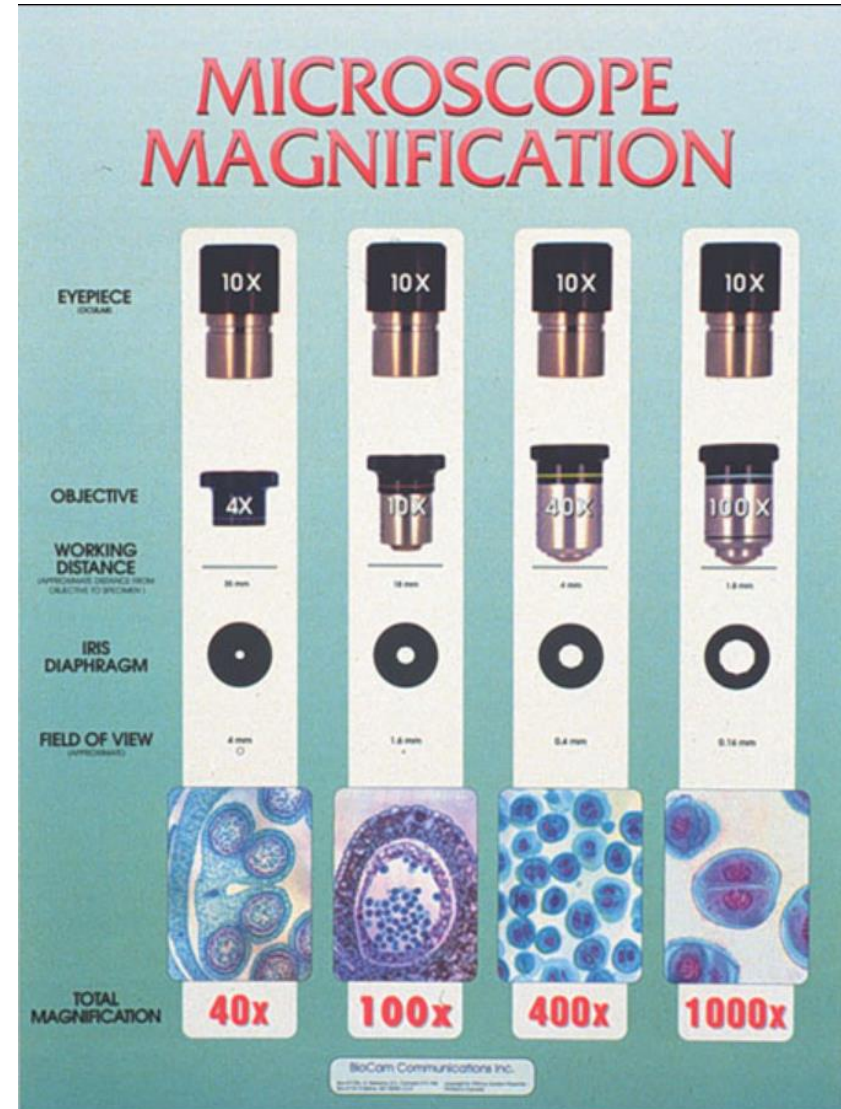
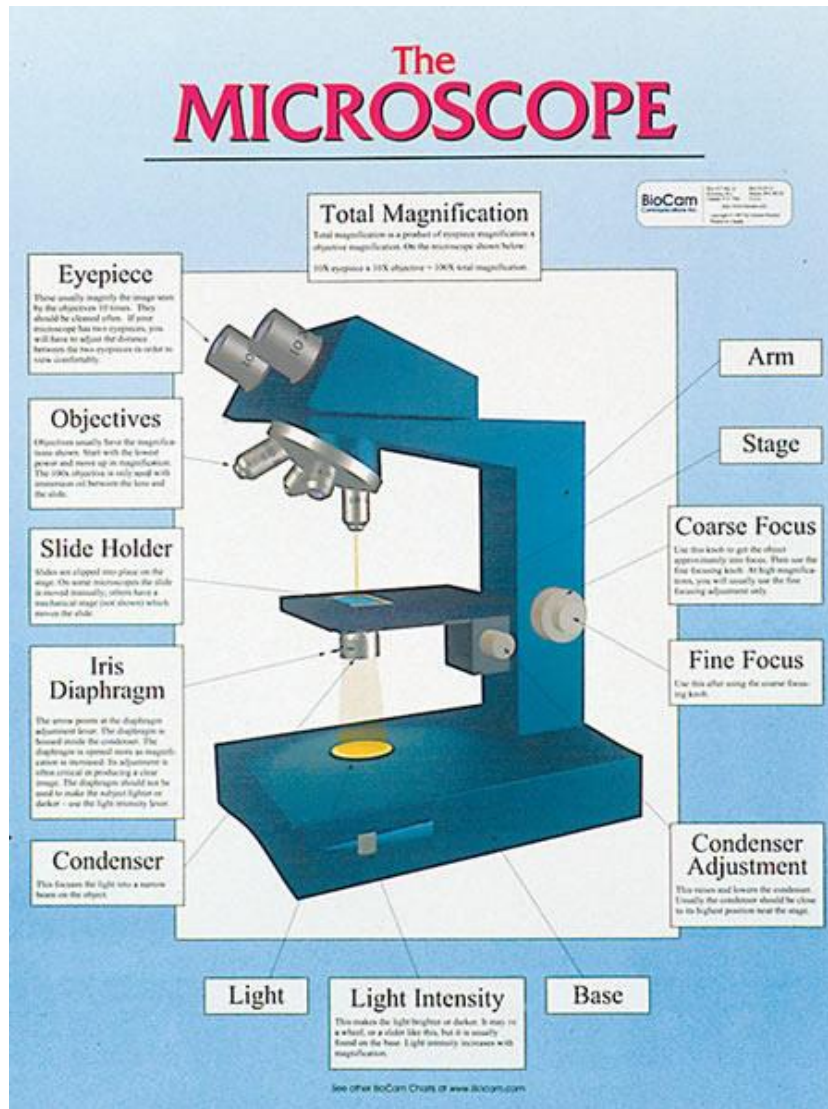
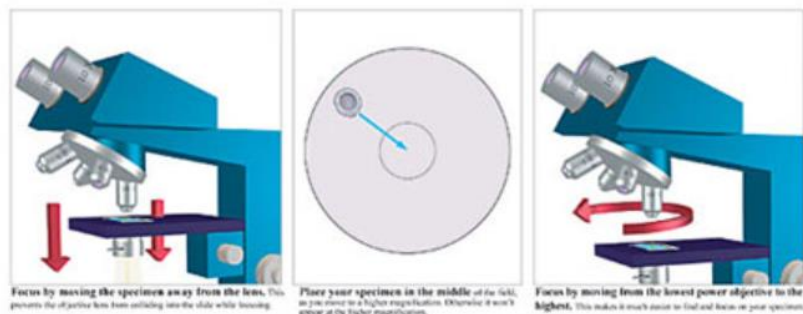


BSC2011L Posters - all posters courtesy of BioCam Charts. They may be accessed at:
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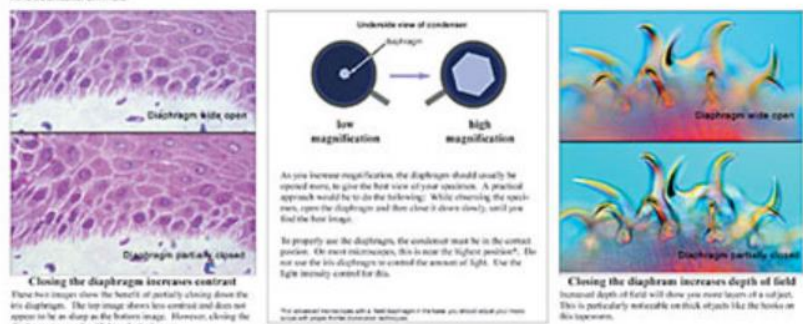
MICROSCOPE FOCUSING TIPS



Dirt will impair your view. Use on the slide areas with the slide. Dirt on the eyepiece will stay with the eyepiece, dirt on the objective will not move and dirt on the condenser will appear to go away as you move the condenser down.

