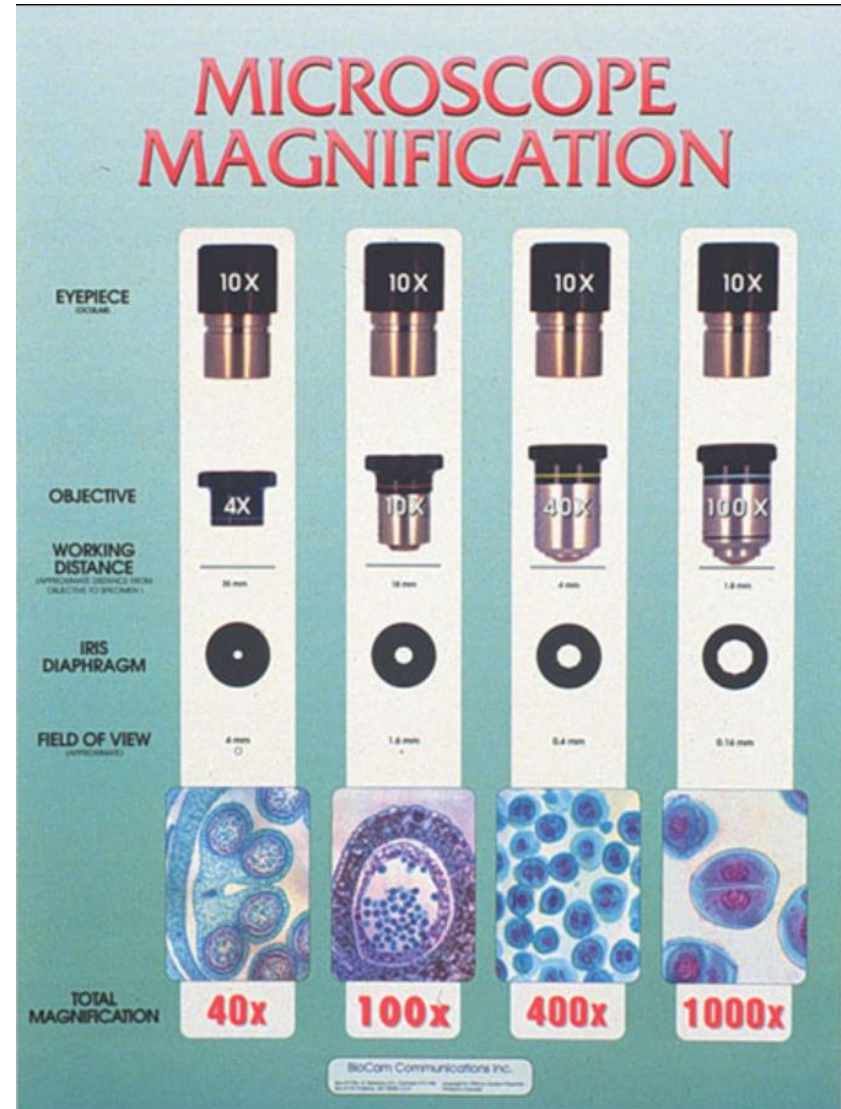
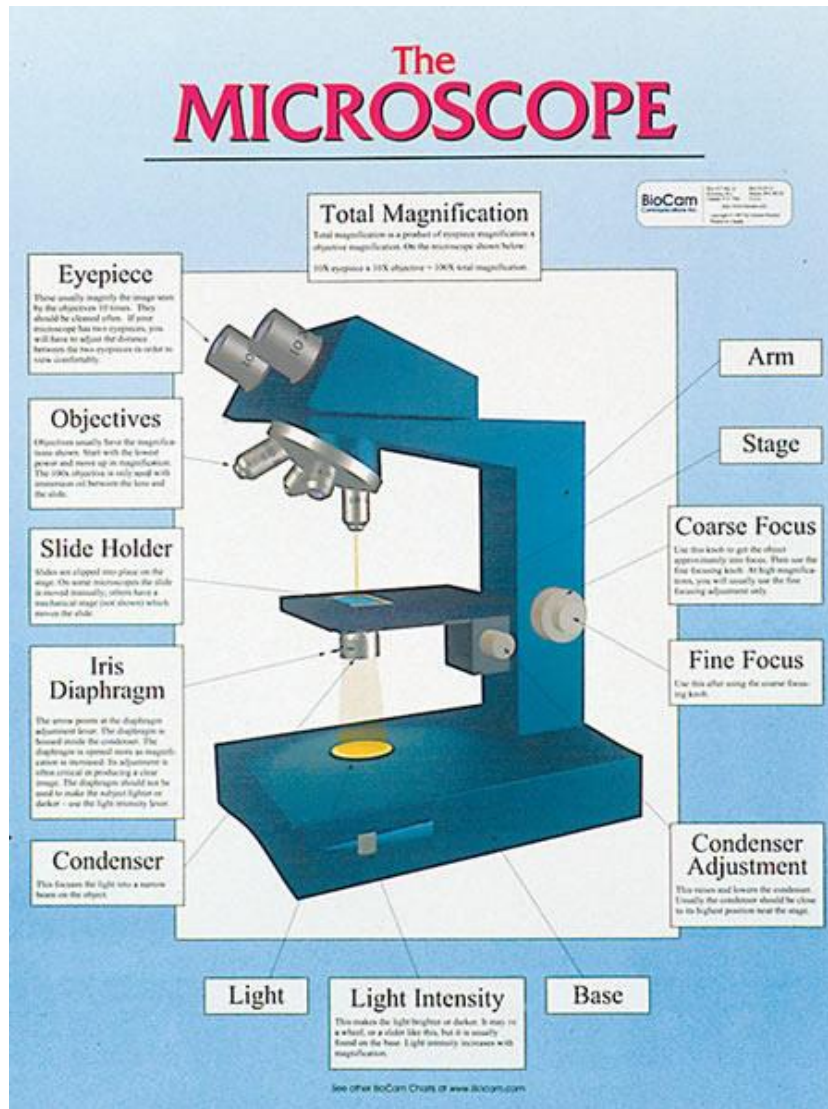
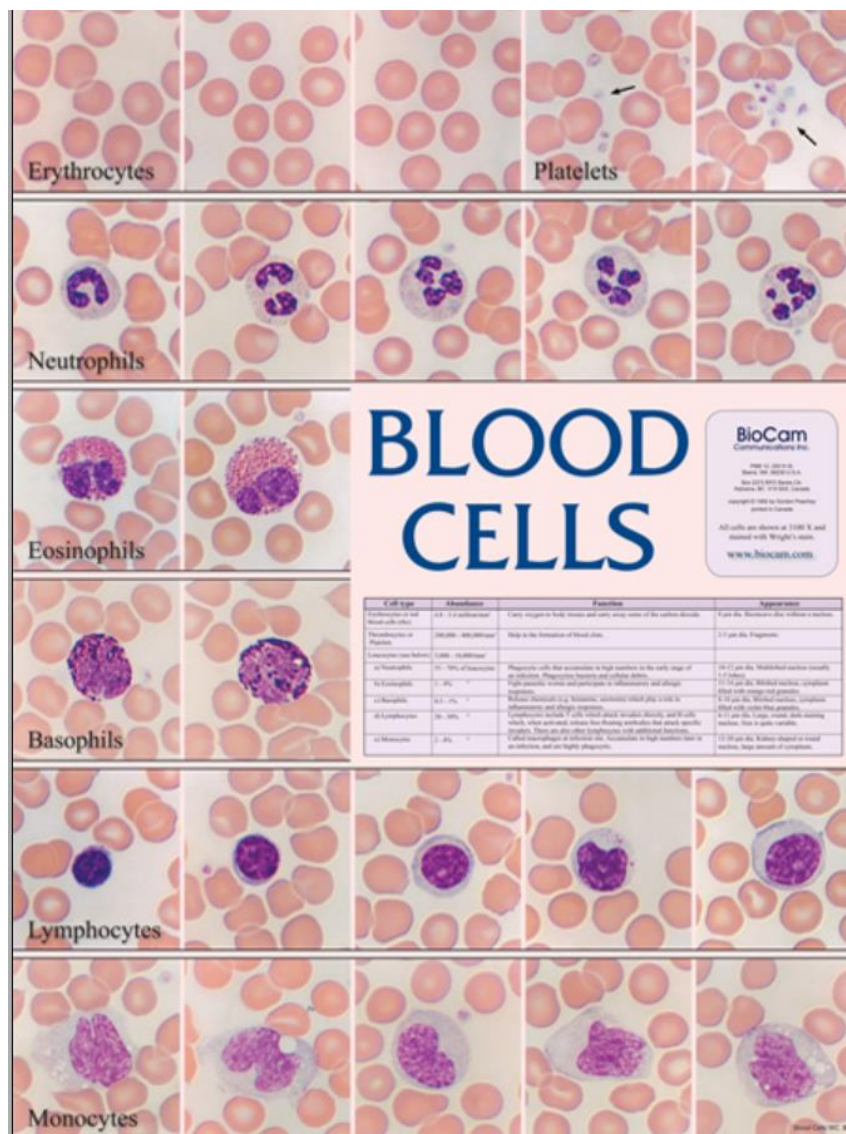
