TT TEXTBOOK TESTBANKS

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Virtual Labs

Guided Exercises for *Anatomy and Physiology Virtual Labs*

CONTENTS

Applying the Scientific Method: Pillbug Preference

The purpose of this laboratory simulation is to practice using the steps of the scientific method. Students will design and analyze a controlled experiment using pillbugs. A hypothesis will be developed, a strategy will be established to test the hypothesis, experimental and control setups will be determined and conducted, and a conclusion will be drawn.

As you follow these steps, answer the corresponding questions:

1. Click the link to this *Virtual* Lab assignment that was set up by your instructor.
2. Read the Key Concepts.
   - **a.** What are the four main steps in the scientific method process?

     (1) _____ (3) _____

     (2) _____ (4) _____
   - **b.** What is the difference between a control group and a test (experimental) group?

     _____

     _____
   - **c.** What step in the scientific method provides a discussion to confirm or reject the original hypothesis?

     _____
   - **d.** If a hypothesis is confirmed, what do you think might be the next steps?

     _____
   - **e.** If a hypothesis is rejected, what do you think might be the next steps?

     _____
3. Read the Overview and watch the short animation.
4. Read Before you begin to receive background information about pillbugs.
5. Continue to the Laboratory Simulation.
6. Complete Phase 1: Hypothesis & Strategy. Each step needs to be completed before moving on to the next step. (Click the bottom tabs to review the Methods, Reset the experiment, add observations in My Notes, record Lab Data, or Show Labels.)
   - **a.** What is your hypothesis for this experiment? _____

     _____
   - **b.** What is your strategy? _____

     _____
7. Complete Phase 2: Experiment.
   - **a.** What is the variable being tested in the experimental group?

     _____

8. Complete Phase 3: Graph and analyze data. Identify the x-axis and y-axis, select line graph from the graph type drop down menu. Click to "CREATE" and "SAVE" the graph. Answer the following questions:

   a. Where was the greatest difference in the number of pillbugs at the end of the 12 minutes?

   _____

   b. Was this greatest difference found in the experimental setup or the control setup or in a combination of both? _____

9. Complete Phase 4: Conclusion.

   a. Did the experiment results confirm or reject your original hypothesis? Explain.

   _____

   _____

10. Complete Phase 5: Save Lab Data. Look for the "Congratulations" message that the finished lab has been automatically submitted. Read the options to save the lab data.

CRITICAL THINKING ASSESSMENT – Virtual Lab

Develop a different hypothesis that you could test using pillbugs.

_____

_____

Share your strategy for testing your hypothesis. _____

_____

_____

What is your experimental group setup? _____

_____

What is your control group setup? _____

_____

Blood – Blood Typing

The purpose of this laboratory simulation is to determine and evaluate the ABO and Rh blood types of the samples.

As you follow these steps, answer the corresponding questions:

1. Click the link to this *Virtual* Lab assignment that was set up by your instructor.
2. Read the Key Concepts.
   - **a.** Where are antigens that determine ABO and Rh blood types located?

     _____
   - **b.** If present, where are antibodies for blood typing located? _____
   - **c.** Complete the table:

Blood type	Antigen	Antibodies	Can donate to	Can receive from
A				
B				
AB				
O				
Rh positive				
Rh negative				

3. Read the Overview.
   - **a.** Why do you think it is critical to know a person's blood type prior to a blood transfusion?

     _____
4. Read Before you begin and make sure you are familiar with the terms.
   - **a.** What type of organic compound is an antigen? _____
   - **b.** What do antibodies do? _____
   - **c.** When agglutinins bind to agglutinogens, the agglutinogens clump together. What is the clumping of red blood cells in blood typing called? _____
   - **d.** What is the fluid containing antibodies called? _____
   - **e.** What does "anti-A" mean? _____
   - **f.** What does "anti-B" mean? _____
   - **g.** What does "anti-D" mean? _____
   - **h.** The blood samples that _____ determine the blood type.
5. Continue to the Laboratory Simulation.
6. Complete Phase 1: Blood lab equipment. Each step needs to be completed before moving on to the next step. (Click the bottom tabs to review the Methods, Reset the experiment, add observations in My Notes, record Lab Data, or Show Labels.)
7. Complete Phase 2: Blood Sample 1.
   - **a.** What would happen if the same toothpick were used on each blood sample?

