

BIO 111 - Laboratory #2: Digestion (Part 2); Neck, Thoracic, and Abdominal Fetal Pig Anatomy; and Respiration

- **Assigned pages:** Mader, S., et al. 2008. Inquiry of Life. pp. 164-171, 172, 216-217, 230, and C49-51.
 - ✓ Know the internal anatomy summarized in the diagram on p. 167 and photo on p. 169.
 - ✓ Fill in the chart on aerobic respiration on p. C-51
 - ✓ **Dissection kit, gloves and goggles are required (please, go get them if you forgot them)**

I. Digestion:

1. GOALS - Digestion (Part II) and internal fetal pig anatomy:

Objectives - at the end of laboratory #2 you should be able to:

- 1.) identify the major organs in the neck region, thoracic cavity, and abdominal cavity and state their function;
- 2.) describe the appearance of the villi in the small intestine and explain how the structure of the villi aid their function

Key terms - you should be able to define:

- | | | |
|---|--|---|
| 1.) Neck region:
thymus glands
thyroid gland
trachea
larynx
esophagus | 3.) Thoracic/abdominal division:
diaphragm | 4.) Abdominal cavity:
liver
stomach
small intestine (locate duodenum)
large intestine (locate cecum)
gall bladder (locate bile duct)
pancreas
spleen
colon
rectum and anus
villi (small intestine inner surface)
surface area (small intestine) |
| 2.) Thoracic cavity:
heart and
pericardial cavity
right and left lung
and pleural cavities | | |

2. Dissection Procedure:

- 1.) **Thoracic and abdominal incisions (section 13.3, pp. 164 -165):**
 - (1.) **p. 164: Read and follow the directions** for preparing your pig for the thoracic and abdominal incisions. Use the diagram on p. 165 as a guide.
 - (2.) **NOTE for Step 8:** You do NOT need to tie off on either side of the umbilical vein
 - (3.) **NOTE for Step 9:** You do not need to rinse your pig unless you want to do so. If you do rinse your pig, please, use the designated/labeled "pig sink".
- 2.) **Neck region observations (section 13.4, p. 166):**
 - (1.) **p. 166:** Read through the section and make the observations for the **thymus glands** (2 tan glands on either side of the larynx); **larynx** (smooth cartilage shaped like a box), **trachea** (ribbed cartilage leading to the lungs) and **esophagus** (muscular tube dorsal to (on the "back side" of) the esophagus); and **thyroid gland** (small globular gland between the two thymus glands).
- 3.) **Thoracic cavity observations (section 13.5, p. 166):**
 - (1.) **Follow the procedure** to locate the three compartments of the thoracic cavity: the left pleural cavity containing the left lung (locate three lobes); the right pleural cavity containing the right lung (locate four lobes); and the pericardial cavity containing the heart
 - (2.) **Observe** the preparation of the fetal pig lung bronchioles and alveoli (site of oxygen and carbon dioxide exchange)
 - (3.) **Observe** the prepared slide of normal lung tissue and the lung of a coal miner.
QUESTION: What is the impact of inhalation of coal mine air on the lung of the coal miner?
- 4.) **Abdominal cavity observations (section 13.6, p. 168 - 170):**
 - (1.) **p. 168: Read** the introduction and the instructions before proceeding with the dissection
 - (2.) **Locate** the liver; TAKE CARE not to remove any latex masses that may encase vital organs
NOTE: check with the instructor, if you locate a latex mass.

- (3.) Follow all directions for observations of the stomach and spleen; small intestine; gallbladder and pancreas; and large intestine
- (4.) View the preparation of the inner, absorbing surface small intestine (under dissecting scope)
QUESTION: How does the structure of the small intestine villi support the function of the small intestine? (Hint: Think surface area!).....More info available on p. 146, lab manual.
- 5.) **Review**:
 - (1.) **p. 172**: Answer questions 6 - 19, 21, and 22

3. REMINDER - storage of your fetal pig:

IMPORTANT: You will be using this pig for labs 1 through 6; please, **do the following at the end of each lab class**:

1. place your pig in the bag and expel excess air by flattening the bag against the pig's body; your lab; instructor will tell you where the fetal pigs are to be stored until your next lab class;
2. tie bag shut and make sure that your name tag is securely attached to this bag;
3. CLEAN your dissecting tools and tray; return tray to side/front bench; and
4. wipe off/clean your goggles and **WASH YOUR HANDS**.

II. Aerobic respiration

1. GOALS :

At the end of Lab 2 you should be able to fulfill the objectives and define the following terms:

Objectives - at the end of laboratory #1 you should be able to:

1. describe the internal structure of the lungs and explain the process of gas (oxygen and carbon dioxide) exchange;
2. explain the difference in appearance and function between healthy and diseased alveoli;
3. demonstrate how lung capacity can be determined with a spirometer; and
4. compare and contrast the respiratory surfaces/ ventilation methods of fish, frogs, and humans

Key terms you should be able to define:

bronchi, bronchioles and alveoli	vital capacity
gas exchange by diffusion	spirometer
negative pressure breathing and positive pressure breathing	residual volume
methods of ventilation (in frogs, fish, and humans)	surface area of lungs

2. Experimental procedure and observations:

1. **pp. 216 - 217**: Read through section 17.1 and **answer** questions 1 - 2.
2. **p. 230, review**: **Answer** questions 1 - 3.
3. **Aerobic respiration observations - fill in the chart on p. C-51**:
 - (1.) **FROGS** (adult amphibian, see important info on pp. 704-705, lecture text):
 - (1.) **Observe** the preserved frogs. While a frog has lungs, it does not breathe as a human breathes. An adult frog inhales air into its nostrils while puffing out the skin of the lower jaw, closes its nostrils as it opens its glottis, pulls in the skin of the lower jaw, then gulps the air into its lungs. Oxygen is absorbed by the lungs but CO₂ is leaves the body by passing through its body tissues and out through the frog's skin. Air passing back and forth through the glottis at the start of the larynx causes the folds at the start of the larynx to vibrate (think bull frogs.....)
 - (2.) **FISH** (see important information on p. 704, lecture text)
 - (1.) Observe preserved fish (operculum and gills). How are O₂ taken in and CO₂ eliminated??
 - (3.) **Humans**: Try the model ("bell jar") of human diaphragm function. Do humans gulp air?
4. **Spirometer (optional) - your instructor will demonstrate how to use the spirometer**:
 - (1.) **p. C-49 - C50**: Read through the descriptions and follow the directions for STEPS 1, 2, &3
 - (2.) **Enter your data** as the "results" on p. C-49; compare your results to someone with the same sex and similar height. Is there a difference? If so, what is it? Why would a difference exist (think type and level of athletic training, perhaps)?