

Overview:

Viewing the organs of an animal, through dissection, gives students better understanding of human body functions.

NOTE: Plan ahead for this lesson. Read the sections “Whole Picture,” and “Activity Preparation” significantly ahead of lesson implementation.

Objectives:

The student will:

- research the Native language words for vertebrate organs;
- identify a minimum of three internal organs during the dissection of a small vertebrate; and
- explain the function of three vertebrate organs.

Targeted Alaska Grade Level Expectations:**Science**

- [7] SC2.3 The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by identifying and describing the functions of human organs (i.e., heart, lungs, brain).
- [7] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.

Vocabulary:

anatomy – the structure of an animal or a plant or any of its parts; the scientific study of the shape and structure of living things

brain – the part of the nervous system in vertebrates that is enclosed within the skull, is connected with the spinal cord, and is composed of gray matter and white matter; it receives and interprets impulses from sense organs, and it coordinates and controls body functions and activities, such as walking and talking; the brain is also the center of memory, thought, and feeling

esophagus – the tube of the digestive tract through which food passes from the throat to the stomach

heart – the hollow, muscular organ that pumps blood through the body of a vertebrate animal by contracting and relaxing; in humans and other mammals it has four chambers, consisting of two atria and two ventricles; the right side of the heart collects blood with low oxygen levels from the veins and pumps it to the lungs, the left side receives blood with high oxygen levels from the lungs and pumps it into the aorta, which carries it to all of the arteries of the body; the heart in other vertebrates functions similarly, but often has fewer chambers

large intestine – the wide lower section of the intestine that extends from the end of the small intestine to the anus

liver – a large, glandular organ in the abdomen of vertebrate animals that is essential to many metabolic processes; the liver secretes bile, stores fat and sugar as reserve energy sources, converts harmful substances to less toxic forms, and regulates the amount of blood in the body

lung – either of two spongy organs in the chest of air-breathing vertebrate animals that serve as the organs of gas exchange; takes in oxygen and exhales carbon dioxide

kidney – either of a pair of organs that are located in the rear of the abdominal cavity of vertebrate animals; regulates the amount of water in the body and filters out waste from the bloodstream in the form of urine

organ – a distinct part of an organism that performs one or more particular functions; examples of organs are the eyes, ears, lungs, and heart of an animal, and the roots, stems and leaves of a plant

pancreas – a long, irregularly shaped gland in vertebrate animals that is located behind the stomach; it secretes insulin and produces enzymes needed for digestion, which are secreted into the gut or small intestine

small intestine – the long, narrow, coiled section of the intestine that extends from the stomach to the beginning of the large intestine; nutrients are absorbed into the bloodstream from the small intestine

stomach – the sac-like, muscular organ in vertebrate animals that receives and stores swallowed food and is a main organ of digestion

trachea – tube-shaped structure in vertebrate animals that leads from the larynx to the bronchi and carries air to the lungs

vertebrate – any of a large group of animals having a backbone, including fish, amphibians, reptiles, birds and mammals; vertebrates are bilaterally symmetrical and have an internal skeleton of bone or cartilage, a nervous system along the back that is divided into brain and spinal cord, and not more than two pairs of limbs

Whole Picture:

All vertebrates share similar anatomical characteristics. Dissecting an animal such as a fish, frog or a small bird helps us to learn about human anatomy. Most organs perform the same basic function in all vertebrates. Looking at the organs of larger animals, such as moose and caribou, also contributes to understanding organ function in humans.

During this lesson, students will be investigating animal anatomy through dissection. Alaska Native Elders emphasize it is important to avoid irreverent, insulting or wasteful behavior toward living things and to treat their remains with respect.

