Carolina Biological Supply Company

Next Generation Dissection

@CarolinaBio

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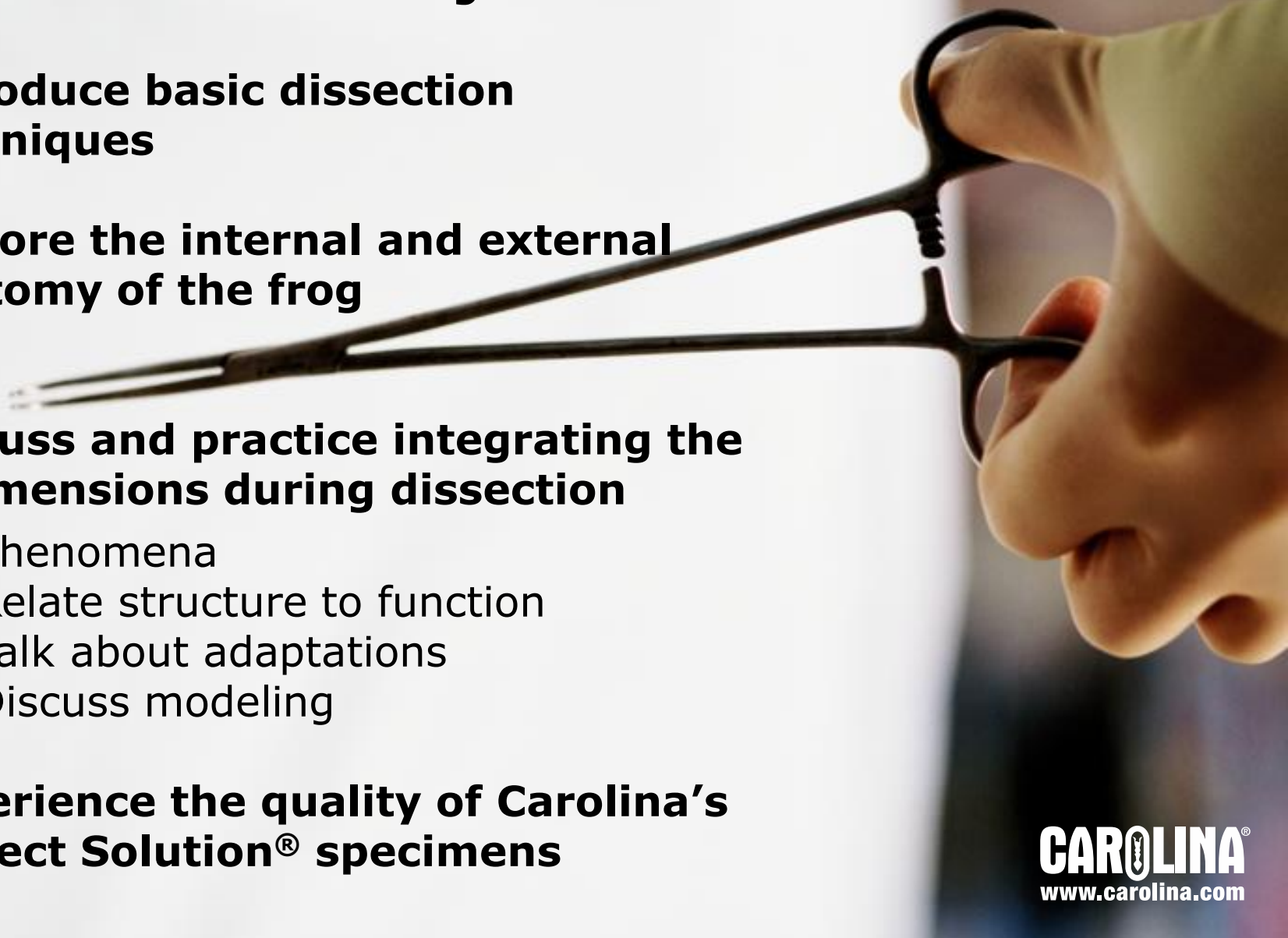
Objectives