Slides that are sections are slices of three dimensional objects. Thinkings, you need to try to interpret the circles, lines and oval you see as tubes, plates, rods, etc.

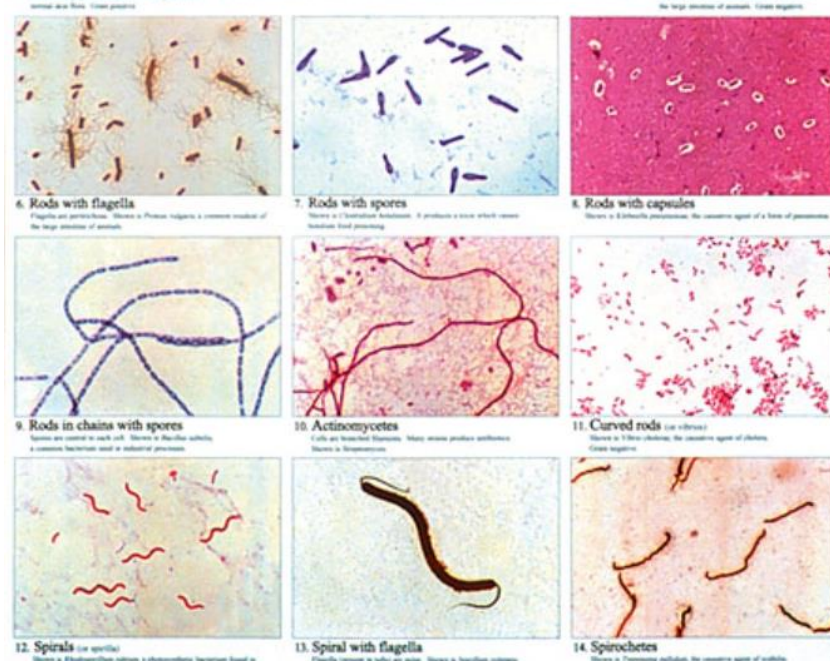
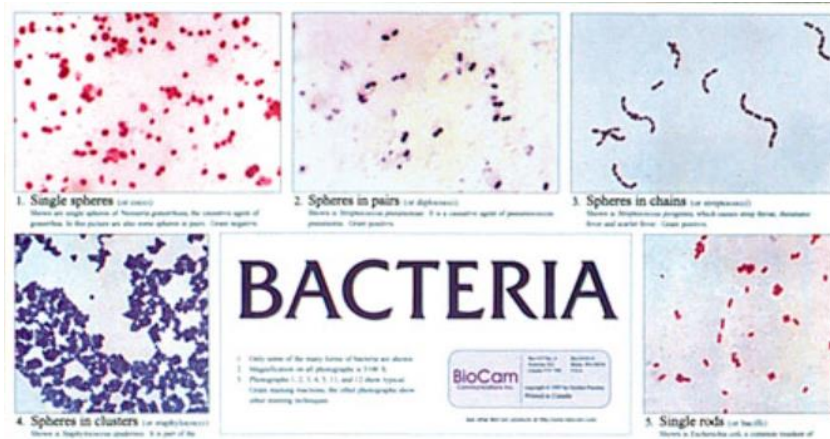
Don't mistake these for your specimen. The easiest way to know if you are looking at the right thing, is to have an idea what to expect before you start.



Closing the diaphragm increases contrast
These two images show the effect of partially closing down the iris diaphragm. The top image shows less contrast and does not appear to be as sharp as the bottom image. However, closing the diaphragm too much will degrade the image.

Closing the diaphragm increases depth of field
Increased depth of field will show you more layers of a subject. This is particularly noticeable on thick objects like the bones on this specimen.

The smallest microscope with a field diaphragm is the one you should use for most work with paper for the microscope.



12. Spirals (spirilla) - Shows a Rhodospirillum rubrum, a photosynthetic bacterium found in stagnant water. (Gram negative)

13. Spiral with flagella - Flagella present in tubes are present. Shows a Spirillum volutans, a large spirillum found in stagnant water.

14. Spirochetes - Shows a Treponema pallidum, the causative agent of syphilis.

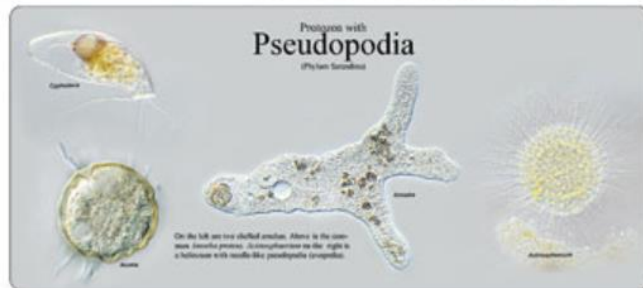


These organisms are best seen at intermediate magnification (400x-1000x).
 Some organisms may be seen under lower magnifications.
 * Photos of these organisms of this size can be seen in the chart POND II.
 * Organisms shown below are single-celled while those above are multicellular.

POND I

SMALLER MICROLIFE

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 or
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 CVS.com
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 Buy your BioCam at
 Rite Aid.com



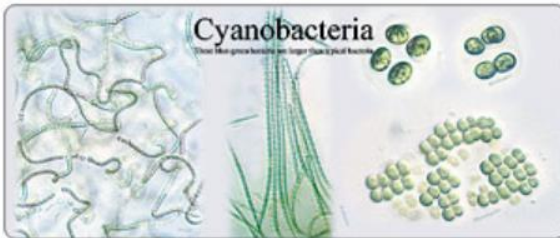
These are representations of the organisms that you may see under low power (10-40X) magnification. The lines on the organisms represent a 100-micron length of the organism photographed.

POND II

LARGER MICROLIFE

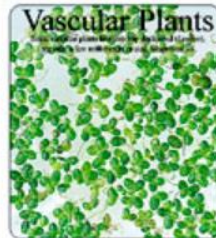
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Cyanobacteria

These blue-green bacteria are larger than typical bacteria.



Vascular Plants

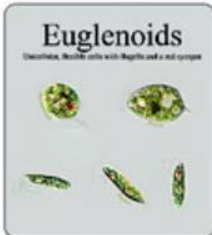
These vascular plants are the most complex and largest of the photosynthetic organisms.

See also one corner of the lake where the algae are found. The algae are found in the same place as the vascular plants are.

POND III

PHOTOSYNTHETIC MICROLIFE

BioCam
See also one corner of the lake where the algae are found. The algae are found in the same place as the vascular plants are.



Euglenoids

These are small, green, oval-shaped cells with flagella and a red spot.



Diatoms

These are small, green, oval-shaped cells with flagella and a red spot.