Materials:

- Goggles (one per student)
- Latex gloves (several pairs per student)
- Dissection tray with pad, 12" x 8" (one per group)
- Standard student dissecting set with scalpel, scissors, tweezers, etc. (one per group)
- Dissection pins (12 per group)
- Paper lab coats (one per student)
- ANSWER SHEET: "Organ Vocabulary"
- STUDENT INFORMATION SHEET: "Anatomy of a Bird"
- STUDENT INFORMATION SHEET: "Anatomy of a Fish"
- STUDENT INFORMATION SHEET: "Anatomy of a Hare"
- STUDENT WORKSHEET: "Dissection"
- STUDENT LAB: "My Language"
- STUDENT WORKSHEET: "Organ Vocabulary"

Activity Preparation:

1. Ideally this lesson should use materials that are meaningful and familiar to students. If feasible, obtain several fresh, un-gutted animals such as a ptarmigan, hare and fish. In addition, ask if anyone in the community would donate organs from a moose, caribou or other subsistence animal for students to view. The heart, liver and kidneys are ideal. Animals captured ahead of time can be frozen until it is time for the lesson, but must be thawed for dissection. This also applies to the organs of larger animals.
2. Prepare students ahead of time for the lesson by explaining what the lab entails.
3. Review the anatomy of the particular animal or animals available for dissection. Enter search terms such as "anatomy of a bird," or "anatomy of a fish," then click images. In addition, searching "anatomy of ruminants" will aid in identifying moose and caribou organs.

Activity Procedure:

Part 1

1. Hand out STUDENT LAB: "My Language." Explain students will be viewing and dissecting invertebrates to study organs. The study of the internal organs of small vertebrates will help students better understand the way a human body functions. It is important to learn how animals fit into the culture of the community and how to study them respectfully. The purpose of the worksheet is to learn this information from Elders. Ask students to return the worksheet prior to continuing the lesson.

Part 2

2. Show students the organ or organs of a large mammal donated for class use. If the donor intends to save the organ for food consumption, take care not to contaminate the specimen by wearing latex gloves when handling the organ and by placing the organ in a clean container/re-sealable bag. Discuss the function of the organ(s). (See Vocabulary section.)
3. Hand out STUDENT WORKSHEET: "Organ Vocabulary" and allow students time to review organs and organ functions. Refer to STUDENT LAB: "My Language" (see Activity Procedure 1) and use Native language terms as well as English terms in naming organs.
4. Hand out STUDENT INFORMATION SHEETS: "Anatomy of a Bird," "Anatomy of a Hare," and/or "Anatomy of a Fish." Vertebrates share many similar organs. Some, like birds and fish, have specialized organs unique to them. Review the information sheets.
5. Divide students into small groups. Hand out STUDENT WORKSHEET: "Dissecting" and review. Ask students to collect the materials needed for the lab and to get organized. Lead students through each step of lab and frequently check for understanding.
6. Clean up. Refer to STUDENT LAB: "My Language" to determine if special measures should be taken when disposing of the remains of animals that have been dissected.

Extension Ideas:

1. A website called Net Frog leads students through a virtual dissection of a frog using real photographs, video, text and interactive activities. Visit the site at <http://frog.edschool.virginia.edu/Frog2/home.html> and click "Begin Dissection."
2. The North Slope Borough School District has an interactive lesson on basic ptarmigan anatomy. It includes Inupiaq words to name vital organs. Review the lesson at http://www.nsbsd.org/departments/inupiaq-education/materials/ptarmigan-anatomy#high_4 then ask a local Native language expert to help with names of organs in the animals you will dissect as well as any large mammal organs you will view. Ask students to do a similar illustration using Native language words.

Answers:

STUDENT LAB: "My Language"

Answers will vary according to region.