- **Introduce basic dissection techniques**
- **Explore the internal and external anatomy of the frog**
- **Discuss and practice integrating the 3 dimensions during dissection**
  - Phenomena
  - Relate structure to function
  - Talk about adaptations
  - Discuss modeling
- **Experience the quality of Carolina's Perfect Solution® specimens**



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Carolina's Perfect Solution® Specimens

Quality

- Superior preservation
- Superior tissue color and texture

Safety

- No dangerous off-gassing
- No formalin odor

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Building Toward 3-Dimensional Learning

Performance Expectations

- **MS-LS1-3**: Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
- **HS-LS-2**: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models • Develop and use a model to describe phenomena. • Develop and use a model to illustrate relationships between systems and components.	LS1 A: Structure and Function • Multicellular organisms have a hierarchical structure with multiple parts. LS4 C: Adaptations • Traits that support survival and reproduction persist.	Structure and Function • The functions and properties of objects can be inferred from their structure.[1]

1. NGSS Lead States, *Next Generation Science Standards: For States, By States* (Washington, DC: The National Academies Press, 2013), Volume 2: Appendixes, page 103.

Start with a Phenomenon

Prelab Modeling

In your classroom, have students construct a physical model of the frog's digestive system using only their prior knowledge.

Provide common materials such as paper towels, balloons, socks, etc.

Dissection Preparation Tips

- **Organize your dissection area:**
  - Take out your dissection tray
  - Lay out your instruments
    - Scissors
    - Probe

- **Use appropriate personal protective equipment:**
  - Apron
  - Gloves
  - Glasses

Carolina® Dissection Mats

- **Clear, concise dissection instructions**
- **Detailed color photographs**
- **Labeled internal and external structures with definitions**
- **Cost-effective**
- **Reusable—wipe clean**

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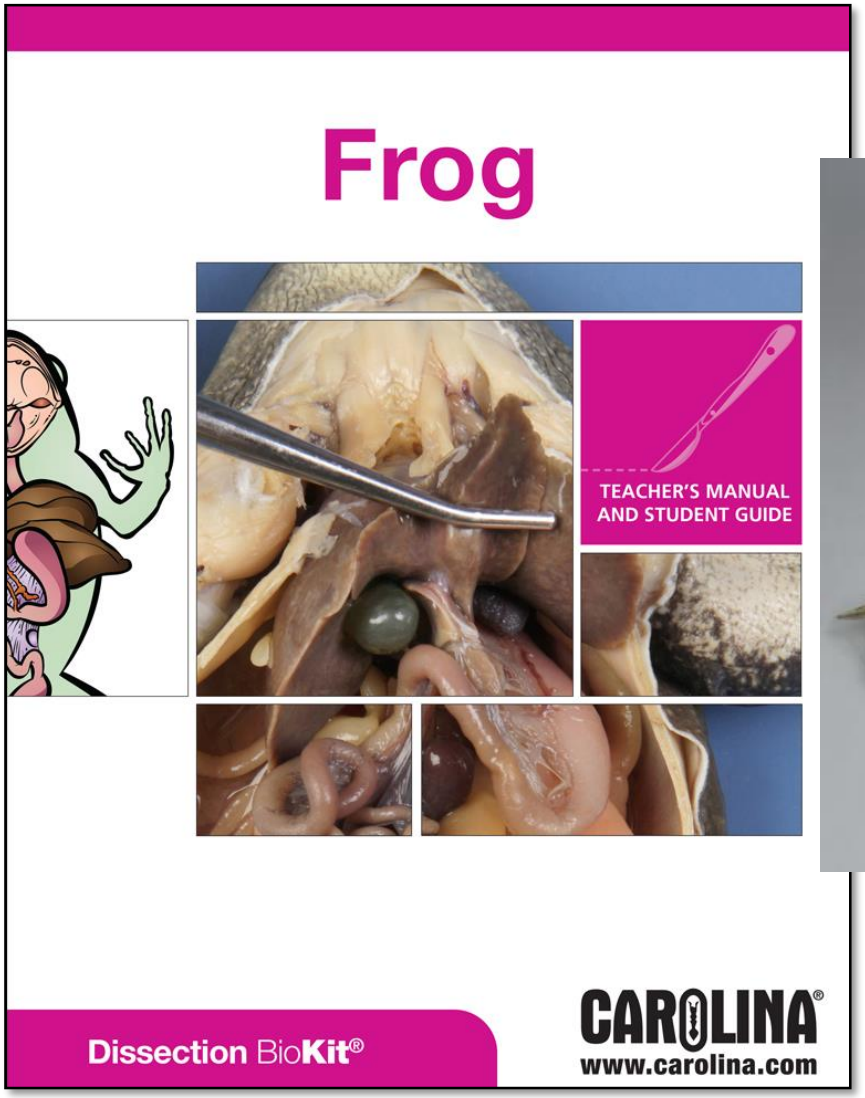
Safety Issues

