

Carolina Biological Supply Company

**AUTOPSY: Forensic Dissection
with Carolina's Perfect Solution[®] Pigs**



Objectives

- **Conduct a pig dissection using the protocol for a human autopsy**
- **Learn an exciting approach to a classic mammalian dissection**
- **Experience the quality of Carolina's Perfect Solution® specimens**



Carolina's Perfect Solution[®] Specimens

Quality

**Superior
preservation**

**Superior
tissue color
and texture**

Safety

**No
dangerous
off-gassing**

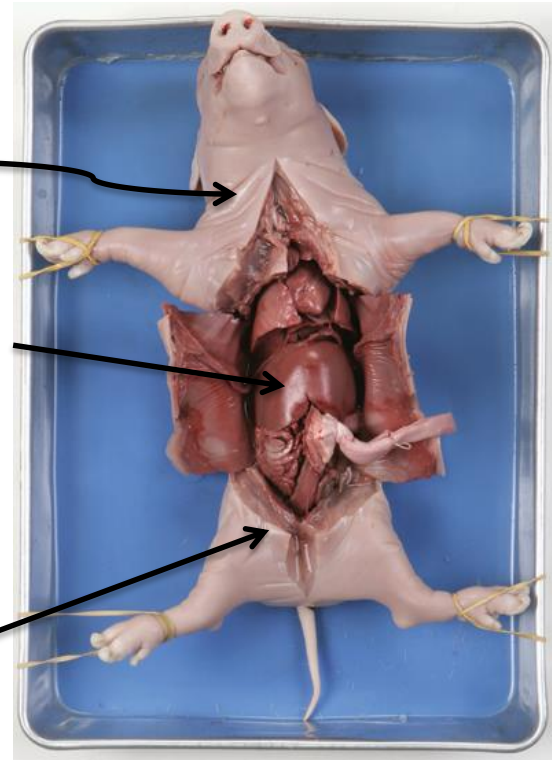
**No formalin
odor**

Compare and See for Yourself!

Competitor's Specimen



Carolina's Perfect Solution[®] Specimen



Dark, unnatural external appearance

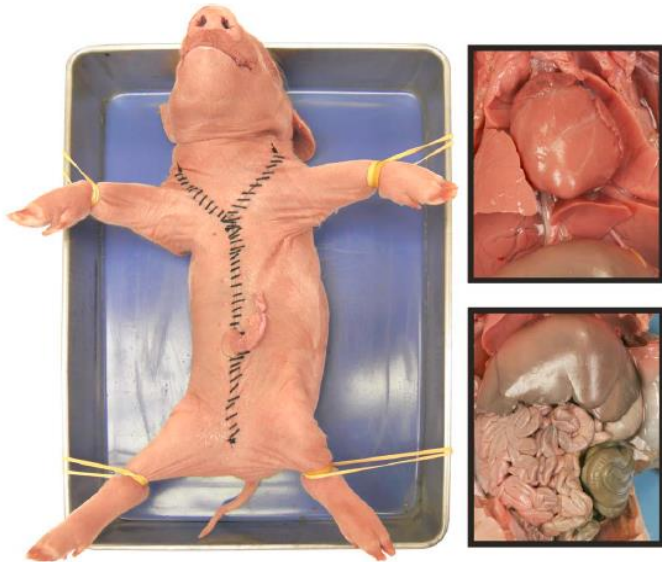
Difficult to identify tissues, organs, and systems

Amazing color and texture

Excerpt from Kit Manual

Carolina™ Forensic Dissection

TEACHER'S MANUAL
AND STUDENT GUIDE



CAROLINA
World-Class Support for Science & Math

Carolina™ Forensic Dissection

Materials

The Classroom Kit (221489) is designed for a class of 32 students working in groups of 4. The Student Kit (221488) is designed for 1 group of 4.

Included in the kit:	Classroom (221489)	Student (221488)
fetal pig (preserved in Carolina's Perfect Solution®)	8	1
adult pig heart (preserved in Carolina's Perfect Solution®)	1	1
adult pig kidney (preserved in Carolina's Perfect Solution®)	1	1
hand lens	8	1
absorbent pad	8	1
large weigh boats	40	5
roll of nylon string	1	1
sponge	8	1
suture needle	8	1
prepared microscope slide set (1 of each slide):	1	1
Mammal Artery and Vein, c.s.		
Human Fundic Stomach, sec.		
Mammal Liver, sec.		
Mammal Lung, sec.		
Mammal Kidney, median sag. sec.		
Mammal Graafian Follicles, sec.		
Mammal Epididymis, sec.		

Needed but not supplied:

For each student group:

- dissecting kit
- 2 dissecting pans
- twine or large rubber bands
- metric ruler
- drinking straw (8" or longer)
- petri dish
- gloves
- laboratory aprons
- safety glasses or goggles

NOTES

autopsy. Using the prepared slides can extend and enhance the autopsy by allowing students to examine some of the tissue types found within each system.

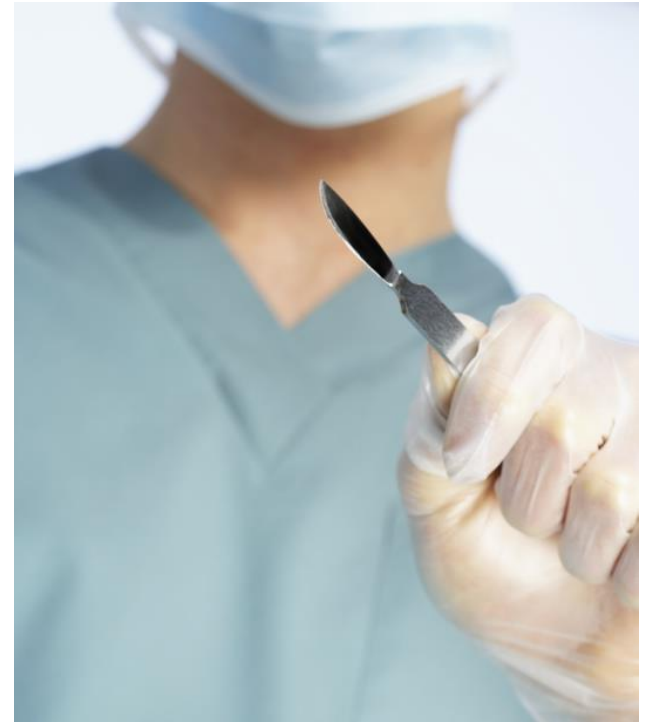
- Set up one dissection station (for a Student Kit) or eight dissection stations for a Classroom Kit.
- The extension activity may be done as a class demo, or you may assign it to each group after the completion of the urogenital system. If you choose to assign the extension activity, reproduce the procedure from the Teacher's Manual for each group and review it with your students.

Procedure

1. Hand out copies of the Student Guide and have each student read the background information and the autopsy/dissection procedure.
2. Before students begin the dissection, review the organ systems as well as the tissue level of organization. You may also review some of the glossary terms from the Student Guide.
3. Divide the class into eight groups of four students if you are using the Classroom Kit. Job duties could be defined as follows: a **Prosector**, board certified pathologist, and **Diener** (pronounced DEE-nur), morgue assistant, for assistance in observation and dissection, a **Materials Manager** for organizing and passing dissection instruments, and a **Recorder**, who records all of the measurements and observations. The Recorder could also take digital photographs of the external and internal examinations and include them in the final autopsy report.
4. Distribute personal protective equipment to each student and dissecting trays and instruments to each group.
5. Distribute one fetal pig to each group. Student groups will follow the autopsy protocol in their Student Guide just as a pathologist would in a human autopsy. They will carefully record external and internal features, compare and contrast organs, organ systems, and tissues. Students should answer the reflection questions after the completion of each system. This activity may take more than one class period to complete.
6. Place the prepared slide tissue sections (the lung, artery and vein, liver, stomach, kidney, Graafian follicles, and epididymis) at each of the seven microscope stations. The eighth station will be used for viewing sections of the small and large intestine through a stereomicroscope.
7. Perform a longitudinal cross section of the adult pig heart (see Figure 1) and kidney (see Figure 2). Have the students compare external and internal similarities and differences with the heart and kidney of their fetal pig.
8. At the end of their forensic dissection, the students will place all of the organs back into the body cavity and close the Y incision with sutures.

Excerpt from Kit Manual

Students work in groups of 4.



Why Are We Doing a Pig Autopsy?

- Pig anatomy is very similar to human anatomy
- Organ systems are completely removed and studied
- Unique protocol that your students will enjoy

Carolina™ Forensic Dissection Kit



This workshop features activities from one of our most popular dissection kits!



***Carolina's Perfect Solution[®] Specimens
Simply the Best—Guaranteed.***

Compare *Carolina's Perfect Solution[®]* preserved specimens to any others. If you are not completely satisfied that our specimens are the best, we will refund or credit your purchase.

It's that simple.

"I use pig dissection as a teaching tool because the anatomy and physiology of the pig is so similar to man. Carolina's Perfect Solution[®] pigs are the finest on the market."

**Dr. David Whetstone
Biology Department
Jacksonville State
University**

CAROLINA[®]
www.carolina.com

Look for All Carolina's Perfect Solution® Products in Our New Catalog

Check out our
NEW 2015
Carolina's Perfect
Solution® catalog
for great deals on our
BEST specimens!



Carolina's Perfect Solution®
Superior Preserved Specimens

The Perfect Solution

- Quality**
 - Superior Tissue
 - Amazing Color
- Safety**
 - No Dangerous Off-Gassing
 - No Special Disposal

2015
Carolina.com • 800.334.5551

CAROLINA®

Safety

- **Personal protective equipment:
Gloves, goggles, and lab aprons**
- **Dissection tools:
New tools = sharp scalpels**



- **Safety tip:
If you are not using an
instrument, set it down**

Model Proper Lab Safety!



**Organize your
dissection area.**

**Lay out your
instruments
so they are
easy to
access.**

Ready?