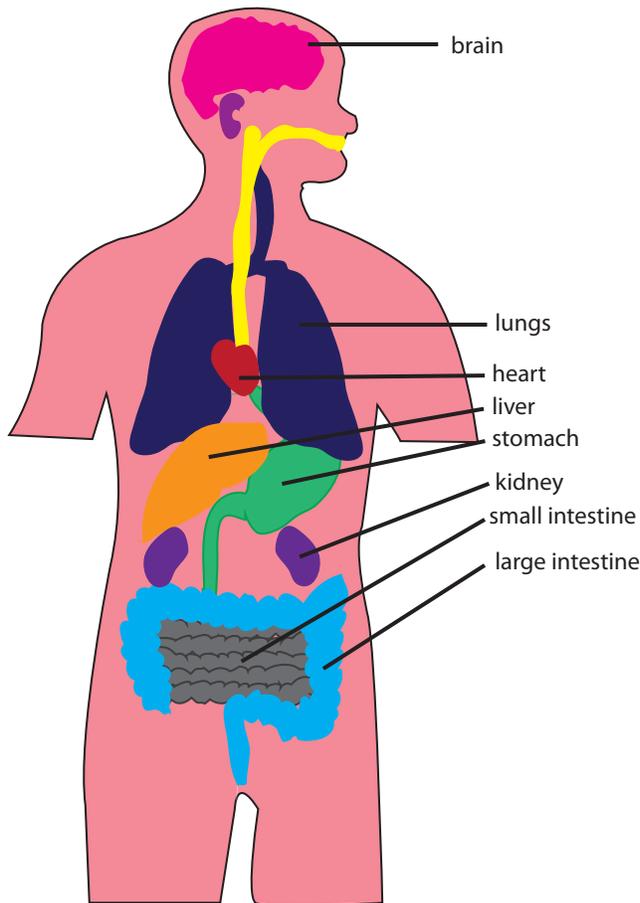
STUDENT WORKSHEET: "Dissection"

1. Monitor progress continually during dissection.
2. Refer to vocabulary section to evaluate organ descriptions.

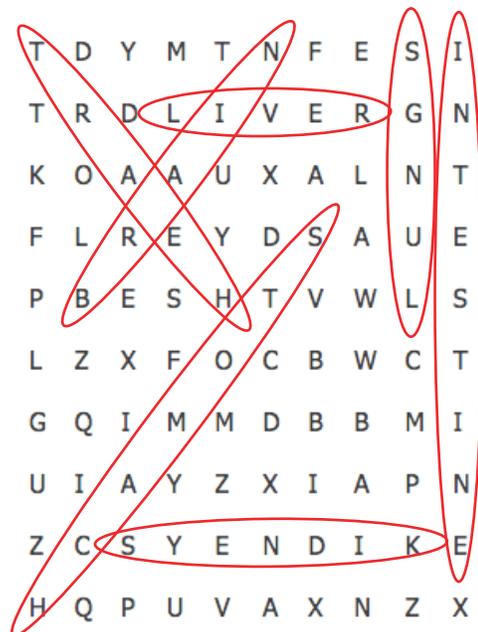
ORGAN VOCABULARY

ANSWER SHEET

- heart — pumps blood through the body, taking blood with low oxygen to the lungs and pumping oxygen-filled blood to all of the body
- lungs — take in oxygen and exhale carbon dioxide
- brain — receives and interprets impulses from sense organs and controls body functions like walking and talking; the center of memory, thought, and feeling
- liver — makes bile, stores fat and sugar as reserve energy sources, changes harmful substances to less toxic
- stomach — receives and stores swallowed food and is a main organ of digestion
- large intestine — the wide lower section of the intestine that extends from the end of the small intestine to the anus
- kidneys — regulate water in the body and filter out waste from the bloodstream
- small intestine — the long, narrow, coiled section of the intestine that extends from the stomach where nutrients are absorbed into the bloodstream



Organ Search



Koyukon riddle:

Wait, I see something: Tiny bits of charcoal scattered in the snow.