Green Algae

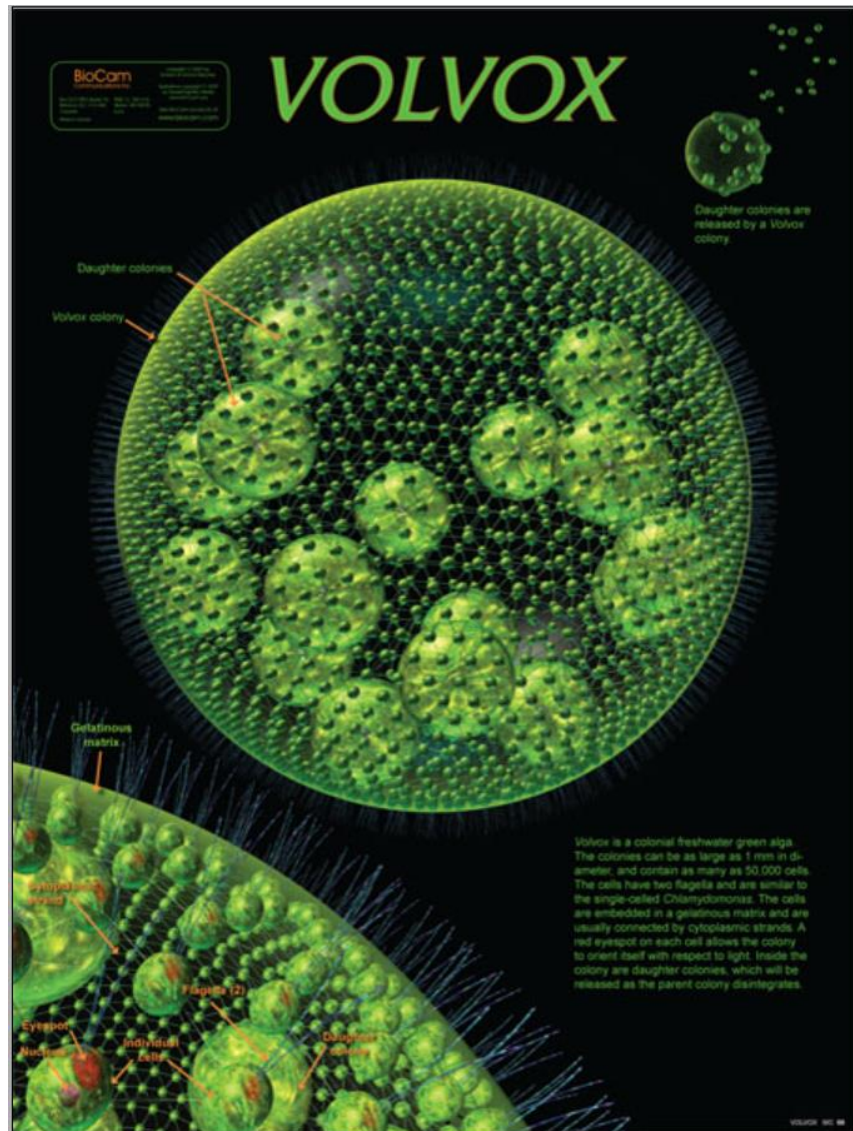
This is a very common and diverse group.

Colonial

Desmids

Unicellular

Filamentous



VOLVOX

BioCam
See also one corner of the lake where the algae are found. The algae are found in the same place as the vascular plants are.

Daughter colonies are released by a Volvox colony.

Daughter colonies
Volvox colony

Gelatinous matrix

Eye spot

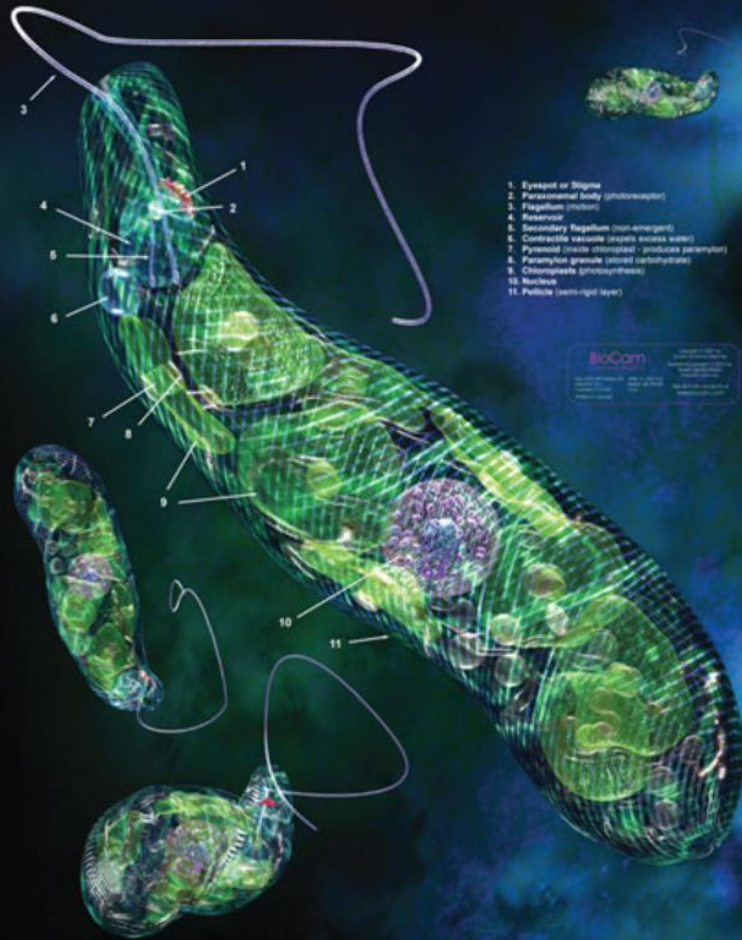
Flagella (2)

Individual cells

Daughter colonies

Volvox is a colonial freshwater green alga. The colonies can be as large as 1 mm in diameter, and contain as many as 50,000 cells. The cells have two flagella and are similar to the single-celled Chlamydomonas. The cells are embedded in a gelatinous matrix and are usually connected by cytoplasmic strands. A red eyespot on each cell allows the colony to orient itself with respect to light. Inside the colony are daughter colonies, which will be released as the parent colony disintegrates.