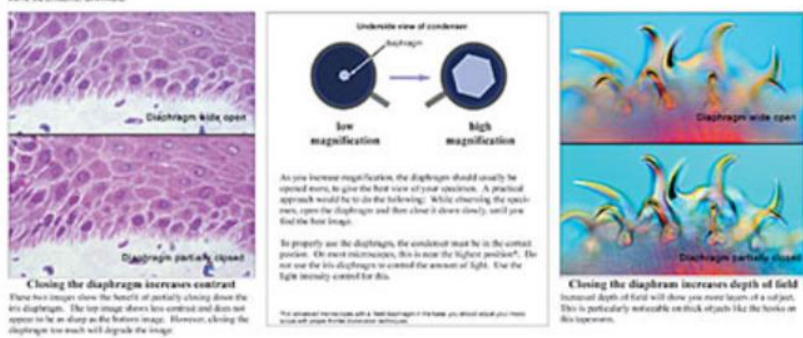
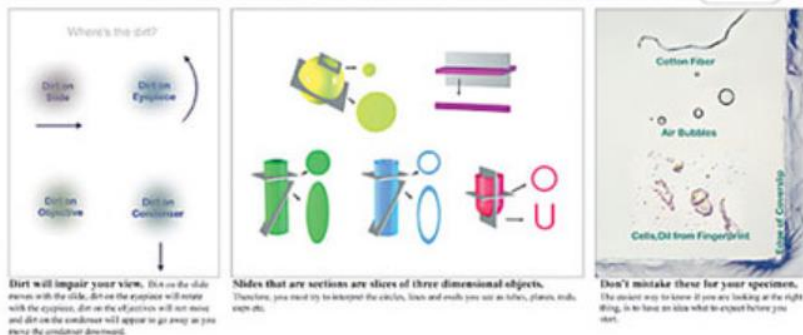