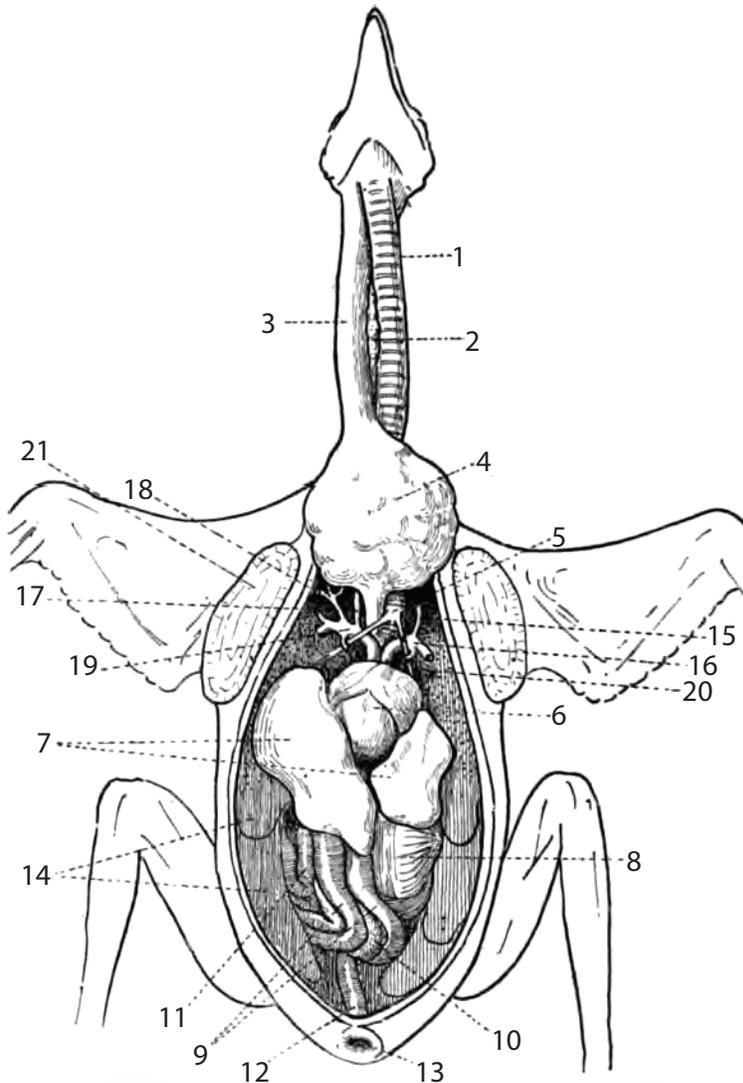
Answer: The bills of ptarmigan

Jetté 1913

Ptarmigan



Image courtesy of Pearson Scott Foresman and the Wikimedia Foundation



- 1. Trachea. 2. Thymus gland. 3. Oesophagus. 4. Crop. 5. Syrinx. 6. Heart. 7. Liver.
- 8. Gizzard. 9. Duodenum. 10. Pancreas. 11. Small intestine. 12. Rectum. 13. Cloaca.
- 14. Air-sacs. 15. Left carotid. 16. Left subclavian. 17. Right carotid. 18. Brachial artery. 19. Right subclavian. 20. Muscles of syrinx. 21. Pectoralis major muscle cut across.

Specialized Organs Unique to Birds

air sacs – unique to the respiratory system of birds; thin-walled structures through which air flows as the bird breathes; aids in breathing and temperature regulation

crop – large bulge at the back of the esophagus that expands to receive food

gizzard – a muscular pouch behind the stomach in birds; it has a thick lining and often contains swallowed sand or grit, which helps to break food into small pieces