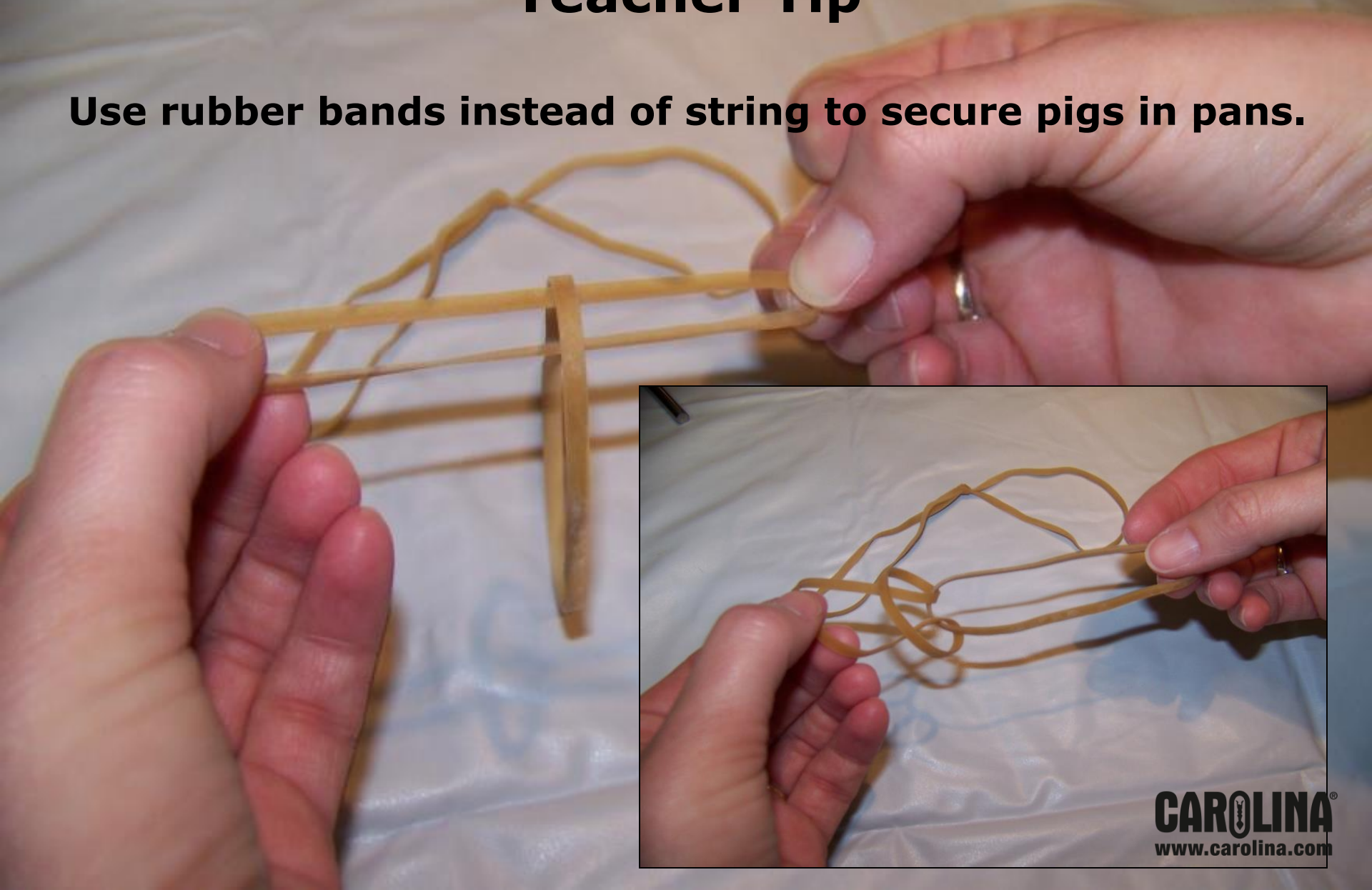
Teacher Tips

- Hold bag upright.
- Cut below the seal.
- Allow fluid to drain into the bag before removing pig.
- **Keep bag upright until we collect fluid.**



Teacher Tip

Use rubber bands instead of string to secure pigs in pans.



Teacher Tips

**Use sponge as
"body block."**

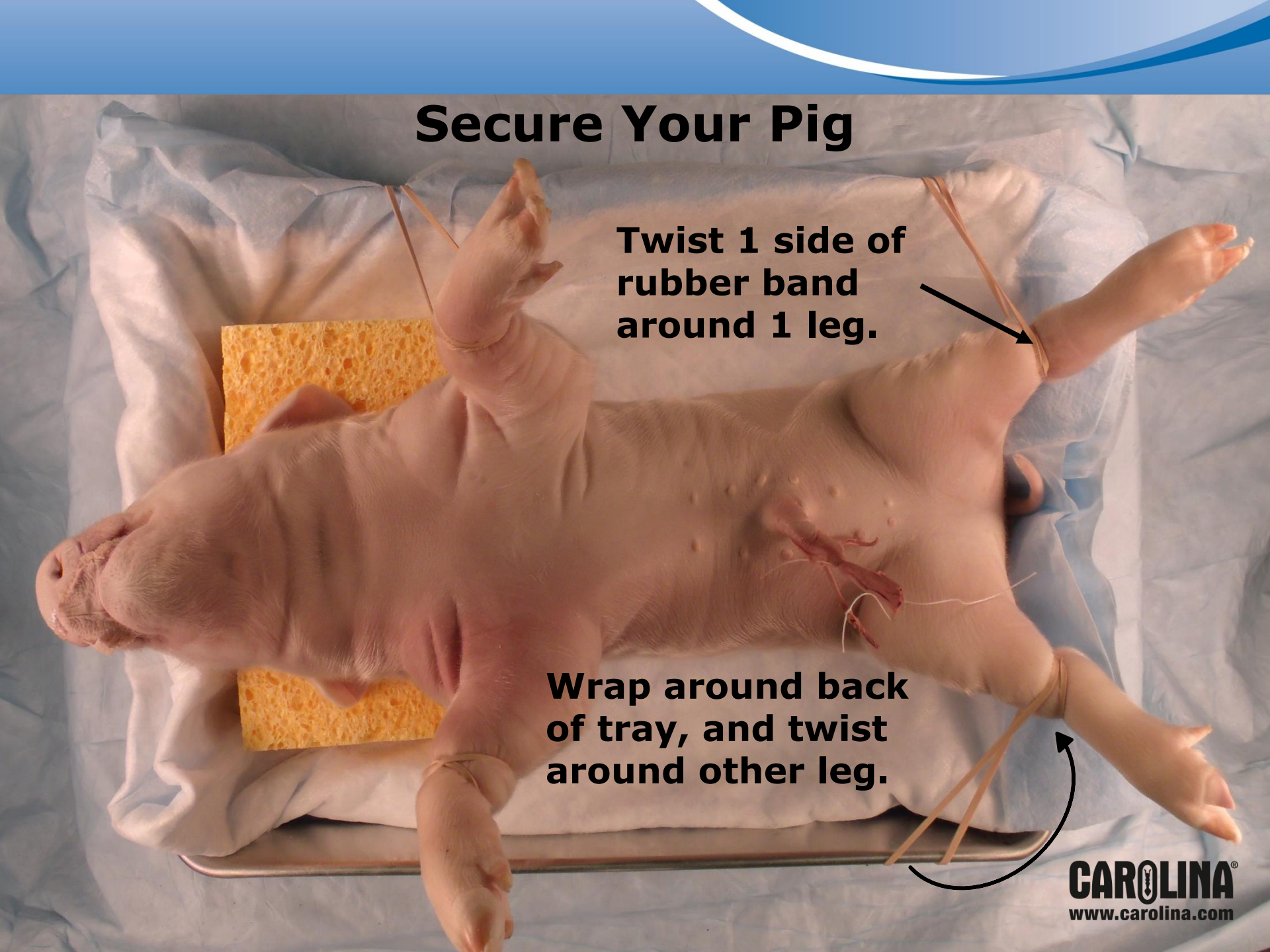
**Use rubber
bands to hold
pigs in position.**

**Place white pad in
pan for easy cleanup.**

Secure Your Pig

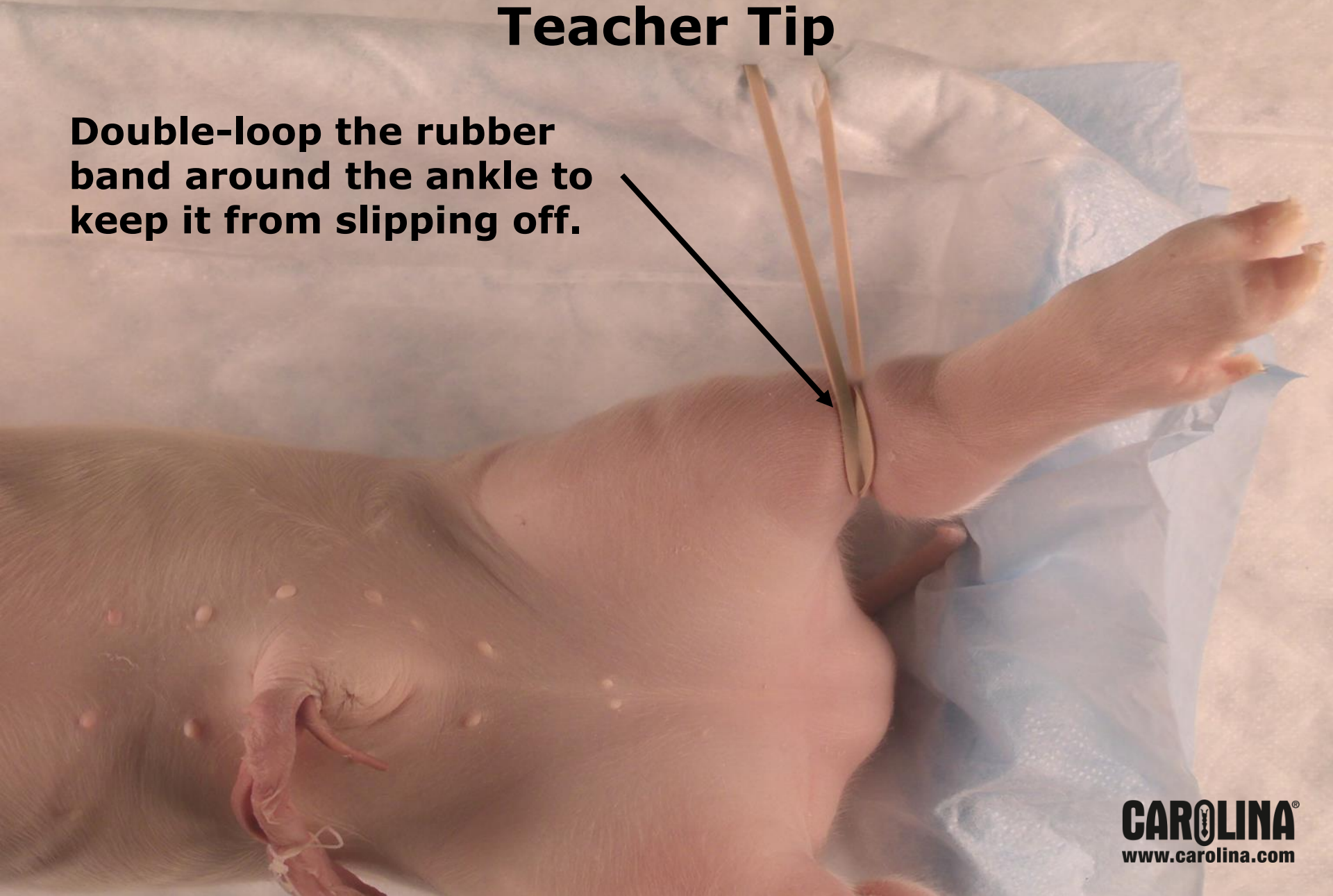
Twist 1 side of rubber band around 1 leg.

Wrap around back of tray, and twist around other leg.



Teacher Tip

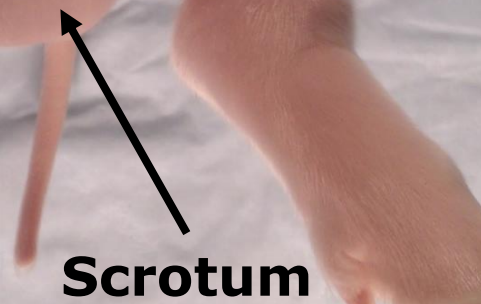
Double-loop the rubber band around the ankle to keep it from slipping off.



Male



Urogenital opening



Scrotum

Female



Genital papilla

External Anatomy

Examine external features of the head:

- Hair
- Mouth
- Nostrils
- Tongue
- Ears
- Eyes

Procedure

The best forensic pathologists have excellent observational skills. From your detailed observations, both externally and internally, try to determine the pig's behavior, characteristics, locomotion, diet, method of reproduction, etc. Other questions to consider would be: Is it a mammal and why? Is it male or female? How would this animal defend itself?

