Carolina Biological Supply Company

Rats!
Inquiry-Based Dissection with *Carolina's Perfect Solution*® Specimens

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Objectives

- **Introduce basic mammalian anatomy using the rat**
- **Perform a rat dissection focusing on structure and function**
- **Perform a dissection using an inquiry-based approach**
- **Experience the quality of *Carolina's Perfect Solution*®**

The Rat Dissection BioKit®

(catalog no. 221487)

Kit includes:

- **15 plain *Carolina's Perfect Solution*® white rats**
- **Teacher's manual with reproducible student guide**

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Dissection Preparation Tips

- **Organize your dissection area**
- **Apron, gloves, and safety glasses**
- **Absorbent pad placed under the dissecting pan (white side facing up)**
- **Lay out instruments for easy access**

Carolina Workshop Materials

These materials are provided to you, compliments of Carolina.

Please set up your workstation.

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Safety Issues

- **Personal protective equipment**
  - **Gloves, goggles, and lab aprons**
- **Sharps**
  - **Use sparingly; explore with blunt instruments**
- **Safety tips**
  - **Set down any unused instruments**

Prepare to Dissect

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Today's Investigation

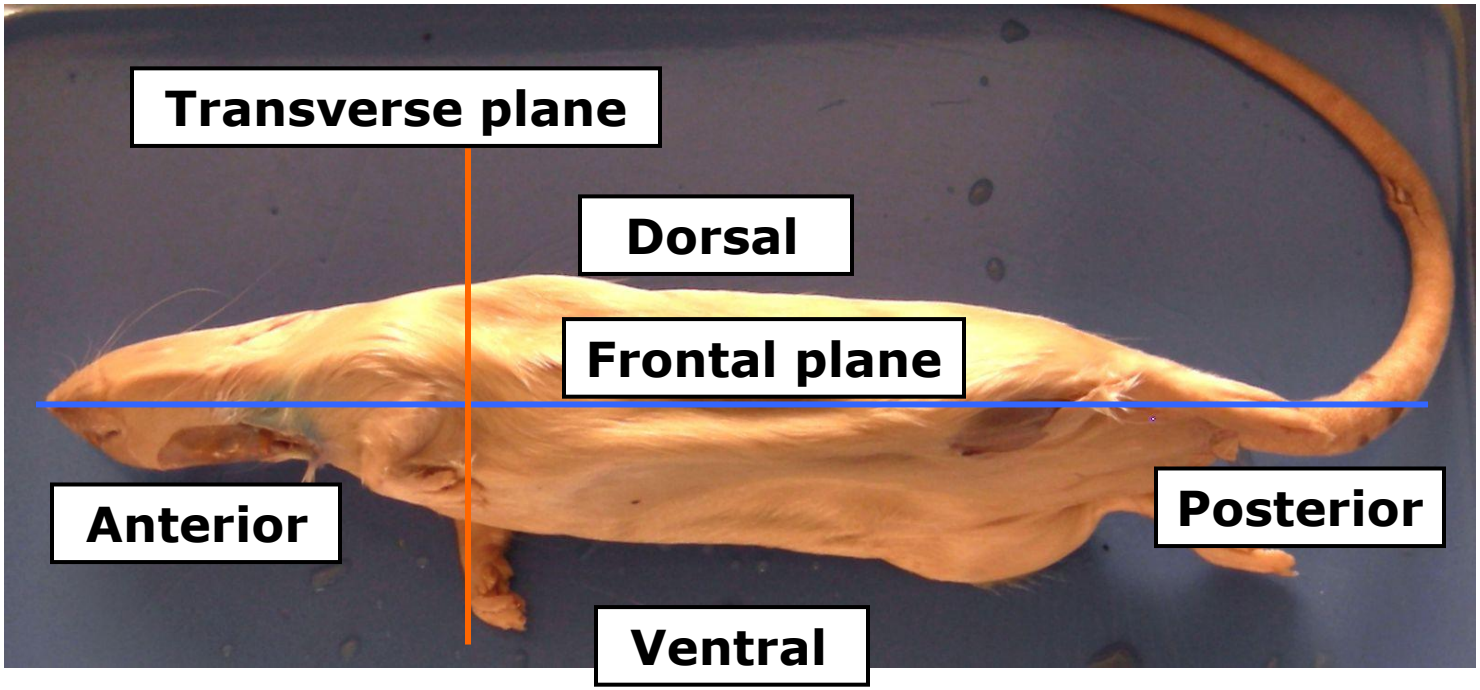
We will explore these sections of the Rat Dissection BioKit®:

- **External anatomy**
- **Digestive system**
- **Urogenital system**
- **Circulatory system**
- **Respiratory system**

Observe External Anatomy

List 3 ways the rat is *different* from humans.	List 3 ways the rat is *similar* to humans.
1.	1.
2.	2.
3.	3.