     _____
   - **b.** What is the blood type (ABO and Rh) of Sample 1? _____

8. Complete Phase 3: Blood Sample 2.

   a. What is the blood type (ABO and Rh) of Sample 2? _____

9. Complete Phase 4: Blood Sample 3.

   a. What is the blood type (ABO and Rh) of Sample 3? _____

10. Complete Phase 5: Determine transfusion compatibility.

   a. Can Rh− individuals receive blood from Rh+ individuals? Why or why not?

   _____

   _____

   b. The results of this chart show that blood type _____ is a universal recipient.

11. Complete Phase 6: Save Lab Data. Look for the "Congratulations" message that the finished lab has been automatically submitted. Read the options to save the lab data.

CRITICAL THINKING ASSESSMENT – Virtual Lab

An individual has blood type AB+. What blood type(s) can this individual donate to?

_____

An individual has blood type O+. What blood type(s) can this individual donate to?

_____

An individual has blood type B−. What blood type(s) can this individual donate to?

_____

What should be removed from the blood of blood type A− before donating it to an individual with AB+ blood?

_____

Blood – Differential White Blood Cell Count

The purpose of this laboratory simulation is to use a brightfield microscope to conduct a differential white blood cell count (DIFF) to distinguish the types and amount of each type of white blood cells in a prepared slide of whole blood.

As you follow these steps, answer the corresponding questions:

1. Click the link to this *Virtual* Lab assignment that was set up by your instructor.
2. Read the Key Concepts.
   - **a.** What is another name for a white blood cell (WBC)? _____
   - **b.** What does a DIFF measure? _____
   - **c.** Why might a DIFF be done? _____

     _____
   - **d.** The most abundant of the granulocytes are _____
   - **e.** The most abundant of the agranulocytes are _____
3. Read the Overview.
   - **a.** What magnification will be used to distinguish the WBCs? _____
4. Read Before you begin.
   - **a.** How should the microscope slide be moved through one field of view at a time?

     _____
   - **b.** If you count 10 lymphocytes, what is the percentage of lymphocytes in your DIFF? _____ Is this a normal count for lymphocytes? _____
5. Continue to the Laboratory Simulation.
6. Complete Phase 1: WBC identification. Each step needs to be completed before moving on to the next step. (Click the bottom tabs to review the Methods, Reset the experiment, add observations in My Notes, record Lab Data, or Show Labels.)
   - **a.** Which WBC has bright red granules? _____
   - **b.** Which WBC has a bean-shaped nucleus? _____
7. Complete Phase 2: Lab equipment.
8. Complete Phase 3: Preparation of blood smear.
   - **a.** What stain was used on the blood smear slide? _____
9. Complete Phase 4: Microscope differential count.
   - **a.** What is the most common WBC? _____
   - **b.** Which WBC has a multilobed nucleus and pink granules? _____
   - **c.** Which WBC is typically the largest in size? _____
10. Complete Phase 5: Lab wrap-up.
    - **a.** Which type of leukocyte (WBC) is the least numerous agranulocyte in the blood? _____
    - **b.** Which type of leukocyte (WBC) is the least numerous granulocyte in the blood? _____

11. Complete Phase 6: Save Lab Data. Look for the "Congratulations" message that the finished lab has been automatically submitted. Read the options to save the lab data.

CRITICAL THINKING ASSESSMENT – Virtual Lab

A cancer patient being treated using chemotherapy has a DIFF that shows a lower than normal number of neutrophils. What is this called? _____

Why might chemotherapy cause this condition? _____

_____

What is a concern in having this condition? _____

_____

This patient is given Neulasta®, a drug that stimulates myeloid growth factors. What is the target and effect of this drug? _____

_____

Blood – Hematocrit

The purpose of this laboratory simulation is to measure and evaluate the hematocrit (HCT) of blood samples from three athletes to determine if any of them have blood doped.