A. External Anatomy

1. Each group should obtain a dissecting pan, an absorbant pad to place under the pan, a fetal pig, dissecting equipment, and personal protective equipment (apron, goggles, and gloves). Use the Autopsy Report for recording all observations.
2. Weigh the fetal pig. Record the weight in pounds and in grams (1 lb = 454 g).
3. Measure the length of the pig from the tip of the nose to the base of the tail. String works better than a ruler since it bends and follows the curvature of the body. Next, measure the string with a metric ruler to determine the pig's length in centimeters. The age of your fetal pig can be determined from the overall length:

Length of Specimen	Approximate Age in Days From Fertilization
4 cm	56 days
20 cm	75 days
25 cm	100 days
30 cm	112–115 days (full term)

4. As you begin to examine the fetal pig, keep the following orientation terms in mind when describing the location of external and internal features.

Dorsal side – the top side or above

Ventral side – the lower side or below

Anterior – toward the head or front

Posterior – toward the tail or rear

Lateral – toward the side

Medial – toward the midline

Proximal – near a point of reference

Distal – away from a point of reference

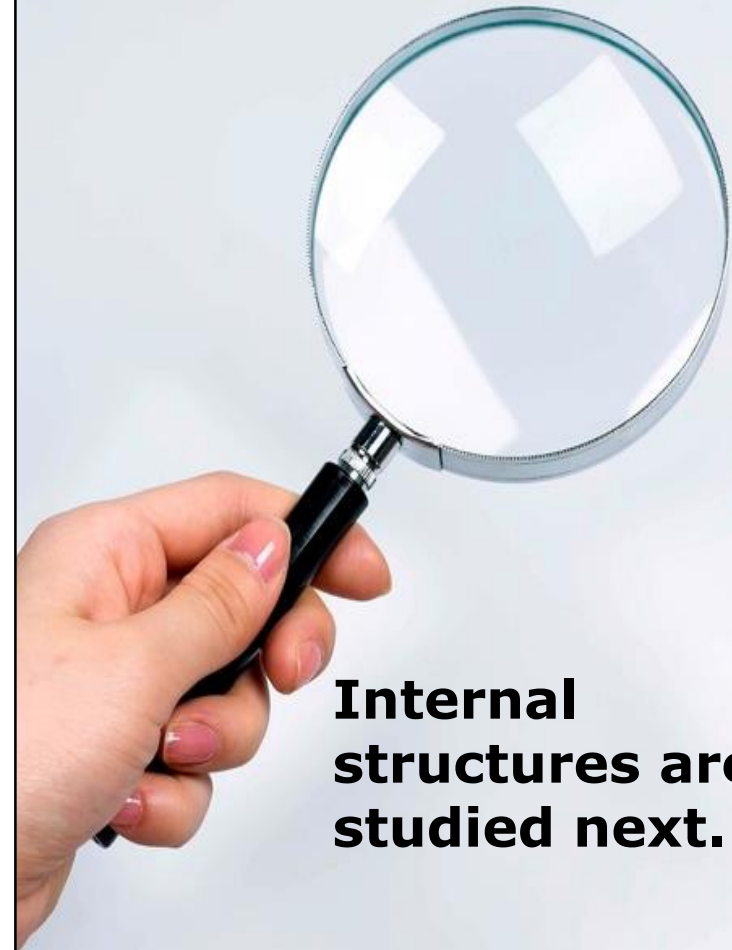
*Right – structures to the right of the "dorsal" midline

*Left – structures to the left of the "dorsal" midline

***Note:** When observing internal structures from the ventral side, or belly, left and right will be reversed (e.g., the right kidney will be viewed on your left).

5. Carefully examine the external features of your pig beginning with the head. Pay attention to the amount and color of hair, birthmarks, and other unique markings. Record your findings as you examine the mouth, nostrils, tongue, ears, and eyes.
6. Examine the dorsal side and appendages. Pay close attention to the feet. Describe in detail each foot and envision how this animal would walk and run.

Student groups perform a thorough external examination of the pig.



Internal structures are studied next.

DATE _____

Autopsy Report
Office of the Yorkshire County Coroner

Examiner Names

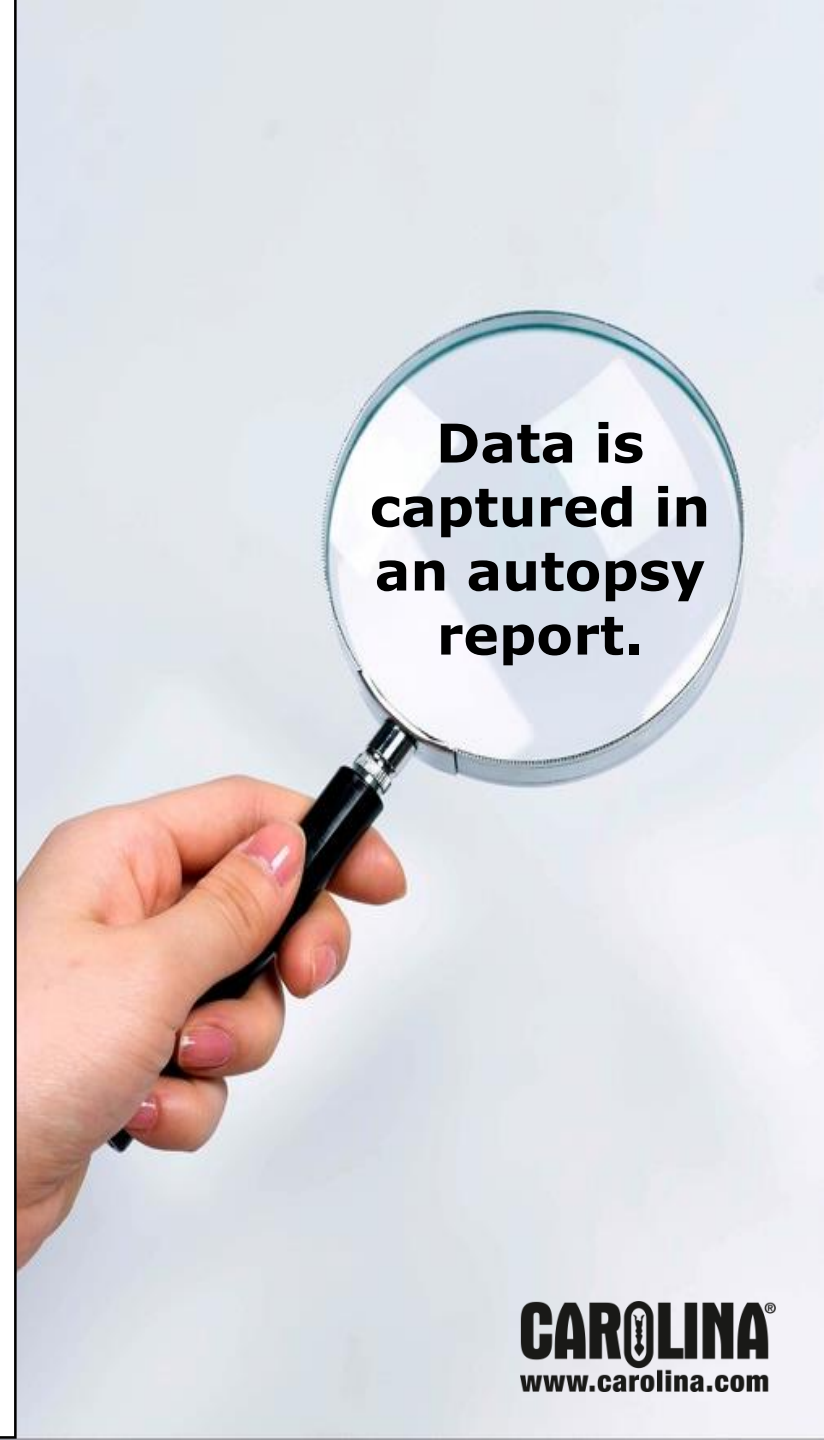
Prosector	Diener	Materials Manager	Recorder
-----------	--------	-------------------	----------