BSC2086L Posters - all posters courtesy of BioCam Charts. They may be accessed at:
http://www.biocam.com/Biocam_wall_charts_gallery.html





MICROSCOPE FOCUSING TIPS



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
anti-serum



Rh⁺
Clumps with
anti-serum



BLOOD TYPING

ABO SYSTEM

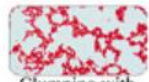
A



A Antigens
(Agglutinogens)



B Antibodies
(Agglutinins)



Clumping with
anti-A serum



No Clumping with
anti-B serum

Can Donate to
A, AB

Can Accept from
A, O

B



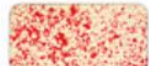
B Antigens
(Agglutinogens)



A Antibodies
(Agglutinins)



No Clumping with
anti-A serum



Clumping with
anti-B serum

Can Donate to
B, AB

Can Accept from
B, O

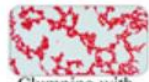
AB



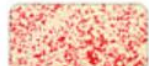
A & B Antigens
(Agglutinogens)



No Antibodies
(Agglutinins)



Clumping with
anti-A serum



Clumping with
anti-B serum

Can Donate to
AB

Can Accept from
A, B, AB, O

O



No Antigens
(Agglutinogens)



A & B Antibodies
(Agglutinins)



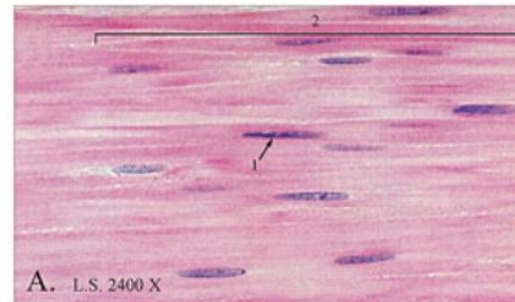
No Clumping with
anti-A serum



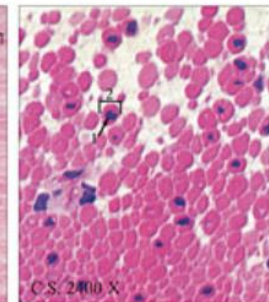
No Clumping with
anti-B serum

Can Donate to
A, B, AB, O

Can Accept from
O



A. L.S. 2400 X



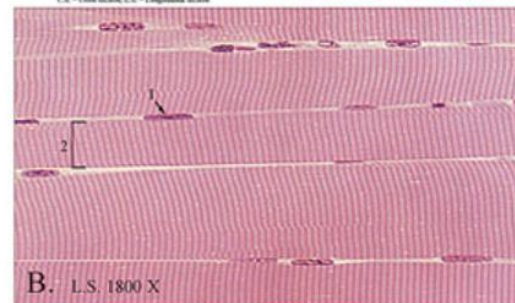
C.S. 2400 X

A. SMOOTH
B. SKELETAL
C. CARDIAC

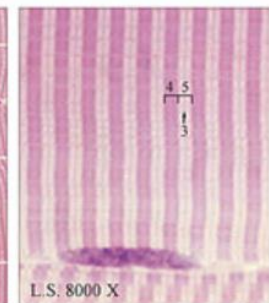
1. Nucleus 4. A band
2. Fiber 5. I band
3. Z line 6. Intercalated disc