As you follow these steps, answer the corresponding questions:

1. Click the link to this *Virtual* Lab assignment that was set up by your instructor.
2. Read the Key Concepts.
   - **a.** Define *hematocrit (HCT).* _____
   - **b.** What is the normal HCT range for adult males? _____ Females? _____
   - **c.** What might cause an abnormal elevation in HCT? _____
   - **d.** What is "blood doping"? _____
3. Read the Overview.
   - **a.** A blood sample that is doped is the _____ control.
   - **b.** A blood sample that is not doped is the _____ control.
4. Read Before you begin.
   - **a.** What do you think the centrifuge does to the blood sample? _____
5. Continue to the Laboratory Simulation.
6. Complete Phase 1: Identify lab equipment. Each step needs to be completed before moving on to the next step. (Click the bottom tabs to review the Methods, Reset the experiment, add observations in My Notes, record Lab Data, or Show Labels.)
   - **a.** Notice that the capillary tubes are heparinized. What do you think this means?
7. Complete Phase 2: Positive control sample.
   - **a.** Is the clay end of the capillary tube facing the *outside* or *center* of the centrifuge? _____
8. Complete Phase 3: Negative control sample.
   - **a.** Why is the negative control sample capillary tube placed directly across from the positive control sample capillary tube?
9. Complete Phase 4: Sample A.
10. Complete Phase 5: Sample B.
11. Complete Phase 6: Sample C.
12. Complete Phase 7: Balance and run the centrifuge.
    - **a.** Based upon your lab data, which sample shows that the athlete has blood doped? _____ Explain your reasoning. _____

13. Complete Phase 8: Lab wrap-up.

a. What is the relationship between hematocrit and oxygen-carrying capacity of the blood?

_____

14. Complete Phase 9: Apply what you have learned.

a. What blood sample represented a person likely to have been blood doping?

_____

b. There is a blood sample that had a higher hematocrit than the negative control but was not likely a person to have been blood doping? Why? _____

_____

15. Complete Phase 10: Save Lab Data. Look for the "Congratulations" message that the finished lab has been automatically submitted. Read the options to save the lab data.

CRITICAL THINKING ASSESSMENT – Virtual Lab

Injection of erythropoietin (EPO) is a blood doping method that an athlete may use to give a competitive edge; therefore, EPO is used as a performance-enhancing drug. What does EPO do? _____

_____

Provide a convincing argument as to the risks associated with taking this drug and why the athlete should refrain from blood doping. _____

_____

_____

_____

Blood – Hemoglobin Content

The purpose of this laboratory simulation is to measure the hemoglobin (Hb) content of blood samples from three athletes to determine if any of them have blood doped.

As you follow these steps, answer the corresponding questions:

1. Click the link to this *Virtual* Lab assignment that was set up by your instructor.
2. Read the Key Concepts.
   - **a.** Define *hemoglobin (Hb)*. _____
   - **b.** About how much of a red blood cell consists of hemoglobin? _____
   - **c.** What is the normal Hb range for adult males? _____ Females? _____
   - **d.** "Blood doping" will *raise* or *lower* hemoglobin content. _____
   - **e.** If hemoglobin content increases, so does blood _____.
3. Read the Overview.
   - **a.** A blood sample that is doped is the _____ control.
   - **b.** A blood sample that is not doped is the _____ control.
4. Read Before you begin.
   - **a.** What does a hemoglobinometer do? _____
   - **b.** Hb is measured in g Hb/100 mL or g Hb/dL. How many milliliters (mL) are in 1 deciliter (dL)? _____
5. Continue to the Laboratory Simulation.
6. Complete Phase 1: Identify lab equipment. Each step needs to be completed before moving on to the next step. (Click the bottom tabs to review the Methods, Reset the experiment, add observations in My Notes, record Lab Data, or Show Labels.)
   - **a.** What does the word *hemolysis* mean? _____
7. Complete Phase 2: Positive control sample.
   - **a.** Is the hemoglobin (Hb) content *below* or *above* or *within* normal range? _____
8. Complete Phase 3: Negative control sample.
   - **a.** Is the hemoglobin (Hb) content *below* or *above* or *within* normal range? _____
9. Complete Phase 4: Sample A.
   - **a.** Is the hemoglobin (Hb) content *below* or *above* or *within* normal range? _____
10. Complete Phase 5: Sample B.
    - **a.** Is the hemoglobin (Hb) content *below* or *above* or *within* normal range? _____
11. Complete Phase 6: Sample C.
    - **a.** Is the hemoglobin (Hb) content *below* or *above* or *within* normal range? _____
12. Complete Phase 7: Lab wrap-up.
    - **a.** Which athlete likely blood doped? _____

13. Complete Phase 9: Apply what you have learned.

a. What characteristic of blood does Hb content measure? _____

b. What other blood test can also be used to measure this characteristic? Explain.