EUGLENA

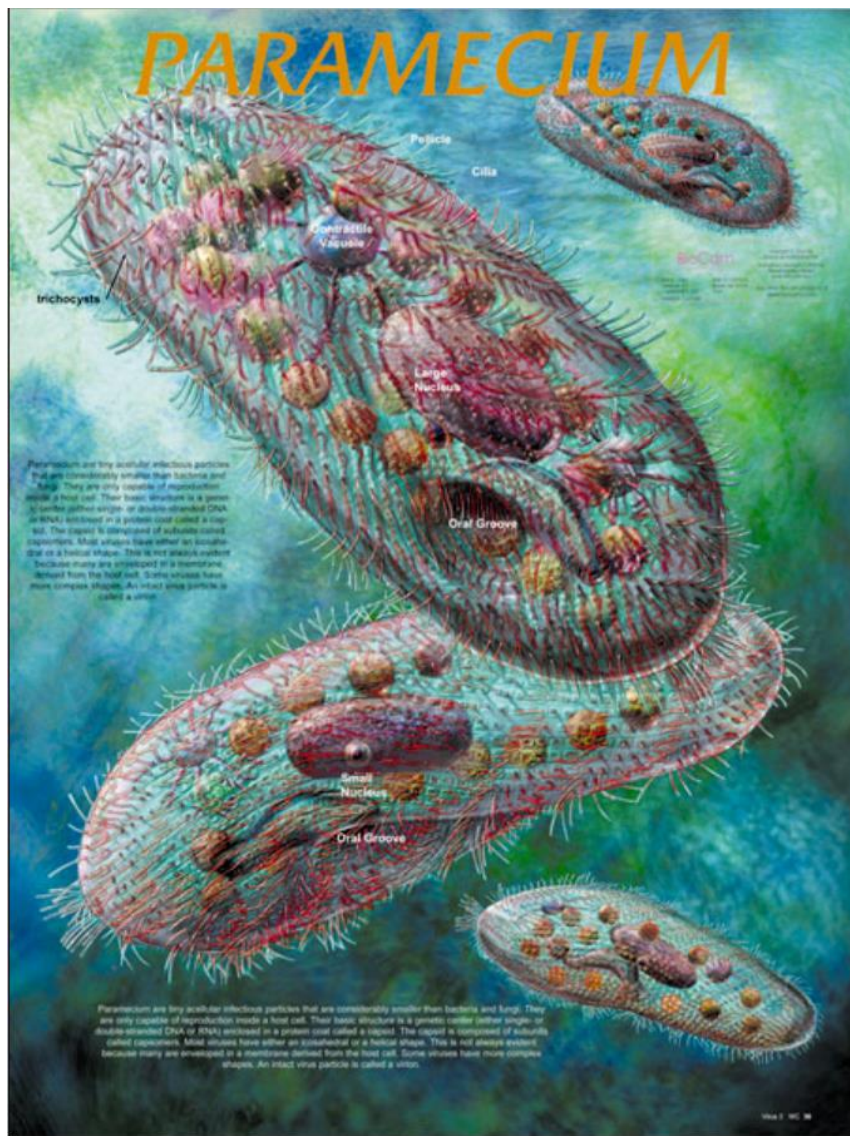


Euglena 100 47

AMOEBA



Amoeba 100 48



MOSS LIFE CYCLE

4. Female Moss Plant

Labels: Sporophyte, Calyptra, Operculum, Capsule, Stalk, Leaves, Rhizoids.

Leafy - mature capsule with peristome teeth

5. Capsule releasing spores

```

graph TD
    G1[Gametophyte (1)] --> G2[Gametophyte (2)]
    G2 --> S1[Young gametophytes grow from peristomes (1)]
    S1 --> G1
    G1 --> S2[Spores from mature capsule fertilize egg to develop (2 & 3)]
    S2 --> G2
    G2 --> S3[Spores grow into filamentous gametophytes (1)]
    S3 --> G1
    G2 --> S4[Spores are released from mature capsule to germinate (2)]
    S4 --> G2
    
```

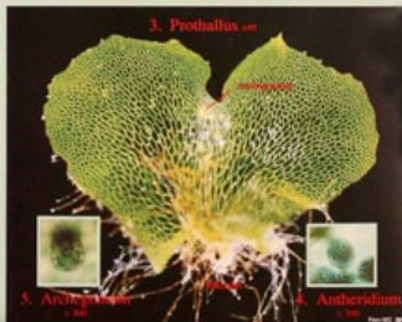
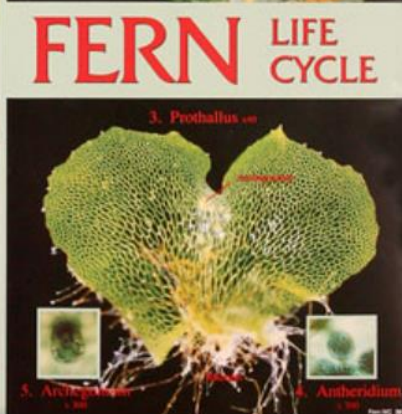
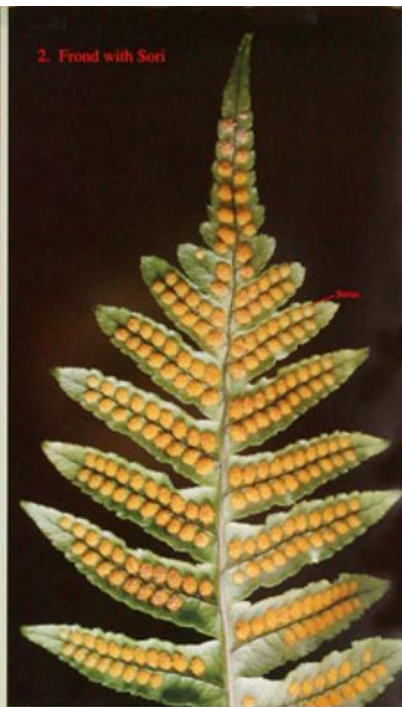
6. Archegonium

7. Young Gametophyte

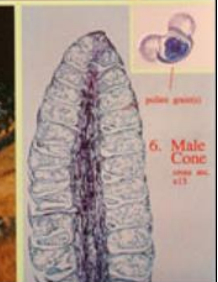
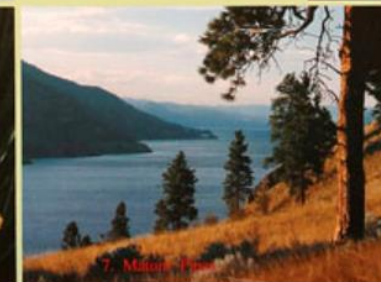
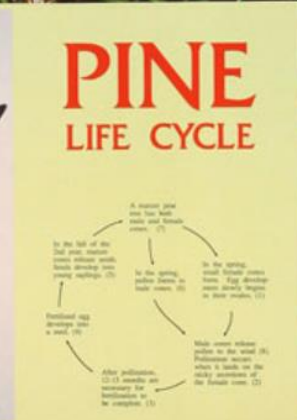
8. Rhizoids