- **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

Frog Dissection



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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.**

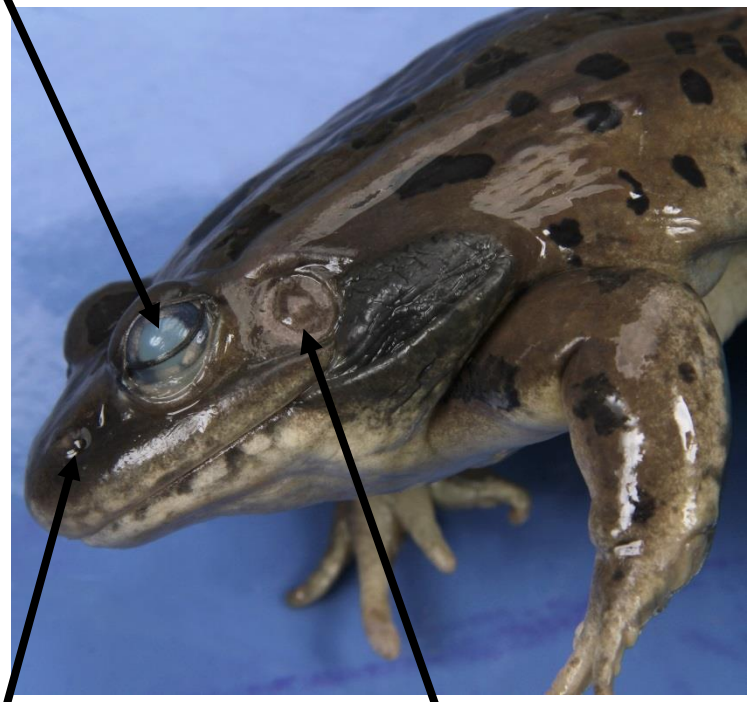
3. **Cut a small hole in the excess plastic. This will allow the fluid to drain to the bottom of the bag.**

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.**

Frog External Anatomy

Eye
(with nictitating membrane)



External Nares

Tympanic Membrane

Note coloration differences on the dorsal and ventral surfaces.

