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

The Per•fect Contest!

\pər-fikt\ adj.

To enter:

1. Take a pic of yourself wearing your **Perfect shirt.**

2. Post and tag Carolina on social media by the end of the conference.

3. Winners will be chosen after the show via social.

Bonus points for creativity!

@carolinascienceeducation

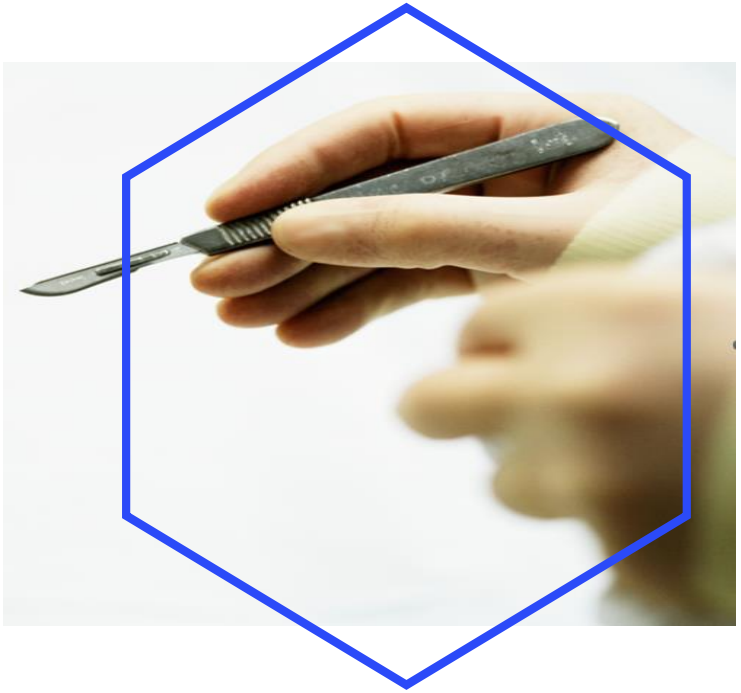
@Carolina Science Education

@CarolinaBio

CAROLINA UNLEASH LEARNING

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**



Building Toward 3-Dimensional Learning

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models • Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.	**LS1.A: Structure and Function** • Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.	**Structure and Function** • The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials. **Scale, Proportions, and Quantity** • Patterns observable at one scale may not be observable or exist at other scales.

Next Generation Dissections

1. NGSS Lead States, *Next Generation Science Standards: For States, By States* (Washington, DC: The National Academies Press, 2013), retrieved from www.nextgenscience.org or ngss.nsta.org

Learning Context

- **Forensic Science**—Inquiry, anatomy and physiology, autopsy techniques
- **Advanced Placement® Biology**—Evolution explains the diversity and unity of life
- **Anatomy and Physiology**—Comparative anatomy
- **High School and Middle School Life Science**—Body structure and functions

Carolina's Perfect Solution® Specimens

Quality

- Superior preservation
- Superior tissue color and texture

Safety

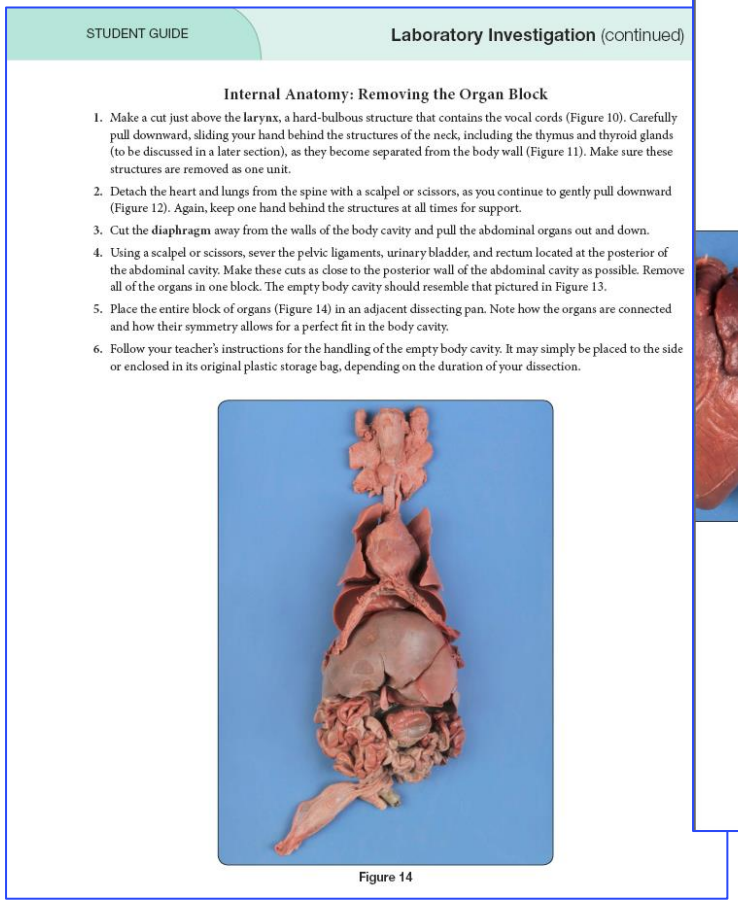
- No dangerous off-gassing
- No formalin odor

Carolina® Forensic Dissection Kit

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

Excerpt from Kit Manual

Students fill out a detailed autopsy report as they perform a thorough examination of pig external and internal anatomy.



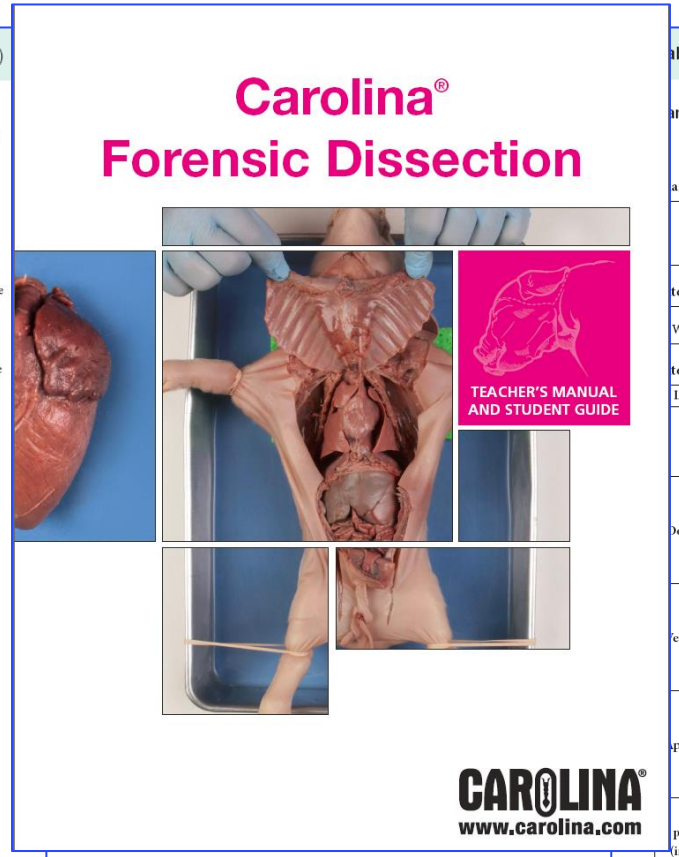
STUDENT GUIDE

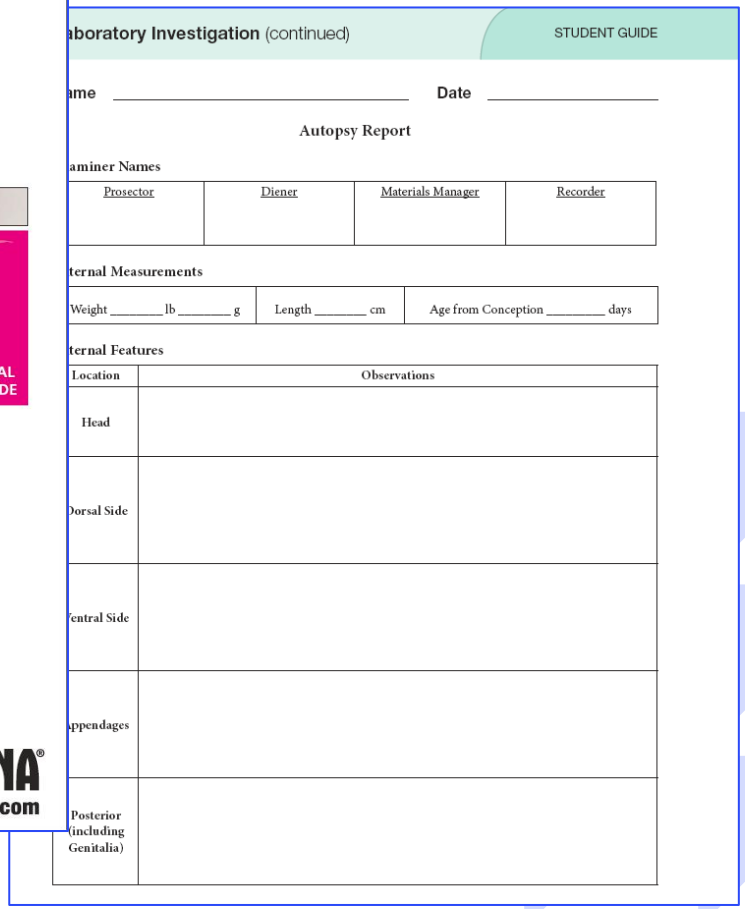
Laboratory Investigation (continued)

Internal Anatomy: Removing the Organ Block

1. Make a cut just above the **larynx**, a hard-bulbous structure that contains the vocal cords (Figure 10). Carefully pull downward, sliding your hand behind the structures of the neck, including the thymus and thyroid glands (to be discussed in a later section), as they become separated from the body wall (Figure 11). Make sure these structures are removed as one unit.
2. Detach the heart and lungs from the spine with a scalpel or scissors, as you continue to gently pull downward (Figure 12). Again, keep one hand behind the structures at all times for support.
3. Cut the **diaphragm** away from the walls of the body cavity and pull the abdominal organs out and down.
4. Using a scalpel or scissors, sever the pelvic ligaments, urinary bladder, and rectum located at the posterior of the abdominal cavity. Make these cuts as close to the posterior wall of the abdominal cavity as possible. Remove all of the organs in one block. The empty body cavity should resemble that pictured in Figure 13.
5. Place the entire block of organs (Figure 14) in an adjacent dissecting pan. Note how the organs are connected and how their symmetry allows for a perfect fit in the body cavity.
6. Follow your teacher's instructions for the handling of the empty body cavity. It may simply be placed to the side or enclosed in its original plastic storage bag, depending on the duration of your dissection.

Figure 14





aboratory Investigation (continued)

STUDENT GUIDE

ame _____ Date _____

Autopsy Report

aminer Names

Prosector	Diener	Materials Manager	Recorder

ternal Measurements

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

ternal Features

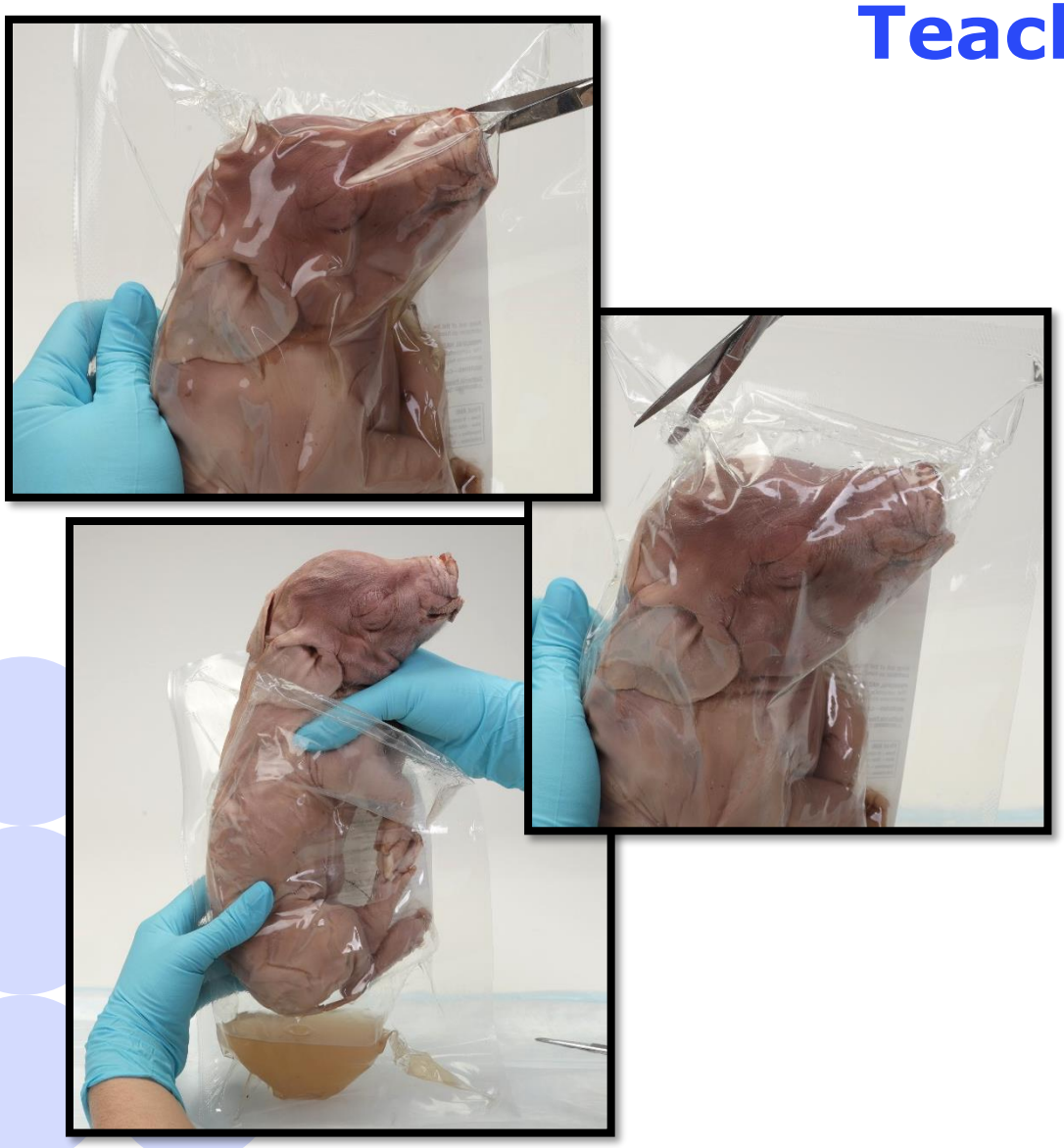
Location	Observations
Head	
Dorsal Side	
Ventral Side	
Appendages	
Posterior (including Genitalia)	

Safety Issues

- **Personal protective equipment**
  Gloves, goggles, and lab aprons
- **Dissection tools**
  Be diligent with sharp tools

Safety Tip
If you are not using an instrument, set it down!