External Measurements

Weight _____ lb _____ g Length _____ cm Age From Conception _____ days

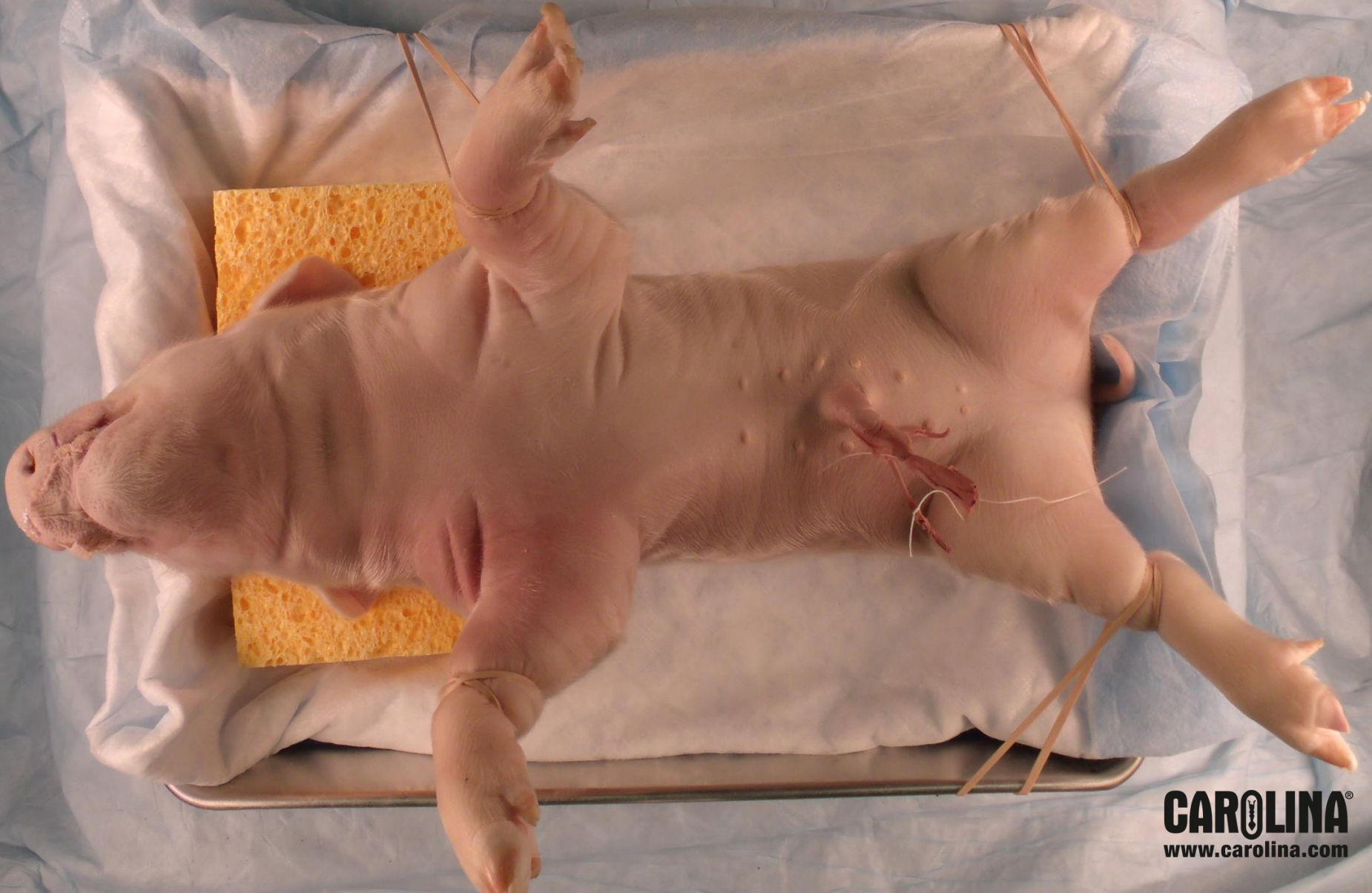
External Features

Location	Observations
Head	
Dorsal Side	
Ventral Side	



**Data is
captured in
an autopsy
report.**

Prepare for Internal Anatomy

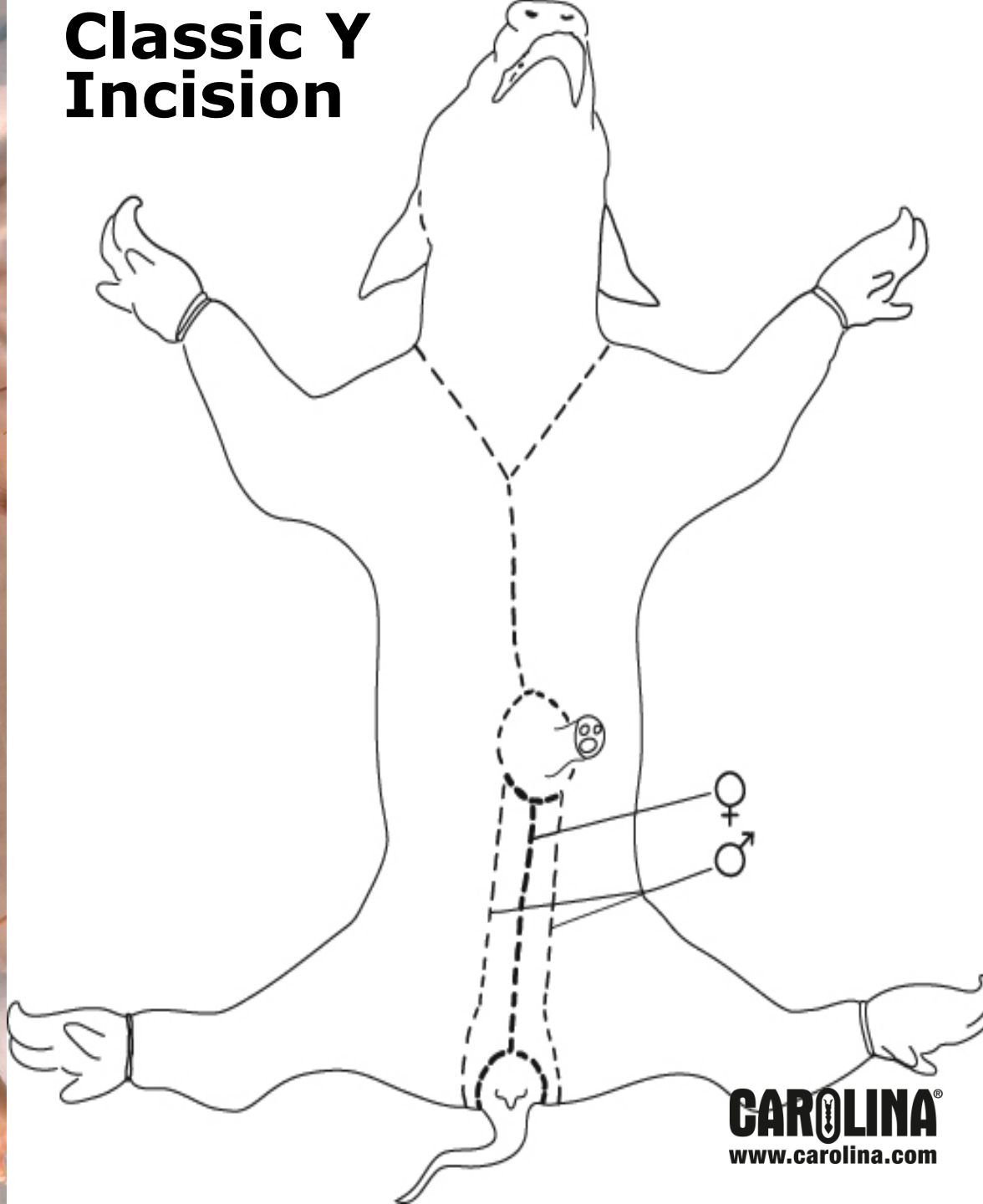
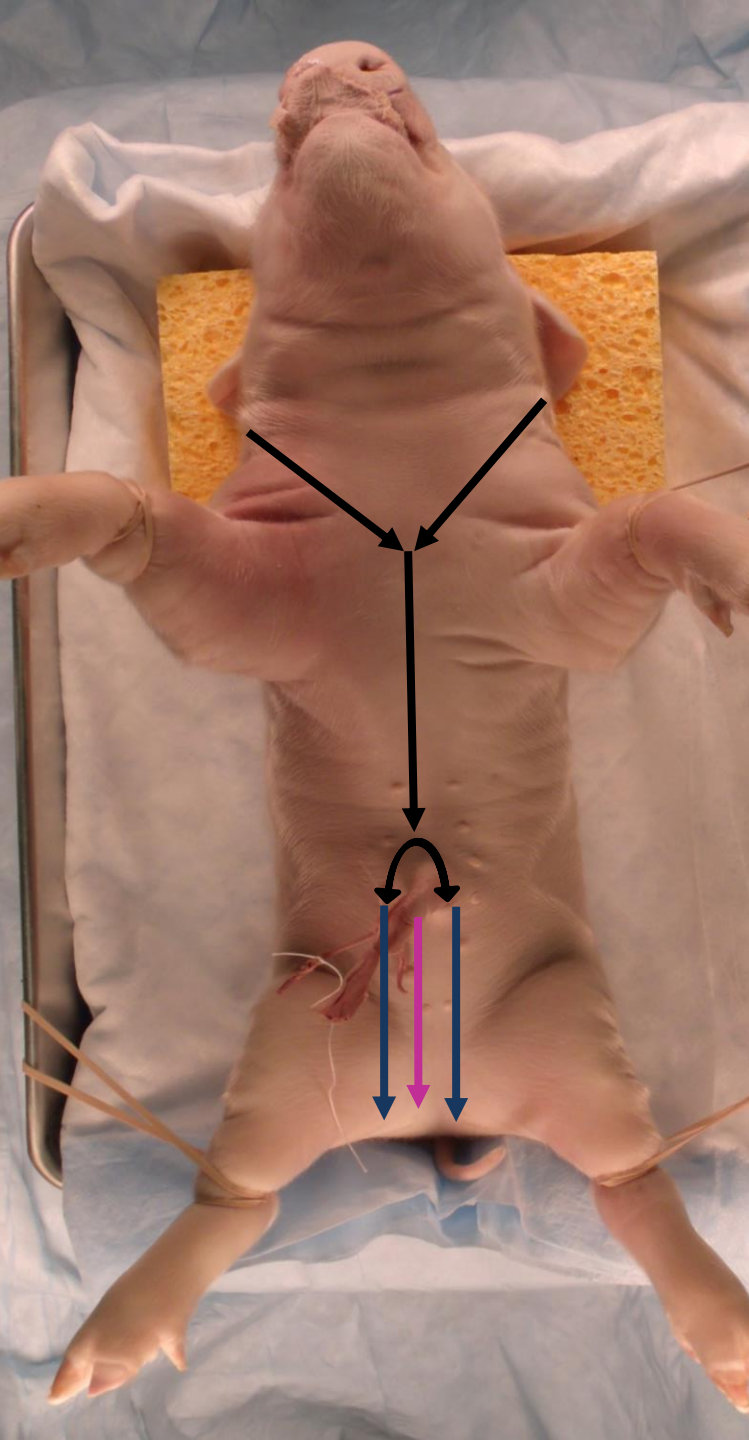


First Incision



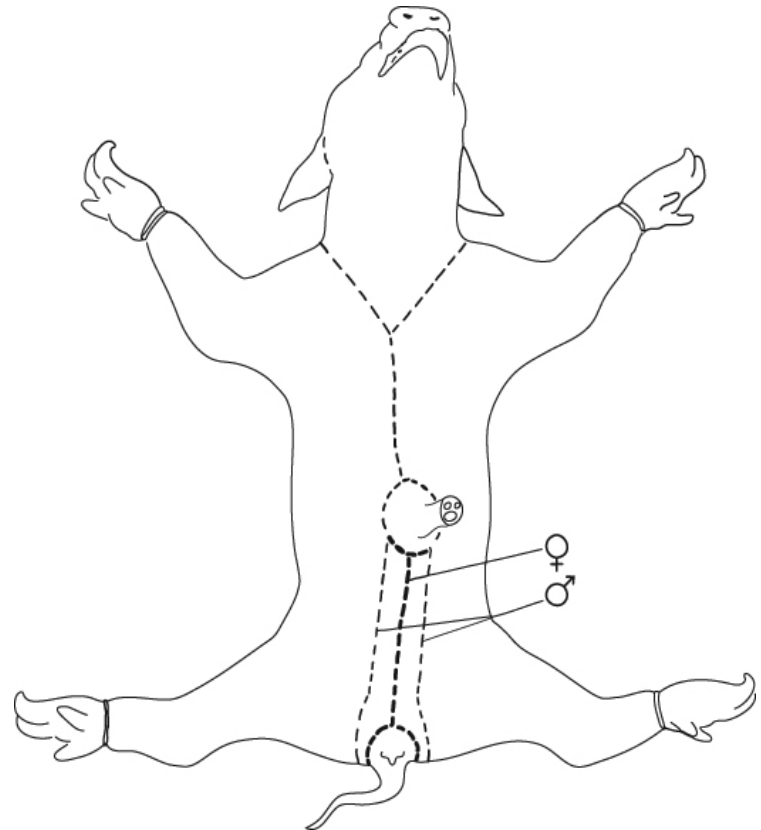
Feel for the space between the top of the shoulder and the corner of the jaw. This will assist you in making the initial incision.