_____

14. Complete Phase 10: Save Lab Data. Look for the "Congratulations" message that the finished lab has been automatically submitted. Read the options to save the lab data.

CRITICAL THINKING ASSESSMENT – Virtual Lab

A prevalent nutritional deficiency is iron deficiency. How would this affect hemoglobin content and the relative size of red blood cells (mean corpuscular volume, MCV)? Explain.

_____

_____

Some of the symptoms an individual with iron deficiency might experience is general weakness, lack of energy, and shortness of breath. Explain why. _____

_____

_____

CONTENTS

PREFACE

This Instructor's Manual is provided to facilitate the preparation, setup, and operation of the laboratory exercises, including grading or checking students' responses to items on the laboratory reports. It is divided into three sections: I, II, and III.

Section I contains information pertaining to the procurement of equipment and supplies and the preparation of the laboratory exercise. A list of major suppliers of equipment and supplies is included to facilitate contacting vendors. Separate lists of equipment, supplies and glassware, chemicals, prepared slides, living material, preserved material, and slaughterhouse specimens are provided.

Section II provides operational suggestions for the successful setup and operation of each exercise. Lists of equipment and materials are not included here since they are provided at the beginning of each exercise in the laboratory textbook.

Section III contains copies of the Laboratory Reports to which the answers to the questions and problems have been added. Instructors may use the answers to grade students' Laboratory Reports and assess student understanding, or the answers may be posted to provide quick feedback to the students.

We hope that you find this Instructor's Manual helpful in the operations of the laboratory sessions. If you have specific suggestions or encounter difficulties in the laboratory exercises, please contact the authors in care of McGraw-Hill Higher Education, 501 Bell Street, Dubuque, IA, 52001.

Section I

Major Suppliers

Equipment

Clay Adams
Becton, Dickinson and Co.
1 Becton Drive
Franklin Lakes, NJ 07417
(201) 847-6800
www.bd.com

Harvard Apparatus Co.
84 October Hill Road
Holliston, MA 01746
(800) 272-2775
www.harvardapparatus.com

Phipps and Bird
P.O. Box 27324
8741 Landmark Road
Richmond, VA 23261
(800) 955-7621
www.phippsbird.com

Propper Manufacturing Co., Inc.
3604 Skillman Avenue
Long Island City, NY 11101
(800) 832-4300
www.proppermfg.com

VWR Science Education
VWR Scientific Products
P.O. Box 5229
Buffalo Grove, IL 60089
(800) 727-4368
www.vwr.com

General Supplies

Carolina Biological Supply Co.
2700 York Road
Burlington, NC 27215
(800) 334-5551
www.carolina.com

Central Scientific Co.
911 Commerce Court
Buffalo Grove, IL 60089
(847) 451-0110
www.cenco.com

Fisher Scientific Co.
(Home Office)
585 Alpha Drive
Pittsburgh, PA 15238
(800) 766-7000
www.fishersci.com

Wards Natural Science Establishment, Inc.
P.O. Box 1712
Rochester, NY 14603
(800) 962-2660
www.wardsci.com

Biochemicals

Calbiochem-Novabiochem Corp.
10394 Pacific Center Court
San Diego, CA 92121
(800) 854-3417
www.calbiochem.com

Becton-Dickinson and Company
(Microbiology products)
1 Becton Drive
Franklin Lakes, NJ 07417
(410) 316-4200
www.bd.com

Sigma Chemical Co.
3300 S. Second Street
St. Louis, MO 63118
www.sigma.com

MAJOR SUPPLIERS

Surgical Instruments

Central Scientific Co.
911 Commerce Court
Buffalo Grove, IL 60089
(847) 451-0110
www.cenco.com

Fisher Scientific Co.
(Home Office)
585 Alpha Drive
Pittsburgh, PA 15238
(800) 766-7000
www.fishersci.com

Propper Manufacturing Co., Inc.
3604 Skillman Avenue
Long Island City, NY 11101
(800) 832-4300
www.proppermfg.com

Animal Cages

Lab Products, Inc.
742 Sussex Avenue
P.O. Box 639
Seaford, DE 19973 (800)
526-0469
www.labproductsinc.com

EQUIPMENT AND SUPPLIES

The equipment and supplies used in exercises of the Anatomy and Physiology Laboratory Textbook, Essentials Version are noted in the cumulative lists below.