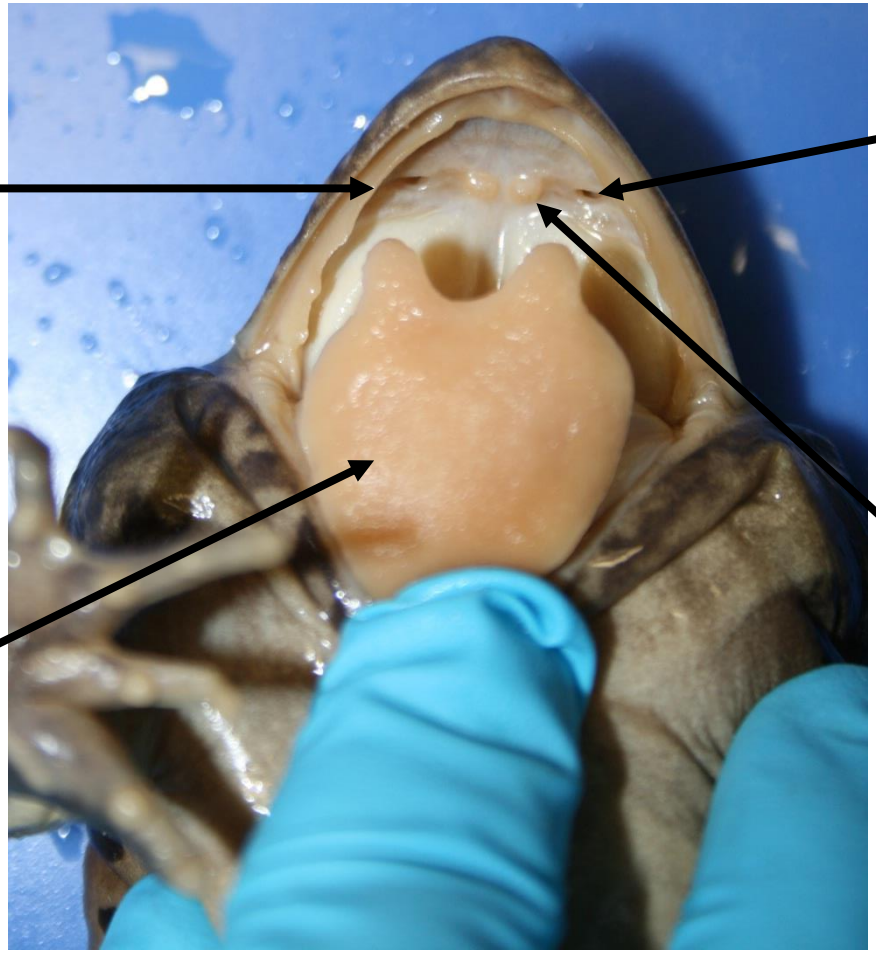
What are some *adaptations* you observe?

Open Wide!

Cut through the jaw joints with your scissors.

Examine the internal structures of the mouth.

Open Wide!



How do the *structures* of the mouth *function* in food capture and ingestion?

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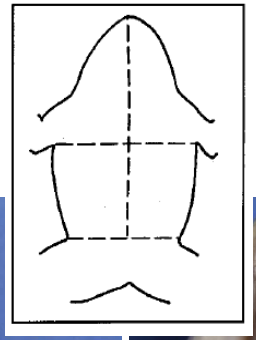
Love the Skin You're In!



