MICROSCOPES

Important Terms

- Eyepiece
- Ocular Lens – Magnifies object by 10x
- Nosepiece
- Objective Lenses – 4x, 10x, 40x, and 100x, Parfocal and Parcentral
- Specimen Holder
- Stage
- Iris Diaphragm Adjustment Lever
- Condenser – Focuses light
- Light
- Rheostat – Adjusts brightness of light
- Base
- Coarse Adjustment Knob
- Fine Adjustment Knob
- Axial Adjustment Knob
- Arm
- Magnification – How much an object is magnified, i.e. 10x
- Resolving Power – How clear an object remains after magnification
- Contrast – How well objects show up against their background
MICROSCOPES

• What is the eyepiece magnification?
  • 10x

• What are the objective magnifications from lowest magnification to highest?
  • 4x
  • 10x
  • 40x
  • 100x

• How do you determine total magnification?
  • Multiply eyepiece magnification by total magnification
BODY ORIENTATION AND DIRECTION

Define:
- Superior
  - Above
- Inferior
  - Below
- Anterior
  - In front
- Posterior
  - Behind
- Dorsal
  - Towards the Back
- Ventral
  - Towards the Belly

Define:
- Medial
  - Towards the midline
- Lateral
  - Away from the midline
- Proximal
  - Closer to the body
- Distal
  - Farther from the body
- Superficial
  - Towards the surface (skin)
- Deep
  - Away from the surface (skin)
BODY CAVITIES

• Define:
  • Open Cavity
    • Any cavity that can be entered without crossing a membrane
  • Closed Cavity
    • Any cavity that cannot be entered without crossing a membrane
  • Cranial Cavity
    • Location of Brain
  • Spinal Cavity
    • Location of Spinal Cord
  • Thoracic Cavity
    • Location of Heart and Lungs (subdivided into pleural, pericardial, and mediastinal cavities)
  • Abdominopelvic Cavity
    • Location of digestive, urinary, and some reproductive organs
SEROUS MEMBRANES

- What are the two layers of a serous membrane?
  - Parietal and Visceral
- What is the fluid between the two membranes?
  - Serous fluid
- What is the serous membrane of the lungs?
  - Pleura (parietal pleura and visceral pleura)
- What is the serous membrane of the Heart?
  - Pericardium (parietal pericardium and visceral pericardium)
- What is the serous membrane of the Abdominal Cavity?
  - Peritoneum (parietal peritoneum and visceral peritoneum)
- What is the mesentery?
  - A double layer of serosa that suspends and attaches organs to the wall of the abdominal cavity
CELL ANATOMY

Not in most plant cells

Peroxisome

Cytoskeleton

Microtubule
Intermediate filament
Microfilament
MITOSIS

• What is Mitosis?
  • Nuclear Division in a cell that results in diploid cells

• What are the five stages of Mitosis?
  • Interphase
  • Prophase
  • Metaphase
  • Anaphase
  • Telophase
MEIOSIS

• What is Meiosis?
  • Nuclear Division in a cell that results in haploid gametes (sex cells)

• What is haploid?
  • Half the normal number of chromosomes, or, one set of chromosomes (i.e. 23 chromosomes in eggs/sperm)

• What is Diploid?
  • A normal number of chromosomes, or, two sets of chromosomes (i.e. 23 pairs in normal somatic cells)

• What is cytokinesis?
  • Usually the last stage in cell division, occurs with telophase
## TISSUES

What are the four types of tissue and the different categories within each type?

<table>
<thead>
<tr>
<th>Epithelial</th>
<th>Connective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple Squamous</td>
<td>Loose/Areolar</td>
</tr>
<tr>
<td>Simple Columnar</td>
<td>Dense/Fibrous</td>
</tr>
<tr>
<td>Simple Cuboidal</td>
<td>Adipose</td>
</tr>
<tr>
<td>Stratified Squamous</td>
<td>Bone/Osseous</td>
</tr>
<tr>
<td>Pseudostratified Columnar</td>
<td>Cartilage/Hyaline</td>
</tr>
<tr>
<td>Muscular</td>
<td>Blood</td>
</tr>
<tr>
<td>Smooth</td>
<td>Nervous</td>
</tr>
<tr>
<td>Skeletal</td>
<td>Neurons</td>
</tr>
<tr>
<td>Cardiac</td>
<td></td>
</tr>
</tbody>
</table>
EPITHELIAL TISSUE

Stratified Squamous – multilayered, regenerates rapidly, found in harsh environments in/on the body

Simple Squamous – single layer of flat cells, found in capillaries

Simple Columnar – single layer of tall column-like cells, found in intestines

Simple Cuboidal – single layer of cube-shaped cells, found in kidneys and glands

Pseudostratified Columnar – squished and abnormally shaped columnar cells, usually ciliated, found in upper respiratory tract