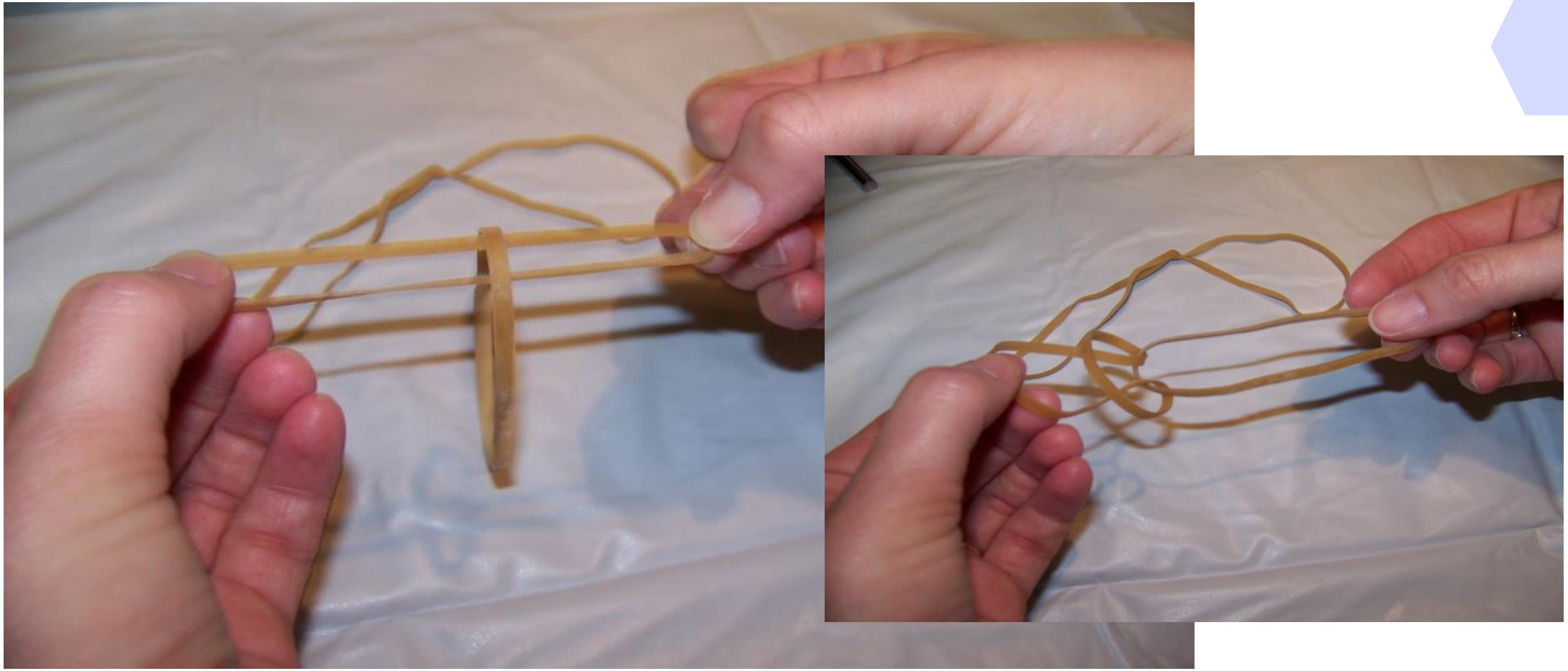
Teacher Tip



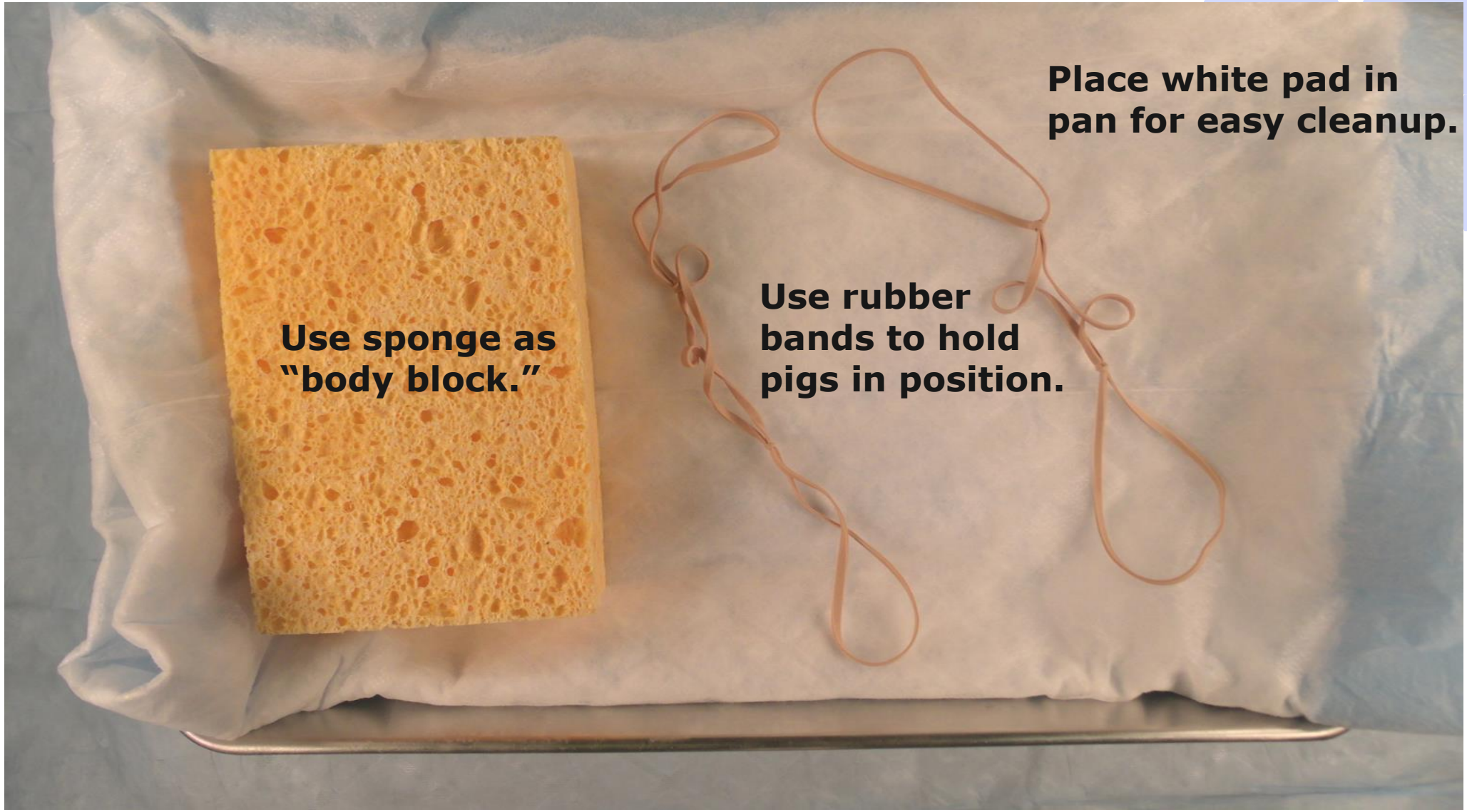
1. **At the anterior of the specimen, locate an area where there is excess plastic.**
2. **Force any fluid out of the area to prevent spills.**
3. **Cut a small hole in the excess plastic. This will allow the fluid to drain to the bottom of the bag.**
4. **Continue to cut around the anterior of the specimen until you can easily remove the specimen from bag.**
5. **Keep bag upright until we collect fluid and bag.**

Teacher Tip

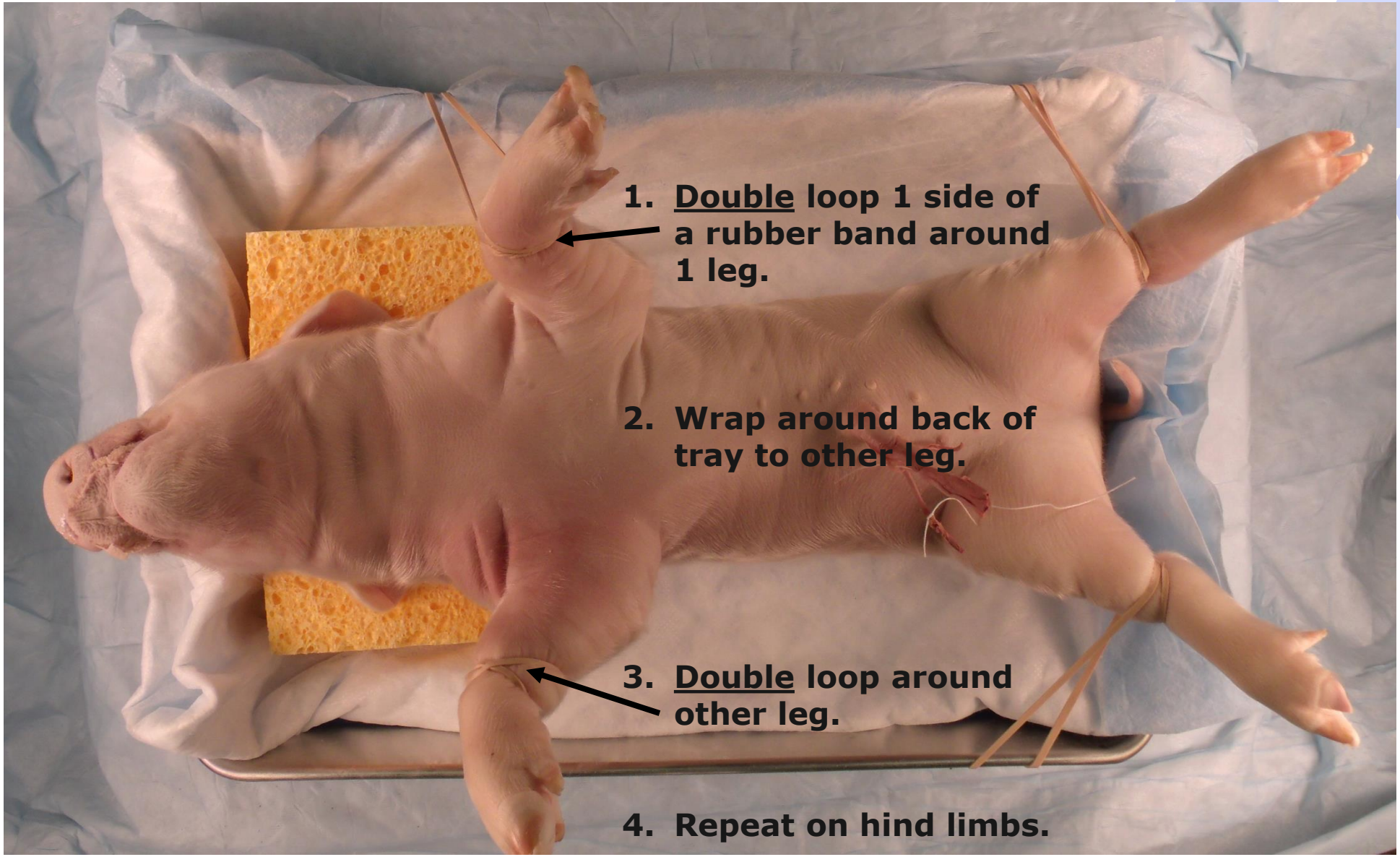
Use rubber bands instead of string to secure pigs in pans.