Specimen Navigation



Part I. External Anatomy

Pre-Dissection Questions

1. **Where do rats live?**
2. **What do rats eat?**
3. **Do rats bear live young?**
4. **List at least 3 ways in which rats are similar to humans.**
5. **Describe a rat's foot structure and for what it might be useful.**

Part I. Procedure

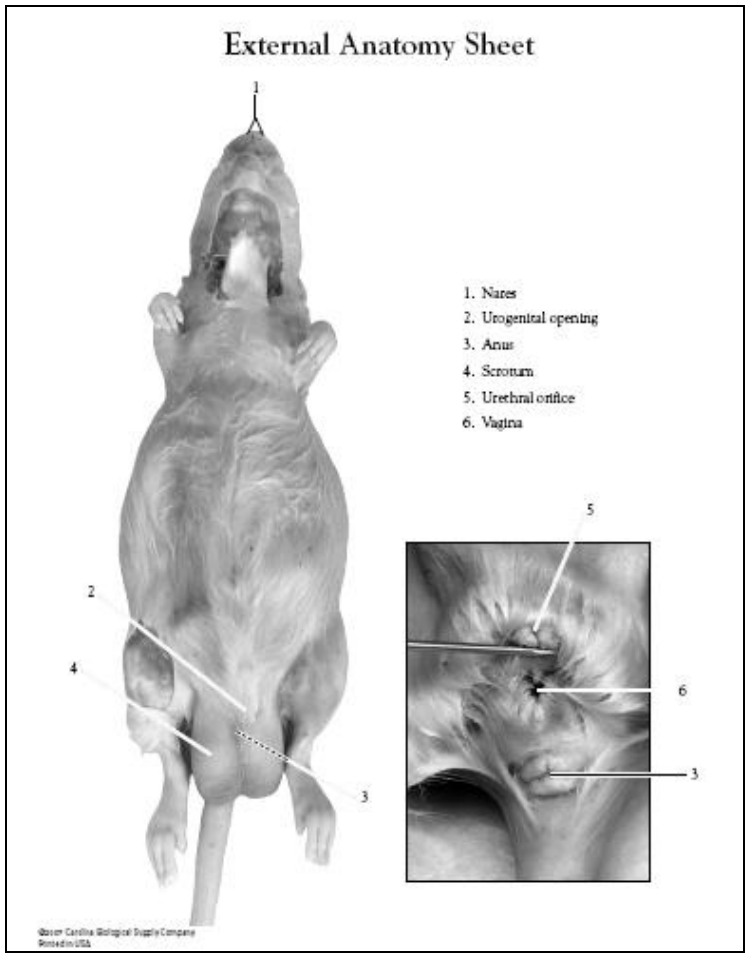
1. Lay the specimen on the dissecting tray and observe the external anatomy of the rat.