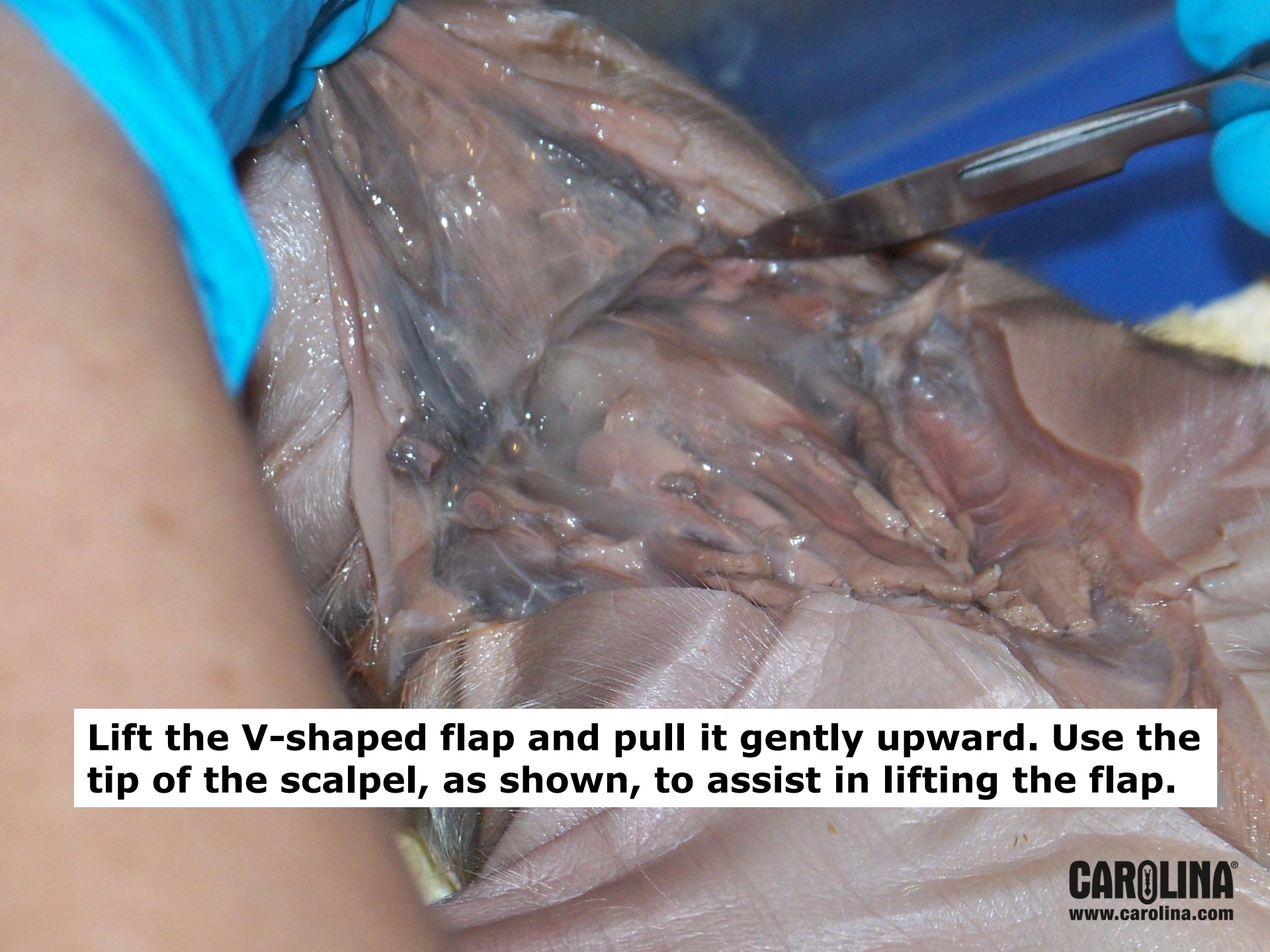
Classic Y Incision



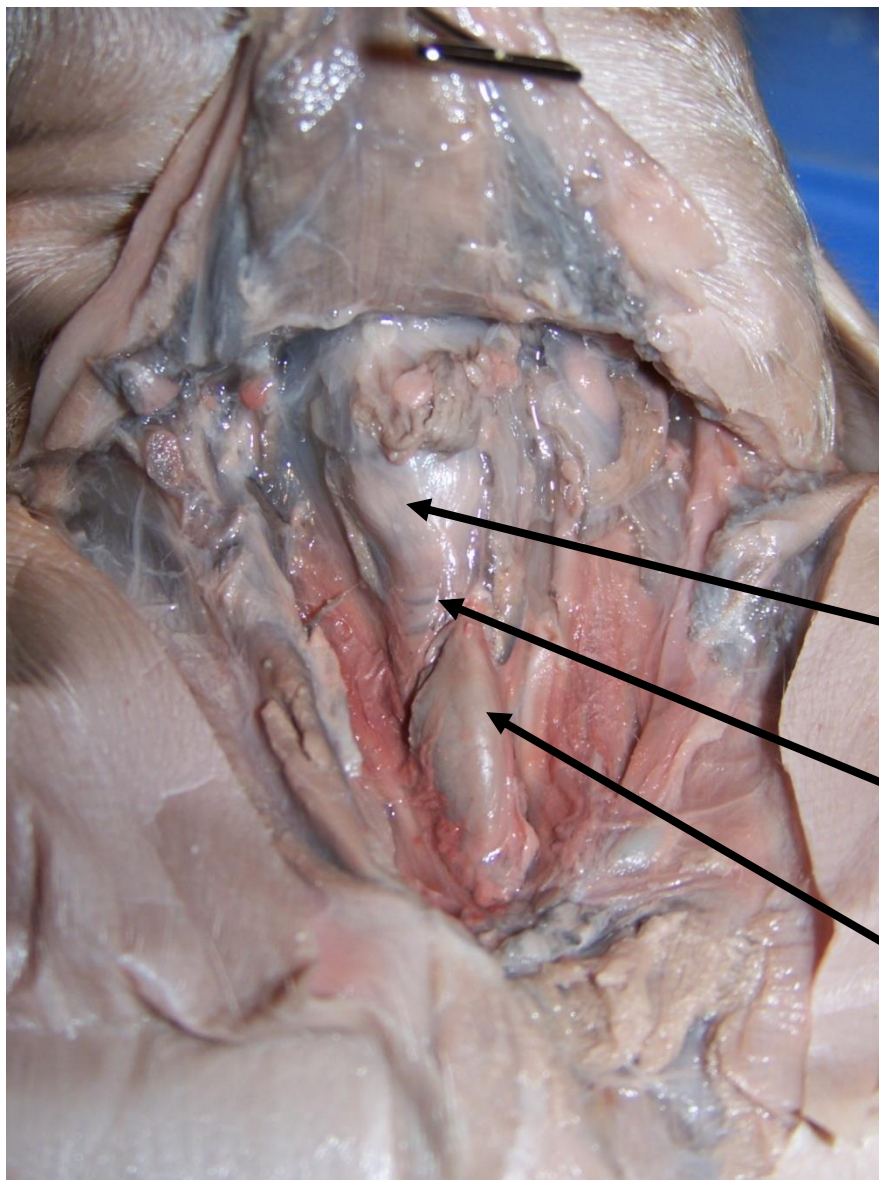
Y-Shaped Incision

- **Continue cutting the tail of the Y incision until you reach the umbilical cord.**
- **Use appropriate cut for male or female pig.**
- **Cut the skin, muscle, and connective tissues of the chest wall (exposing the sternum and rib cage).**





Lift the V-shaped flap and pull it gently upward. Use the tip of the scalpel, as shown, to assist in lifting the flap.



The thymus gland tissue is removed, and the thyroid gland is exposed.

Thyroid cartilage over larynx

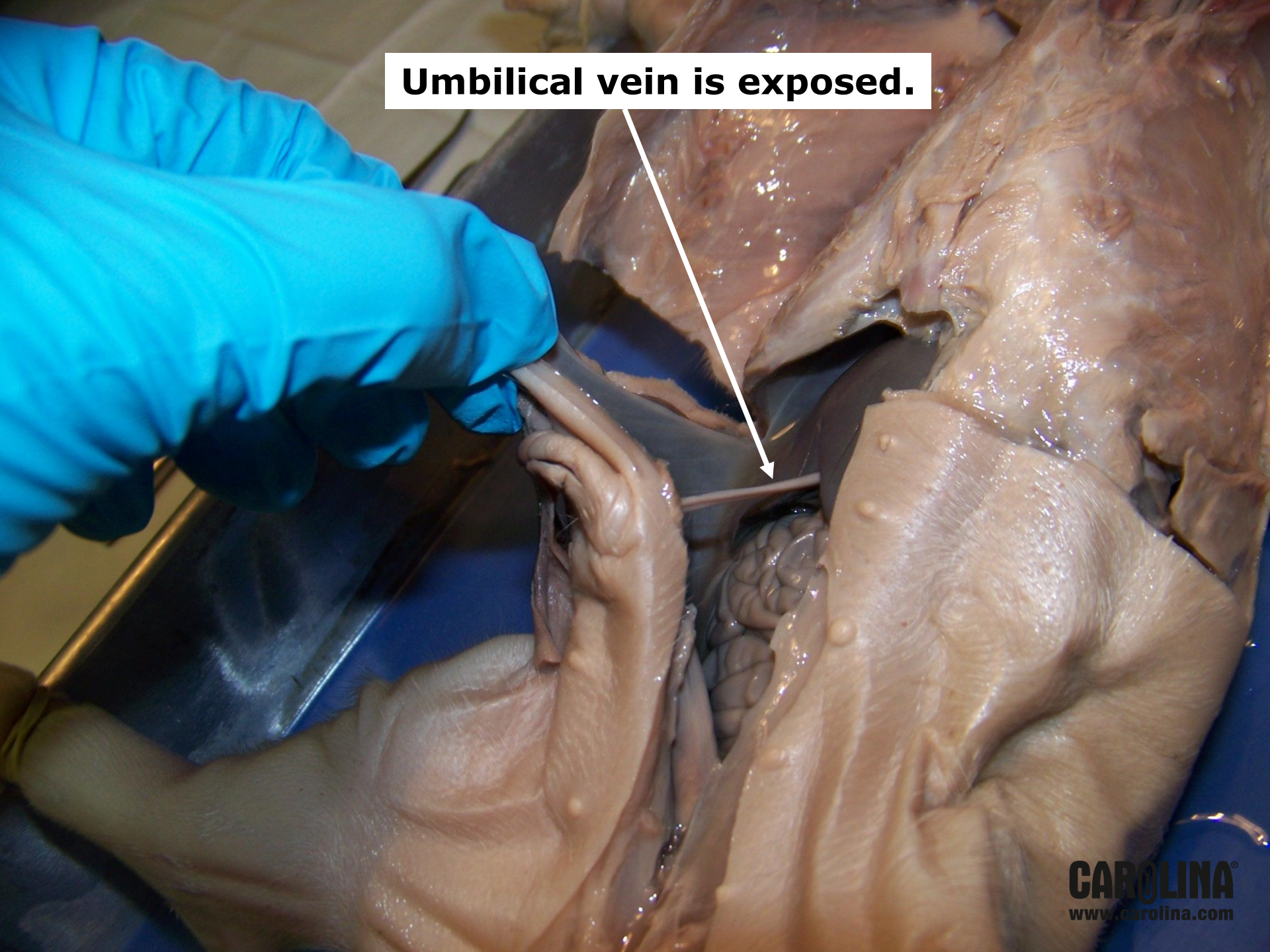
Trachea

Thyroid gland



Peel skin and tissue away from midline incision. Use the scalpel or scissors to help clear away the fascia. Make a lateral incision on both sides of the body at the bottom of the rib cage.

