (P for purple flowers), and the recessive allele is not capitalized (p for white flowers). As well as simple dominance, there is also incomplete dominance and codominance.

Genome

Genomes refers to all the hereditary material of an organism. Specifically, it refers to a copy of all the DNA found in a set of chromosomes. It includes both genes and non-coding DNA.

Chromosome, Chromatid, Centromere, Homologue

A chromosome is a long DNA molecule containing many genes. In eukaryotes, it is associated with proteins. In the metaphase stage of mitosis, the chromosome material has duplicated itself and the two new halves are called chromatids. They are joined at the centromere and the centromere is attached to the spindle. A homologue is the matching chromosome inherited from the second parent.

Mitosis/Meiosis

Mitosis is the process whereby the cell divides to produce two identical copies. This is followed by cell division. It occurs in somatic cells of eukaryotes. Meiosis is the process where a diploid germ cell divides twice to form haploid gametes (egg and sperm cells).

Haploid and Diploid

Haploid cells have one copy of each chromosome. In humans this would be an egg or sperm cell. Diploid cells have two copies of each chromosome, as would most or most somatic cells in humans.

Monohybrid and Dihybrid Crosses

A monohybrid cross is a cross between hybrid (heterozygous) for a gene where only one gene is compared to a Pp x Pp. A dihybrid cross is a cross between hybrids where two genes are compared to a PpWw x PpWw.

P, F₁ and F₂ Generations

In a cross, P is the parental generation, and F₁ refers to the first offspring, or first filial generation. When F₁ offspring breed freely amongst themselves, the result is the F₂, or second filial generation.

Replication, Transcription, and Translation

DNA copies itself by replication, makes a complementary RNA copy of itself by transcription, and the RNA uses translation to make a polypeptide or protein.

Exon and Intron

An exon is the part of a substrate gene that is expressed, or codes for proteins. An intron is the non-coding part of the gene found at intervals between the exons.

Gene Expression

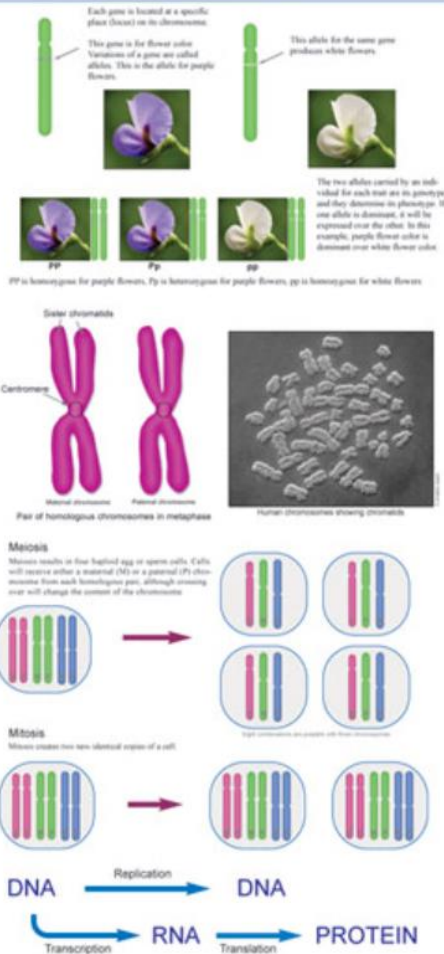
Most cells in our bodies have a complete complement of our genes. However, only certain genes are activated, or expressed, in each type of cell. This gene expression allows for cell specialization.

Crossing Over

During meiosis, homologous chromosomes exchange segments of DNA with each other. This allows for greater genetic variation within a population.

DNA and RNA

DNA, or deoxyribonucleic acid, provides the basic instructions for genes. These instructions are copied to RNA, or ribonucleic acid, when it is transcribed from DNA. RNA carries these instructions into proteins. RNA also has other cellular activities.