9. Antheridium

10. Gametophyte

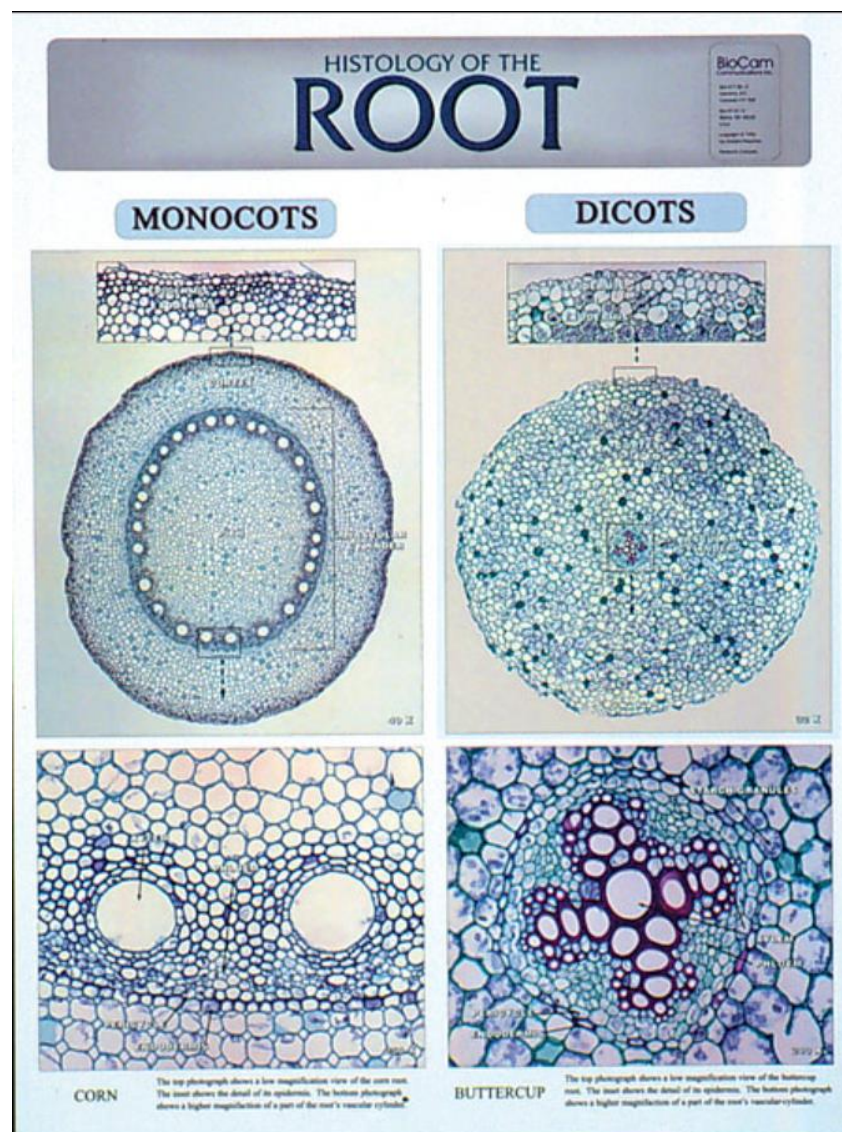
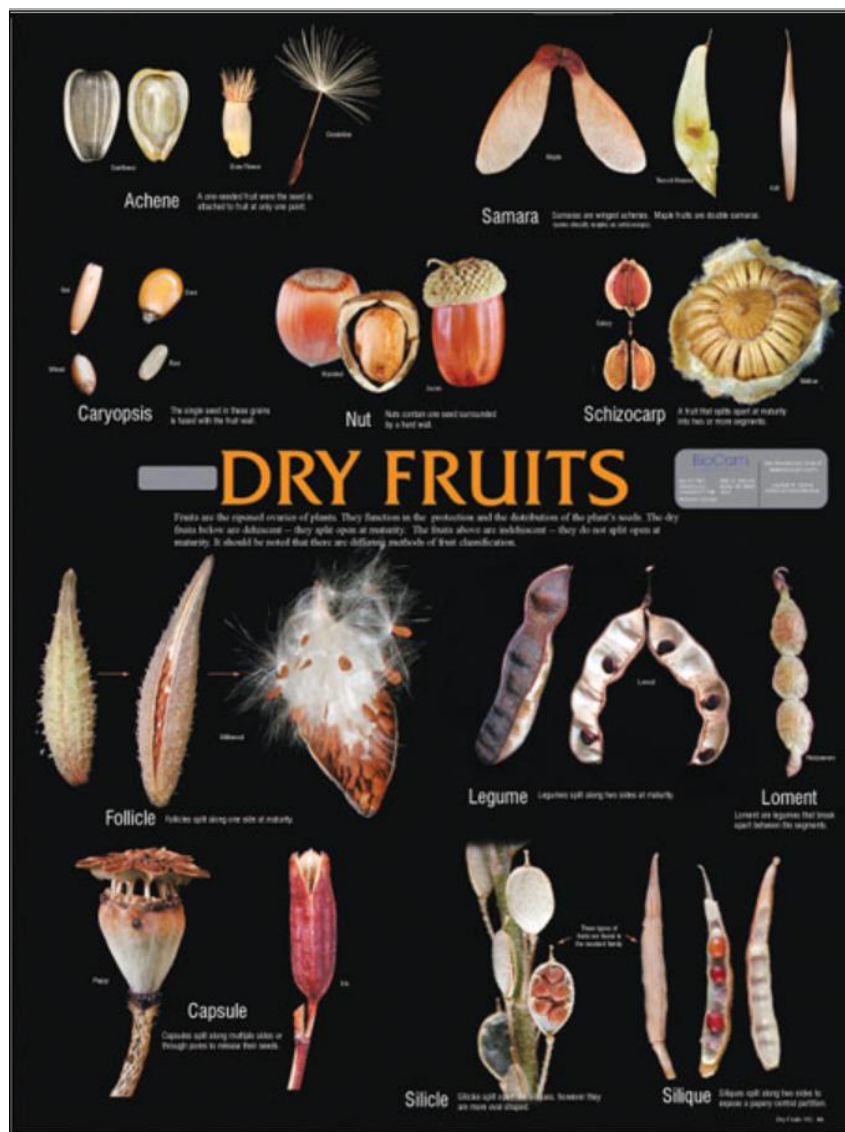


Archegonium: 100x
Antheridium: 100x



Male Cone: 100x
Male Cone: 100x
Male Cone: 100x

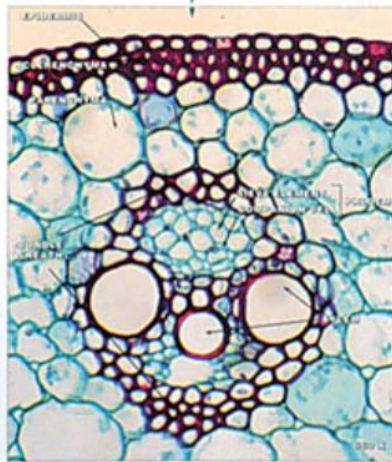
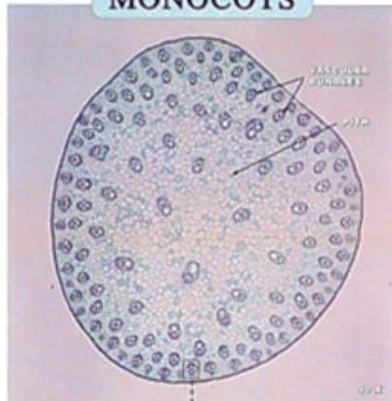




HISTOLOGY OF THE STEM

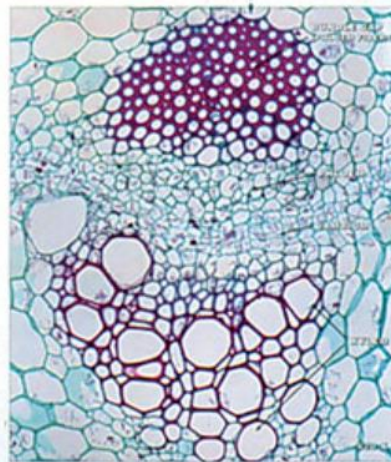
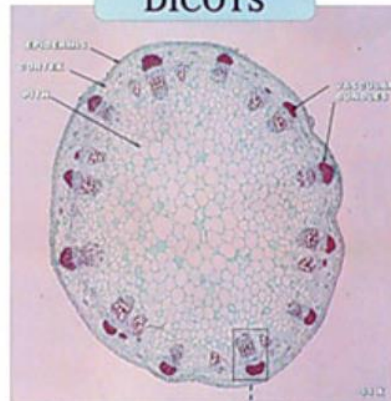
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MONOCOTS



Corn The top photograph shows a low magnification view of the cross section of a corn stem. The bottom photograph shows a single vascular bundle from this stem.

DICOTS

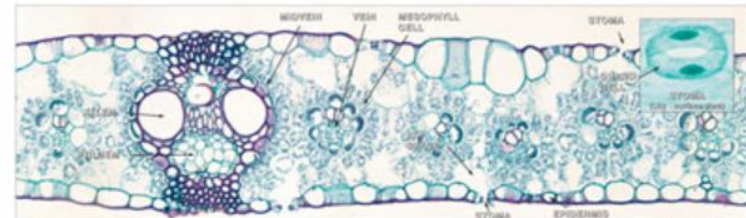


Sunflower The top photograph shows a low magnification view of the cross section of a sunflower stem. The bottom photograph shows a single vascular bundle from this stem.

HISTOLOGY OF THE LEAF

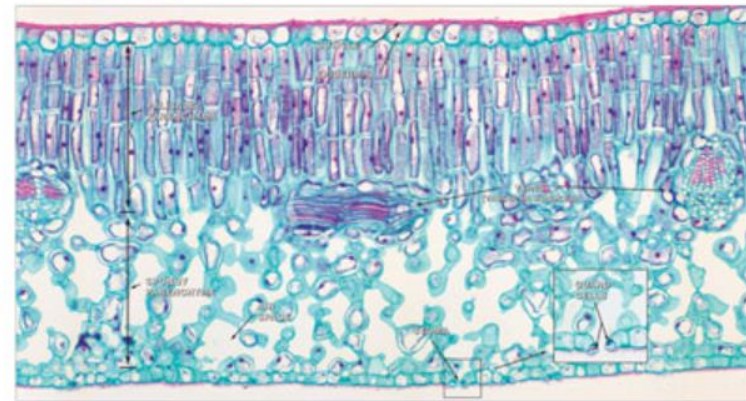
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MONOCOTS

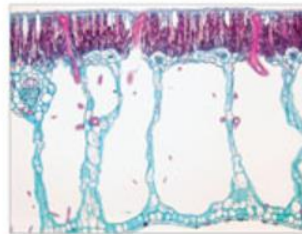


Corn Leaf 440x

DICOTS



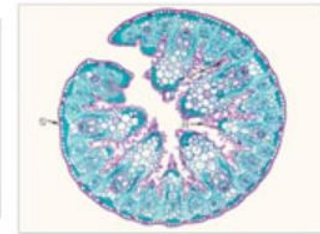
Lilac Leaf 430x



Water Lily Leaf, 120x

Hydrophilic leaves are adapted to very wet environments. This water lily leaf on the left has stomata only on the top surface, large air spaces for flotation and reduced vascular tissue.