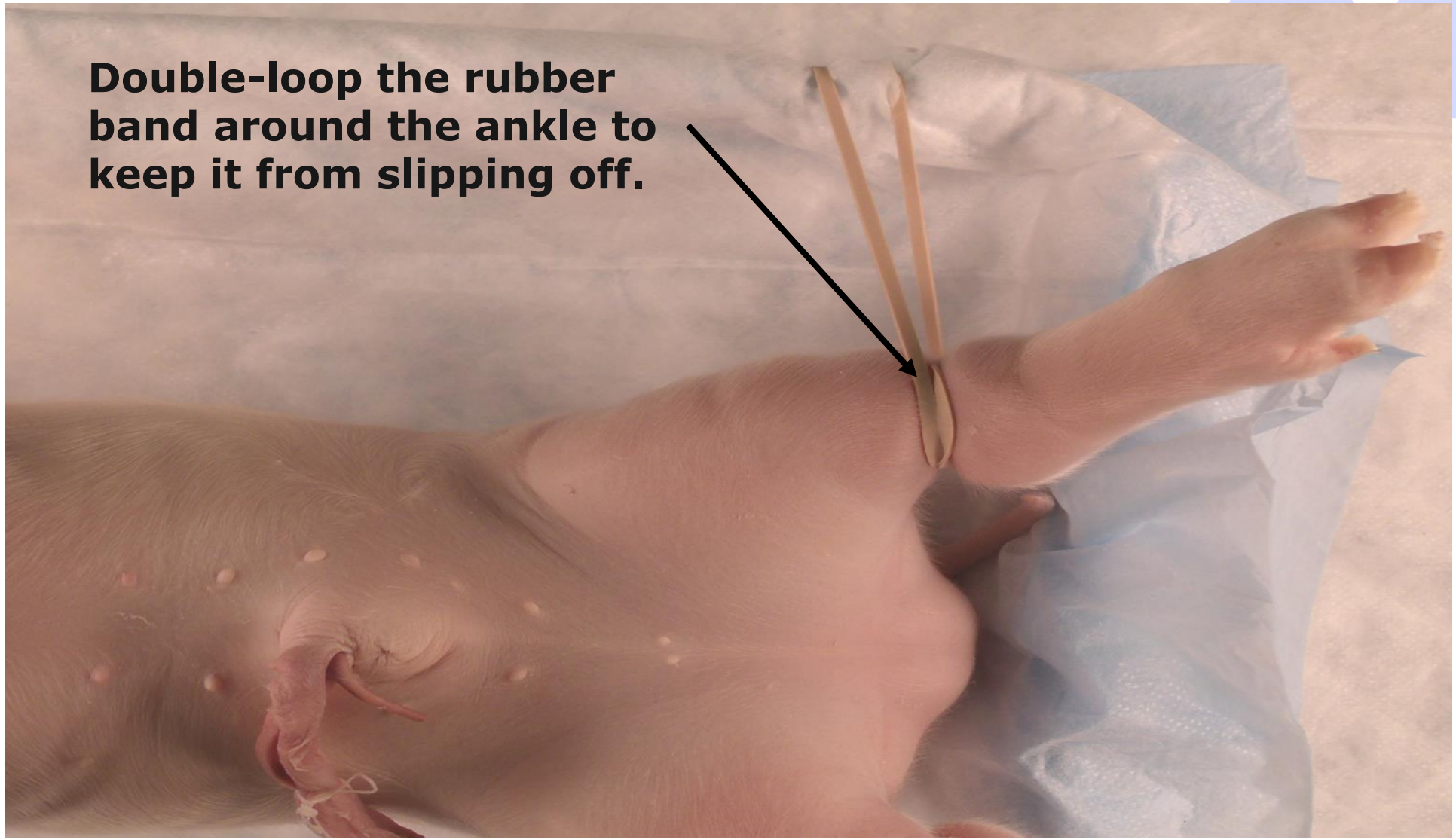
Teacher Tips



Secure Your Pig



Teacher Tip

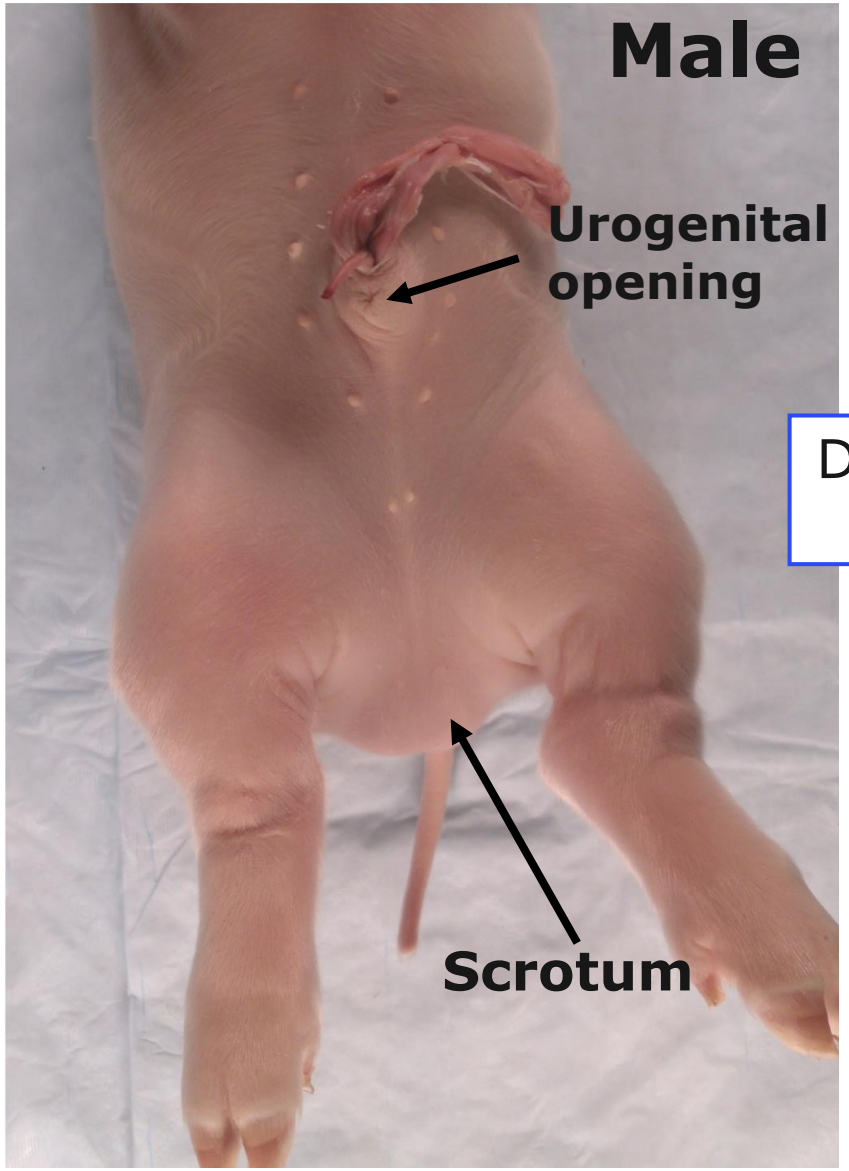


External Anatomy

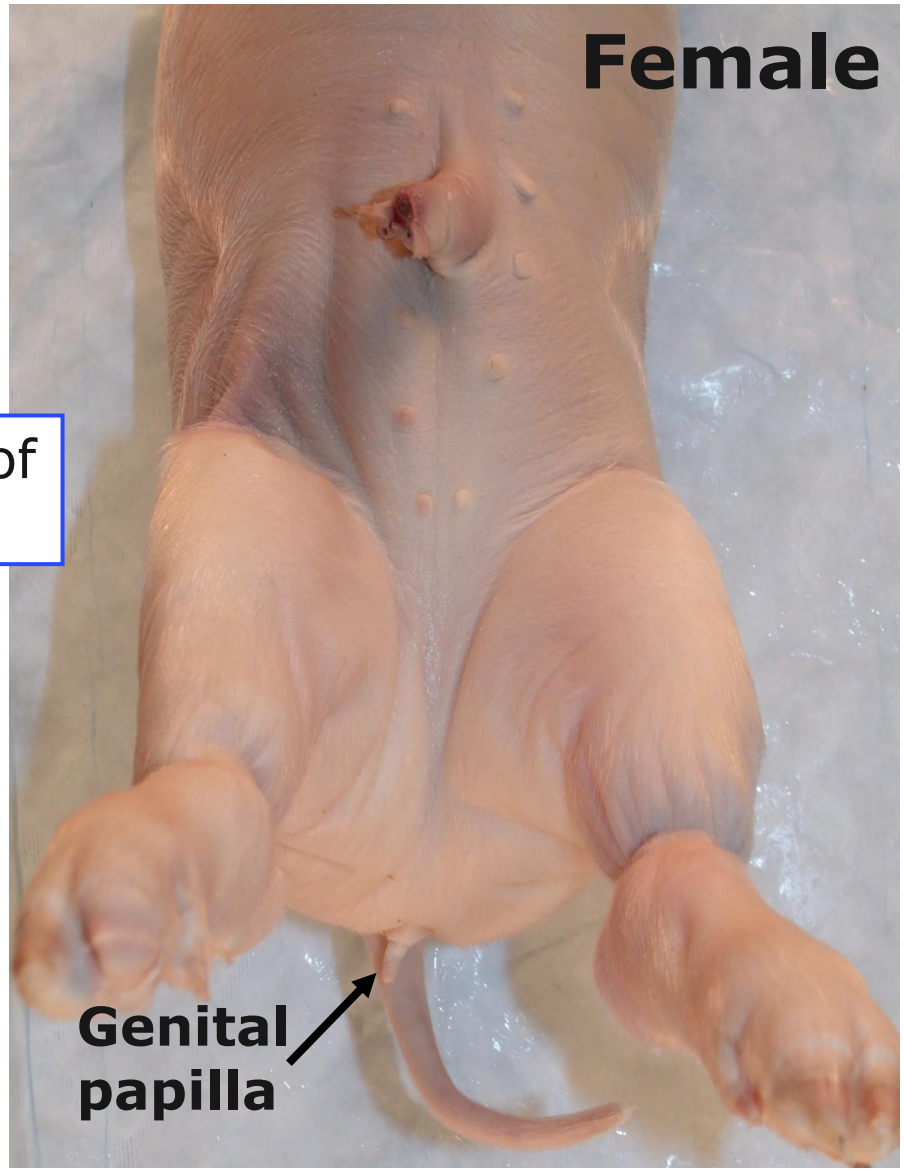
Examine external features of the head:

- ✓ **Hair**
- ✓ **Mouth**
- ✓ **Nostrils**
- ✓ **Tongue**
- ✓ **Ears**
- ✓ **Eyes**

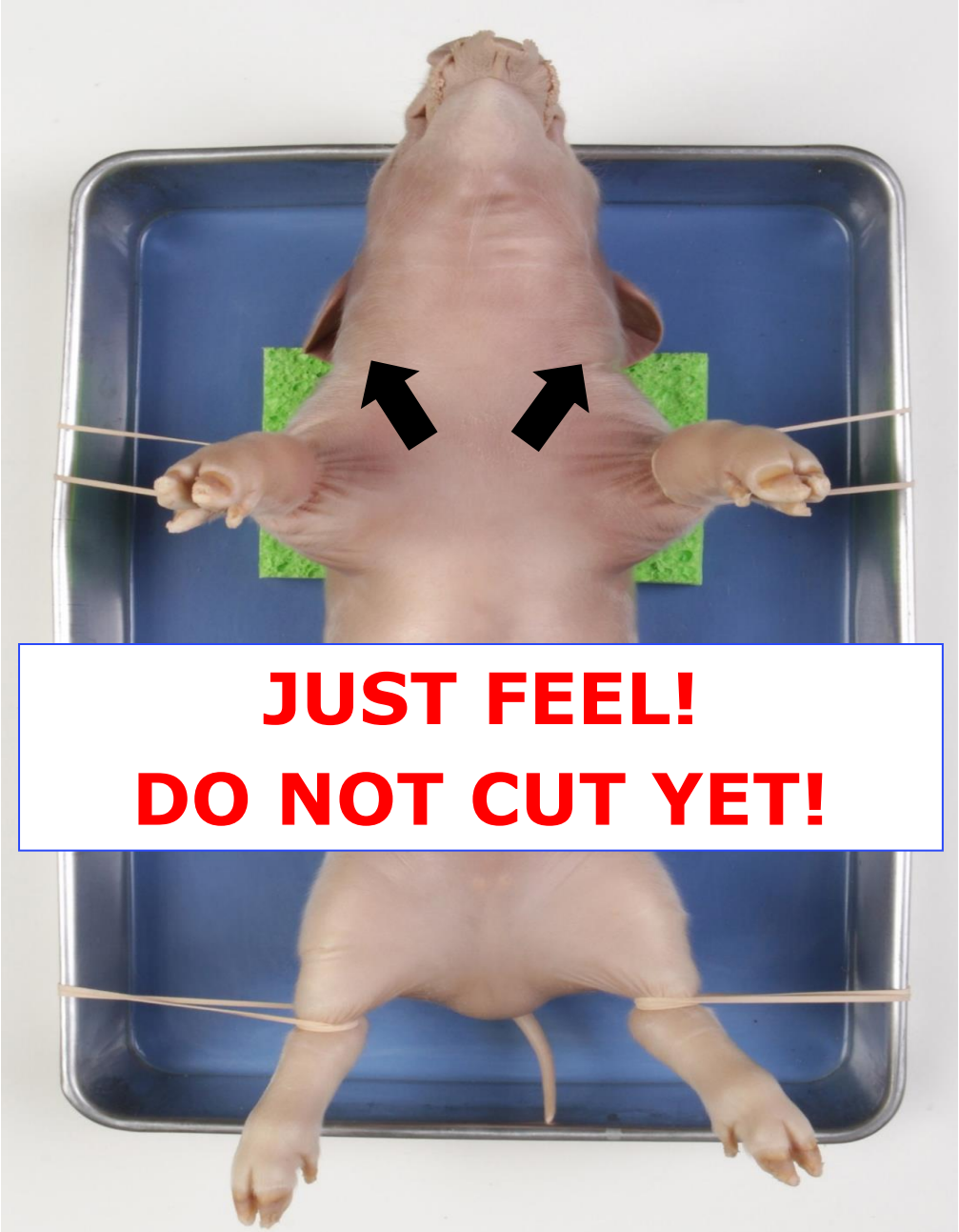
External Anatomy



Determine the sex of your specimen.

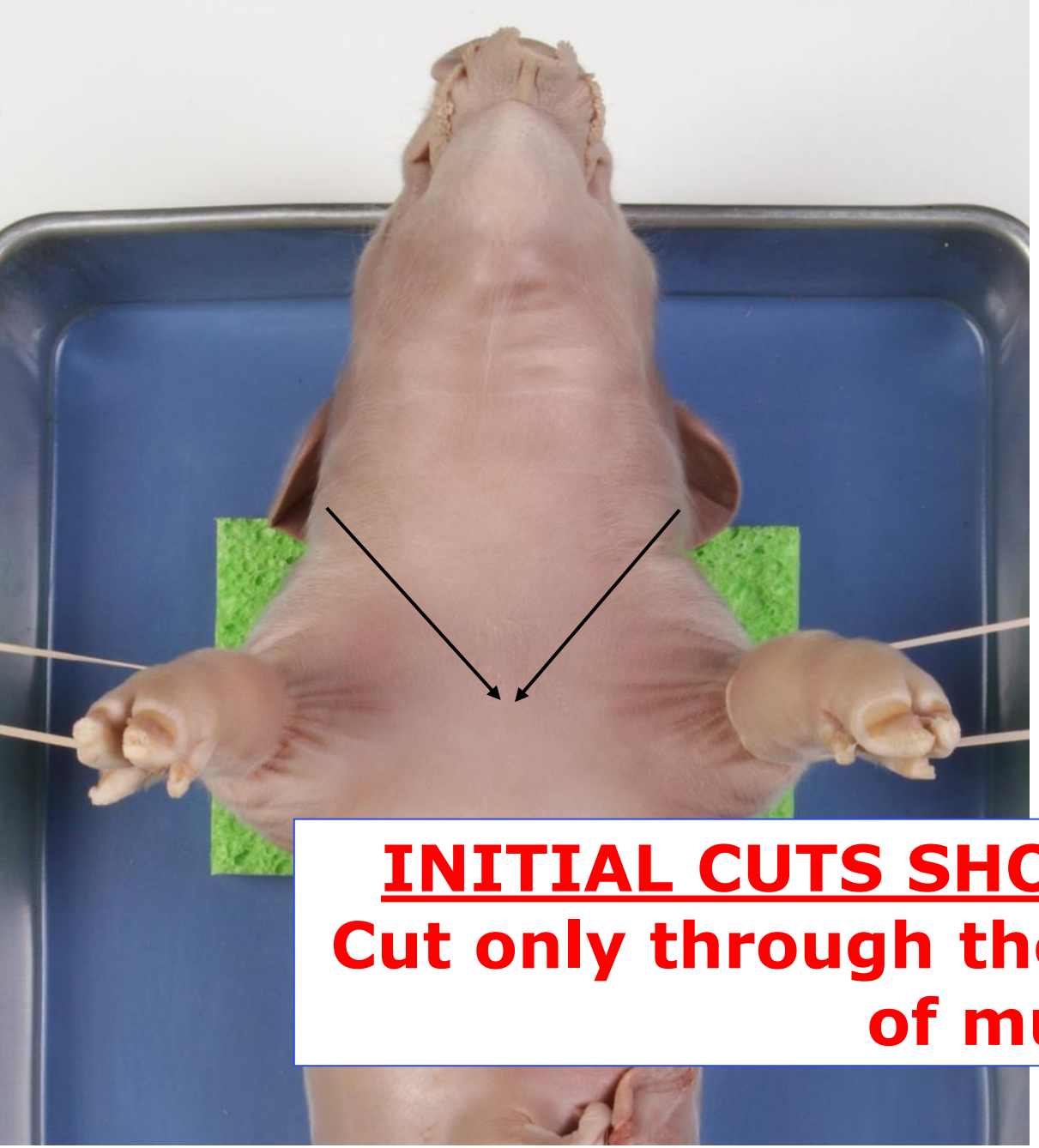


Prepare for Internal Anatomy



The initial incisions will expose the structures of the neck.