2. Handle the rat and observe it from all angles.

3. Manipulate your specimen's limbs and take note of the organism's articulation.

4. Open the mouth and observe the rat's dentition.

Sexual Dimorphism



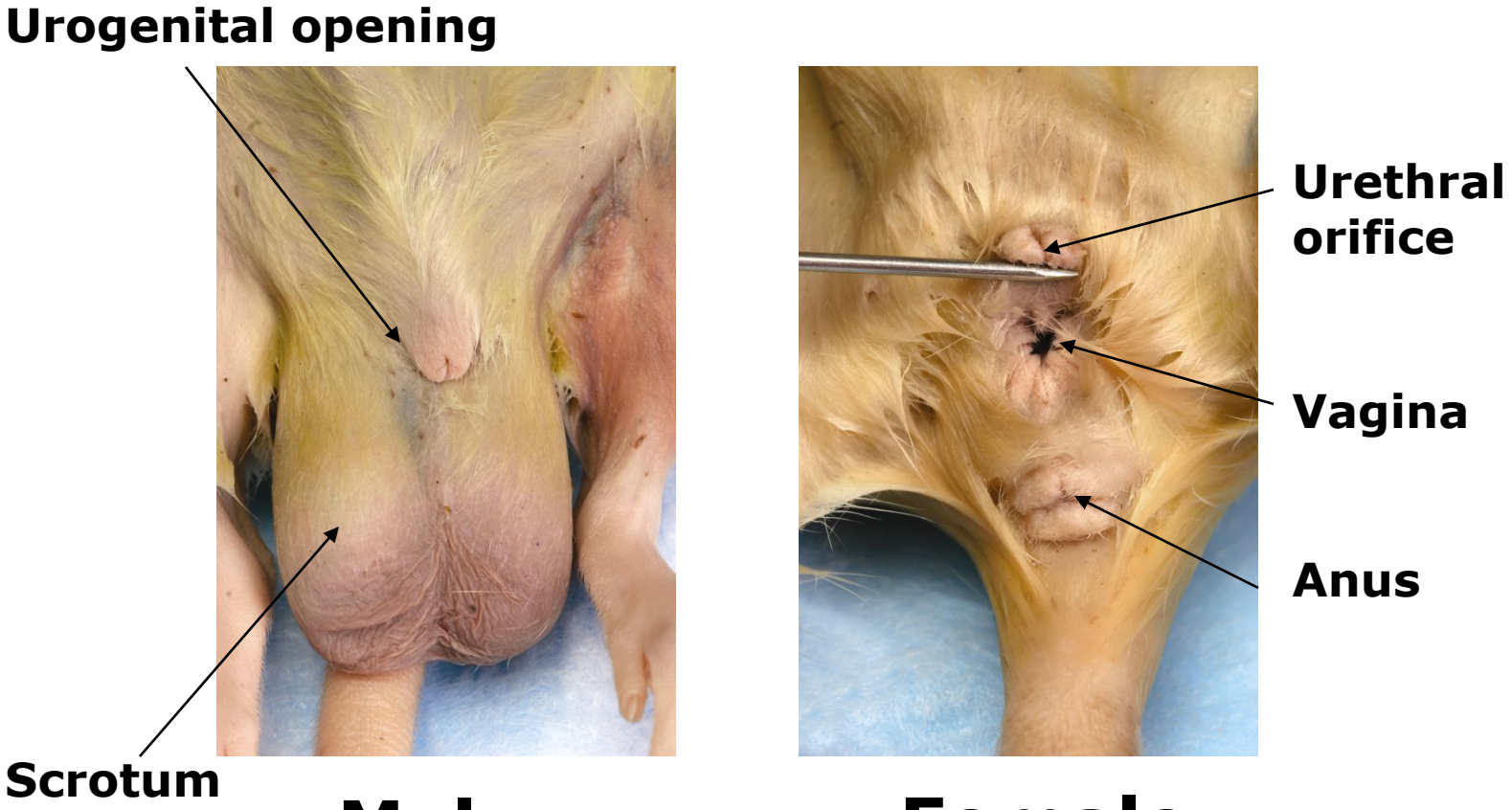
Female Structures

- ❑ Urethral orifice
- ❑ Vagina
- ❑ Anus

Male Structures

- ❑ Urogenital opening
- ❑ Anus
- ❑ Scrotum

Sexual Dimorphism



Male **Female**

Part II. Digestive System

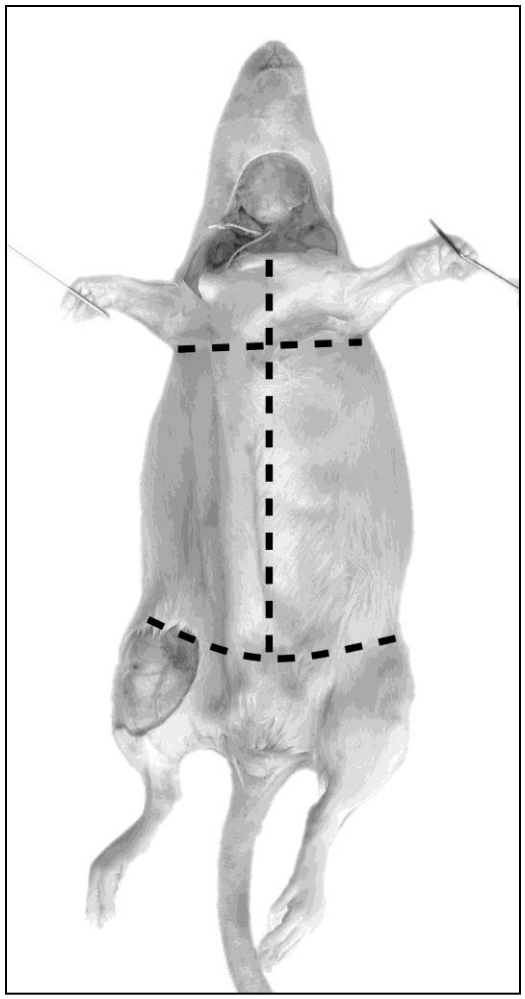
Pre-Dissection Questions

1. **What types of food do rats eat?**

2. **Do rats hunt for their food? If not, how do they obtain or capture food?**

1. **What sort of food might a rat be better suited to digest than a human being is?**