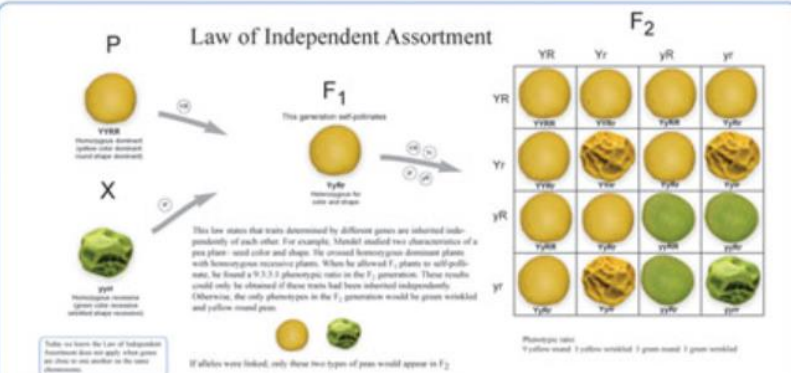
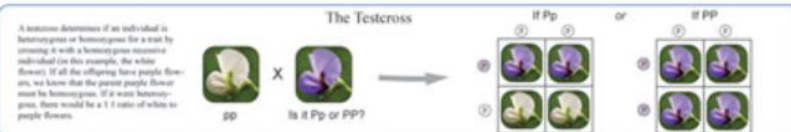
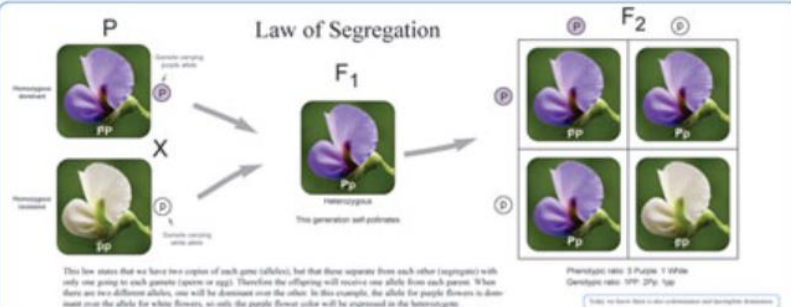


GENETICS II

Mendelian Genetics



In 1866 Gregor Mendel published his findings on genetics after eight years of studying 30,000 pea plants. Initially, his observations were mostly ignored. While there are exceptions to the principles he formulated, they still form the cornerstone of our modern knowledge of genetics.



Rh SYSTEM

Rh is one of many systems of blood classification. Like the ABO system, it is based on antigens on the surface of red blood cells. In the Rh system, individuals who possess the antigen are Rh⁺, while those with the antigen are Rh⁻.



Rh⁻
No clumping with
antiserum



Rh⁺
Clumps with
antiserum



BLOOD TYPING

ABO SYSTEM

A



A Antigens
(Agglutinogens)

B



B Antigens
(Agglutinogens)

AB



A & B Antigens
(Agglutinogens)

O



No Antigens
(Agglutinogens)



B Antibodies
(Agglutinins)



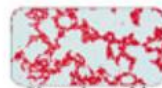
A Antibodies
(Agglutinins)



No Antibodies
(Agglutinins)



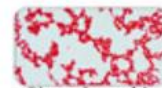
A & B Antibodies
(Agglutinins)



Clumping with
anti-A serum



No Clumping with
anti-A serum



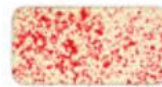
Clumping with
anti-A serum



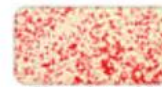
No Clumping with
anti-A serum



No Clumping with
anti-B serum



Clumping with
anti-B serum



Clumping with
anti-B serum



No Clumping with
anti-B serum

Can Donate to
A, AB

Can Donate to
B, AB

Can Donate to
AB

Can Donate to
A, B, AB, O

Can Accept from
A, O

Can Accept from
B, O

Can Accept from
A, B, AB, O

Can Accept from
O