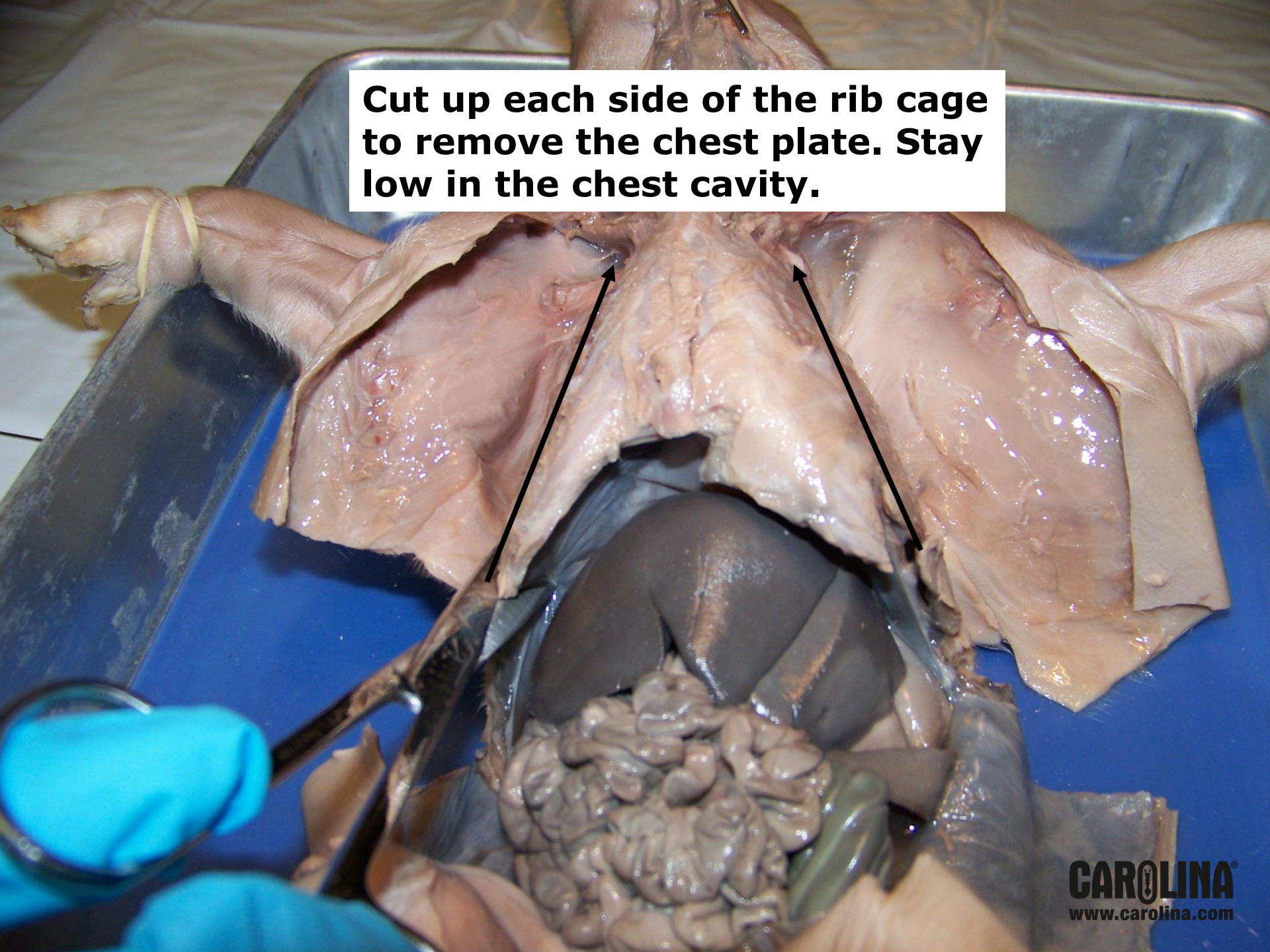
Umbilical vein is exposed.

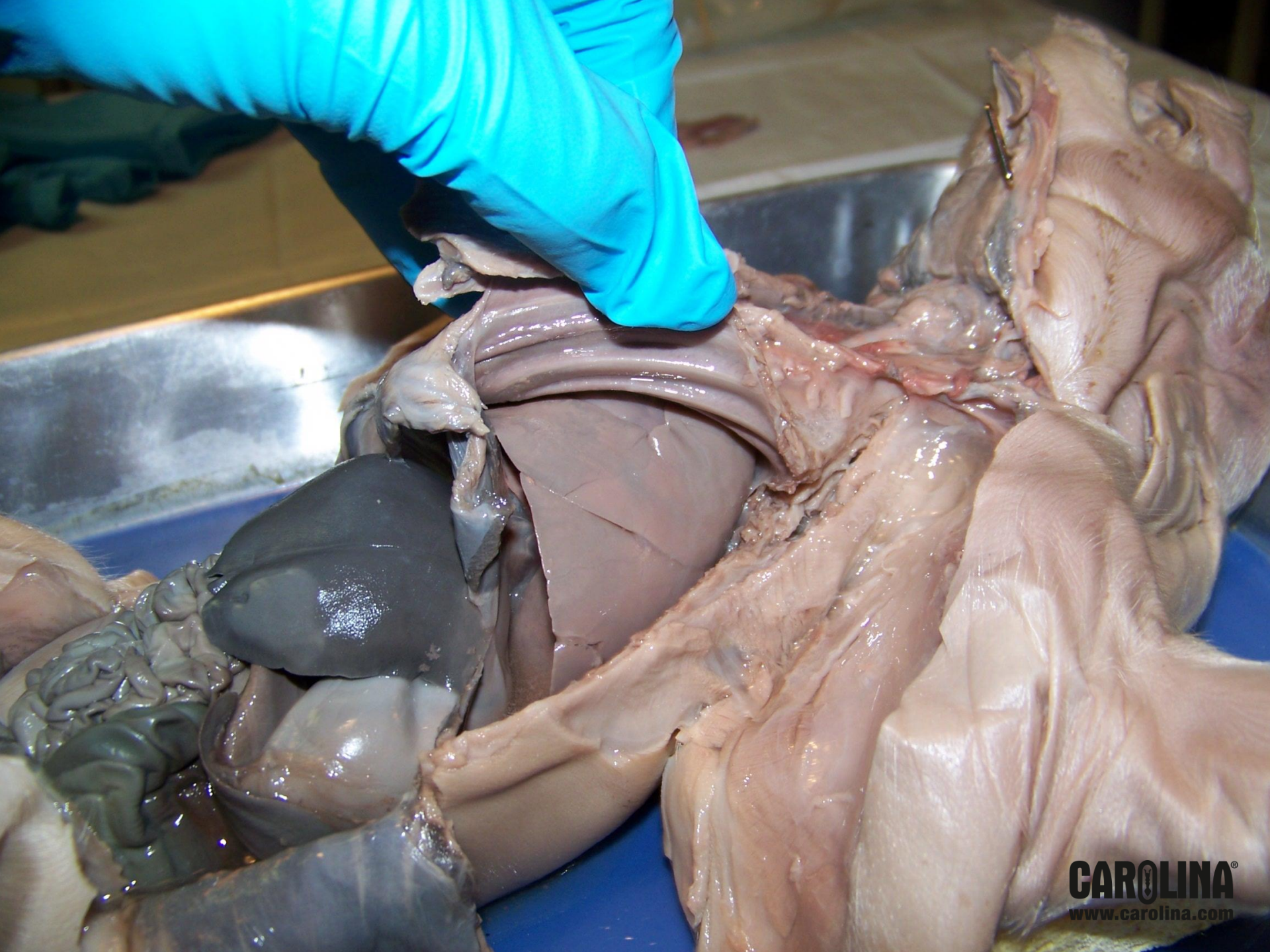


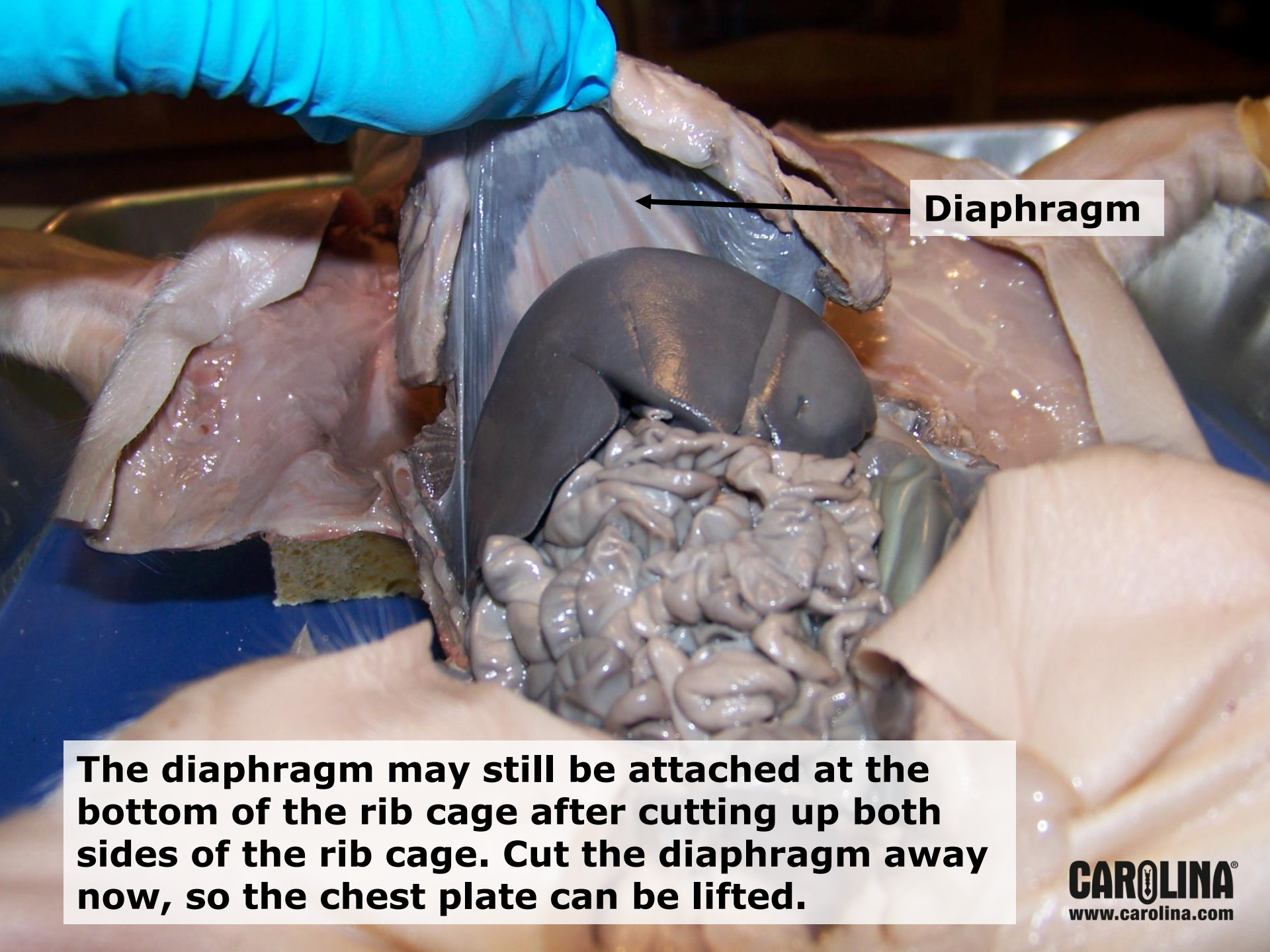
Make low, lateral incisions to expose the abdominal cavity.



Cut up each side of the rib cage to remove the chest plate. Stay low in the chest cavity.