Part II. Digestive System

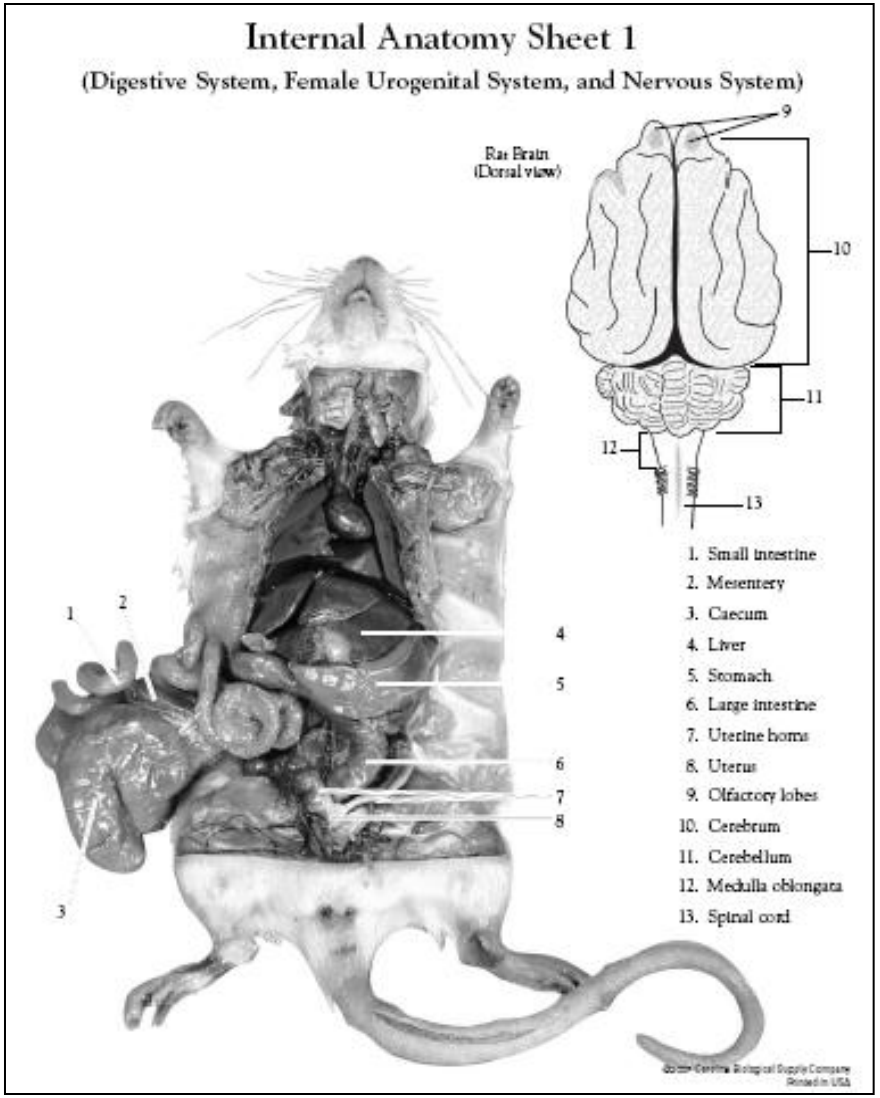


- **Begin at the throat.**
- **Use scissors.**
- **Cut in a posterior direction, to the first opening at the caudal end of the animal.**
- **Lacerate the skin only.**

Part II. Digestive System