C.S. = Cross section, L.S. = Longitudinal section

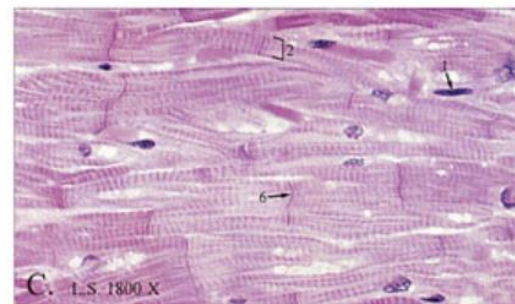
MUSCLE TISSUE



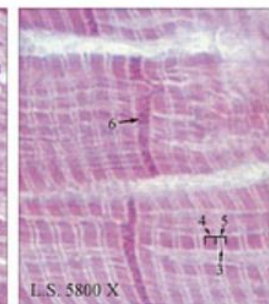
B. L.S. 1800 X



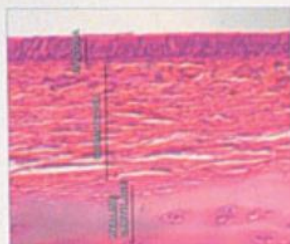
L.S. 8000 X



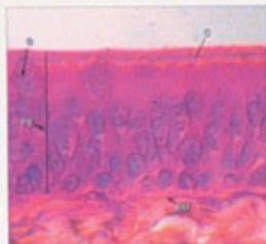
C. L.S. 1800 X



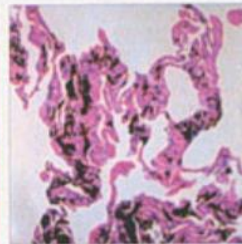
L.S. 5800 X



Trachea - low magnification Shows a low magnification view of the trachea. This section shows the cartilage 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 175X.

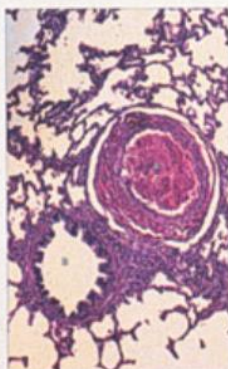


Trachea - mucosa Shows pseudostratified ciliated columnar epithelium (PC). Goblet cells (GC) secrete mucus. The cells (GC) goblet cells have particles of mucus and debris towards the throat. Goblet cells (GC) secrete mucus into the lumen of the trachea. Magnification 450X.

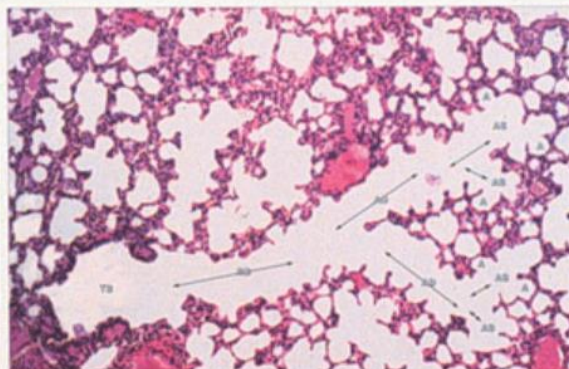


Smoker's Lung Shows the thick carbon particles that are deposited in the lungs of a smoker. Compare this to the picture of the lungs below. Magnification 150X.

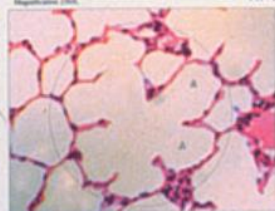
HISTOLOGY OF THE RESPIRATORY SYSTEM



Bronchiole Shows a low magnification view of the bronchiole (B). Compare the bronchiole to the artery (A). Magnification 150X.



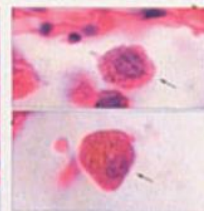
Terminal Bronchiole (TB) ⇒ Respiratory Bronchiole (RB) ⇒ Alveolar Duct (AD) ⇒ Alveolar Sac (AS) ⇒ Alveolus (A) Magnification 750X.



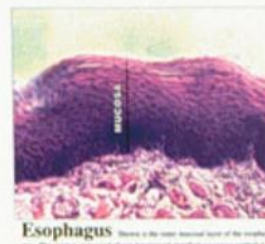
Alveolar Sac Shows a low magnification view of a network of alveoli. The alveoli are defined by the alveolar wall. Magnification 475X.