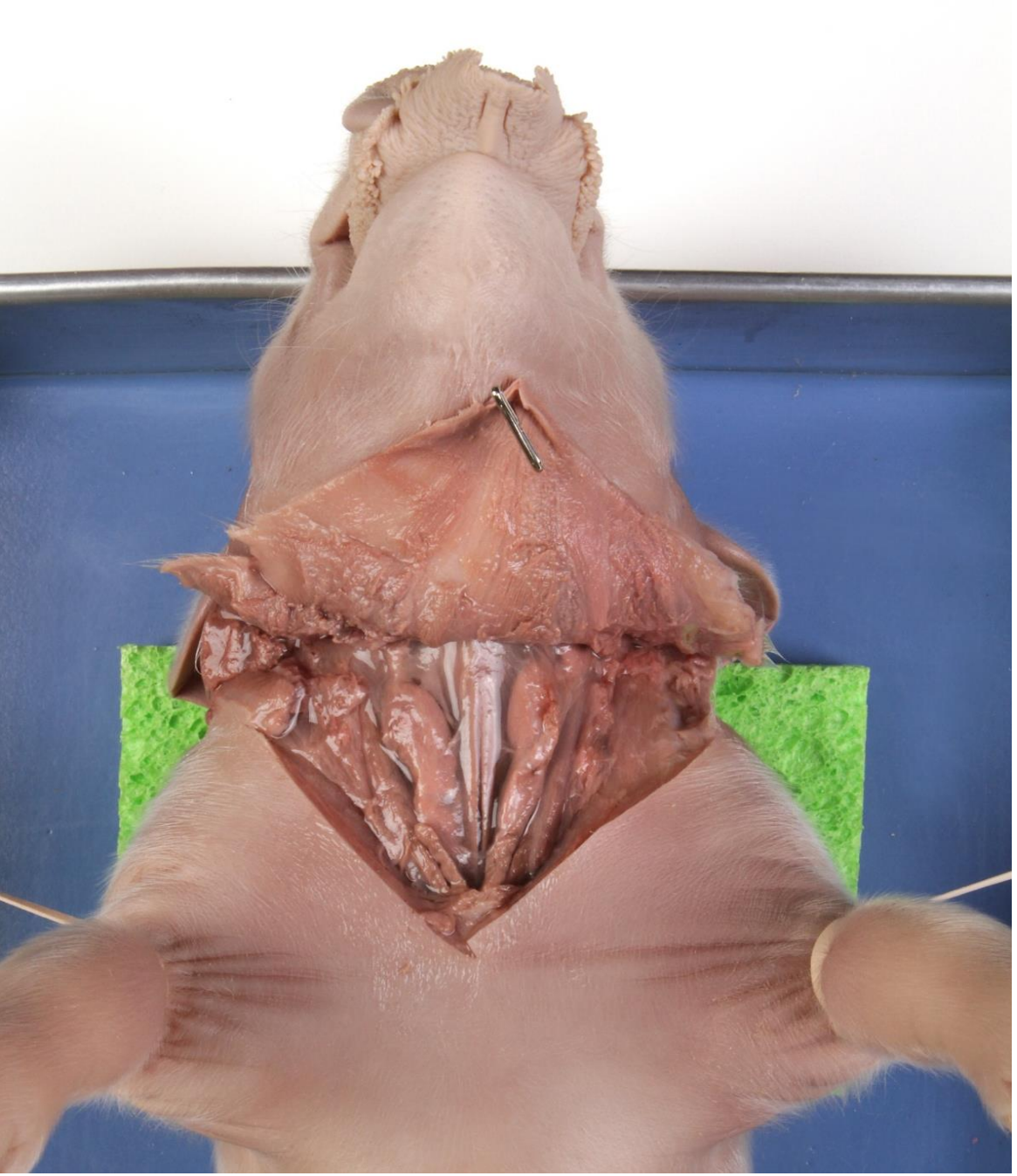
Feel for the space between the top of the shoulder and the corner of the jaw indicated by the ⬆. This is where the initial incisions will begin.



First Incisions

Make the V-shaped cut indicated by the black arrows.

<u>INITIAL CUTS SHOULD BE SHALLOW!</u>
Cut only through the skin and first layer of muscle!



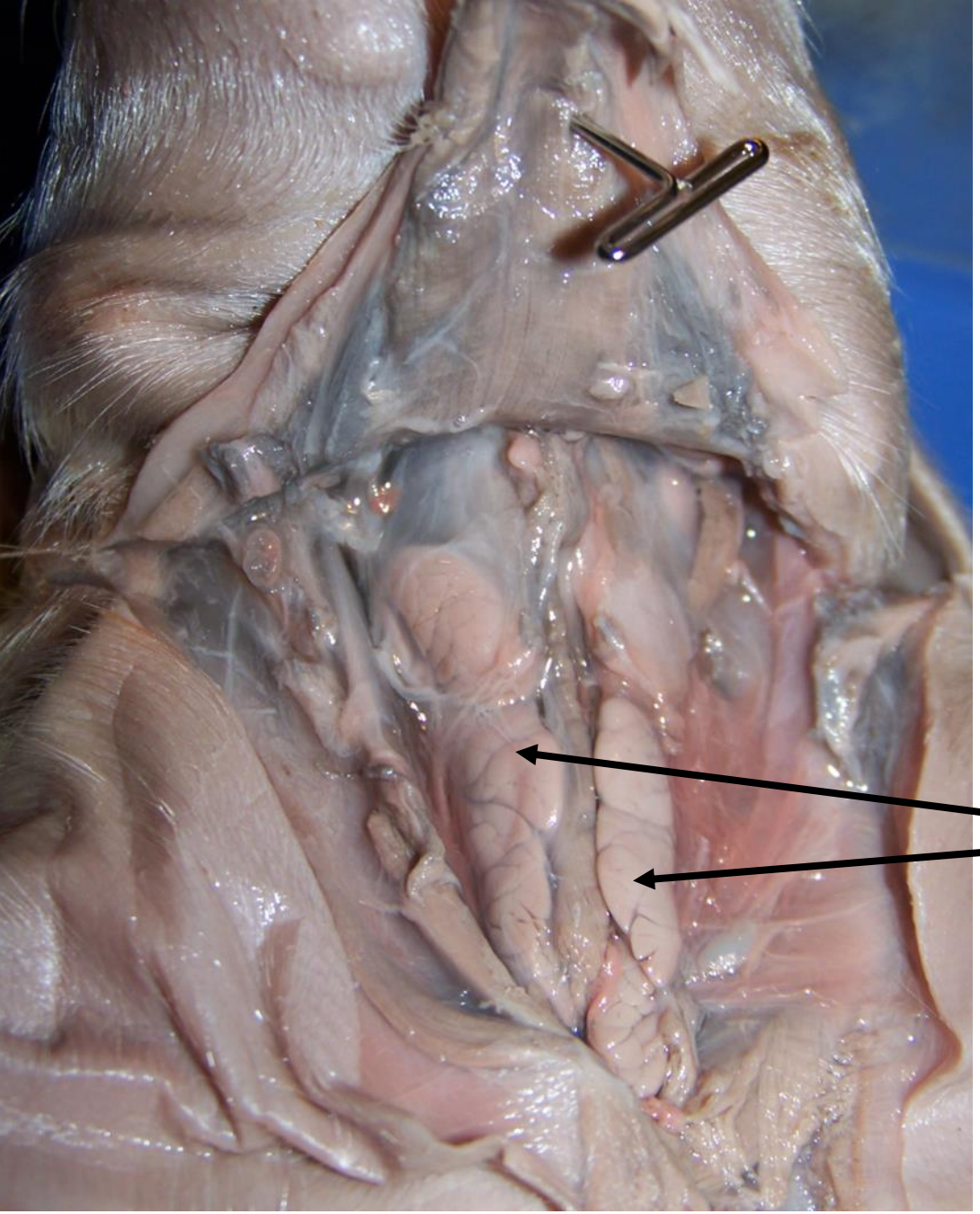
First Incisions

Lift the V-shaped flap and pull it gently upward.

Use the tip of the scalpel to assist in lifting the flap.

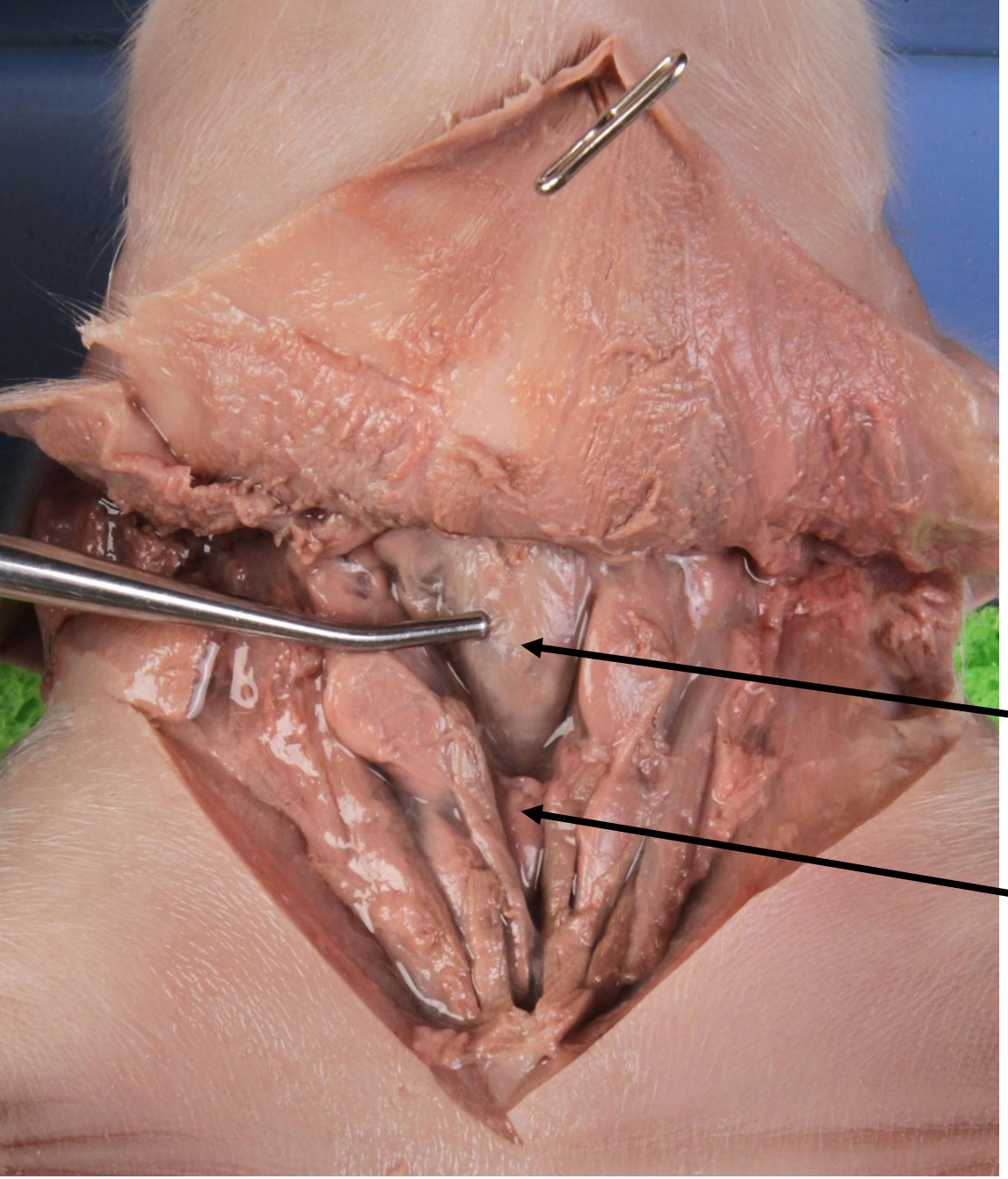
The Neck

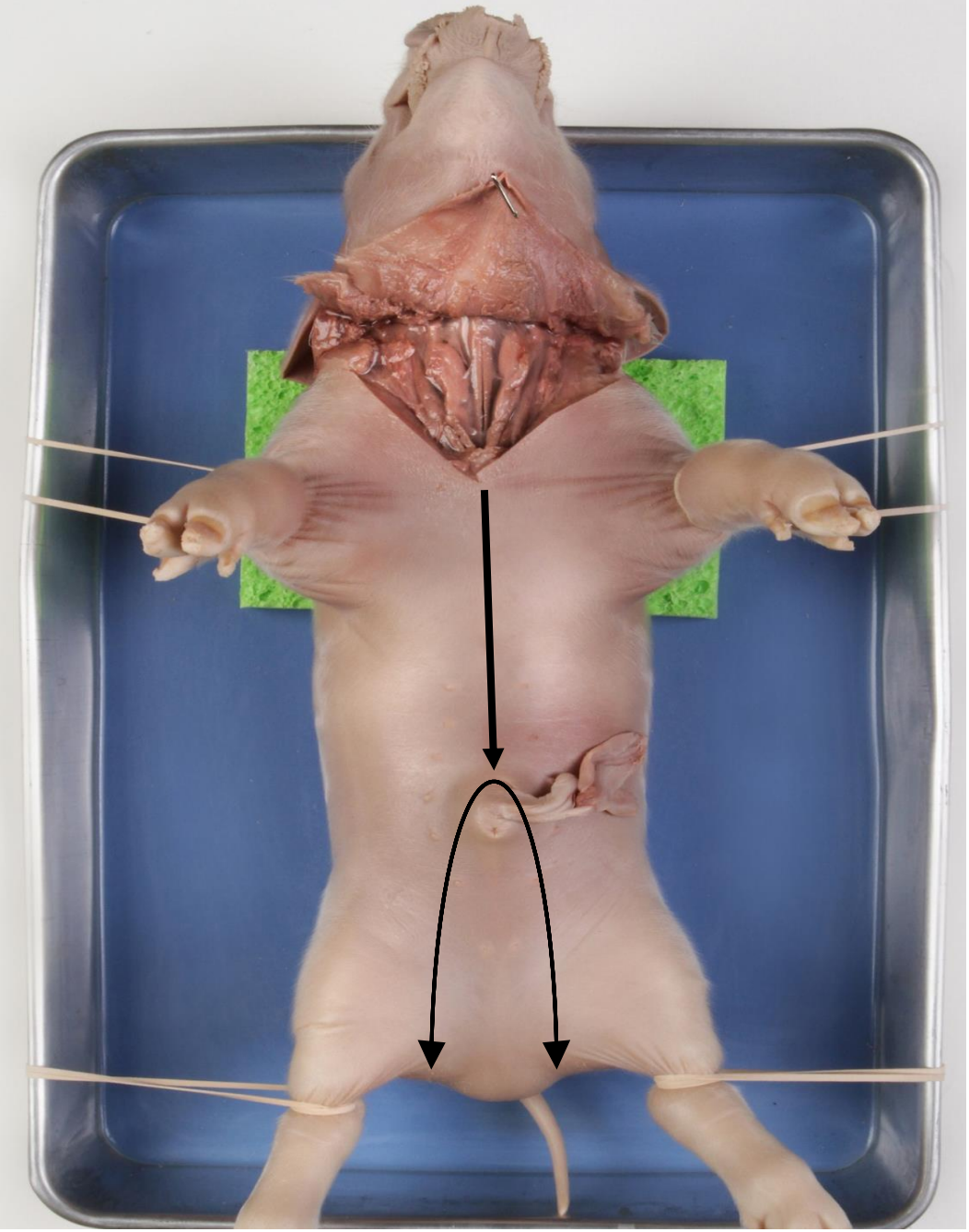
Push the thymus tissue to either side with your blunt probe to expose the **thyroid gland** and **larynx** below, lying between these 2 masses.