Using scissors and lifting muscle layers as you cut will prevent damage to underlying organs.

Identifying Digestive Organs



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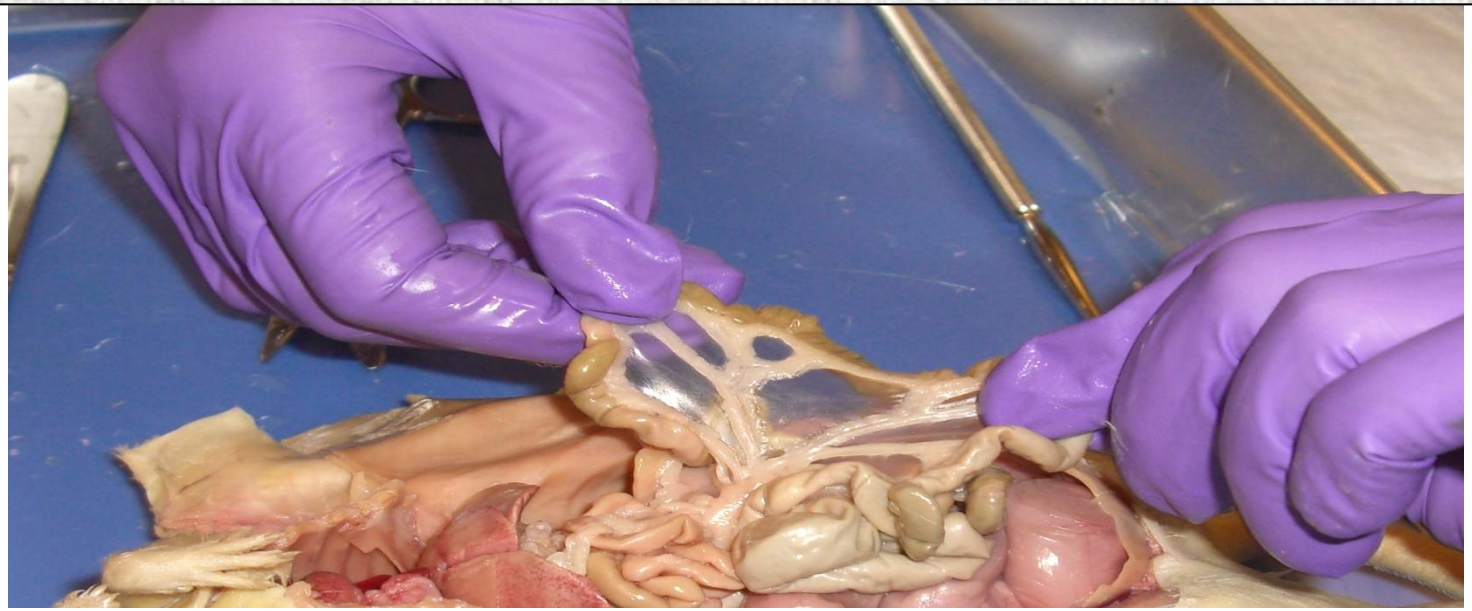
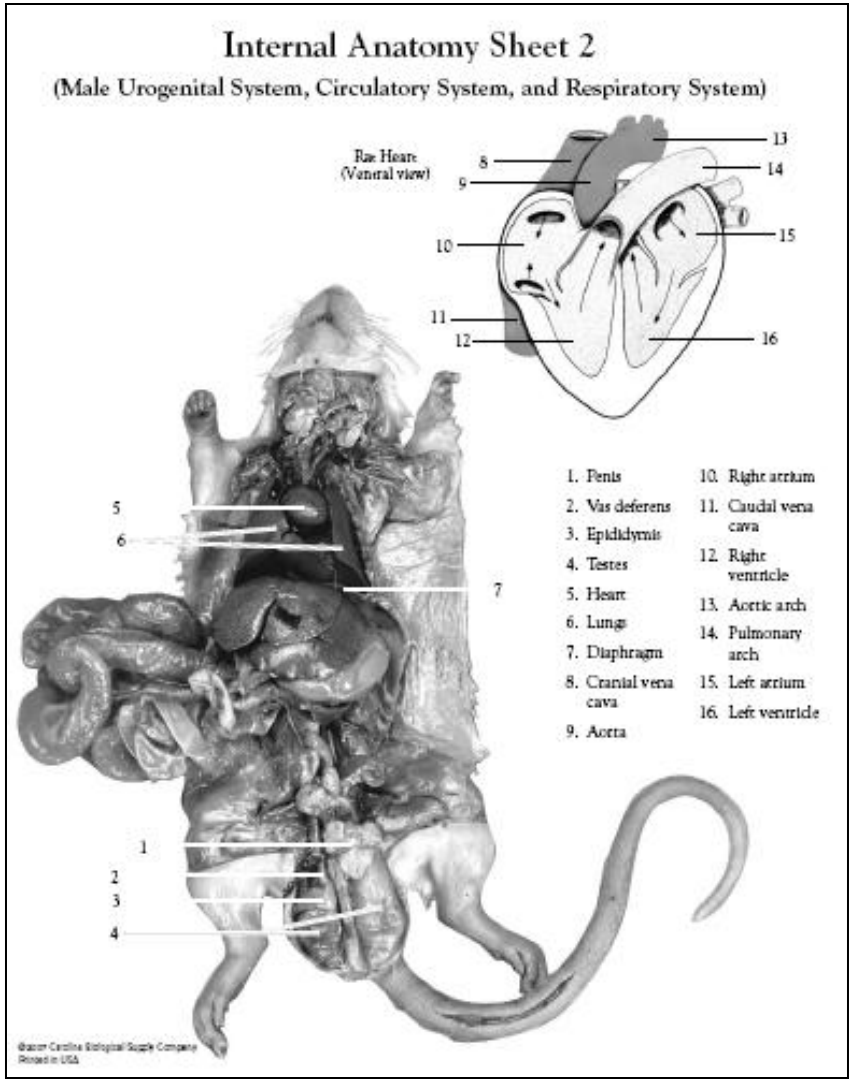
Part II. Procedure