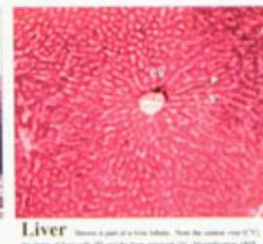
Alveolus Gas exchange occurs here in the alveolus. Note the capillary (C) containing a red blood cell (RBC). Alveoli have both squamous epithelial cells (type I) and cuboidal epithelial cells (type II) which secrete surfactant. Magnification 1500X.



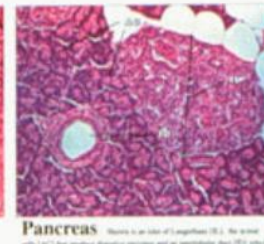
Dust Cells (alveolar macrophages) These cells wander through the alveoli and phagocytose dust particles and debris. Magnification 1500X.



Esophagus Shows the inner mucosal layer of the esophagus. This layer is composed of non-keratinized stratified squamous epithelial cells. Magnification 250X.

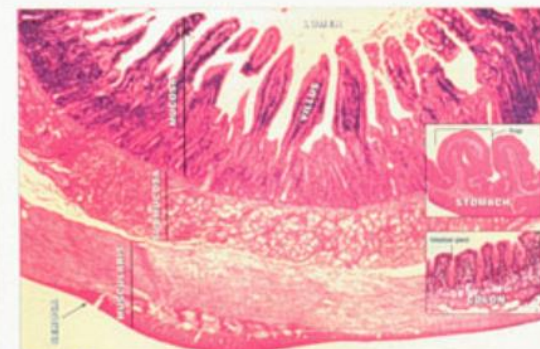


Liver Shows a part of a liver lobule. Note the central vein (CV), the plates of liver cells (PL) and the liver sinusoids (LS). Magnification 400X.



Pancreas Shows an islet of Langerhans (IL), the endocrine cells (EC) that produce digestive hormones and an isletlet (IL) which carries the digestive enzymes towards the duodenum. Magnification 750X.

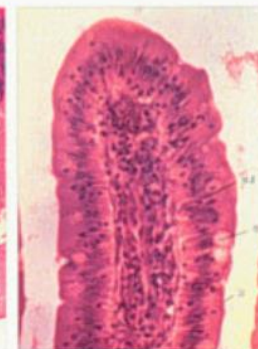
HISTOLOGY OF THE DIGESTIVE SYSTEM



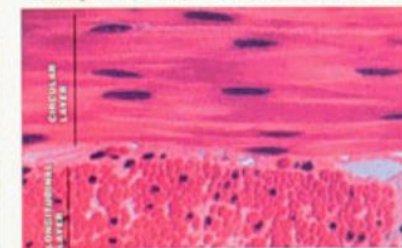
Small Intestine (duodenum) The four layers that make up the wall are the same as those found in the (SI) from the esophagus to the anus. The small intestine has many projections (the villi) that increase surface area for digestion and absorption. Magnification 100X.

Stomach Shows the large folds (rugae) of the wall of the empty stomach. Magnification 50X.

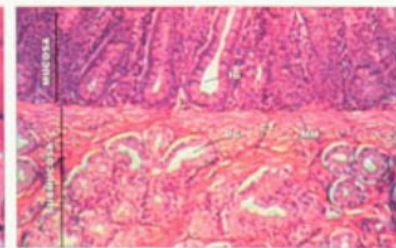
Colon (large intestine) Shows the long intestinal glands (crypts) of the colon and the absence of villi. Magnification 150X.



Villus The villus is lined with columnar epithelial cells (EC). Microvilli form the brush border (BL) and numerous goblet cells (GC) secrete mucus. The interior of the villus is composed of connective tissue, blood vessels and a nerve. Magnification 750X.



Muscularis Both layers of the muscularis are composed of the same smooth muscle cells (elongated and spindle-shaped cells). Contractions of the muscularis help food mix with digestive enzymes and create peristaltic waves to pass food along the GI tract. Magnification 800X.



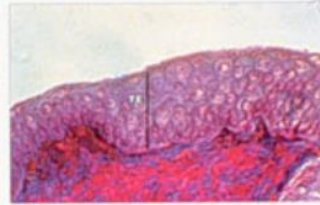
Submucosa The submucosa is composed of connective tissue (CT). It has blood vessels (arteries and veins). The lamina propria (LP) has fibroblasts (FB) and numerous goblet cells (GC) secrete mucus. The submucosa (SM) is a thin layer of smooth muscle (SM) that lines the innermost part of the intestine. Magnification 500X.



Kidney (small mammal). Look at magnified sections of the cortex to find the glomeruli and the convoluted tubules. Look in the medulla to find collecting tubules and papillary ducts. Magnification 11X.