The Neck

Gently push the thyroid gland to the side to reveal the rings of the **trachea**, connected to the **larynx.**





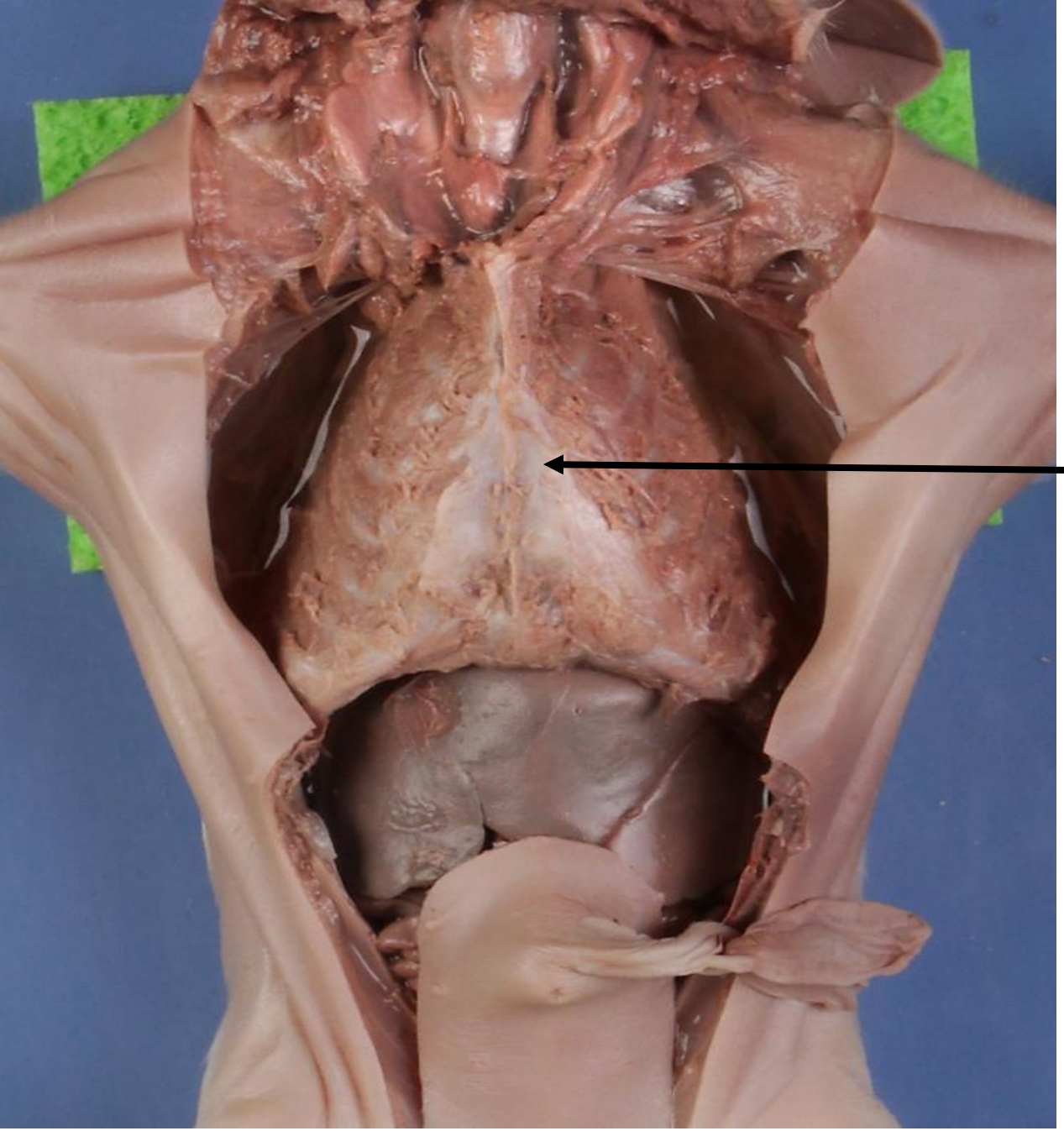
Finishing the Classic Y Incision

Continue cutting the tail of the Y incision until you reach the umbilical cord.

Cut around the top of the umbilical cord. Continue the cuts, in parallel, toward the posterior of the pig.

THE INITIAL CUTS SHOULD BE SHALLOW, cutting only through the skin and first layer of muscle!

CAROLINA UNLEASH LEARNING

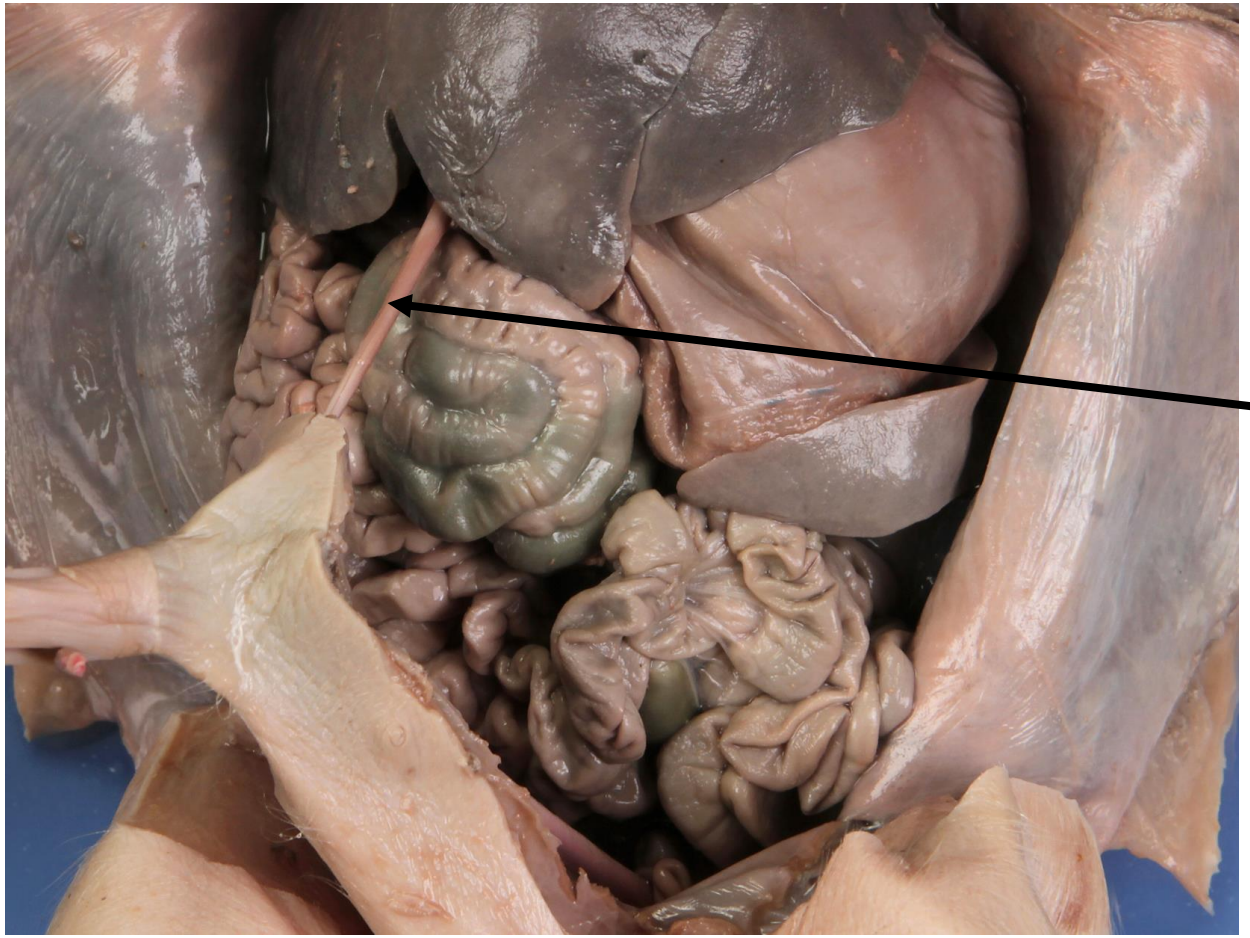


Finishing the Classic Y Incision

Use your scalpel to peel the skin and tissue away from midline incision to reveal the **chest plate**.

DO NOT CUT THE CHEST PLATE!

Finishing the Classic Y Incision



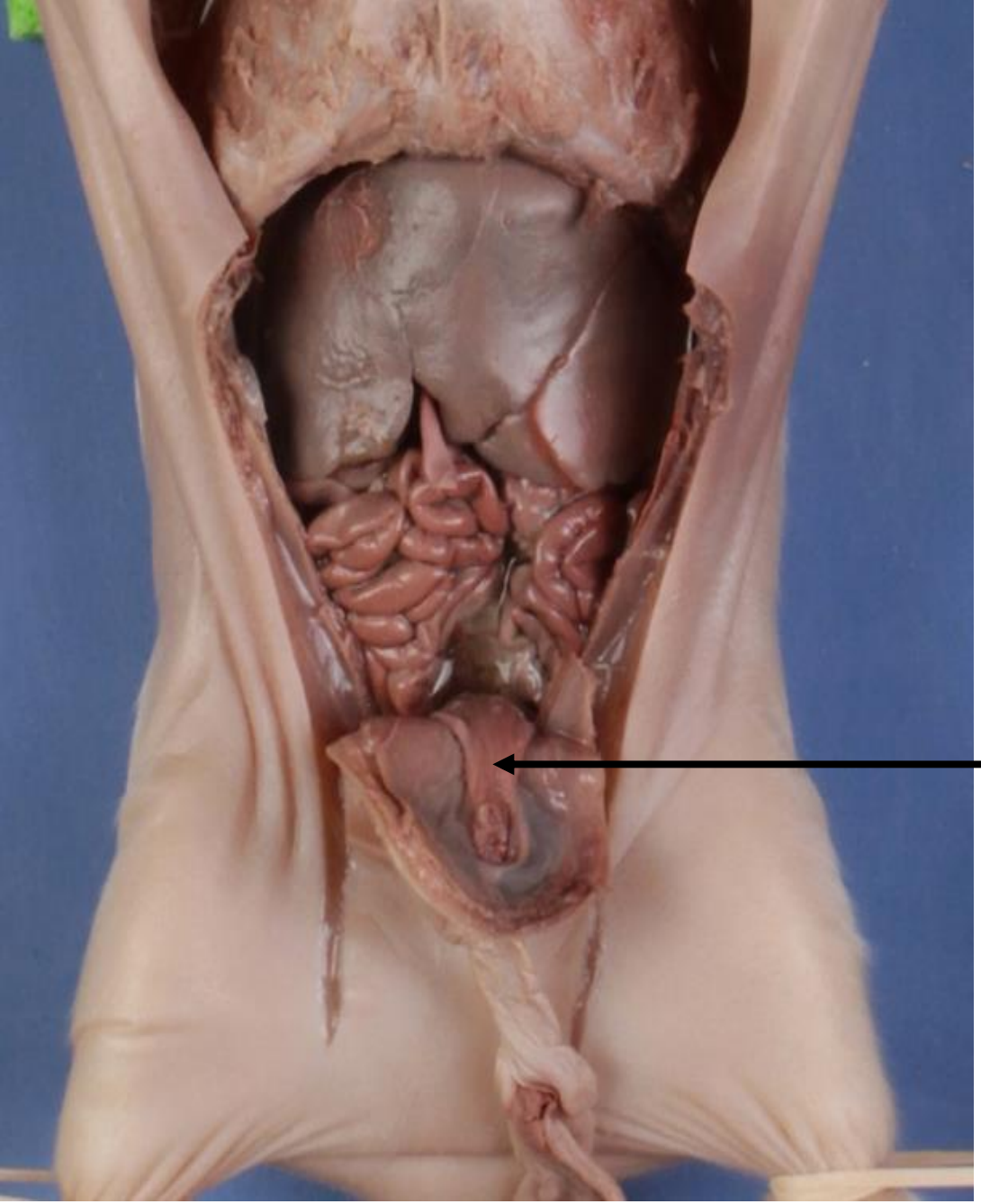
Pull back the skin flap containing the umbilical cord.

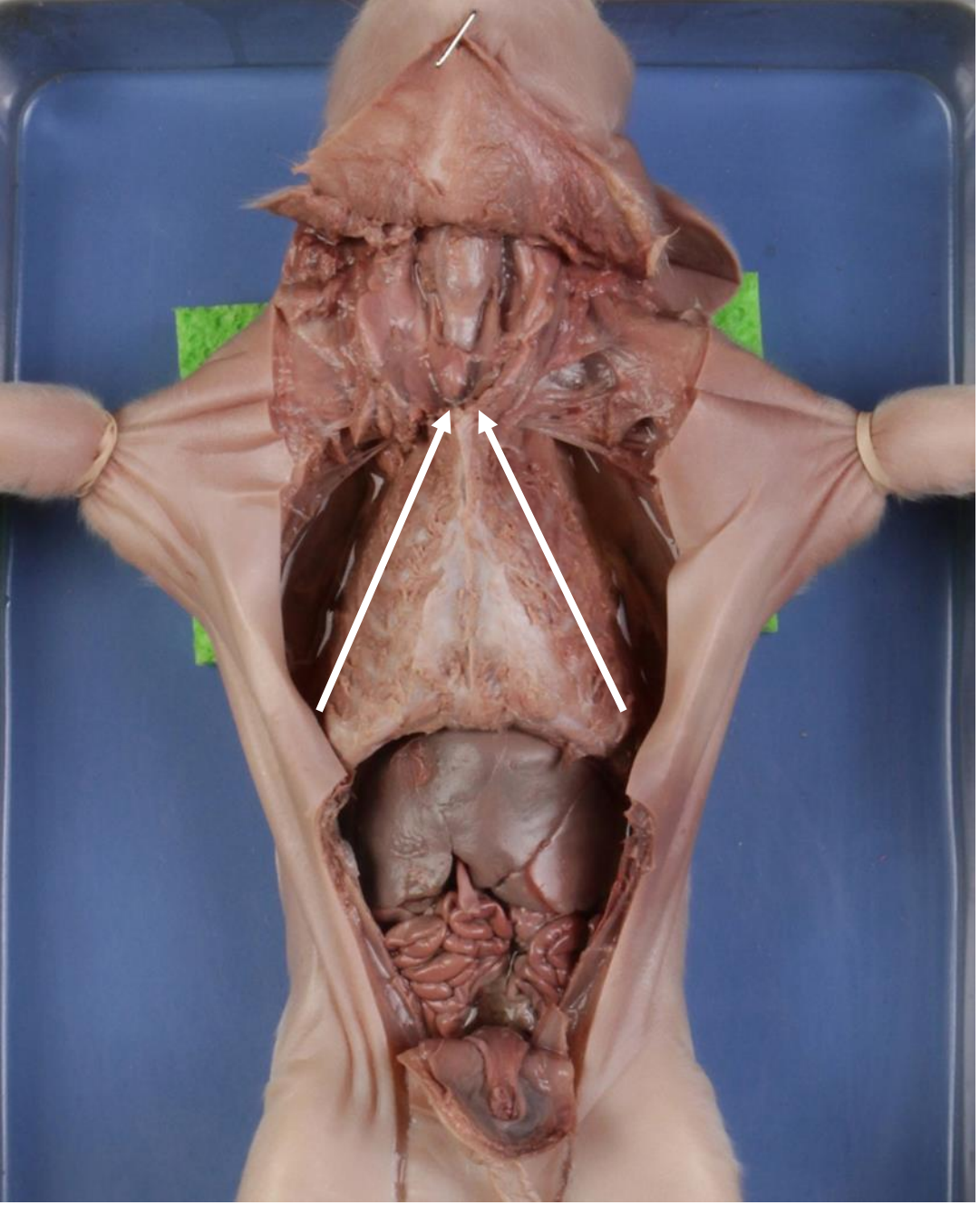
Locate the **umbilical vein** connected to the liver. Snip this vein and lay the skin flap between the back legs.