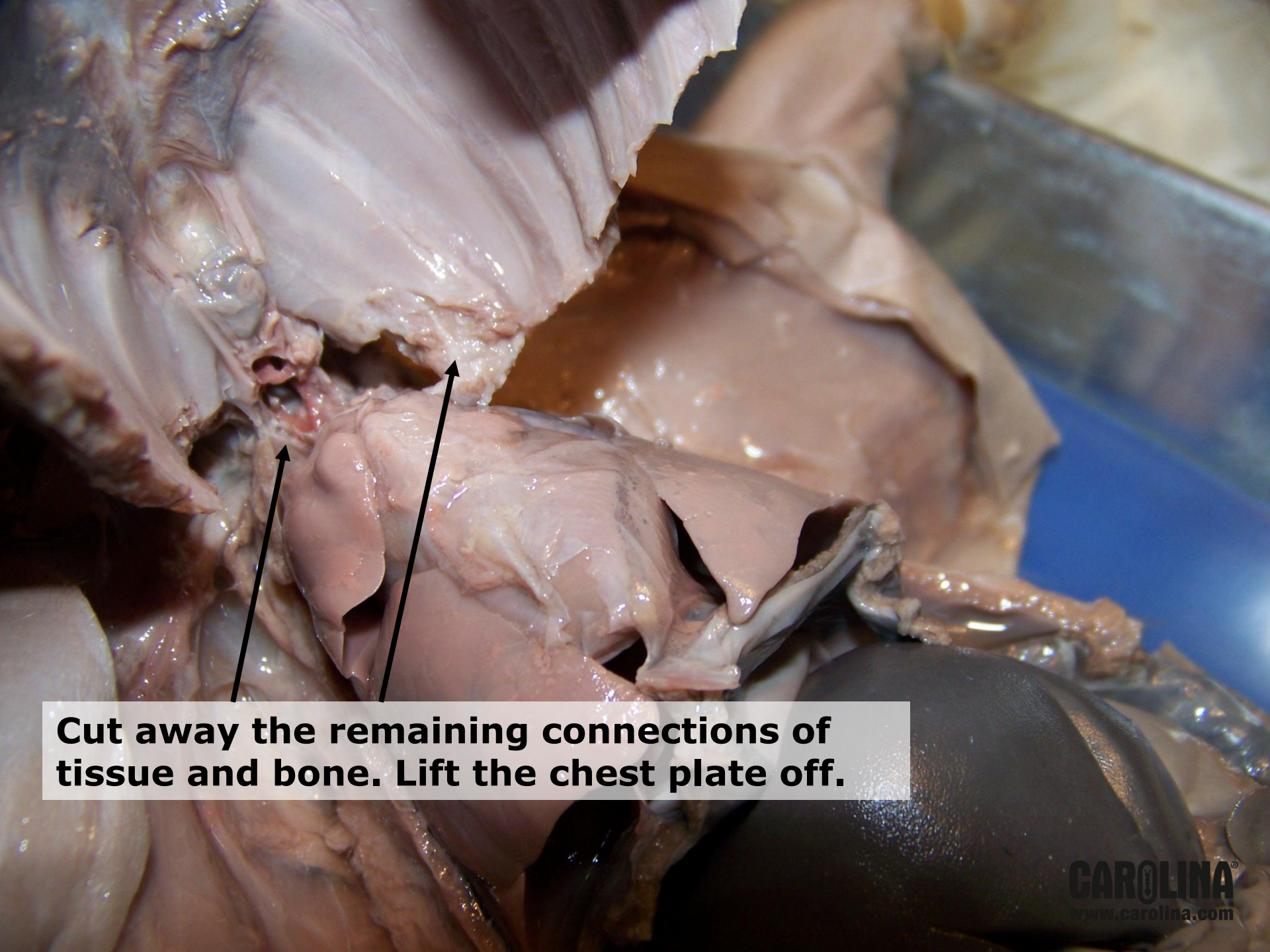


Diaphragm

The diaphragm may still be attached at the bottom of the rib cage after cutting up both sides of the rib cage. Cut the diaphragm away now, so the chest plate can be lifted.

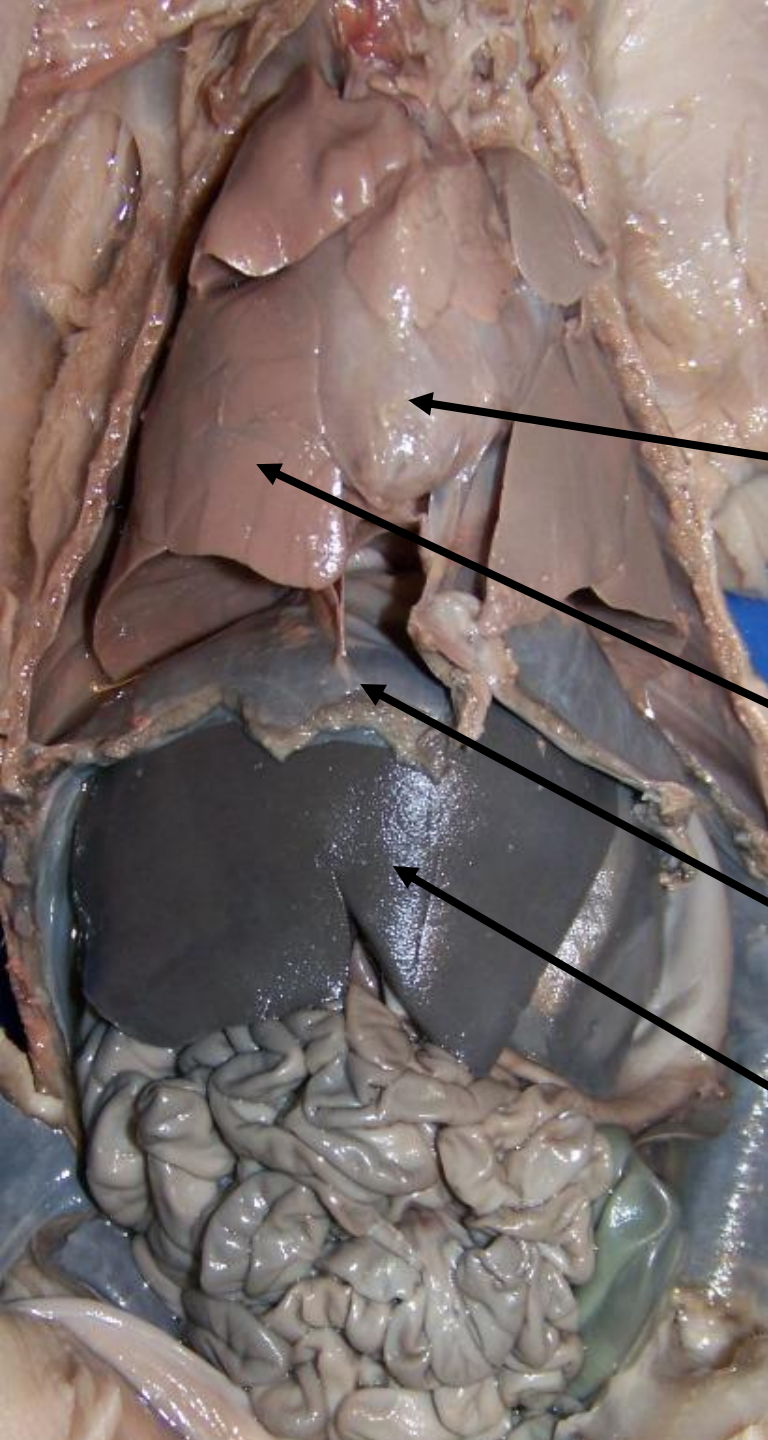
The diaphragm is cut away.





Cut away the remaining connections of tissue and bone. Lift the chest plate off.