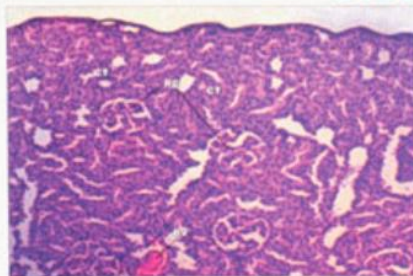


Ureter This longitudinal section shows transitional epithelial cells (TE). Breakoff this layer to compare tissue. Magnification 40X.

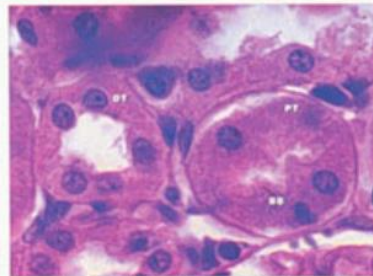


Urinary Bladder The outer layer consists of transitional epithelial cells (TE). These cells allow for stretching of the bladder as it fills. Breakoff this layer to compare tissue. Magnification 100X.

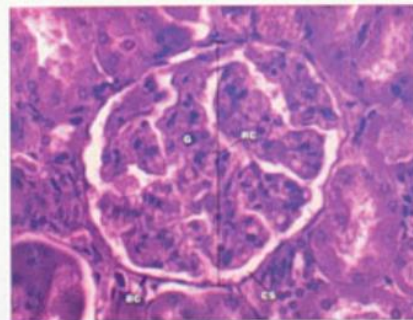
HISTOLOGY OF THE URINARY SYSTEM



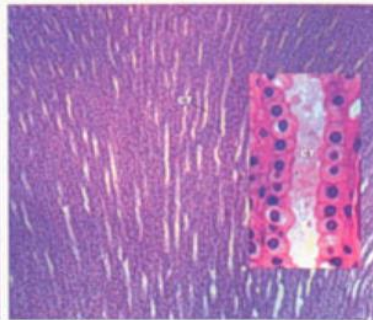
Renal Cortex In the cortex are many renal corpuscles composed of the glomerulus (glomerular capillaries) surrounded by the capsule and the proximal and distal convoluted tubules and ducts of the (DC). renal corpuscle (DC) (renal corpuscle) and (DC) (renal corpuscle). Magnification 100X.



Proximal and Distal Convoluted Tubules The proximal convoluted tubule (PT) has a brush border (BB) formed by microvilli while the distal convoluted tubule (DT) has fewer walls and does not have the brush border. Magnification 170X.



Renal Corpuscle The renal corpuscle (RC) is composed of the glomerulus (G) (glomerular capillaries) surrounded by the capsule (CA). Capsule (CA) is space (CS). Magnification 100X.

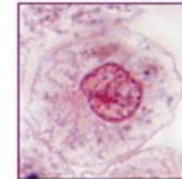


Renal Medulla In this view we observe many collecting tubules leading into papillary ducts. Magnification 170X. The base shows a cross-up of a single collecting tubule (CT) (ductal base) and/or two collecting tubules. Magnification 170X.

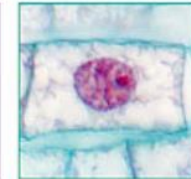


Interphase

- Most cellular metabolic activity takes place during interphase. During this time the following events happen:
 - Most cells increase in mass.
 - Cell organelles such as ribosomes, mitochondria, Golgi apparatus, and nucleus are duplicated.
 - DNA is synthesized and chromosomes are duplicated. Each chromosome and its duplicate are joined at a region called the centromere. Together they are considered as two chromosomes completing their path called sister chromatids. They are not visible until the chromosomes tightly coil (condense) during mitosis.



Animal Cell (Whitefish Bladder)



Plant Cell (New Root Tip)

The diagram of mitosis is of a cell with two pairs of chromosomes (4C).

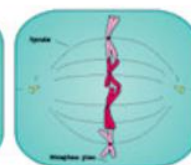
Photograph shows cells magnified 100X.

MITOSIS



1 Prophase

Chromosomes condense and become visible. The nuclear membrane and nucleolus disappear. A spindle apparatus begins to form. In animal cells, centrioles move toward the poles of the spindle. The latter part of this phase is also called prometaphase.



2 Metaphase

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



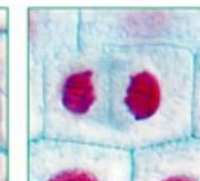
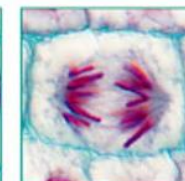
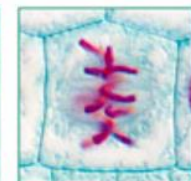
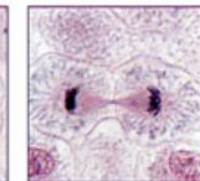
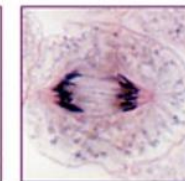
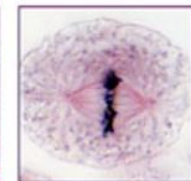
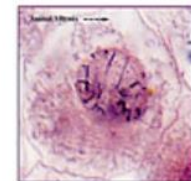
3 Anaphase

Sister chromatids split at the centromeres and travel toward 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. Cytokinesis at cell division begins as a cleavage furrow (in animal cells) and a cell plate (in plant cells).