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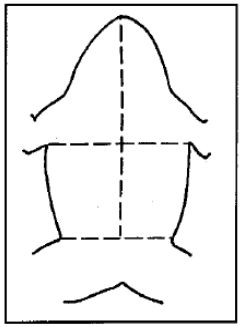
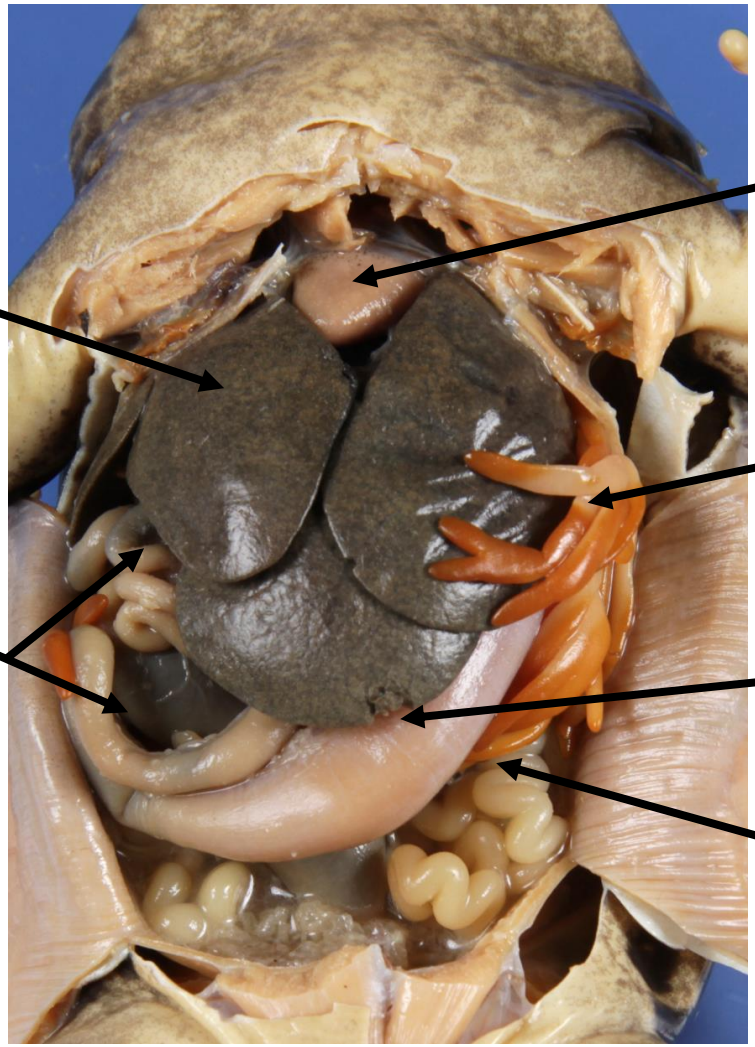
Love the Skin You're In!



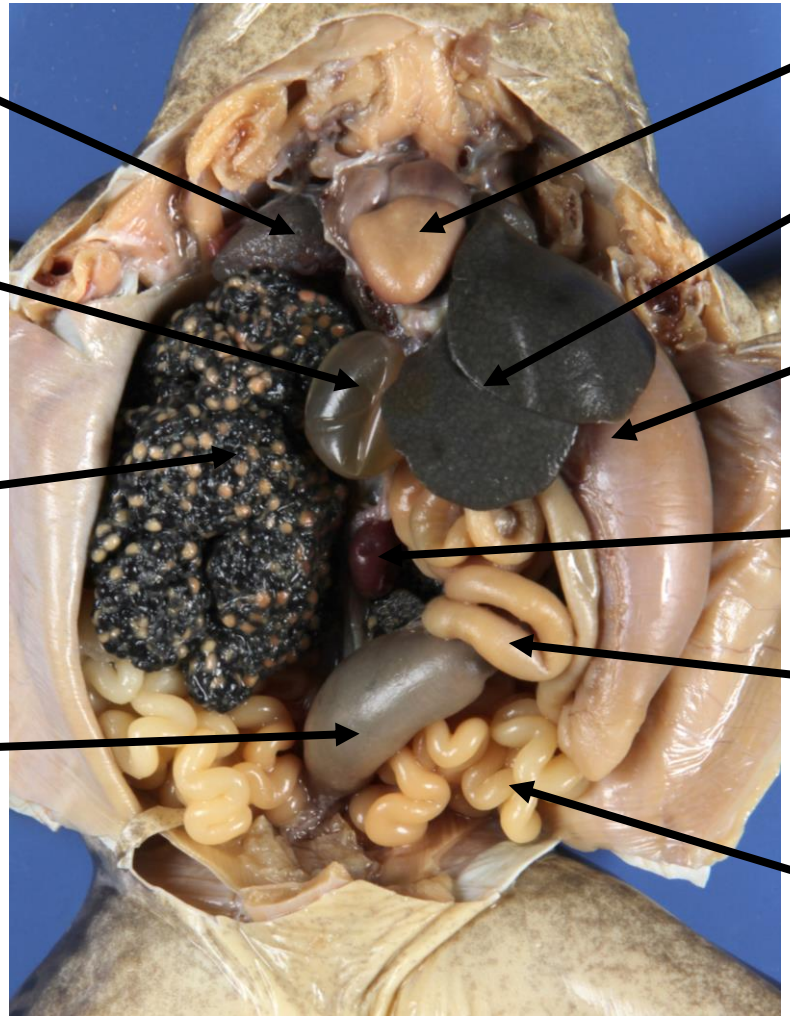
Pull back the flaps of skin.