Grass Leaf, 130x



Xerophytic leaves are adapted to very dry environments. This grass on the right has a curled leaf shape, many hairs (to cover its surface, minimize heat loss and reduce transpiration) and a thick cuticle to resist evaporation.



Class Bivalvia

These have shells with two halves or valves that are joined together. They are mostly aquatic but some are found in freshwater. Shells can move by rapidly closing their

PHYLUM
The Phylum
Mollusca

MOLLUSCA

BioCam

These are soft-bodied animals, most of which have shells. However, in some the shell is reduced or absent. Most mollusks are aquatic but many are also found in fresh water and on land. All mollusks have 1. A muscular foot used in locomotion. In some species the foot is used to suck into the mantle. 2. A visceral mass that contains their internal organs. 3. A fleshy fold of tissue called the mantle. 4. In the mantle that surrounds the shell. Many also have a sensory organ to sense food or the substrate.



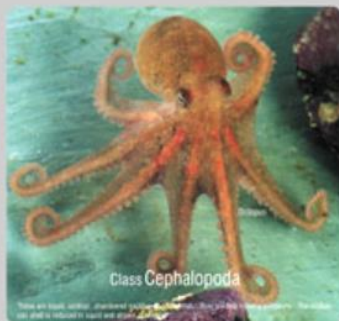
Marginal Jellyfish

Marginal Jellyfish

Class Gastropoda

These are often moving, usually with a shell, that is often light-colored. They are found in many habitats, including freshwater, marine, and on land.

Marginal Jellyfish



Class Cephalopoda

These are large, soft-bodied animals with a head and tentacles. They are found in the ocean and are known for their intelligence and ability to change color.



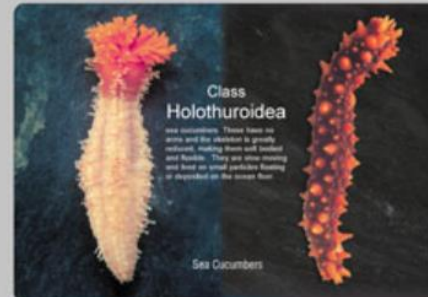
Class Polyplacophora

These are small, flat, oval-shaped mollusks with a shell made of eight plates. They are found in the ocean and are known for their ability to regenerate lost body parts.



Class Scaphopoda

These are small, elongated mollusks with a shell that is open at both ends. They are found in the ocean and are known for their ability to burrow into the sand.



Class Holothuroidea

Sea Cucumbers



Class Crinoidea

This group includes feather stars and sea lilies. They are permanently attached to the substrate by a stalk, while feather stars have flexible arms which they can grasp the substrate.

Feather Star

PHYLUM
The Phylum
Echinodermata

ECHINODERMATA

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Echinoderms - these are large, often entirely marine creatures. They are radially symmetrical. They have a skeleton made up of calcium carbonate. They uniquely have a water vascular system. This is a series of canals that provide the hydraulic system for the echinoderms to power their tube feet. Among other uses, the tube feet allow echinoderms to move and to some cases to capture prey.



Class Asteroidea

Sea stars and brittle stars. Usually have five arms, though some have more. They are found in many habitats, including freshwater, marine, and on land.

Sea Stars



Brittle Star

Basket Star

Class Ophiuroidea

Brittle stars, brittle stars. These mobile echinoderms usually have five arms. Their arms radiate from a central disc and can be moved. In the brittle star each arm is flexible.



Sand Dollar

Class Echinoidea

Sea urchins, heart urchins, and sand dollars. These echinoderms have five arms. Sea urchins have long spines which protect them and can pull in retraction. Sand dollars (and heart urchins) have very short spines and flattened body shapes.

Sea Urchin

Class Chilopoda

Centipedes are fierce predators found in dark, damp environments. Behind their head, they have at least 18 segments each containing a pair of legs. They have a single pair of antennae, mandibles and long-like mouthparts that contain poison.



Centipede

Class Diplopoda

Millipedes are usually slower moving than centipedes. Normally they feed on decaying plant material. They may have from 17 to more than 100 segments, each bearing 2 pairs of legs.



Millipede

Class Merostomata

This horseshoe crab is one of a few examples of a largely extinct group. These are not true crabs. Horseshoe crabs burrow through sand and feeding on small invertebrates. Head and thorax are fused into a cephalothorax. Underneath they have five pairs of walking legs.



Horseshoe Crab

PHYLUM
The Ecdysozoa
Phylum of Life Series

ARTHROPODA

There are over a million known arthropod species. Arthropods are segmented animals with jointed appendages. The appendages can be used for defense, walking, feeding, sensory and reproduction. A thoroughly exoskeleton is made from protein and chitin. In addition they have well-developed sensory organs and an open circulatory system. Most aquatic species have gills while terrestrial arthropods have internal surfaces like the trachea in insects for gas exchange.

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Class Insecta

Insects have a body with head, thorax and abdomen. The thorax usually has three pairs of legs. They have compound eyes, many have wings and many undergo metamorphosis. About 1 million species have been identified so far. They are extremely successful, but are rare in marine environments.



Butterfly



Grasshopper



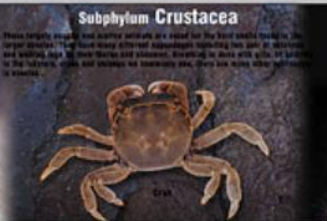
Beetle

Subphylum Crustacea

These largely aquatic and mostly sessile animals are found in the lower levels of the food chain. They have many different adaptations including two pairs of antennae and walking legs. Some have long antennae and swimming legs. Some have long antennae and swimming legs. Some have long antennae and swimming legs.



Hermit Crab



Crab



Shrimp

Class Arachnida

These Arthropods have a head and thorax (cephalothorax), with four pairs of walking legs. They also have chelicerae that can tear food apart (and mediate poison in spiders) and pedipalps that may be used for feeding, reproduction or other functions.



Mite



Scorpion



Spider

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Class Trematoda

The arms of these ectoparasites are slender and sharply set off from the central disc. Suckling arms spread their highly branched arms to catch larger prey. Little stalks have suckles like movement of their arms and thus are sometimes called suckling arms. The arms of these ectoparasites are slender and sharply set off from the central disc. Suckling arms spread their highly branched arms to catch larger prey. Little stalks have suckles like movement of their arms and thus are sometimes called suckling arms.



Sheep Liver Fluke x 3



Blood Fluke (schistosoma haematium) x 10



Chinese Liver Fluke x 15



Fish Parasite x 10

Class Monogenea

The arms of these ectoparasites are slender and sharply set off from the central disc. Suckling arms spread their highly branched arms to catch larger prey. Little stalks have suckles like movement of their arms and thus are sometimes called suckling arms.