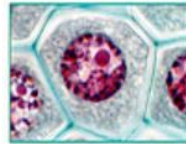


Interphase

Before mitosis begins, cell organelles such as chromosomes, mitochondria, endoplasmic reticulum, and centrioles are duplicated.

DNA is synthesized and chromosomes are duplicated. Each chromosome and its duplicate are joined at a region called the centromere. Together they are considered as one chromosome, comprising two parts called sister chromatids. The chromosomes become visible when they tightly coil (condense) during prophase I.

The photographs below show mitosis in the production of liver pollen. The diagrams include centrioles and aster formed only in animal cells.



The diagrams of mitosis are of a cell with two pairs of chromosomes, 4n = 8.

Photographs show cells magnified 2,000 X.

MEIOSIS

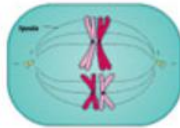


MEIOSIS I



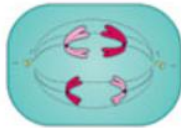
Prophase I

Chromosomes condense and become visible. The nuclear membrane and nucleolus disappear and a spindle apparatus begins to form. Homologous chromosomes align during a process called synapsis. Crossing over (exchange of genetic material between homologous chromosomes) occurs during this stage.



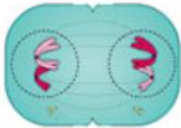
Metaphase I

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



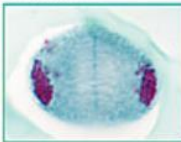
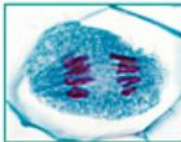
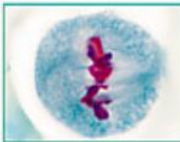
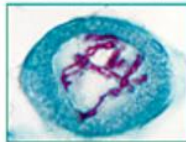
Anaphase I

Homologous chromosomes pair separate and each homologue tends towards opposite ends of the spindle.



Telophase I

Chromosomes arrive at the ends of the spindle and the spindle apparatus begins to disassemble. Two nuclear membranes may be formed around the chromosomes. Cytokinesis in cell division may begin with a cleavage furrow in animal cells and a cell plate in plant cells.



MEIOSIS II



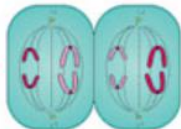
Prophase II

The nuclear membrane and nucleolus, if present, may disappear. A spindle apparatus begins to form.



Metaphase II

Chromosomes align themselves at the center of the spindle on the metaphase plate.



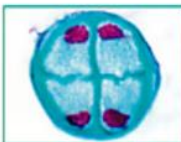
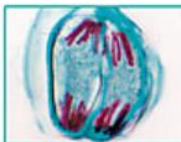
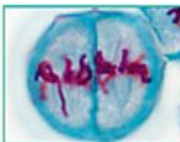
Anaphase II

Sister chromatids split at the centromere and travel toward opposite ends of the spindle. Each chromatid is now considered a chromosome.

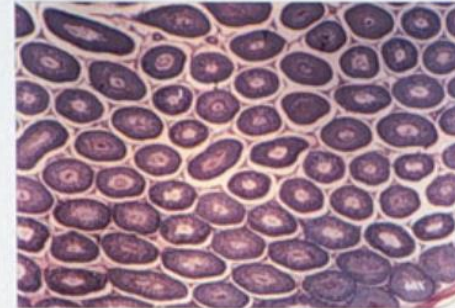


Telophase II

Chromosomes arrive at the ends of the spindle and the spindle apparatus begins to disassemble. Two nuclear membranes are formed and the chromosomes uncoil. Cytokinesis or cell division begins.

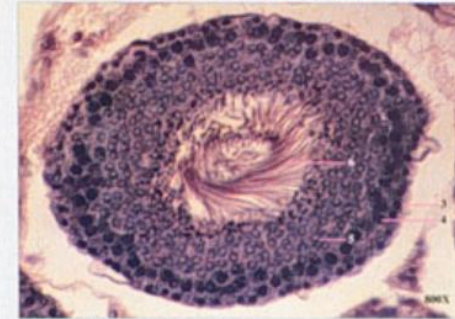


MEIOSIS II



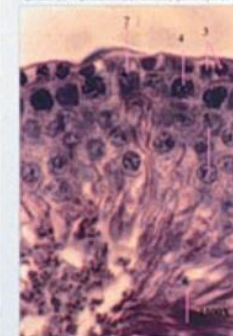
Testis - Low Magnification

This view shows a cross section through seminiferous tubules (1). Spermatogenic cells (sperm) develop inside the tubules in a sequential order (2). The nuclei are visible (3).