Make cuts through the muscle using the same pattern.

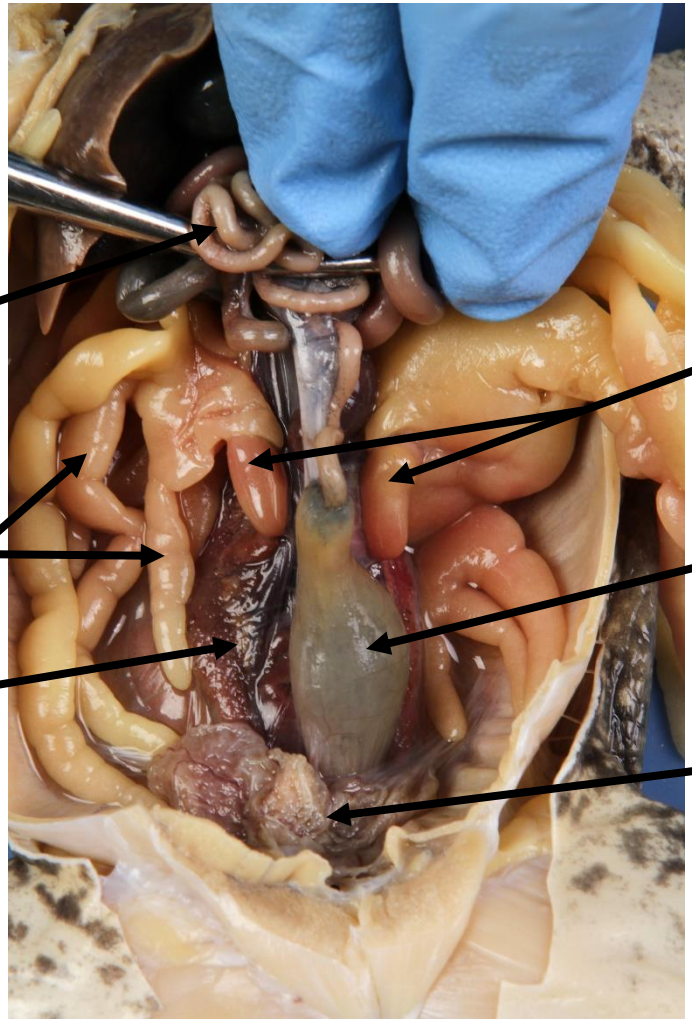
Internal Anatomy



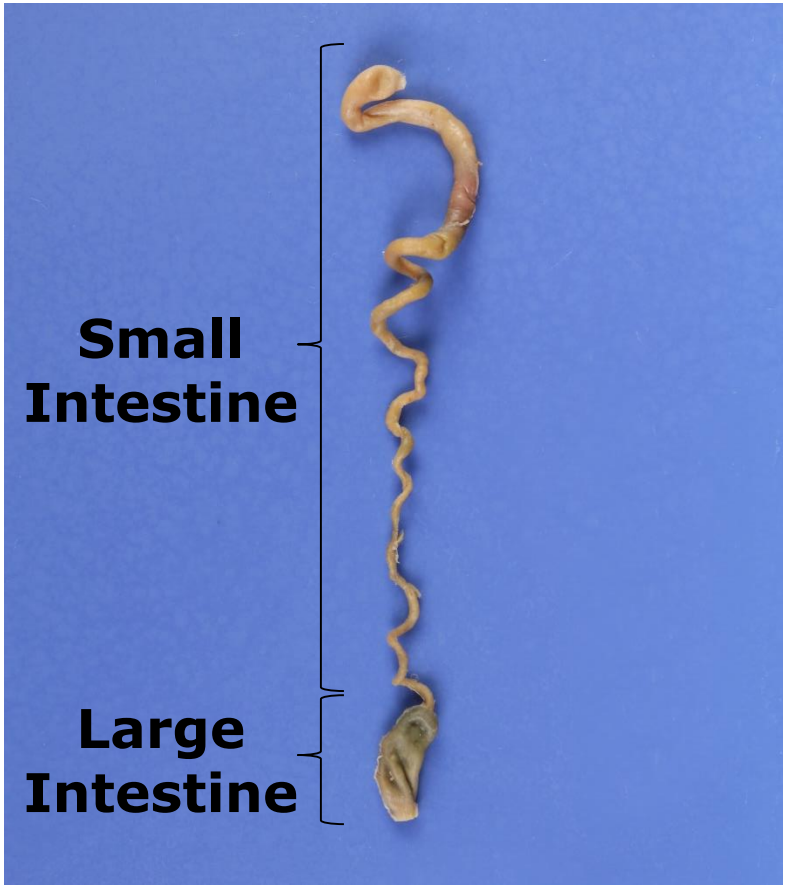
Internal Anatomy—Female



Internal Anatomy—Male



Structure and Function



Remove the small and large intestine.

Carefully cut the mesentery holding the small intestine together and stretch it out.

Why is the small intestine so much longer than the large intestine?

Assessment

- **Have students describe how the structure of other organs they observe during the dissection are related to their function (i.e., fat bodies, stomach).**

- **Revisit and modify the prelab model of the frog digestive system based on evidence gathered during the dissection.**

- **Dissect another vertebrate and discuss homologous structures.**

- **Provide the function and have students fill in the corresponding structure or vice versa (next slide).**

Assessment

Student Artifact

Function	Structure
Support	Vertebral column
Camouflage	Difference in dorsal and ventral pigmentation
Movement	Muscular hind legs for jumping and swimming
Catching Prey	Forked, muscular tongue attached at front
Ingestion	Tongue attached at front; 2 types of teeth
Circulation	One 3-chambered heart

Can you think of more?

Cleanup Instructions

- **KEEP GLOVES ON!**
- **Place ONLY animal waste in buckets.**
- **All other trash goes in trash bags.**
- **Clean tools and wipe off tables.**

Dissection and NGSS Resources

For FREE resources check out

www.carolina.com/teachdissection

Webinars

Frog Dissection for 3-Dimensional Learning

56:44

Articles

Next Generation Dissections

Dee Dee Whitaker
Product Content Manager

Candace Berkeley
Preserved Materials Product Manager