Equipment

anatomical wall charts
boards, frog
centrifuge, microhematocrit (Clay Adams)
clamps
dissecting pans, wax
bottom femur, human,
split hammers, reflex
testing
hot plates, electric
Ishihara's Test Plates for Color
Blindness knife, butcher
lamps, laboratory
type meter sticks
microscopes,
compound
microscopes,
dissecting Models:
- brain, with removable parts
- ear, with removable parts
- eye, with removable parts
- cell, generalized
- head, sagittal section
- heart
- joints: knee; shoulder
- lungs, corrosion preparation of airways
- reproductive organs, male and female
- skin
- spinal cord, x.s.
- torso with removable organs
- urinary system
- pelves, male and female

pipetting devices
ring stands
skeleton, adult human, articulated
skeleton, adult human, disarticulated
skeleton, fetal human, articulated
skulls, adult human with removable top of cranium
slide warming box (blood typing)
Snellen eye charts
sphygmomanometers
spirometers, Propper
stethoscopes, flat diaphragm
stopwatches or watches with second hands
syringes, hypodermic (1, 5, 10 ml)
test tube holders
test tube racks, Wasserman type
thermometer, glass, F/C
tube reader for hematocrit
tuning forks
vertebral column, wired together
water baths

Supplies and Glassware

alcohol wipes
bags, biohazard
bags, paper, for hyperventilation
baskets, wire, 6″
beakers, 50, 150, 250, 1,000 ml
bottles, cropping
brushes, test tube
capillary tubes, plain, .5 ml diam.
Checkstix (Ames) for urine unknowns
cotton, absorbent and nonabsorbant
cover glasses, cotton
cups, paper
cups, plastic with cover, 4 oz. for urine collection
dialysis sheets (for osmometers)
dissecting instruments
files, 3-cornered, 6-8″ long
flasks, Erlenmeyer, 125, 250 ml
frog boards with wrapping cloths
Kimwipes
lancets, sterile, disposable
medicine droppers
microscope slides, depression type
microscope slides, plain
microscope slides, plain with polished edges
mouthpieces for Propper spirometers, sterile, disposable
Multistix, 10SG urinalysis test strips
needles, hypodermic syringe, 22 gauge
paper, bibulous
paper, filter
paper, lens
paper, pH indicator
Parafilm pencils,
colored pens, glass
marking
Petri dishes, plastic disposable
pins, common
pins, dissecting pipe
cleaners pipettes, 1,
5, 10 ml rubber
bands
rulers, clear plastic, metric, 6″
Seal-Ease (Clay Adams)
straws, plastic drinking
string
tape, masking
tape, Scotch
test tubes, 13, 16 mm diameter
thistle tubes (for osmometers)
thread, cotton
toothpick
towels, paper
wash bottles, plastic

Chemicals, Reagents, and Biologicals

acetylcholine
agar-agar
alcohol, isopropyl
alpha amylase
Amphyl solution
blood, fresh sheep
blood typing antisera (anti A, B, D)
buffer solutions, pH 5, 7, 9
electrode gel
epinephrine (bitartrate salt)
glucose
histamine
household bleach or Lysol disinfectant
India ink
iodine solution (IKI)
maltose
methylene blue granules
methylene blue stock solution
petroleum jelly
potassium permanganate granules
Ringer's solution, frog
sodium chloride
starch, soluble
Wright's blood stain
xylene