Digestive tract: Cut the mesentery so the digestive tract remains attached. Trace the path of food. Identify structures and record observations.



Part III. Urogenital System



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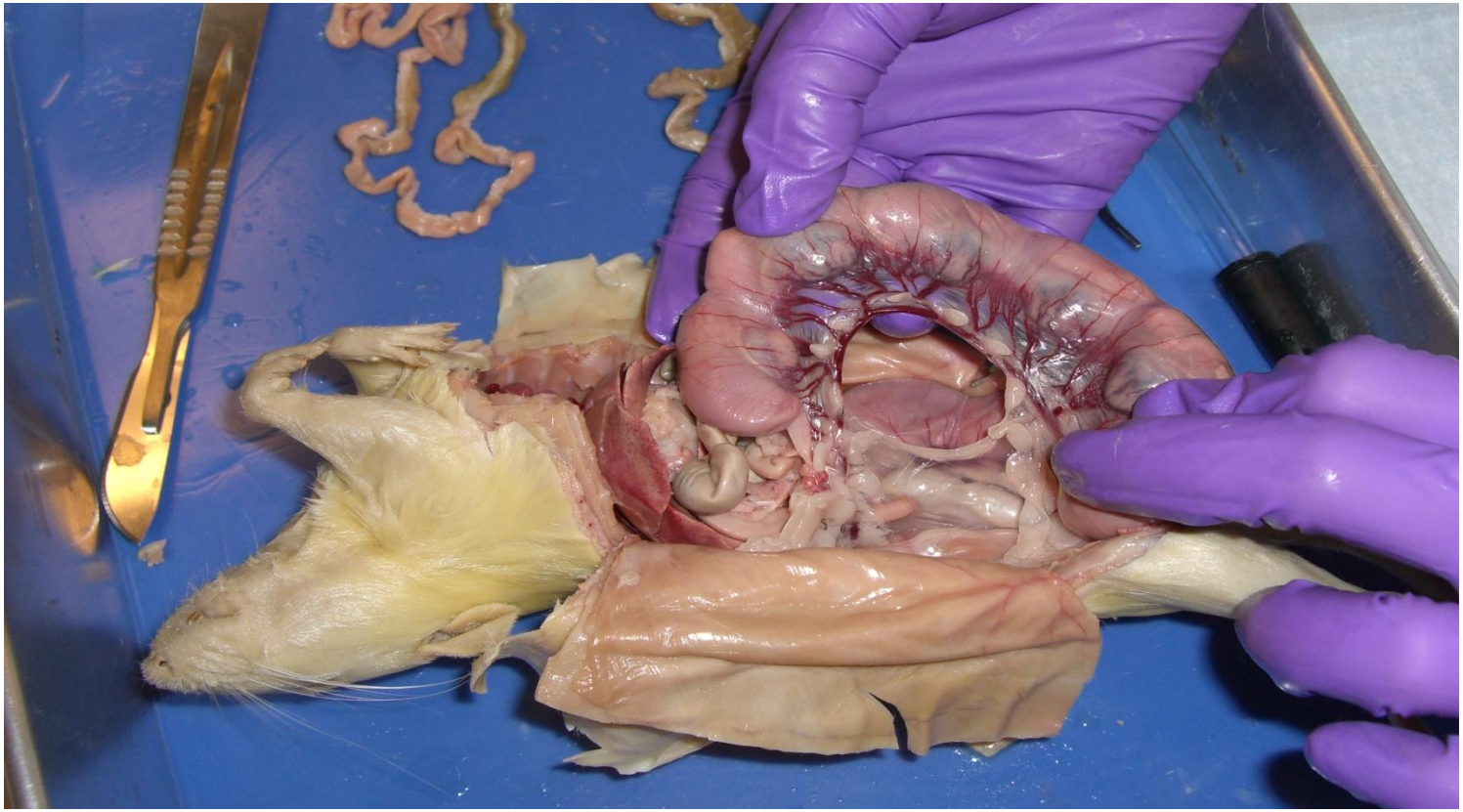
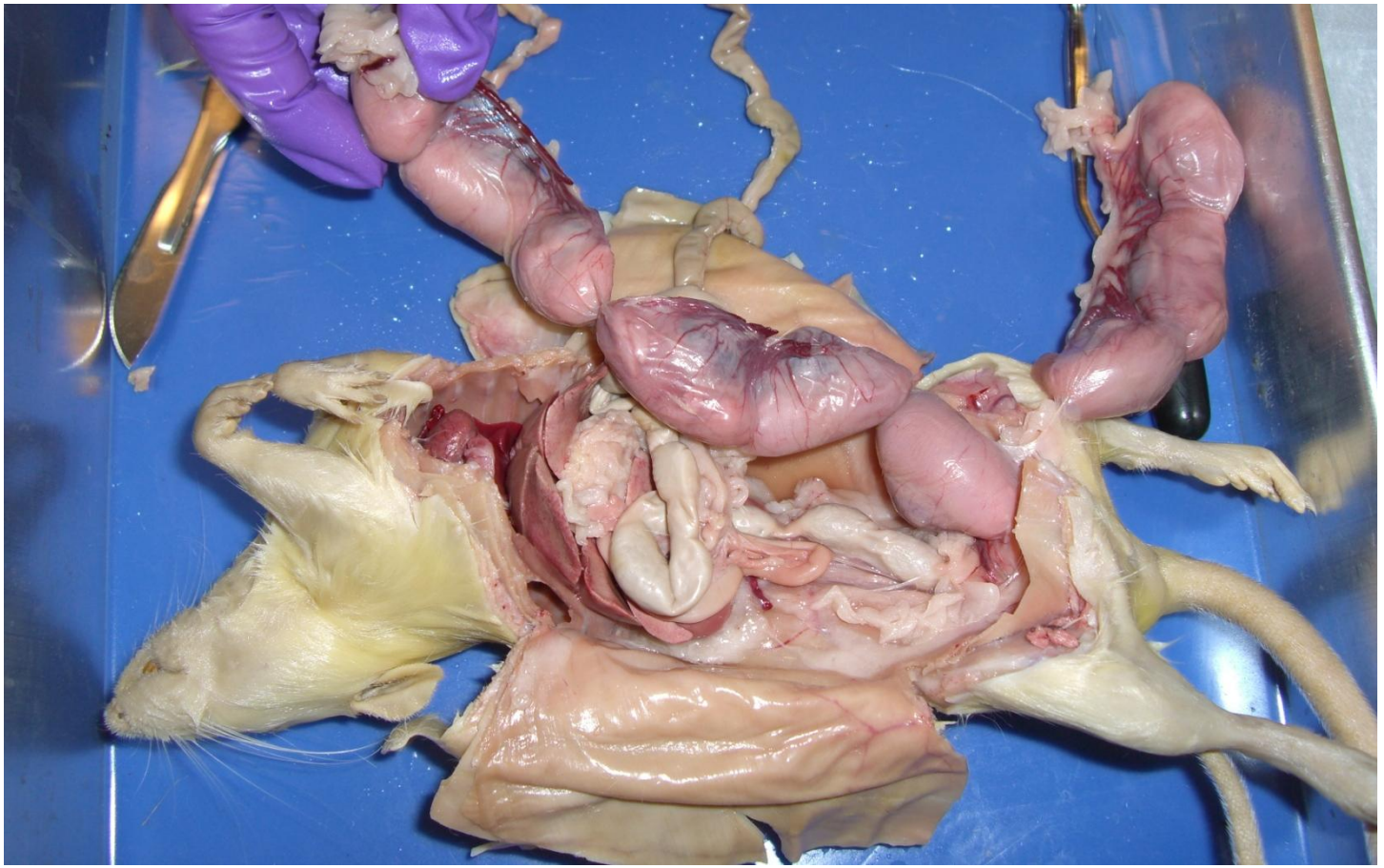
Part III. Urogenital System

- Kidneys
  - Hilus
- Adrenal glands (part of the endocrine system)
- Renal artery
- Renal vein
- Ureter
- Bladder
- Urethra
- Male
  - Penis*
  - Urogenital duct

Pregnant Female Rat



Pregnant Female Rat



Pregnant Female Rat

How does the reproductive system of a female rat allow for multiple developing fetuses?