Chest Plate Removed



**Heart (with overlying
thymus and pericardial sac)**

Lungs

Diaphragm

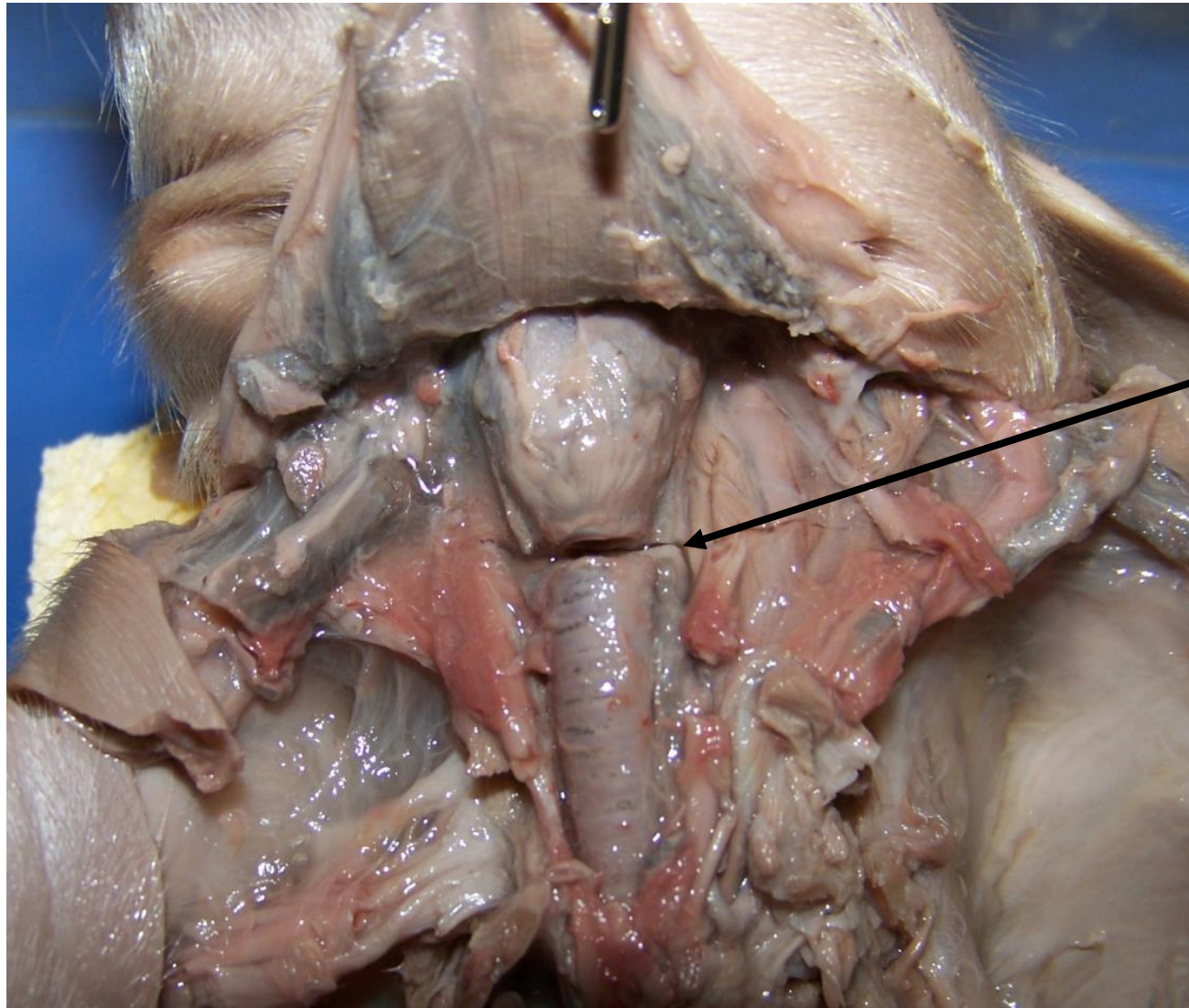
Liver



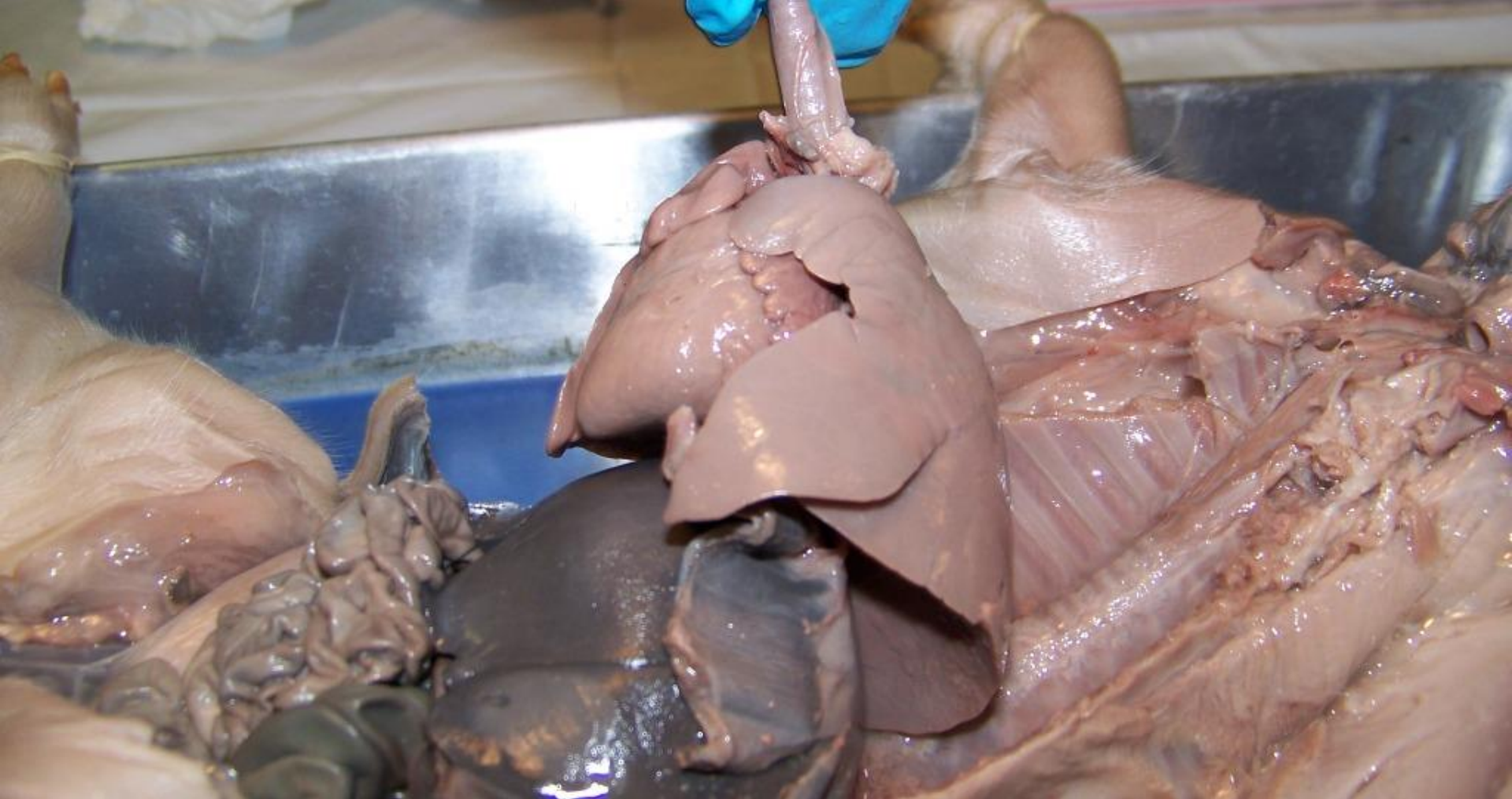
Stomach, lifted

Pancreas

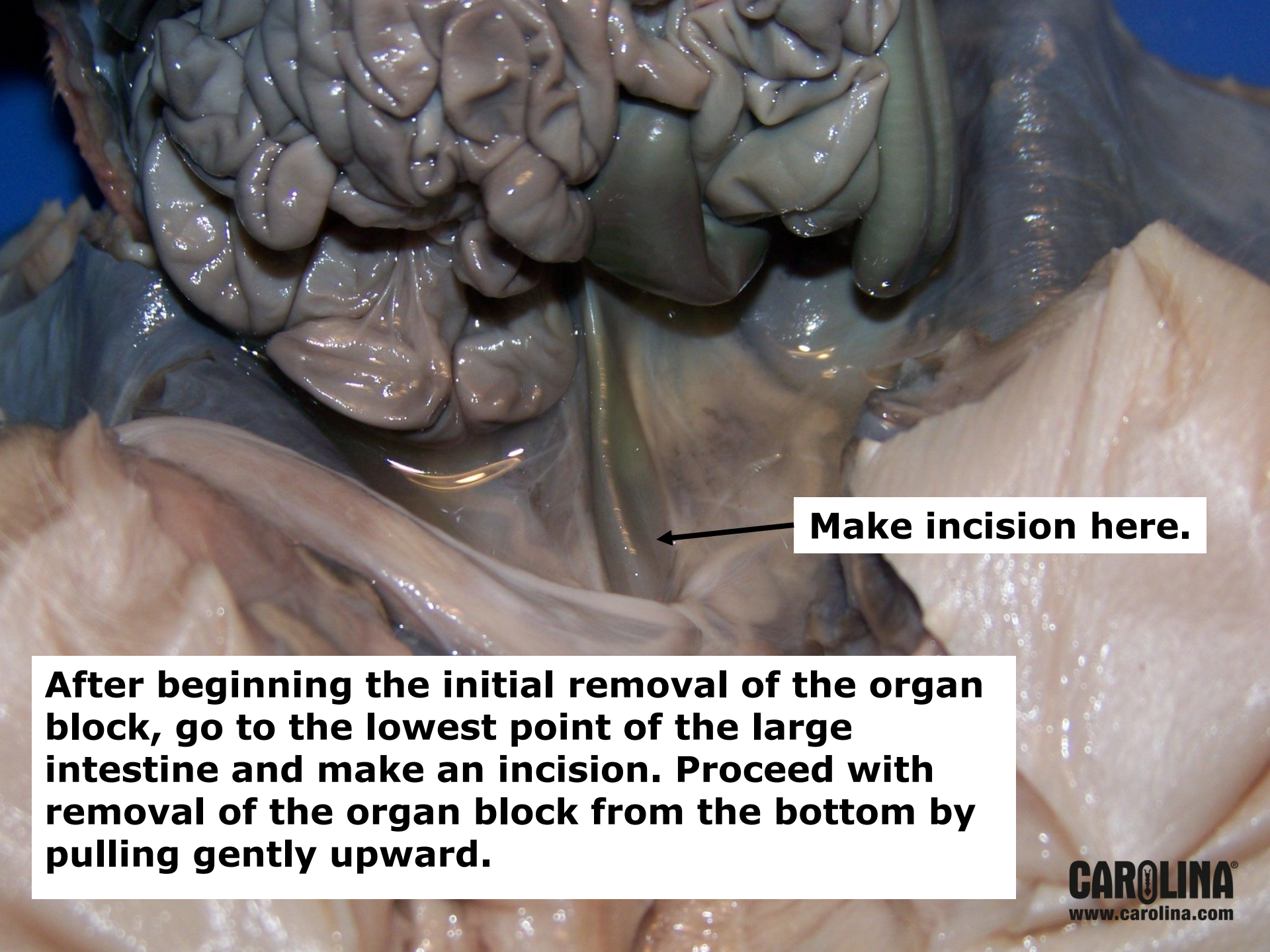
Before removing the organ block, have students look for and examine the pancreas. Gently lift the stomach and look for the gland tissue in the crease between the bottom of the stomach and the top of the intestines.



To begin removal of the organ block, make the initial incision at the top of the trachea, just below the larynx.

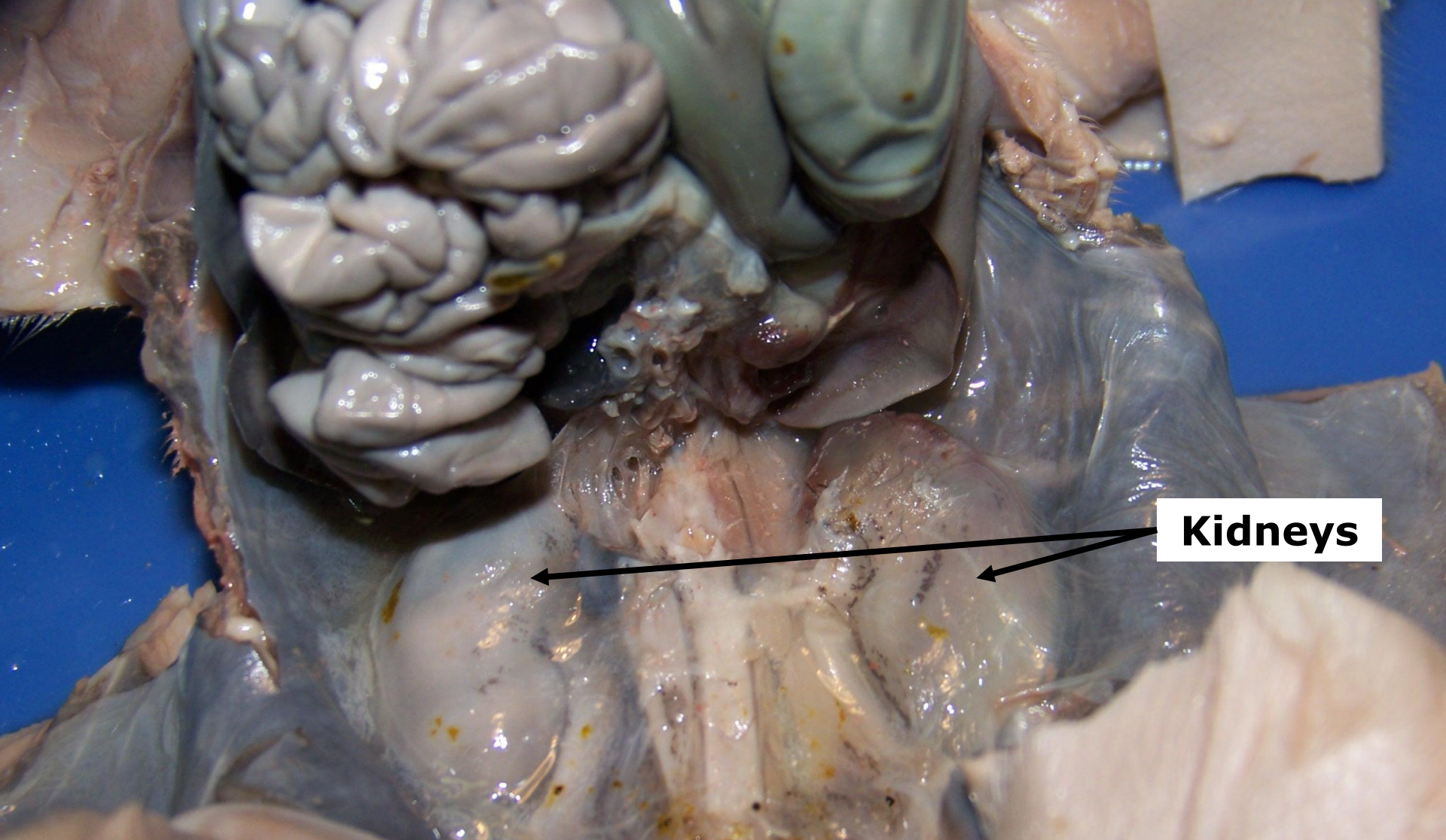


Lift from trachea and pull gently downward. Make sure you have included the esophagus lying posterior to the trachea. Use the tip of the scalpel to help remove the connective tissue that holds the organ block to the back of the body.



Make incision here.

After beginning the initial removal of the organ block, go to the lowest point of the large intestine and make an incision. Proceed with removal of the organ block from the bottom by pulling gently upward.



Kidneys

As you pull upward, note the kidneys in the posterior of the abdominal cavity. These can be removed later.





Organ Block Removed

- **Begin to remove organs individually.**
- **Measure the length and mass of each organ.**
- **Record in data table.**

Internal Anatomy

- **Respiratory system**
- **Endocrine system**
- **Circulatory system**
- **Digestive system**
- **Urogenital system**
- **Fetal pig heart vs. adult pig heart**
- **Fetal pig kidney vs. adult pig kidney**
- **Central nervous system (brain, spinal cord)**
- **Prepared microscope slides**

Bringing Home the Bacon!



Return all of the organs to the body cavity and suture the incisions.

Cleanup Instructions

- **KEEP GLOVES ON!**
- **STAY AT YOUR TABLE.**
- **Separate animal waste, tools, and trash.**
- **Only place animal waste in buckets.**
- **All other trash goes in trash bags.**
- **Wipe out pans, clean tools, and wipe off tables.**



We Can Meet Your Dissection Needs



Top-quality specimens and supplies



Additional Resources from Carolina

Carolina™ Dissection Mats

Guide students through dissection, teaching internal and external features.



Carolina Free Resources



Carolina offers many free resources to help support teachers.

CAROLINA[®]
www.carolina.com



CAROLINA[®]
www.carolina.com