PHYLUM
The Ecdysozoa
Phylum of Life Series

PLATYHELMINTHES

Echinoderms are spiny-skinned, entirely marine creatures. They are radially symmetrical, and have a thin skin covering an endoskeleton of calcareous ossicles. They have a unique water vascular system. This is a series of canals that provide the hydraulic system for echinoderms to extend their tube feet for functions such as moving, feeding, and gas exchange.

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Class Cestoidea

The arms of these ectoparasites are slender and sharply set off from the central disc. Suckling arms spread their highly branched arms to catch larger prey. Little stalks have suckles like movement of their arms and thus are sometimes called suckling arms. The arms of these ectoparasites are slender and sharply set off from the central disc. Suckling arms spread their highly branched arms to catch larger prey. Little stalks have suckles like movement of their arms and thus are sometimes called suckling arms.



Tapeworm - Densia x 2



Tapeworm sections

Class Turbellaria

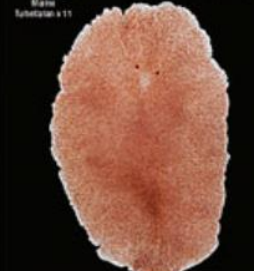
The arms of these ectoparasites are slender and sharply set off from the central disc. Suckling arms spread their highly branched arms to catch larger prey. Little stalks have suckles like movement of their arms and thus are sometimes called suckling arms. The arms of these ectoparasites are slender and sharply set off from the central disc. Suckling arms spread their highly branched arms to catch larger prey. Little stalks have suckles like movement of their arms and thus are sometimes called suckling arms.



Marine Turbellarian x 15



Aquatic Turbellarian (Planaria) x 14



Marine Turbellarian x 2

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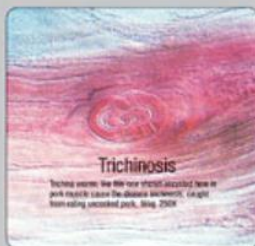


PHYLUM
The Biology
of Life Series

NEMATODA



In addition to general things I want to say here that most nematodes aren't parasites. I just have them on the poster because they are all that was available. In addition to general things I want to say here that most nematodes aren't parasites. I just have them on the poster because they are all that was available.



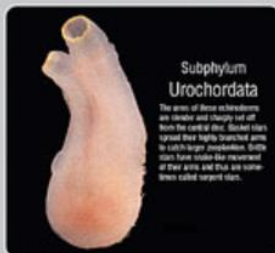
PHYLUM
The Biology
of Life Series

ANNELIDA



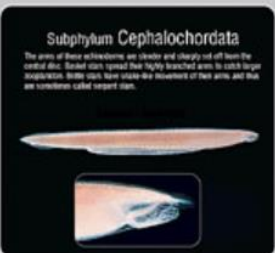
Earthworms are segmented worms. They have a segmented body and a central nervous system. They are found in soil and water.





Subphylum Urochordata
The area of these chordates are smaller and change out all from the central disc. Sac-like structures have highly branched arms to catch larger food particles. Little sacs form inside the movement of their arms and thus are sometimes called siphon sacs.

Chordates
Ichthyoderms are spiny-skinned, entirely marine creatures. They are radially symmetrical, and have a thin skin covering an endo-skeleton of calcareous ossicles. They have a unique water vascular system. This is a series of canals that provide the hydraulic system for echinoderms to extend their tube feet for functions such as moving, feeding, and gas exchange.



Subphylum Cephalochordata
The area of these chordates are smaller and change out all from the central disc. Sac-like structures have highly branched arms to catch larger food particles. Little sacs form inside the movement of their arms and thus are sometimes called siphon sacs.

PHYLUM
The Kingdom of Life

CHORDATA

All Classes below belong to the Subphylum Vertebrata

BioCam
The Kingdom of Life



Class Amphibia
Tree Frog

Catty, This is just an extension of the above, but with a lot of info about vertebrates.
Echinoderms are spiny-skinned, entirely marine creatures. They are radially symmetrical, and have a thin skin covering an endo-skeleton of calcareous ossicles. They have a unique water vascular system. This is a series of canals that provide the hydraulic system for echinoderms to extend their tube feet for functions such as moving, feeding, and gas exchange.



Class Osteichthyes
Nagfish



Class Amphibia
Tree Frog



Class Osteichthyes



Class Chondrichthyes



Class Amphibia
Tree Frog



Class Osteichthyes



Class Chondrichthyes

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-.



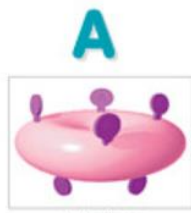
Rh-
No clumping with antiserum



Rh+
Clumps with antiserum

BLOOD TYPING

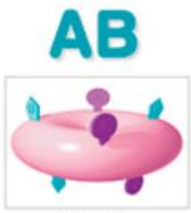
ABO SYSTEM



A Antigens
(Agglutinogens)



B Antigens
(Agglutinogens)



A & B Antigens
(Agglutinogens)



No Antigens
(Agglutinogens)



B Antibodies
(Agglutinins)



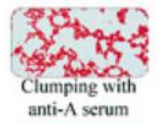
A Antibodies
(Agglutinins)



No Antibodies
(Agglutinins)



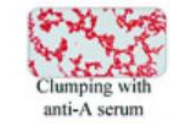
A & B Antibodies
(Agglutinins)



Clumping with anti-A serum



No Clumping with anti-A serum



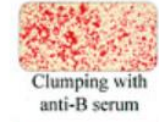
Clumping with anti-A serum



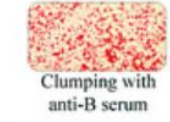
No Clumping with anti-A serum



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

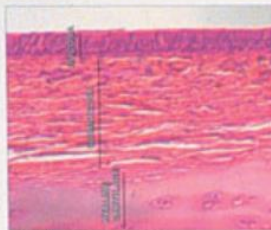
Can Donate to
A, B, AB, O

Can Accept from
A, O

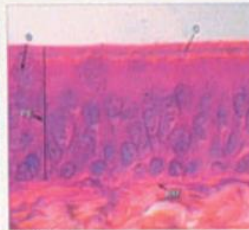
Can Accept from
B, O

Can Accept from
A, B, AB, O

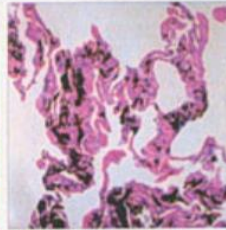
Can Accept from
O



Trachea - low magnification Shows a low magnification view of the trachea. The section shows the cross section through one of the C-shaped rings of cartilage that give the trachea support. See the next picture for a close-up of the trachea. Magnification 100X.

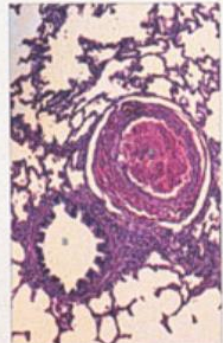


Trachea - mucosa Shows a pseudostratified ciliated epithelium (PE) lining the trachea. The cilia (C) project above the surface of the cells and beat in a coordinated fashion to move mucus and debris out of the trachea. Goblet cells (G) secrete mucus into the lumen of the trachea. Magnification 100X.

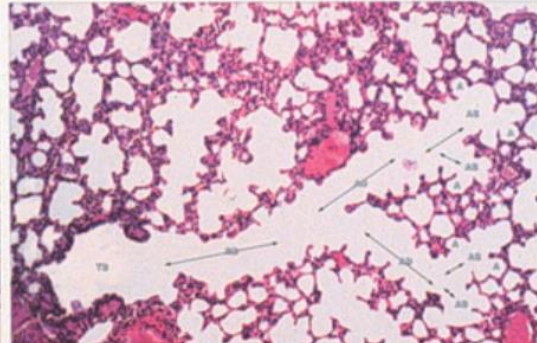


Smoker's Lung Shows the thickened alveolar walls that are deposited in the lungs of a smoker. Compare this to the picture of the lungs below. Magnification 100X.