Finishing the Classic Y Incision

On the skin flap, locate the **urinary bladder**.

It is a deflated, muscular sac that can be detached from the skin flap.



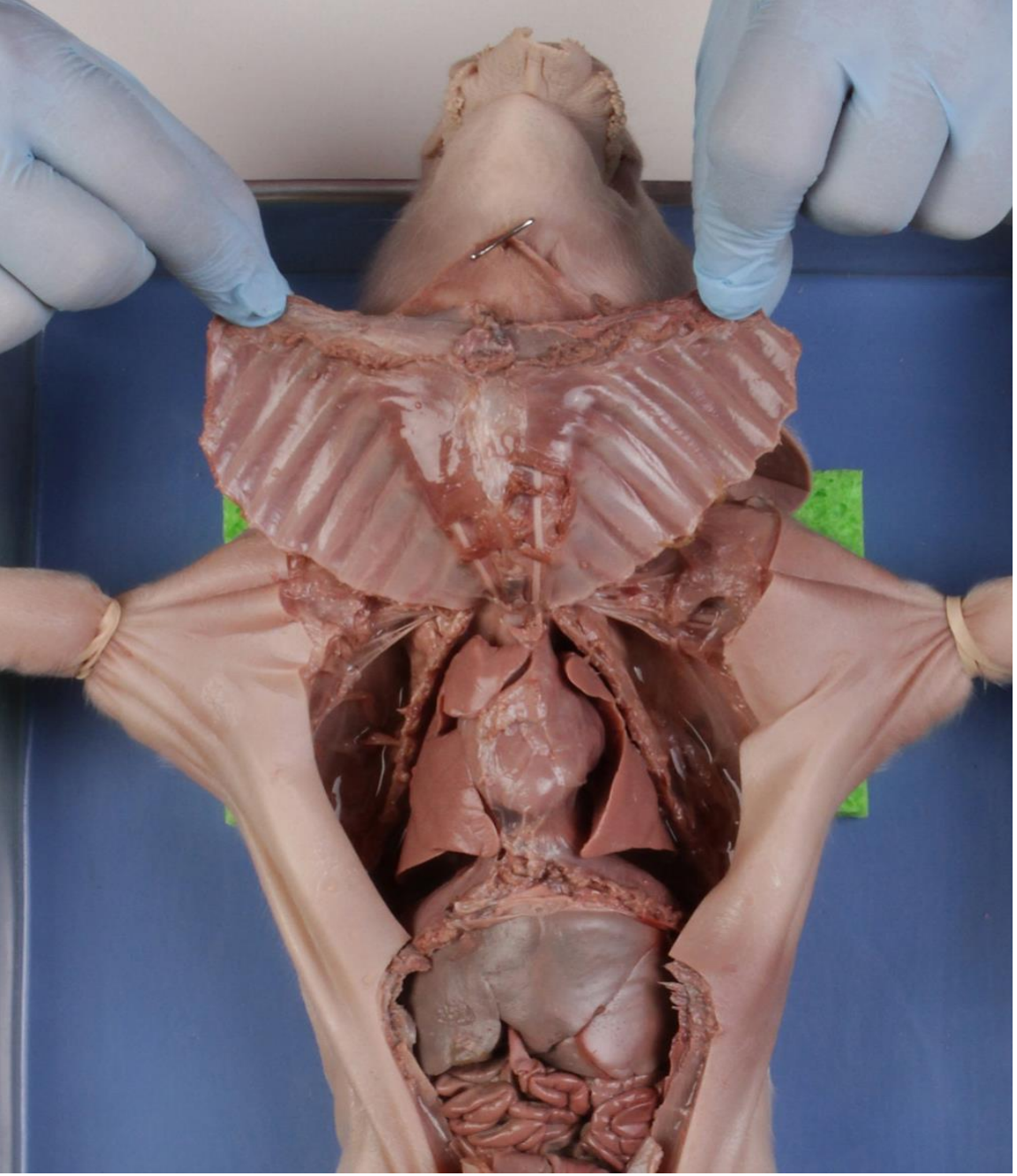


Removing the Chest Plate

Cut up each side of the rib cage as indicated by the white arrows.

Stay low in the chest cavity.

Share the provided bone cutting forceps at your table.

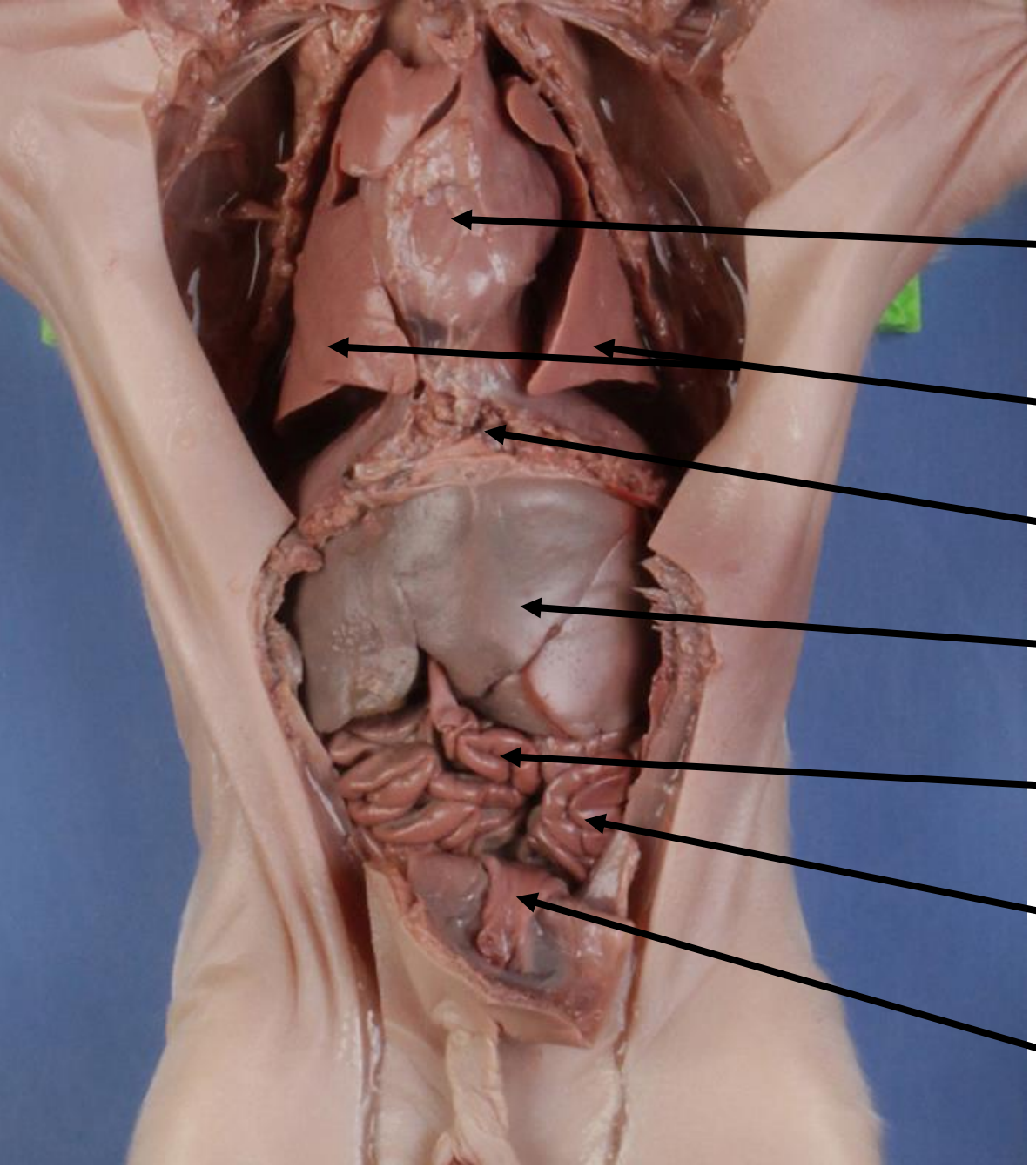


Removing the Chest Plate

The **diaphragm**, a thin sheet of muscle, may still be attached at the bottom of the rib cage. Cut the diaphragm away, so the chest plate can be lifted.

Snip the apex of the chest plate and remove it completely.

Chest Plate Removed



Heart (with overlying thymus and pericardial sac)