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As science teachers across all grade levels make the transition to 3-dimensional learning and the Next Generation Science Standards® (NGSS), is there still a place for dissections in the classroom? The answer is a resounding yes! Dissection labs excite students and motivate them to ask probing questions about anatomical structures and processes, to identify patterns across species, and to relate structure to function. Dissection *can* and *should* be part of your implementation of 3-dimensional learning, and Carolina can help you make this transition with updated kits and resources.

Next Generation Science Standards® (NGSS) and 3-Dimensional Learning

The NGSS and many new state standards foster 3-dimensional instruction: science and engineering practices, crosscutting concepts, and disciplinary core ideas. Well-designed science instruction should incorporate all three dimensions at every grade level, with every activity. If implemented properly, dissections address all three learning dimensions.

Kits

Carolina Kits | 3D™ BIOLOGY High School Lab Kits

Carolina BioKits®: Cladograms and Evolution

Item # 221042 Online Only Exclusive

★★★★★ Write a review Ask a question

Watch Video

For a class of 32. Students use 2 lines of evidence to model evolutionary relationships. They examine the external anatomy of 5 preserved specimens and create a cladogram based on anatomical similarities. Next, they compare the amino acid sequence of the cytochrome c protein of each specimen to that of humans and construct a second cladogram based on these molecular similarities. Finally, they create a revised cladogram that considers both morphological characteristics and genetic information.

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