ANATOMY OF A HARE

STUDENT INFORMATION SHEET

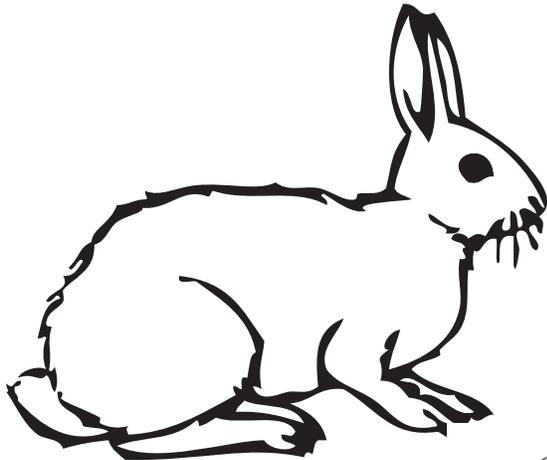


image courtesy of explorenature.org

Koyukon riddle:

Wait, I see something: We are wide open in the bushes.

Answer: The snowshoe hare's eyes

Jetté 1913

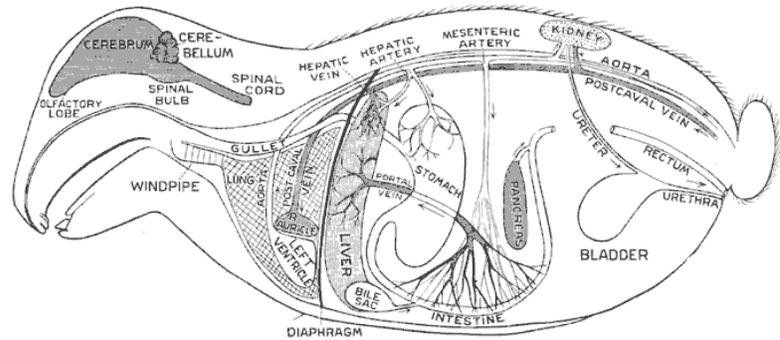


image courtesy of <http://etc.usf.edu/clipart>

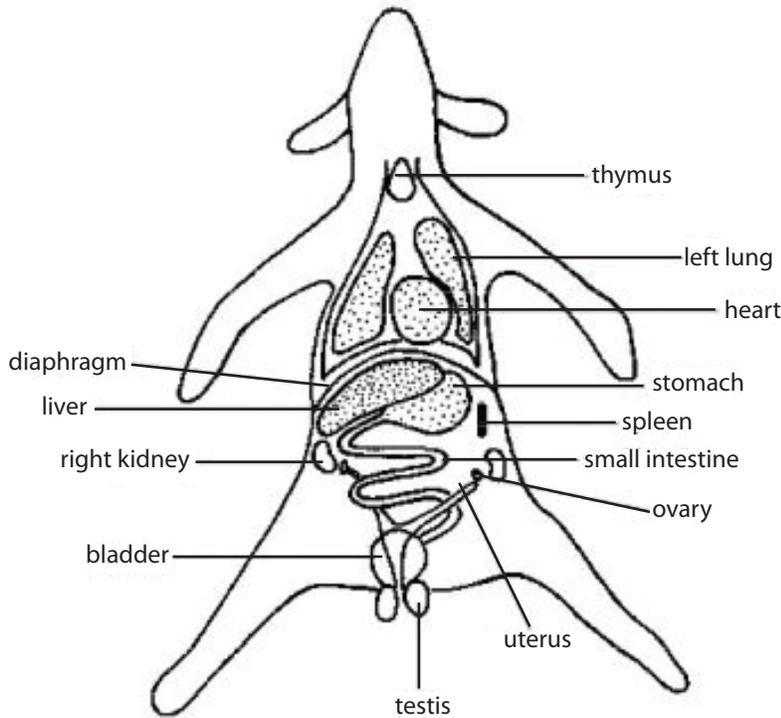


image courtesy of despairingself.wordpress.com

Caution:

Tularemia, a disease sometimes carried by the snowshoe hare, can be transferred to humans by direct contact with an infected animal through an opening or break in the skin. When dissecting a hare be extra cautious to avoid infection.