Prepared Microscope Slides

adrenal gland
artery, atherosclerotic, x.s.
artery and vein, x.s.
blood, human, Wright's stain
cochlea, x.s.
connective tissues proper
    adipose
    bone, l.s., x.s.
    dense fibrous
    loose (areolar)
    reticular
connective tissues special
    bone, compact, l.s., x.s.
    cartilage
        elastic
        fibrocartilage
        hyaline
epithelial tissues
    simple
        ciliated columnar
        cuboidal
        nonciliated columnar
        squamous
    pseudostratified ciliated
        columnar nonciliated
        columnar
    stratified
        columnar
        squamous
        transitional
hair follicle ileum
wall, x.s. jejunum
wall, x.s. kidney
letter e
liver
lung, emphysematous
lung, normal
lymph node, x.s.
mitosis:
    Ascaris mitosis
    whitefish blastula
muscle tissues
    cardiac, teased and unteased
    smooth, teased and unteased
    skeletal, teased and unteased
nasal septum
neuron smears, multipolar
ovary, corpus luteum
ovary, mature follicles
pancreas
parathyroid gland
pineal gland
pituitary gland
retina through fovea centralis
salivary gland
skin, human keratinized
skin, human, nonkeratinized
sperm, human
spinal cord, rat, x.s. stomach
wall, fundus, x.s. taste buds
on vallate papillae testis,
human
thymus gland
thyroid gland
trachea, human, x.s.
trachea, rat, x.s.

Preserved Materials

brain, human
brains, sheep
kidneys, sheep, triple injected
rats

Fresh Slaughterhouse (or Preserved) Materials

beef eyes
beef femurs, split
beef knee joints, split
sheep hearts
sheep kidneys
sheep plucks, minus livers

SOLUTION PREPARATIONS

Recipes for preparing the solutions used in the exercises are listed below in alphabetical order.

Buffer Solution, pH 5 (Ex. 34)

Make up 1 liter each of the following solutions:
M/10 potassium acid phthalate
20.418 gm. $KHC_8H_4O_4$ to distilled water to make one liter
M/10 sodium hydroxide
4.0 gm. sodium hydroxide to distilled water to make one liter.
Use 50 ml. of the first solution and 23.9 ml. of the second solution to make 73.9 ml. of pH 5 buffer solution.

Buffer Solution, pH 7 (Ex. 34)

Make up 1 liter each of the following solutions:
M/15 potassium acid phosphate
9.08 gm. KH_2PO_4 to distilled water to make one liter.
M/15 disodium phosphate
9.47 gm. Na_2HPO4 (anhydrous) to distilled water to make one liter.
Use 38.9 ml. of the first solution and 61.1 ml. of the second solution to make 100 ml. of pH 7 buffer solution.

Buffer Solution, pH 9 (Ex. 34)

Make up 1 liter each of the following solutions:
.2M boric acid
5.96 gm. H_3BO_3 to distilled water to make one liter.
.2M potassium chloride
14.89 gm. KCl to distilled water to make one liter.
.2M sodium hydroxide
8 mg. NaOH to distilled water to make one liter.
Use 50 ml. each of the first two solutions, 21.5 ml. of the third solution and dilute to 200 ml. of distilled water.

This solution is used with most amphibian muscle and nerve preparations. Frog skin and toad bladder preparations can also be handled with this saline solution.

NaCl	6.02 gm.
KCl	0.22 gm.
$CaCl_2$	0.22 gm.
$NaHCO_3$	2.00 gm.
Glucose	1.00 gm.
Distilled water to make 1 liter	

Iodine (IKI) Solution (Ex. 34)

Potassium iodide	20 gm
Iodine crystals	4 gm
Distilled water	1 liter

Dissolve the potassium iodide in 1 liter of distilled water and add the iodine crystals, stirring to dissolve. Store in dark bottles.

Salivary Amylase Solution, 10% (Ex. 34)

Materials
Beaker, 250 ml
Dropping bottles
Graduated cylinder, 50 ml
Paraffin

1. After rinsing your mouth with water, place a small piece of paraffin under your tongue to soften it prior to chewing to stimulate saliva flow.
2. Expectorate into a 50-ml graduated cylinder until you have collected 10 ml of saliva not counting the foam.
3. Add distilled water, adjusted to pH 7, to the 50-ml mark and pour the mixture into the beaker.
4. Refill the graduate with distilled water, agitate gently to mix, and pour it into the beaker. Stir the contents in the beaker thoroughly.
5. Dispense the 10% saliva solution into labeled dropping bottles.

