

## INTRODUCTION TO RAT ANATOMY

White albino rats, *Rattus norvegicus* are representatives of a major lineage of animals, the deuterostomes. This group includes such diverse organisms as starfish, sea urchins, and all vertebrates. Deuterostomes are classified together because all share a similar developmental pattern. Cleavage is radial, the anus forms before the mouth, and the mesodermal lined body cavity is formed from out pockets of the gut.

Like humans, rats are mammals and share the characteristics that define the class. Rats are **homeothermic** and regulate their body temperature by generating heat through metabolic processes and controlling heat loss. Heat loss is reduced by a covering of hair and a layer of subcutaneous fat. Rats are also capable of regulating the amount of blood flowing to the skin, where heat is exchanged. They can also pant and sweat to help relieve heat build-up. Like other mammals young develop in a uterus and are nourished through the placenta. After birth nourishment is provided through the mammary glands.

Before beginning your study of rat anatomy it is important that you understand some of the terminology used to refer to major regions of the body (Fig. 1.1). These terms are used when describing the orientation of various structures.

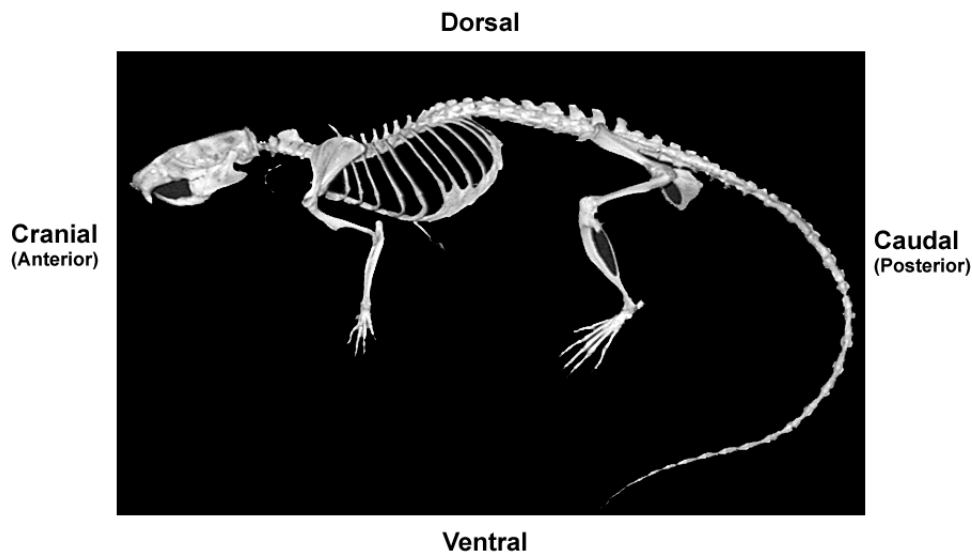


Figure 1.1. Left, lateral view of a rat skeleton

### **Cranial (anterior) vs. Caudal (posterior)**

Structures oriented toward the head or at the front end of the rat are in a **cranial** or anterior position. Those oriented toward the tail or back of the rat are in a **caudal** or posterior position.

### **Dorsal vs. Ventral**

Structures located on the back or upper surface are in a **dorsal** position while those located on the belly or under surface are in a **ventral** position. For example, in the picture above the spines of the vertebrae are oriented dorsally and the ribs attach to the ventral, lateral surface of the vertebrae.

### **Medial vs. Lateral**

The skeleton can be divided into right and left halves by a **sagittal plane**. This is a longitudinal plane that passes from the cranial to the caudal end along the midline. If a structure is found on the **medial surface** it

will be on the surface that is oriented toward the midline of the body. If it is on the **lateral surface** it will be oriented away from the midline or toward the side. In figure 1.1 you can see the lateral surface of the scapula but the medial surface is not visible.

### **Distal vs. Proximal**

The terms distal and proximal are generally used in reference to a fixed point and are often used when describing the position of structures associated with the limbs. Structures farther away from the reference point are **distal** and those closer to the reference point are **proximal**. If no reference point is given it is assumed the reference point is the midline. For example, in the forelimb the paw is distal and the elbow is proximal.

## **MATERIALS TO BE STUDIED FOR LAB PRACTICAL**

( February 4th ) test periods to be assigned\*

### **week 1**

1. Know the two major regions of the skeletal system and be able to identify bones belonging to each.
2. Be able to recognize and orient vertebrae from the different regions of the vertebral column.
3. Know the major bones that form the skull in rats and beavers.
4. Know the names of the 16 muscles studied and recognize origins and insertions.
5. Be able to identify muscles that have similar or opposing functions and know the difference between flex/extend, abduct/adduct, protract/retract.

### **week 2**

6. Locate and know the names and major functions of the principal organs of the digestive and respiratory systems.
7. Locate and know the names and functions of the structures associated with the male and female urogenital systems.
8. Know the general pattern of circulation, the importance of a four chambered heart, the major vessels of the hepatic portal system, and the names and functions of the major endocrine glands.
9. Identify the major regions of the brain.

Since you will be evaluated with a lab practical, the best way to prepare for the exam is by working with the rats. In addition you may also find the rat tutorial helpful. It presents the material in a different manner and may be a good way to review once you are familiar with the rat. Keep in mind the tutorial is not a substitute for working with the material in the lab. To access the tutorial go to the Kenyon College Homepage ► Departments ► Biology ► Introductory Laboratory ► 110 ► Rat Tutorial.

**If you have classes or events on Thursday that may conflict with the practical, make sure you notify your instructor during the first week of classes so you can reserve your time.**