Investigating Internal Anatomy

Develop a question about internal anatomy to investigate.

Why are rats used so frequently as laboratory specimens?

How does the digestive system of a rat differ from humans?

What portion of the rat brain seems most pronounced? Why is this advantageous for the survival of rats?

Guided Inquiry

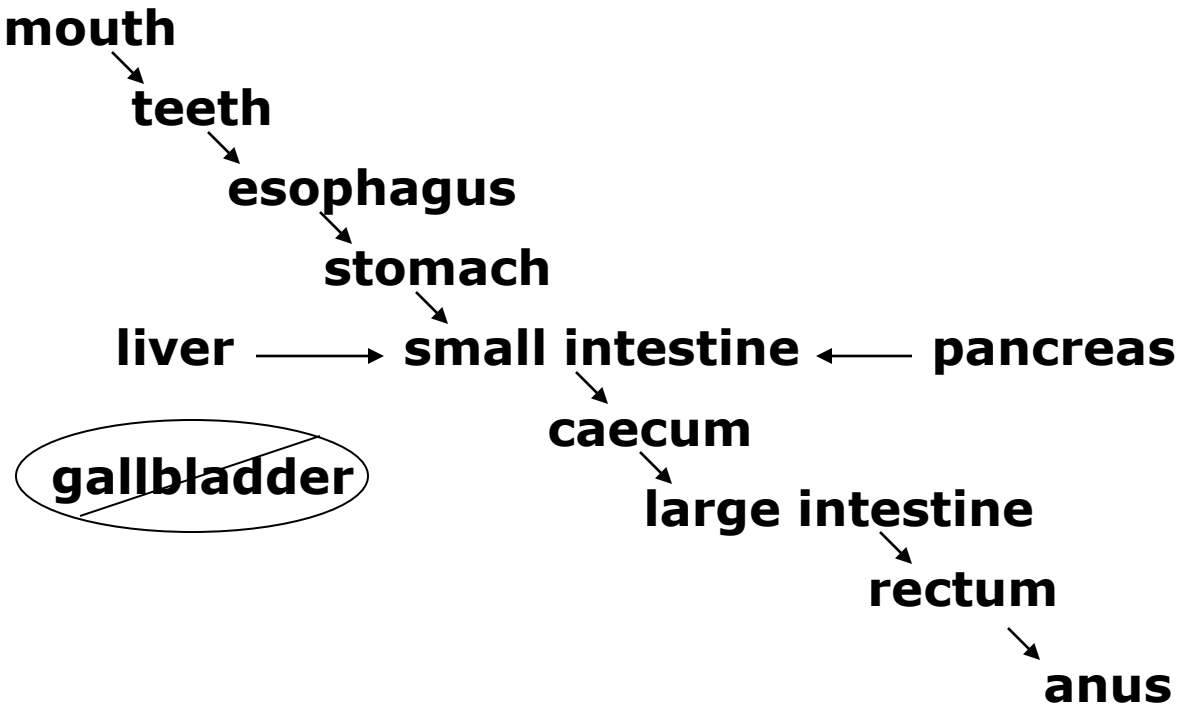
Benchmarks to guide student dissection

List major organs students should locate and identify.

- **Esophagus**
- **Stomach**
- **Liver**
- **Small intestine**
- **Kidney**
- **Urinary bladder**
- **Ovaries**
- **Testes**
- **Lungs**
- **Heart**
- **Spleen**
- **Major muscle groups**