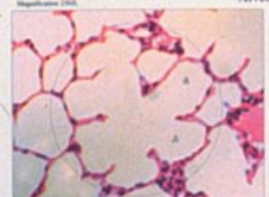
HISTOLOGY OF THE RESPIRATORY SYSTEM



Bronchiole Shows a low magnification view of the bronchiole (B). Compare the bronchiole to the artery (A). Magnification 100X.



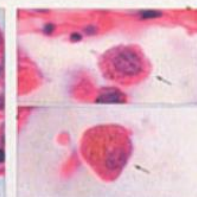
Terminal Bronchiole (TB) → Respiratory Bronchiole (RB) → Alveolar Duct (AD) → Alveolar Sac (AS) → Alveolus (A) Magnification 100X.



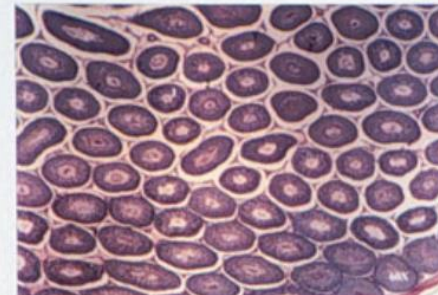
Alveolar Sac Shows a low magnification view of a cross section through an alveolar sac. Adipose (A) is visible. Magnification 475X.



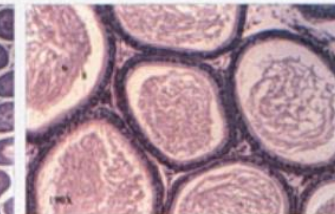
Alveolus Gas exchange occurs here in the alveoli. Here are a capillary (C) containing a red blood cell. Alveoli have both apical epithelial cells (type I) and cuboidal epithelial cells (type II) which secrete surfactant. Magnification 1000X.



Dust Cells (alveolar macrophages) These cells travel through the alveoli and phagocytose their particles and debris. Magnification 1000X.

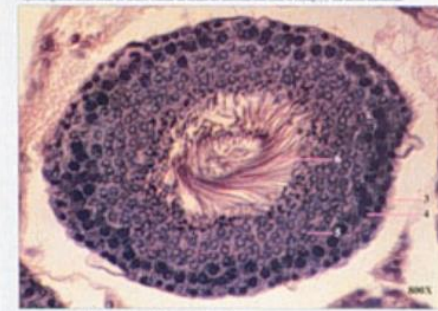


Testis - Low Magnification This view shows a cross section through seminiferous tubules (1). Spermatogenic cells inside the tubules (2) are the cells that develop into sperm cells. The tubules are surrounded by cells of Leydig (3). See the next section.

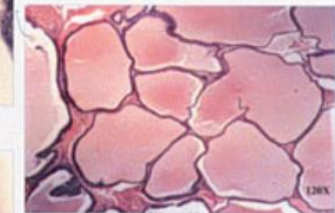


Epididymis Spermatocytes (1) develop from the testis and are found in the epididymis. Spermatocytes are individual cells that are at various stages of development (2). Magnification 100X.

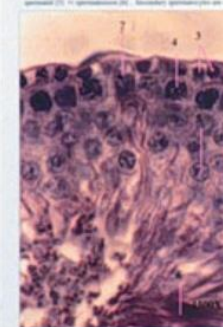
HISTOLOGY OF MALE REPRODUCTION



Testis - Medium Magnification This view shows an individual seminiferous tubule. The tubule is surrounded by cells of Leydig (3). The tubule contains spermatogenic cells (1) and spermatozoa (2). Secondary spermatocytes are about third and are usually seen in sections.



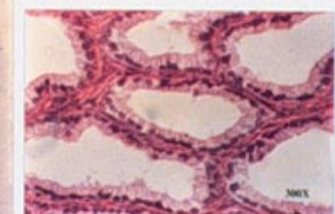
Prostate Prostate is a highly vascularized gland that makes up about 30% of the volume of the male. The prostate contains several secretory glands.



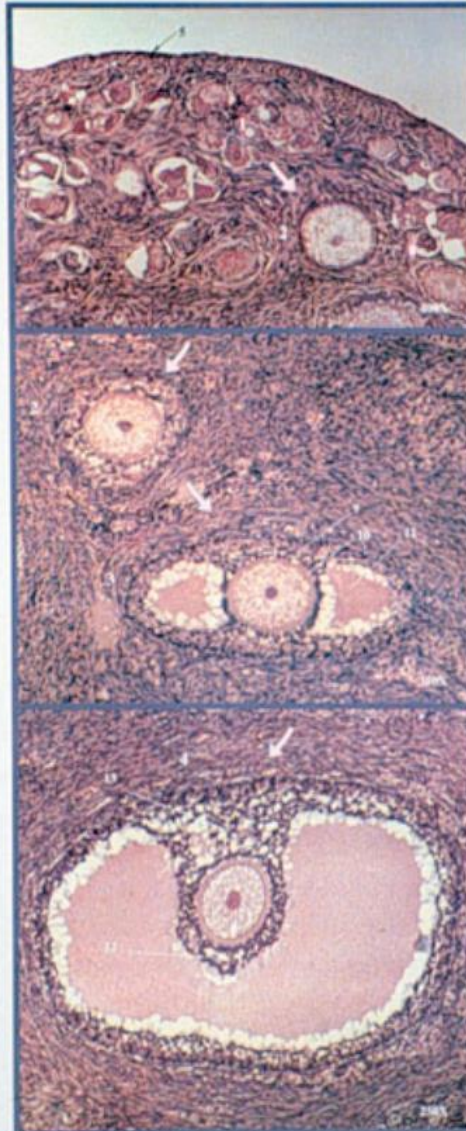
Testis - High Magnification spermatogenesis (1), primary spermatocytes (2), spermatozoa (3), seminiferous tubule (4), Leydig cell (5).



Spermatozoa (sperm cells)



Seminal Vesicle Prostate is a highly vascularized gland that makes up about 30% of the volume of the male. The prostate contains several secretory glands. The prostate contains prostatic secretions, fructose and fructose.



Ovary - Developing Follicles

Ovary contains many follicles at various stages of development. A follicle consists of an ovocyte (immature egg) and surrounding cells. Each month a few **primordial follicles** respond to FSH and begin their development into **primary follicles**. The ovocyte enlarges and the cells forming the follicle wall enlarge and multiply. Later in the secondary follicle, a cavity (the antrum) forms around the ovocyte. The final stage is the **antral** or **Graafian follicle**. This large follicle grows to the side of the ovary and the ovocyte is released in the uterine (Fallopian) tube. Not all follicles that start to develop will reach this final stage.



Ovary - Low Magnification

This view shows an ovary with follicles at different stages of development. Ovary is from a small mammal.

HISTOLOGY OF FEMALE REPRODUCTION



1. Primordial follicle
2. Primary follicle
3. Secondary follicle
4. Vesicular (Graafian) follicle
5. Germinal epithelium
6. Tunica albuginea
7. Oocyte
8. Nucleus
9. Granulosa cells
10. Zona pellucida
11. Antrum with follicular fluid
12. Corona radiata
13. Corona capillaris
14. Corpus luteum
15. Myometrium
16. Endometrium
17. Stratum functionalis
18. Stratum basalis



Uterine (Fallopian) Tube

The ovocyte is released into the tube where fertilization occurs.



Corpus Luteum of ovary

After ovulation, the vesicular follicle forms the corpus luteum. The corpus luteum secretes progesterone and estrone. Unless pregnancy occurs, it will degenerate after about 12 days.



Uterus

The wall of the uterus is where the embryo (blastocyst) will implant. If implantation does not occur, the inner lining of the endometrium is shed during menstruation.