Reproductive Cells – sperm and egg cells are haploid gametes
## CONNECTIVE TISSUE

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adipose</td>
<td>Cells contain a large fat droplet, used for energy storage</td>
</tr>
<tr>
<td>Loose/Areolar</td>
<td>Binds epithelia and organs in place, has loosely connected fibers</td>
</tr>
<tr>
<td>Fibrous</td>
<td>Dense with collagenous fibers, found in tendons and ligaments</td>
</tr>
<tr>
<td>Blood</td>
<td>Made up of plasma, erythrocytes, leukocytes and platelets, carries nutrients and wastes</td>
</tr>
<tr>
<td>Bone</td>
<td>Osteocytes, osteoblasts, and osteoclasts suspended in an extracellular matrix of hard calcium</td>
</tr>
<tr>
<td>Cartilage</td>
<td>Chondrocytes secrete a rubbery matrix of collagen and chondroitin sulfate, found in joints</td>
</tr>
</tbody>
</table>
MUSCLE TISSUE

Skeletal Muscle – Bundles of long, unbranched, striated cells, responsible for voluntary movement, made up of sarcomeres

Smooth Muscle – non-striated and spindle shaped, responsible for involuntary activity of things like the stomach and constriction/dilation of arteries

Cardiac Muscle – branched and striated, has intercalated disks to help transfer of electrical signals, found only in the heart, responsible for contraction of the walls of the heart
NERVOUS TISSUE

Neurons – Receive and transmit signal throughout the body via the nervous system. Have dendrites for receiving impulses from other nerve cells and axons for sending out impulses to other cells.

Glia – cells that support, nourish, and insulate the neurons.

Photomicrograph: Neurons (100x)
THE INTEGUMENTARY SYSTEM
BONE CLASSIFICATION

1. Femur or thighbone
2. Sphenoid bone from skull
3. Carpal or wrist bone
4. Parietal bone from roof of skull
BONE ANATOMY

Long Bone

1. Epiphysis
2. Diaphysis
3. Metaphysis
4. Articular cartilage
5. Tender zone
6. Secondary center of ossification
7. Sesamoid bone
8. Epirthesis
9. Epiphyseal line
10. Epiphyseal plate

11. Flat bone
12. Irregular bone
13. Short bone
14. Long bone
MICROSCOPIC BONE ANATOMY

1. Lacunae
2. Lamellae
3. Osteocyte
4. Central Canal
5. Endosteum
6. Periosteum
7. Blood Vessels
8. Canaliculi
THE AXIAL SKELETON

1. External Auditory Meatus
2. Squamous Suture
3. Coronal Suture
4. Mandible
5. Vomer
6. Nasal Bone
7. Zygomatic Bone
8. Temporal Bone
9. Parietal Bone
10. Frontal Bone
11. Zygomatic Arch
12. Maxilla
13. Lacrimal Bone
14. Occipital Bone
15. Lambdoidal Suture
16. Styloid Process
17. Mastoid Process
18. Mandibular Condyle
19. Sagittal Suture
THE AXIAL SKELETON

1. Ethmoid Bone
2. Sphenoid (greater)
3. Cribriform Plate
4. Occipital Condyles
5. Sphenoid (lesser)
6. Occipital Bone
7. Foramen Magnum
8. Optic Foramina
9. Olfactory Foramina
10. Palatine Bone
11. Hypophyseal Fossa
THE AXIAL SKELETON

1. Spinous Process
2. Transverse Foramen
3. Transverse Process
4. Vertebral Body
5. Atlas

Atlas
Axis
THE AXIAL SKELETON

Manubrium

Body

Xyphoid Process

True Ribs

False Ribs
THE AXIAL SKELETON

• What are the 5 types of vertebrae and how many are there of each type?
  • 7 Cervical
  • 12 Thoracic
  • 5 Lumber
  • 5 Fused Sacral Vertebrae
  • 3-5 Small Coccal Vertebrae (coccyx)

• How many pairs of ribs are there and what type of vertebra does each pair anchor to?
  • 12, Thoracic

• How many of each type of rib are there?
  • 7 true
  • 5 false
THE APPENDICULAR SKELETON

- Ileum
- Ischium
- Pubis
- Greater Trochanter
- Lesser Trochanter
- Femur
- Fibula
- Medial Malleolus
- Calcaneus
- Os Coxa
- Head
- Neck
- Condyles
- Patella
- Tibial Tuberosity
- Tibia
- Lateral Malleolus
- Tarsals
- Metatarsals
- Phalanges

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Questions

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http://www.daytonastate.edu/asc/ascsciencehandouts.html