Lungs

Diaphragm

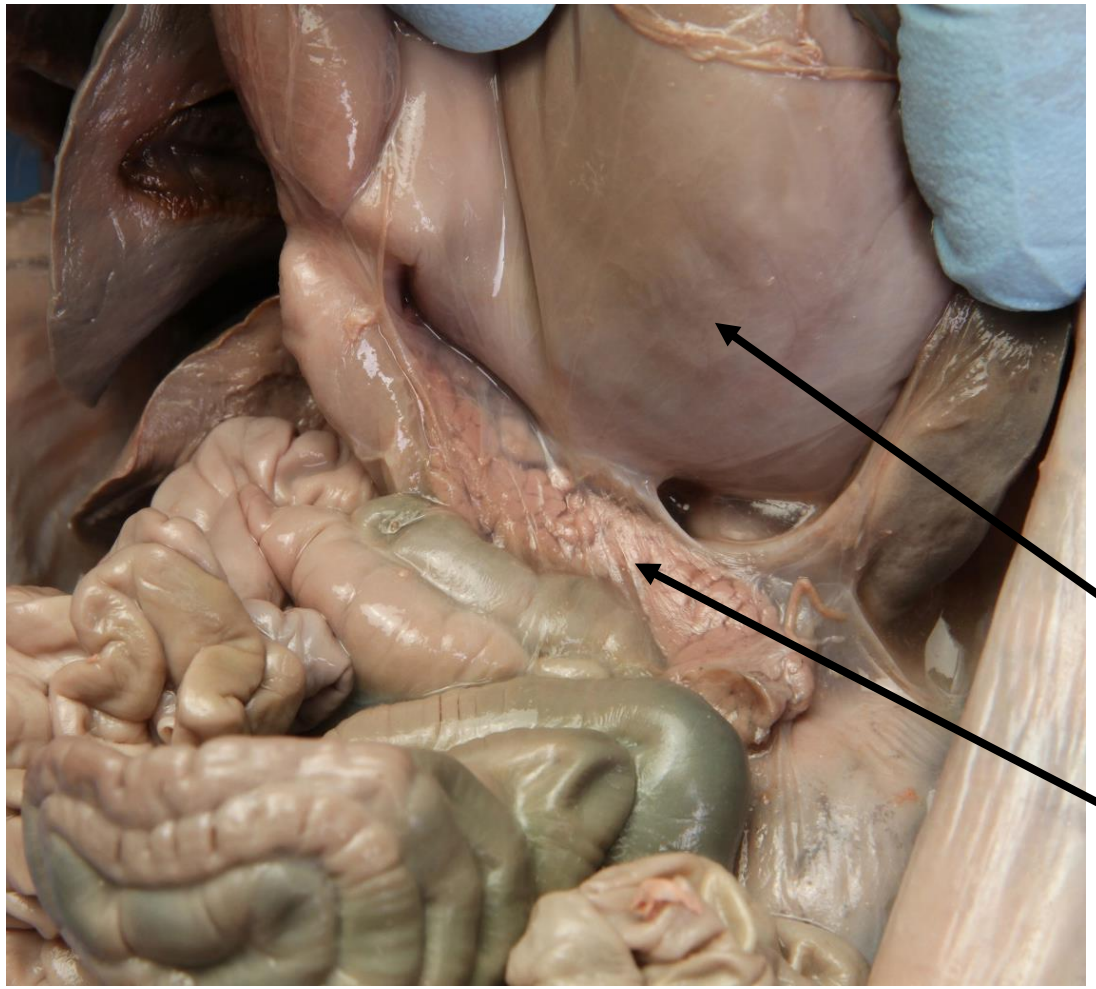
Liver

Small Intestine

Large Intestine

Urinary Bladder

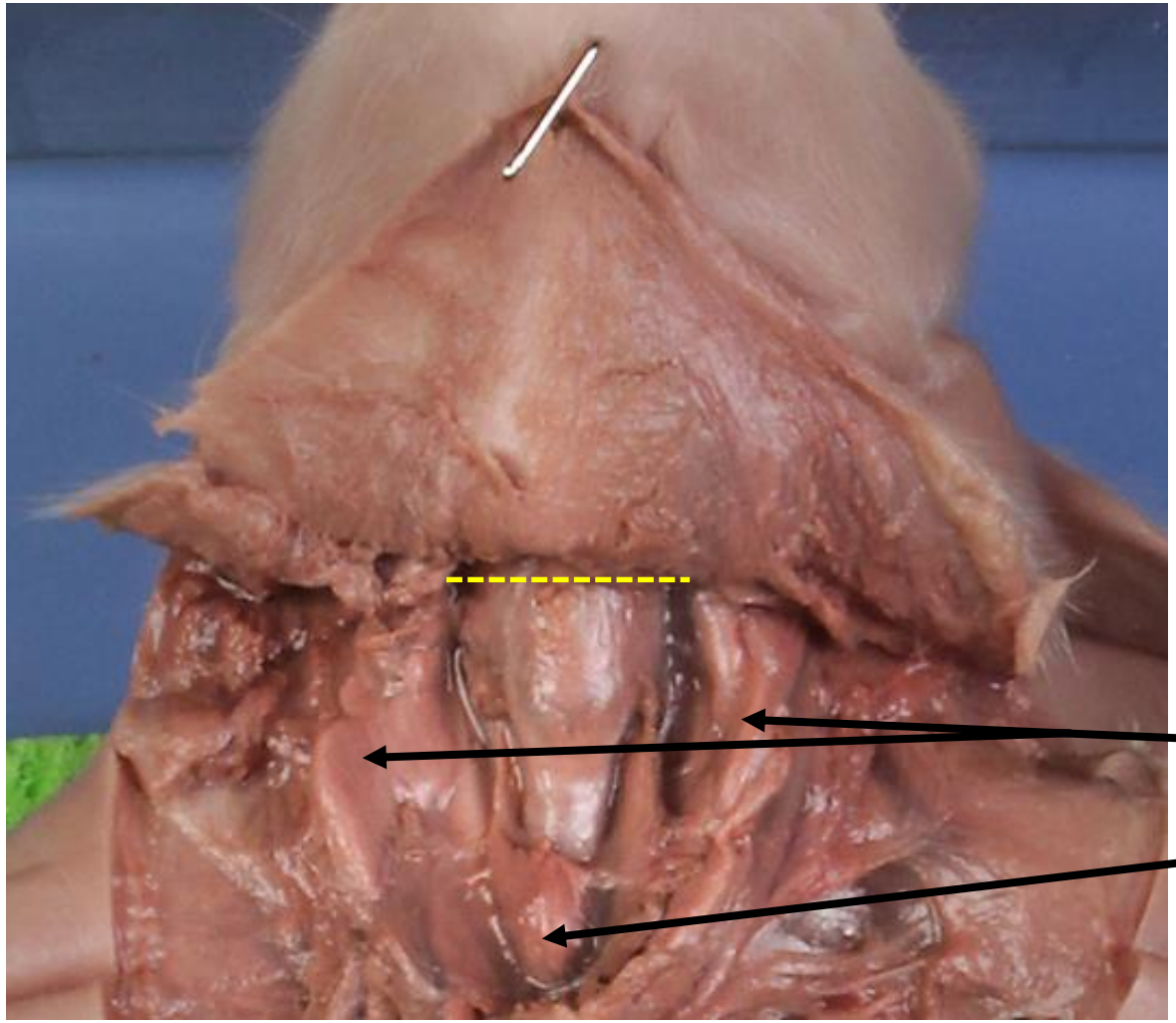
Chest Plate Removed



Locate the pancreas:

Gently lift the stomach. Look for the glandular tissue in the crease between the bottom of the stomach and the top of the intestines.

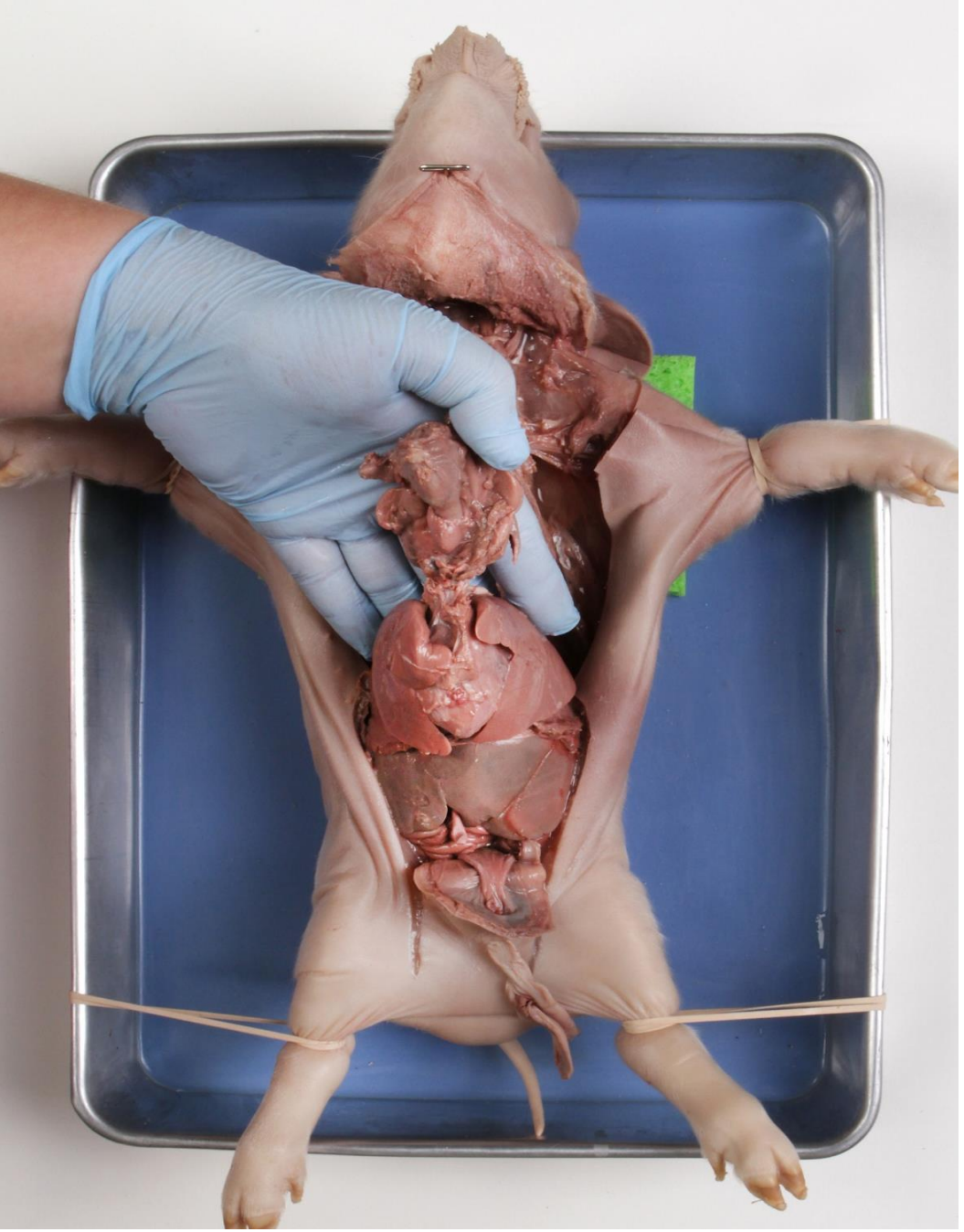
Removing the Organ Block



Make the initial incision at the top of the **larynx**, indicated by the yellow dashed line.

With your fingers, lift the **larynx** and gently begin to pull downward.

Try to remove all the **thymus** and **thyroid gland.**



Removing the Organ Block

Continue to gently pull downward.

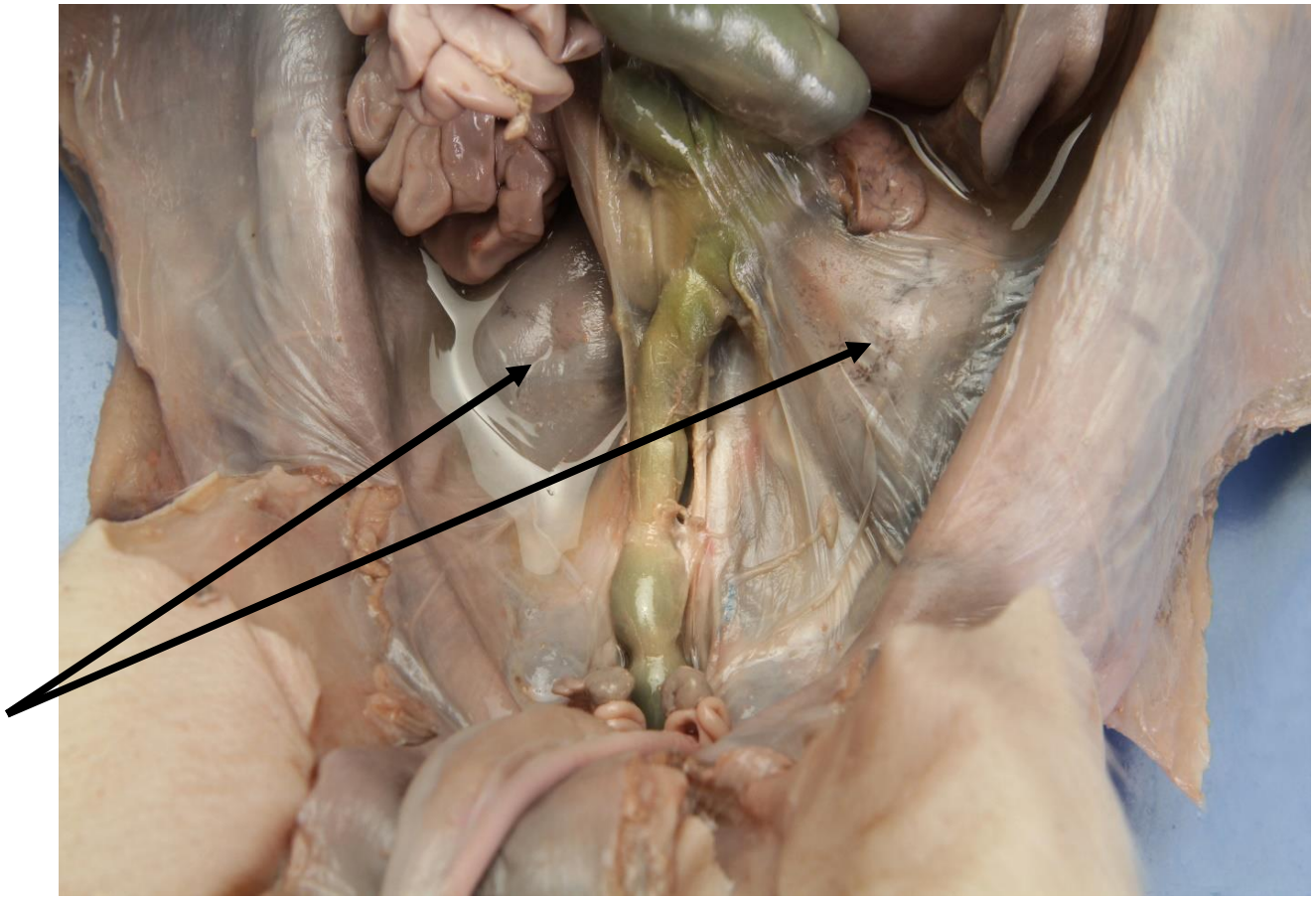
Make sure you have included the **esophagus**, a muscular tube, lying posterior to the trachea.

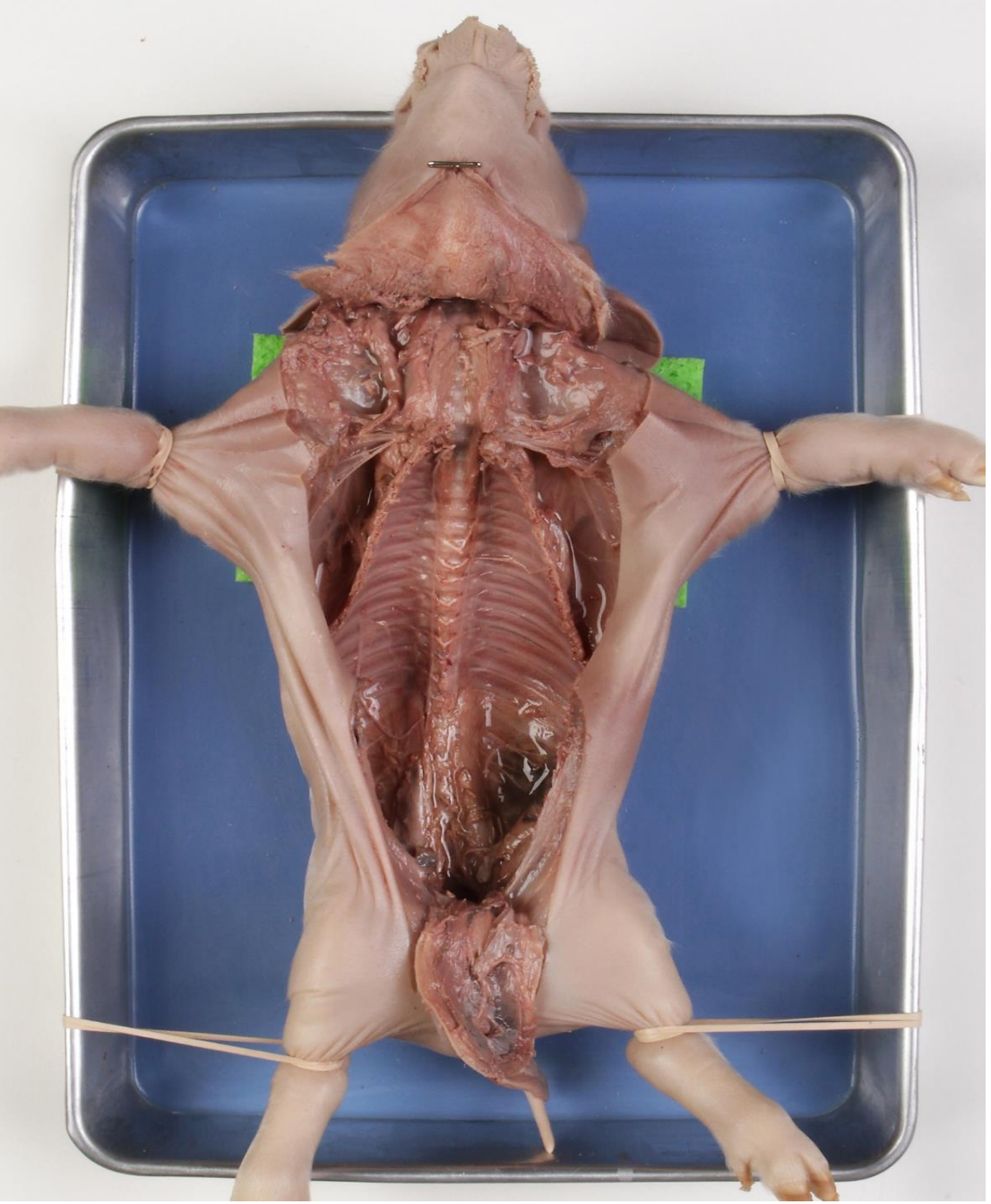
Use your hand or the tip of the scalpel to help remove the connective tissue that holds the organ block in place.

Removing the Organ Block

As you pull upward, note the **kidneys** covered by a thin membrane in the posterior of the abdominal cavity.

Try to remove these with the organ block. If you cannot, they can be removed later.