Soluble Starch Solution, 1% (Ex. 34)

Add 10 g cornstarch to 1 liter of distilled water. Stir to mix. Heat just to boiling, cool, and filter. Keep refrigerated until used.

MICROSCOPIC STUDY

Several of the exercises involve microscopic study of prepared slides. However, some students may tend to consider observation of the photomicrographs sufficient rather than studying the microscope slides. Students should be warned that this behavior will not prepare them for laboratory practicums. Making labeled drawings of microscopic observations is still a good learning technique.

INFECTION CONTROL

Safety procedures for infection control should be carefully followed to prevent the transmission of infectious agents. Exercises where infection control is especially important are: 4 Membrane Transport; 18 Blood Tests; 22 The Respiratory System; 23 The Digestive System; and 24 The Urinary System. Instructors are urged to consider infection control when using these techniques. The safeguards for blood tests listed at the beginning of Exercise 18 are also applicable to the use of saliva and urine in laboratory experiments. Advise students of the procedures that you wish to have followed.

Alcohol swabs are widely used for cleansing the skin or objects, but they are only fair sanitizing agents. Disinfection requires using a suitable disinfectant, such as 10% household chlorine bleach or 0.5% Amphyl. Disposable items in contact with body fluids should be placed immediately after use in a biohazard bag or sharps container and autoclaved before disposal. Nondisposable items should be disinfected chemically or autoclaved prior to cleaning.

SECTION II

Operational Suggestions

1. INTRODUCTIONTO HUMAN ANATOMY AND BODY ORGANIZATION

During the first lab session, it is helpful to review the "To The Student" section with the class in order to set the stage for productive laboratory activity. At this time you should emphasize the student behaviors that you want to encourage and identify your expectations of the students.

The first laboratory period usually involves the orientation session plus Exercise 1. Students will not have had time to label the figures prior to the lab session, so the entire exercise will be completed in the lab. This exercise causes no difficulty for students. The use of wall charts and a torso model helps students visualize the body regions and cavities.

The portion of this exercise that summarizes the organ systems of the body, including the Laboratory Report, should be completed prior to the lab session so that students are prepared for the dissection of a freshly-killed rat. The purpose of this dissection is to provide an overview of mammalian anatomy, observation of fresh tissues and organs, and location of the major organs of the ventral cavity. It is not intended as a detailed dissection, such as when using a cat or fetal pig as a dissection animal.

We use young mature rats, 50% male and 50% female. This allows all students to observe the anatomy of urinary and reproductive organs by exchanging specimens. If using fresh-killed rats, the rats are killed just prior to the lab session by placing them in a large crock containing chloroform-soaked cotton. The lid is sealed with masking tape. Allow 45 minutes for killing.

This is a good time to explain to students the importance of using disposable protective gloves when doing dissections and handling body fluids. Students have little trouble with the dissection if they follow the directions carefully. They should be reminded that the purpose of dissection is to expose tissues and organs for study and that tissue damage should be kept to a minimum. It is necessary to pry open the mouth to examine the teeth. Cutting a cheek on one side helps to expose the molars.

Time allotment: 2 to 2.5 hours

2. MICROSCOPES

It is helpful if students complete sections A through C on the Laboratory Report prior to the lab session. The required microscopic observations provide additional opportunities for students to improve their microscopy skills as well as observing cellular structures. If you have a microscope video system available, it can be used to good advantage in this exercise and others involving microscopic study.

Some students may need assistance in comprehending depth of field and in learning how to focus through the depth of a hair.

Time allotment: 1 to 2 hours

3. CELLULAR ANATOMY AND MITOSIS

Students should study this exercise and complete sections A through D on the Laboratory Report prior to the lab session. The required microscopic observations provide additional opportunities for students to improve their microscopy skills as well as observing cellular structures. If you have a microscope video system available, it can be used to good advantage in this exercise and others involving microscopic study.

Whitefish blastula slides are used for study because they clearly show the pattern of chromosome movement. Students may need to be reminded to make drawings of the stages as they discover them on the slide and not to search for them in the order of the mitotic sequence.

Time allotment: 1 to 1.5 hours