King Salmon

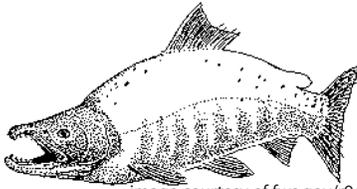


image courtesy of fws.gov/r9extaff/drawings/gamfish.htm

Koyukon riddle:

Wait, I see something: It is spreading softly on the surface of the water.
Answer: Blood from the king salmon, clubbed in the water so it will not upset the canoe when it is pulled inside.
 Jetté 1913

Specialized Organs Unique to Fish

gills – allow fish to breath underwater

lateral line – one of the fish’s primary sense organs; detects underwater vibrations and determines direction and source

swim bladder – contributes to the ability of a fish to control buoyancy

pyloric ceca – finger-like protrusions where the intestine meets the stomach; aids digestion

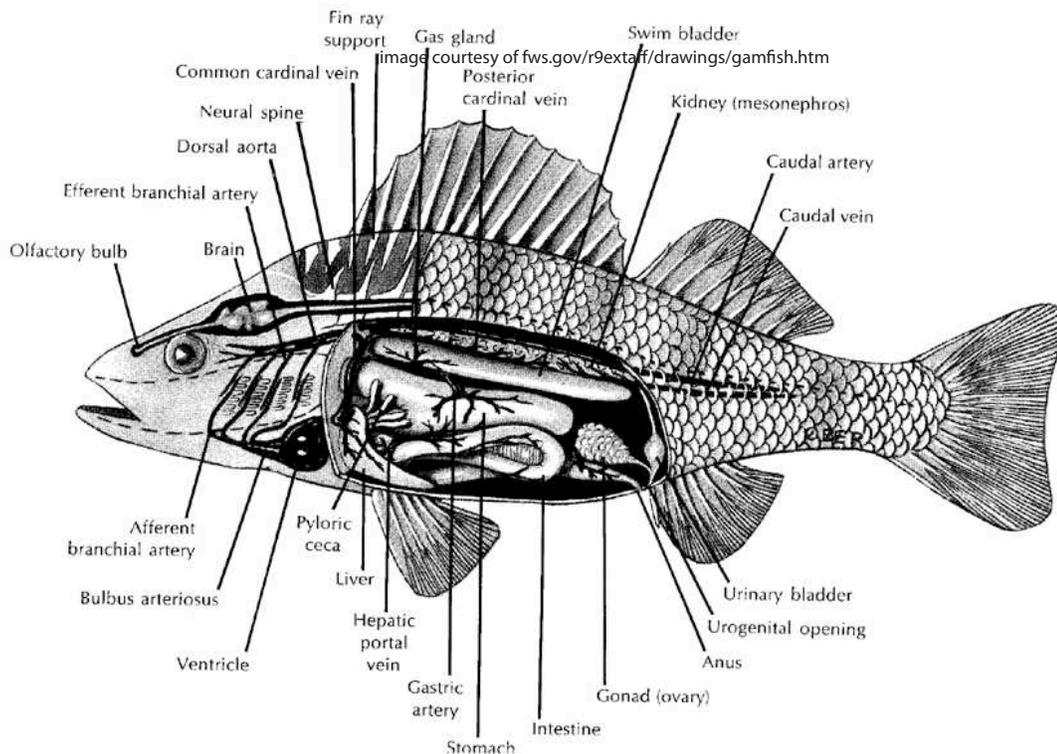


image courtesy of http://www.hedley.ca/anatomy_internal.html

NAME: _____
DISSECTION

STUDENT WORKSHEET
(page 1 of 2)

Step 1:

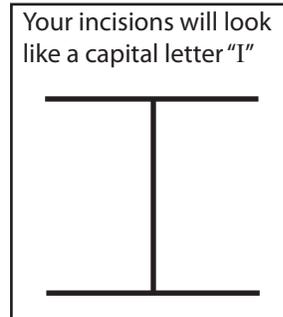
Collect the lab materials needed, then put on gloves, lab coat and goggles.