Testis - Medium Magnification

This view shows an individual seminiferous tubule. The production of spermatozoa proceeds as follows: Spermatogonium (1) to primary spermatocyte (2) to secondary spermatocyte (3) to spermatid (4) to spermatozoon (5). Secondary spermatocytes are short-lived and are not usually seen in sections.

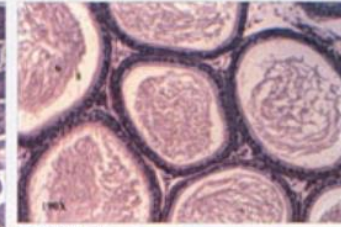


Testis - High Magnification

spermatogonium (1), primary spermatocyte (2), spermatid (3), spermatozoon (4), interstitial cell (Sertoli cell) (5)



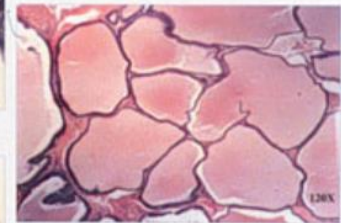
Spermatozoa (sperm cells)



Epididymis

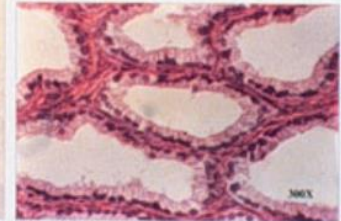
Spermatozoa (1) mature (become more fertile and motile) and are stored in these tubules. Disaggregated spermatozoa are introduced into the wall with the aid of peritubular branching capillaries (2).

HISTOLOGY OF MALE REPRODUCTION



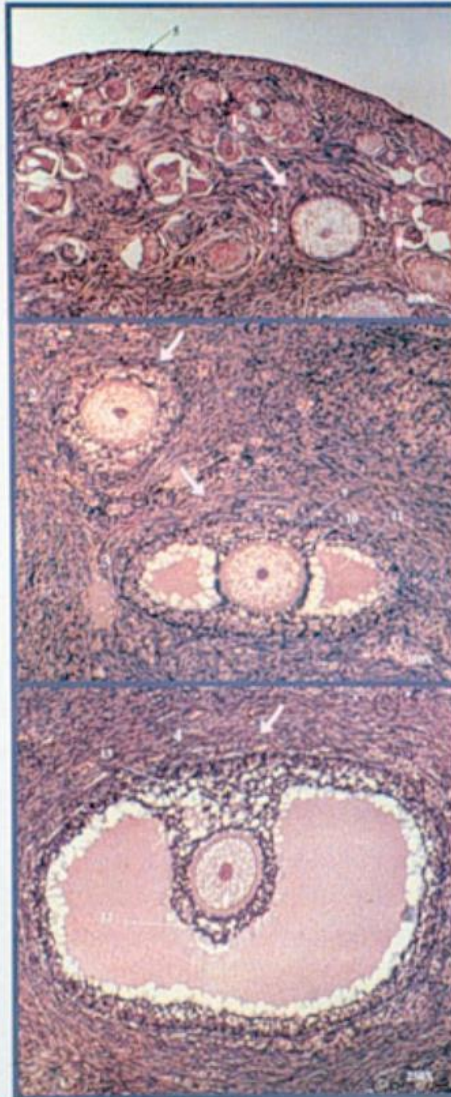
Prostate

Produces a milky secretion that makes up about 30% of the volume of semen. The secretion contains diluted mucus.



Seminal Vesicle

Produces a viscous alkaline secretion that makes up about 10% of the volume of semen. The secretion contains prostaglandins, fructose and enzymes.



Ovary - Developing Follicles

Ovaries contain many follicles at various stages of development. A follicle consists of an ovum (matured egg) and surrounding cells. Each month a few **primordial follicles** (labeled in 1) and begin their development into **primary follicles**. The ovum enlarges and the cells forming the follicle both enlarge and multiply. Later in the **secondary follicle**, a cavity (the antrum) forms around the ovum. The final stage is the **tertiary or Graafian follicle**. This large follicle pushes to the side of the ovary and the ovum is released to the uterine (Fallopian) tube. Not all follicles that start to develop will reach this final stage.



Ovary - Low Magnification

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

HISTOLOGY OF FEMALE REPRODUCTION

BioCam
1000 Series
1000 Series
1000 Series
1000 Series

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



Uterine (Fallopian) Tube

This image is stained with the dye toluidine blue.



Corpus Luteum of ovary

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



Uterus

The wall of the uterus is where the embryo (fertilized egg) implants. If implantation does not occur, the inner layer of the endometrium is shed during menstruation.