Removing the Organ Block

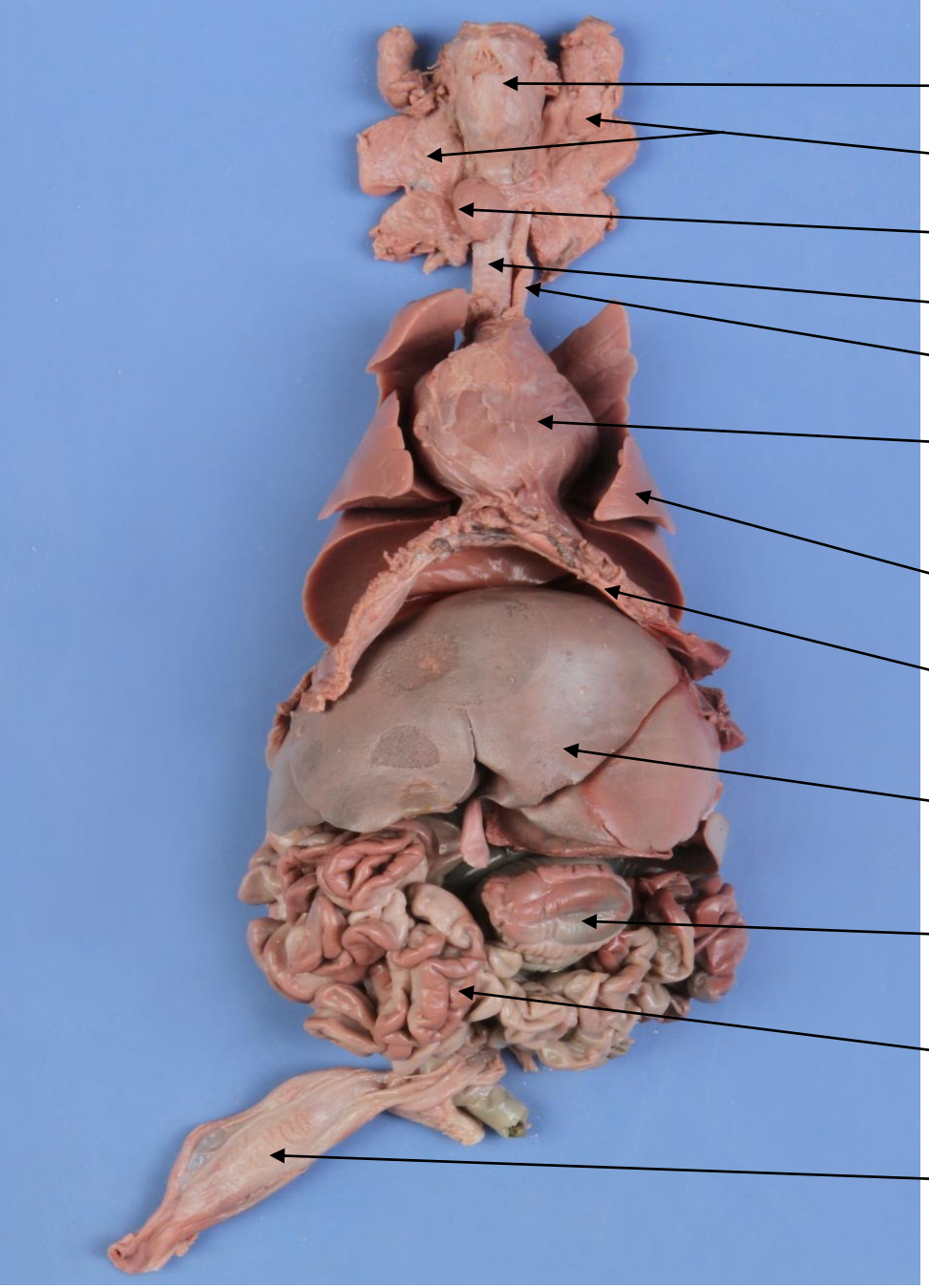
At the lowest point of the **large intestine**, make an incision.

Proceed with removal of the organ block from the body cavity.

Make sure to also remove the **urinary bladder** from the skin flap.

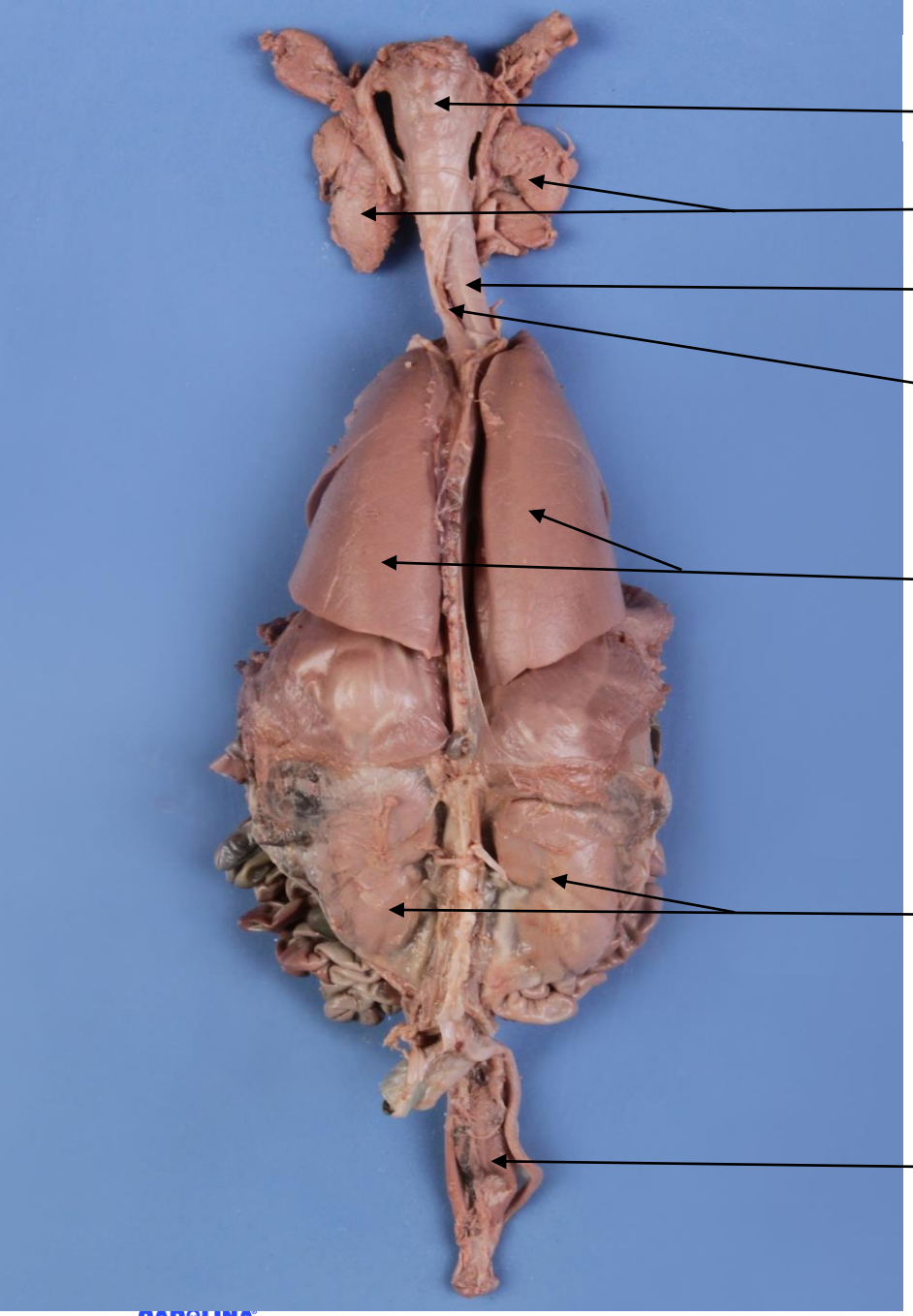
CAROLINA UNLEASH LEARNING

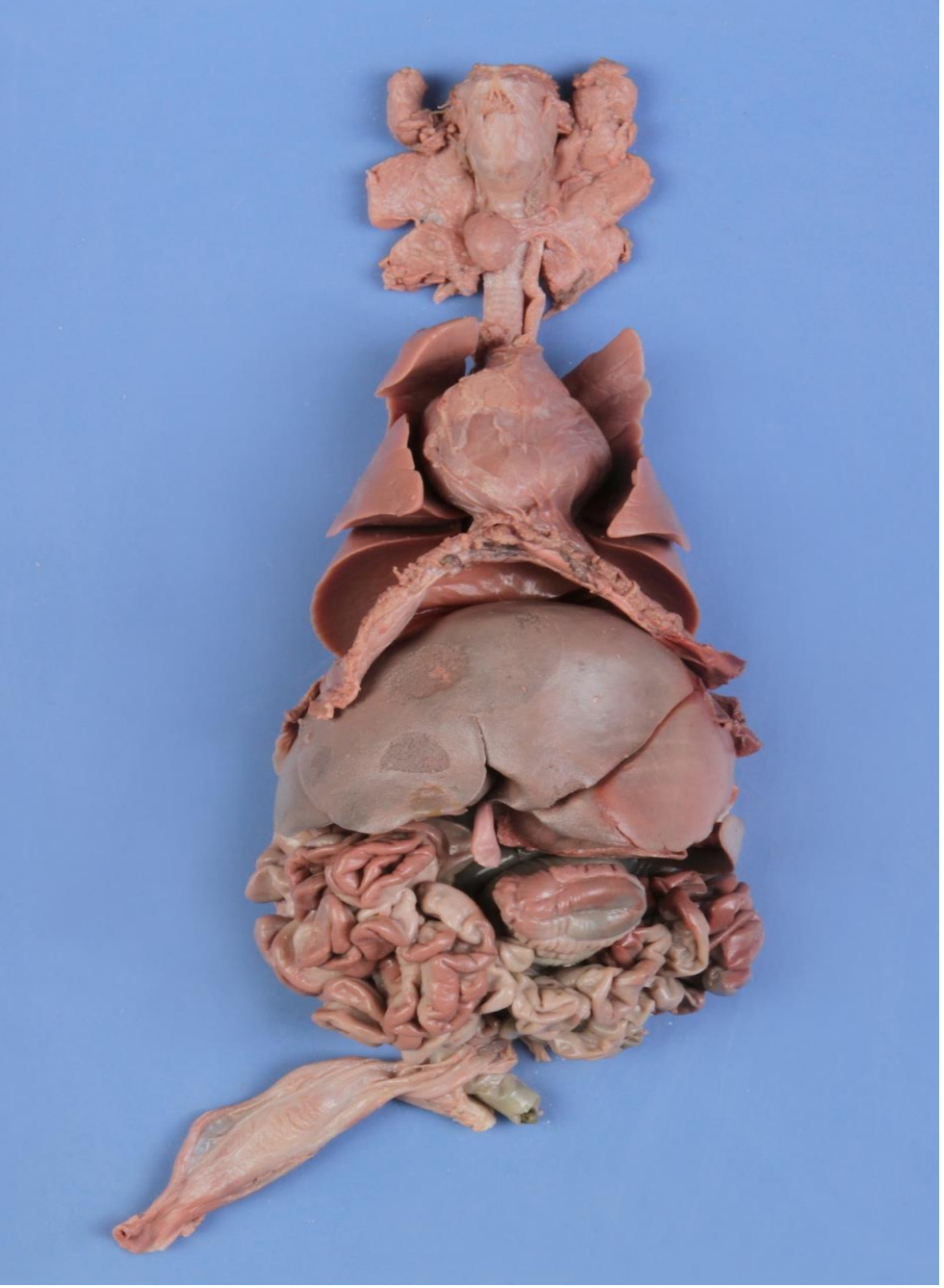
The Organ Block



- Larynx
- Thymus
- Thyroid Gland
- Trachea
- Esophagus
- Heart (with overlying thymus and pericardial sac)
- Lungs
- Diaphragm
- Liver
- Large Intestine
- Small Intestine
- Urinary Bladder

The Organ Block





The Organ Block

In the kit, students would now:

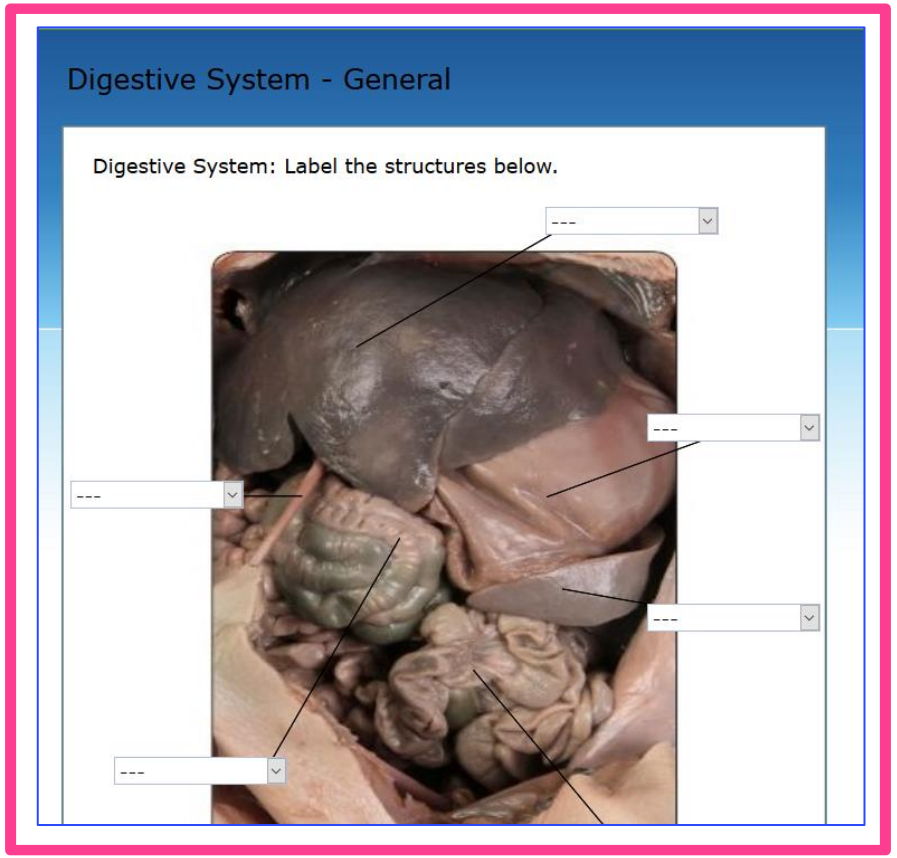
- ❑ Remove organs individually
- ❑ Make observations of each organ
- ❑ Measure the length and mass of each organ
- ❑ Record all data in the Autopsy Report

Bringing Home the Bacon!

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

Carolina® Forensic Dissection Kit

With the purchase of this kit, you receive 1-year free access to digital resources including dissection safety videos, fill-in student guides, and pre-lab and post-lab assessments.



Cleanup Instructions

- **KEEP GLOVES ON!**
- **Separate trash from animal material/waste**
- **Carolina Employees will be walking around to collect ONLY animal waste.**
- **All other trash goes in trash bags.**
- **Wipe out pans, clean tools, and wipe off tables.**