Step 2:

Place your animal on the dissection tray. (Lay a bird on its back, a fish on its side.)

Place pins to hold the animal in place. Open the wings on a bird. In addition, pin the legs. On a fish, pin the tail, dorsal fin and head. For a hare, pin all four legs.

Step 3: Cutting the Abdomen



- Use the scalpel to carefully make an incision from the throat to where the legs meet. (In the case of a fish, from the neck to the tail.) Do not cut too deeply. Please avoid cutting into the organs.
- Make your second incision across the top of the chest and third across the lower abdomen.
- Peel back the skin flaps and pin them back.
- Carefully cut through any remaining muscle of the abdomen in the same way.

Lab Materials Needed

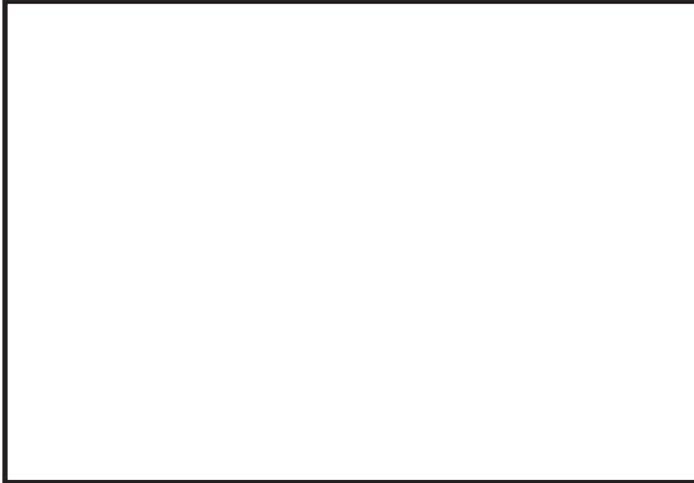
- Goggles (one pair per student)
- Latex gloves (one pair per student)
- Dissection tray with pad, 12" x 8" (one per group)
- Dissecting set (one per group)
- Dissection pins (12 per group)
- Lab coats (one per student)

Step 4:

- Find the liver and carefully remove it, using the scalpel if needed. Set it on your tray.
- Next, find the stomach, intestines, heart and lungs. Remove them, as well.
- See if you can find the kidneys then remove them, as well.
- If you have a bird, see if you can find the crop. If you have a fish, see if you can find the swim bladder.

NAME: _____
DISSECTION

Use the space below to draw three of the organs. Label the illustration with the proper organ name. Describe the function of the organ on the lines to the right.







NAME: _____

STUDENT LAB

MY LANGUAGE

Directions: Ask an Elder or knowledge bearer to help you with this worksheet.

Our class will be studying the following animal: _____.

1. What is the name of the animal in our Native language?

2. Does this animal have any special significance?

3. Is there a proper way to dispose of the animal when we are done studying?

4. Can you share a special story about this animal?

(If you need more room to write, please use the back of this page.)

5. The heart pumps blood through the body, taking blood with low oxygen and pumping it to the lungs then pumping blood with high oxygen levels from the lungs to all of the body.

What is the Native language word for heart? _____

6. The lungs of air-breathing animals take in oxygen and exhale carbon dioxide.

What is the Native language word for lungs? _____

7. The brain receives and interprets impulses from sense organs and controls body functions like walking and talking; the brain is also the center of memory, thought, and feeling.

What is the Native language word for brain? _____

8. The liver makes bile, stores fat and sugar as reserve energy sources, changes harmful substances to less toxic forms, and regulates the amount of blood in the body.

What is the Native language word for liver? _____

9. The stomach receives and stores swallowed food and is a main organ of digestion.

What is the Native language word for stomach? _____

10. The kidneys regulate water in the body and filter out waste from the bloodstream.

What is the Native language word for kidneys? _____