Additional Activities

Have students create a flowchart of organs for each system



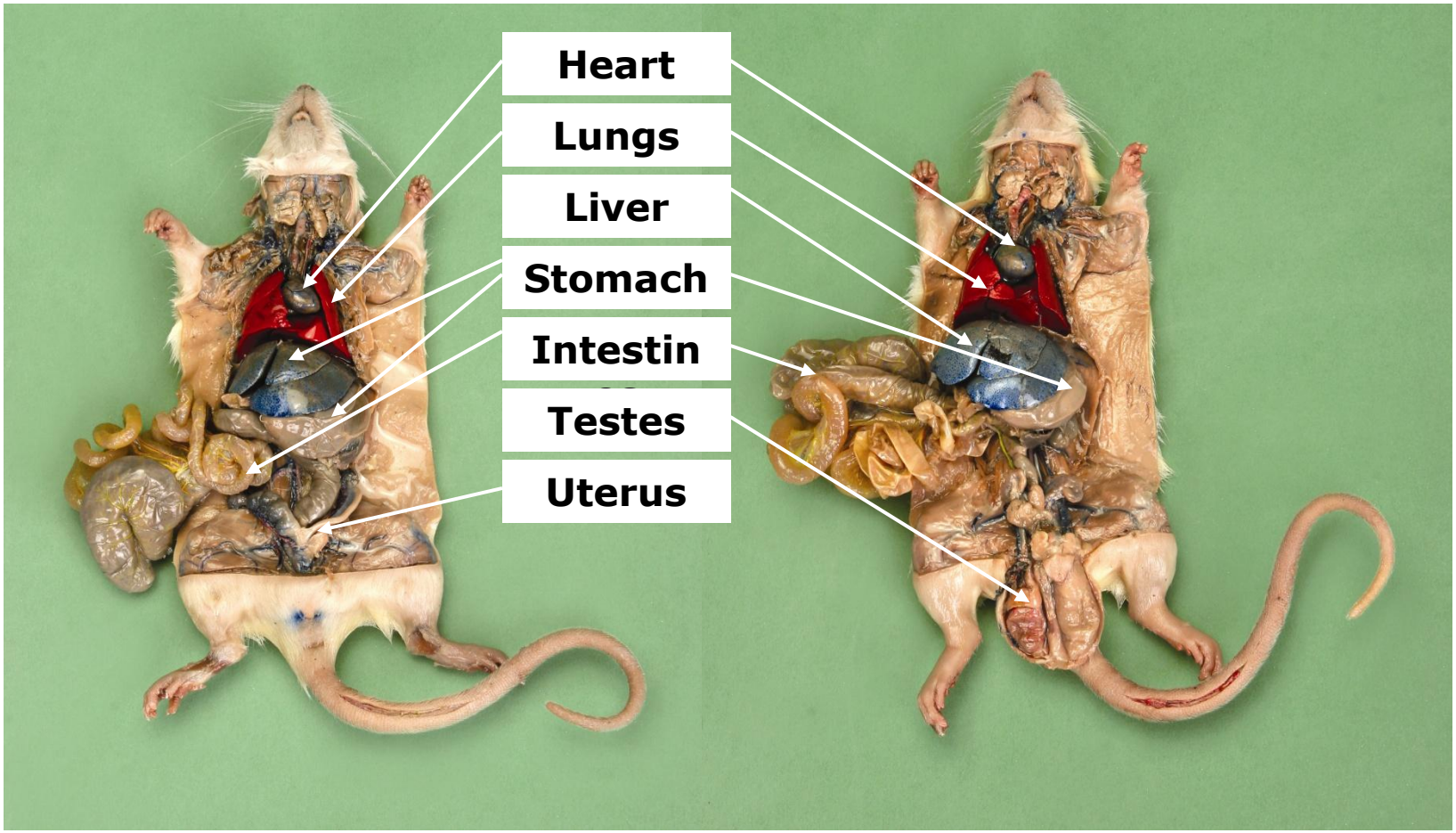
Additional Activities

- **Determine points where systems interconnect.**
- **Identify purpose for interconnection.**

Respiratory/Circulatory

- **Systems connect where capillaries that branch from the pulmonary arteries surround the alveolus of the lungs; gas exchange takes place to supply O_2 to blood cells and take away CO_2.**

Internal Anatomy Exploration



Classification

Human		Rat
Domain:	Eukarya	Eukarya
Kingdom:	Animalia	Animalia
Phylum:	Chordata	Chordata
Class:	Mammalia	Mammalia
Order:	Primates	Rodentia
Family:	Hominidae	
Genus:	*Homo*	
Species:	*Homo sapiens*	

Organ System Jigsaw

1. Assign each group one of the major organ systems:
    a. Circulatory and Respiratory
    b. Digestive
    c. Urogenital
    d. Muscular and Nervous

Organ System Jigsaw

2. **Complete the dissection of the selected organ system according to the guide.**

3. **Make note of any tips for dissection to share with the group at the end of the session.**

We Can Meet Your Dissection Needs

Top-quality specimens and supplies

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Additional Resources from Carolina

Carolina™ BioLab® Virtual Lab Series

Guide students through an interactive virtual dissection, teaching internal and external features.

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Carolina Free Resources

carolina tips®
August 2010

Carolina offers many free resources to help support teachers.

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Time to Clean Up . . .

Carolina's Perfect Solution® specimens

- **Return to white bucket or take home for further study**

- **All other waste in the trash bags**

Dissecting pans and instruments

- **Clean or take as gift**

Safety glasses and aprons

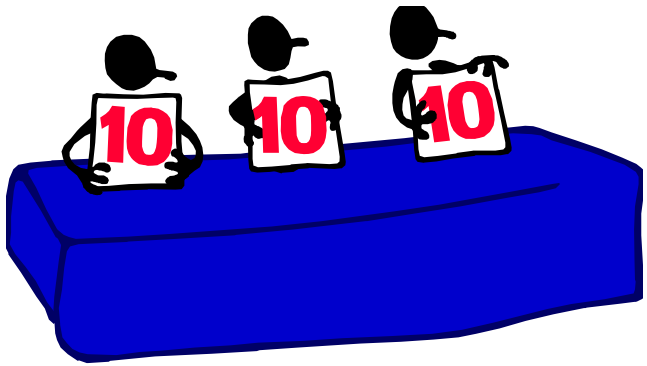
- **Gift from Carolina**

Evaluation forms/info cards

- **Complete, return to presenter**

Evaluations: Share Your Thoughts!

Scale = 1 to 10



10 = Outstanding

9 = Above Average

8, 7 = Average

6, 5, 4 = Below Average

3, 2, 1 = Well Below Average

Please provide comments!

Carolina Biological Supply Company

Thank you for investing your time in our training program.

For all of your classroom needs, check out our Web site, www.carolina.com.

Enjoy the rest of the conference!

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