

Chapter 1 - Introduction to Human Anatomy and Physiology

Section 1.2 - ANATOMY AND PHYSIOLOGY

Two major areas of medical science, **anatomy** (ah-nat'o-me) and **physiology** (fiz"e-ol'o-je), address how the body maintains life. Anatomy, from the Greek for "a cutting up," examines the **structures**, or morphology, of body parts—their forms and organization. Physiology, from the Greek for "relationship to nature," considers the **functions** of body parts—what they do and how they do it. Although anatomists rely more on examination of the body and physiologists more on experimentation, together their efforts have provided a solid foundation for understanding how our bodies work.

It is difficult to separate the topics of anatomy and physiology because anatomical structures make possible their functions. Parts form a well-organized unit—the **human organism**. Each part contributes to the operation of the unit as a whole. This functional role arises from the way the part is constructed. For example, the arrangement of bones and muscles in the human hand, with its long, jointed fingers, makes grasping possible. The heart's powerful muscular walls contract and propel blood out of the chambers and into blood vessels, and heart valves keep blood moving in the proper direction. The shape of the mouth enables it to receive food; tooth shapes enable teeth to break solid foods into pieces; and the muscular tongue and cheeks are constructed in a way that helps mix food particles with saliva and prepare them for swallowing (fig. 1.2).

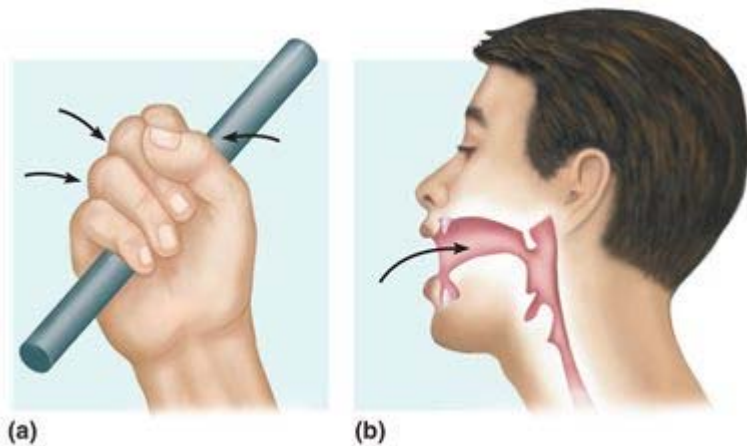


FIGURE 1.2

The structures of body parts make possible their functions: (a) The hand is adapted for grasping and (b) the mouth for receiving food. (Arrows indicate movements associated with these functions.)

As ancient as the fields of anatomy and physiology are, we are always learning more. For example, researchers recently used imaging technology to identify a previously unrecognized part of the brain, the planum temporale, which enables people to locate sounds in space. Many discoveries today begin with investigations at the molecular or cellular level. In this way, researchers have discovered that certain cells in the small intestine bear the same taste receptor proteins found on the tongue. At both locations, the receptors detect molecules of sugar. The cells in the tongue provide taste sensations, whereas the cells in the intestines help regulate the digestion of sugar. The discovery of the planum temporale is anatomical; the discovery of sweet receptors in the intestine is physiological.

Many nuances of physiology are being revealed through the examination of genes that function in particular cell types under particular conditions, sometimes leading to surprising findings. Using such "gene expression profiling," for example, researchers discovered that after a spinal cord injury, the damaged tissue releases a flood of proteins previously associated only with skin wounds. This discovery suggests new drug targets. Comparing gene expression profiles can reveal commonalities, among pairs of diseases, that had not been suspected based on whole-body-level observations.

PRACTICE

- 4 What are the differences between anatomy and physiology?
- 5 Why is it difficult to separate the topics of anatomy and physiology?
- 6 List several examples that illustrate how the structure of a body part makes possible its function.
- 7 How are anatomy and physiology both old and new fields?