

## MODULE 1 - INTRODUCTION - The Human Body

\*\*\*Notes – additional reading for this module Roscoe pages 3-8, 20-23 (waiting on new edition text to confirm)

### Learning outcomes

- 1.1 Discuss the organization of living things
- 1.2 Discuss the organization of the human body
- 1.3 Define properties of life and homeostasis

### Definitions

#### Biology

- Study of all living things

#### Anatomy

- Study of structures within the human body

#### Physiology

- Study of how the body and its parts function

### 1.1 Organization of Living Things

#### The Kingdoms

The Kingdoms are comprised of six different categories that include the following:

- **Archaeobacteria** – This Kingdom is one of the two Kingdoms that include bacteria. These are organisms that are all prokaryotic, unicellular and live in extreme environments such as hot springs.
- **Eubacteria** - This is the second Kingdom that includes bacteria. These organisms are also all prokaryotic and unicellular.
- **Protists** – These are eukaryotic and mostly unicellular organisms. They are often found in water environments. This is the most numerous & diverse kingdom.
- **Fungi** – These organisms are all eukaryotic and multicellular with one exception, yeast. Unlike the plant Kingdom, these organisms are not photosynthetic.
- **Plants** – This group is eukaryotic, multicellular and photosynthetic.
- **Animals** – This is where we will spend much of our time studying. These organisms are eukaryotic and multicellular. Another important characteristic that helps us differentiate them from plants is that they are capable of locomotion (movement).

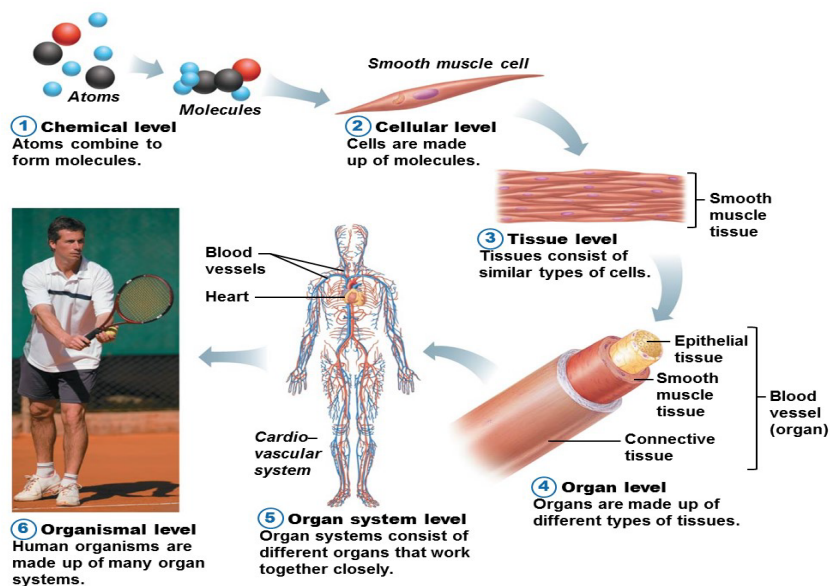
### 1.2 Organization of the Human Body

The human body can be divided into a hierarchy of organization. This concept is what we will spend the next two semesters in both biology and chemistry to understand. The hierarchical organization is as follows:

- Atom
- Molecules

- Cells
- Tissues
- Organ
- Organ System
- Organism

In chemistry we will study the chemical level (atoms and molecules) in detail. In this course we will spend the semester studying the chemical, cellular and tissue levels. Next semester in Introduction to Human Anatomy and Physiology we will look more closely at the organ, organ system and organismal levels.



### 1.3 Properties of Living Things

#### Properties of Living Things

These are the concepts we will be discussing throughout this semester in this course. The properties of living things include:

- Macromolecules
- Cellular Structure
- Growth & Metabolism
- Reproduction
- Hereditary Material
- Evolution
- Homeostasis

#### Necessary life functions

In your second semester A & P course we will build on the concepts from this course and begin to discuss many of the necessary life functions. These include the following:

- Maintain Boundaries
- Movement
- Responsiveness
- Digestion
- Metabolism
- Excretion
- Reproduction
- Growth

### Homeostasis

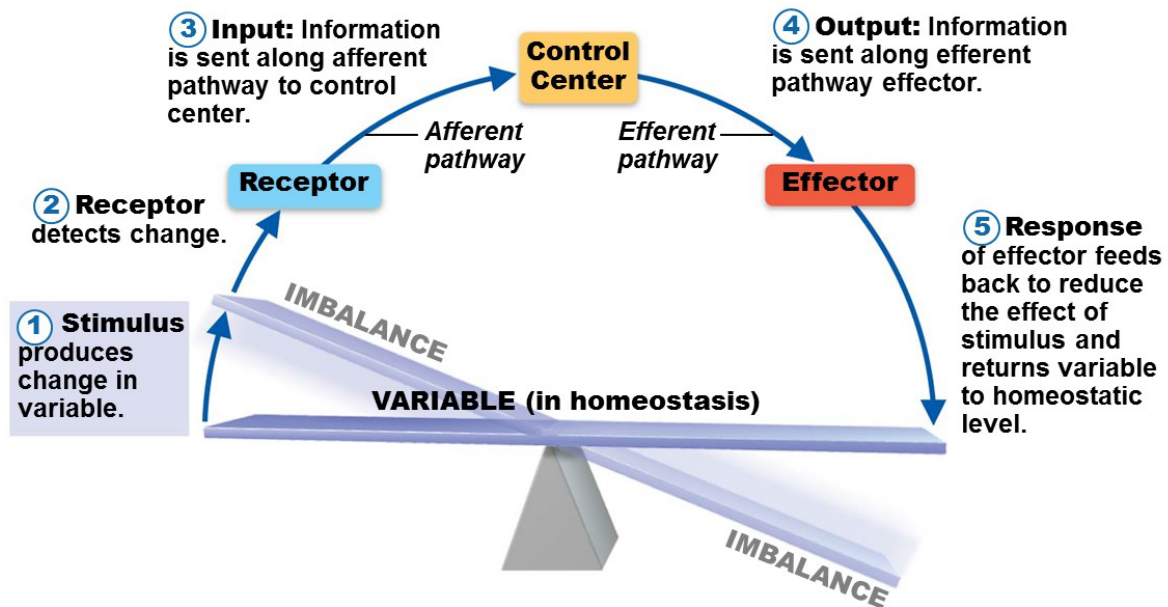
An extremely important concept that will be discussed throughout both semesters this year is homeostasis. Homeostasis is the maintenance of a stable internal environment. you will often here it referred to as a dynamic state of equilibrium that is necessary for normal body functioning. Homeostasis is necessary to sustain life.

When homeostasis is lost we are in homeostatic imbalance. This is simply a disturbance in homeostasis that ends up most often resulting in disease.

So How do we maintain homeostasis?

The body is a miraculous thing! There are an endless number of ways our body's work to ensure we function at an optimal level every day.

Homeostasis is maintained by feedback systems. Feedback systems have a few key elements that we first need to understand.



Let's take a look at these different components. First the Receptor. The receptor is responsible for responding to changes in the environment. We refer to these environmental changes as stimuli. The receptor responds by sending the information to the control center along what we

call the afferent pathway. The control center is responsible for determining a set point. It analyzes the information and determines an appropriate response. This response to the stimulus is sent along an efferent pathway to the effector. The effector response by reducing the effect of the stimulus and helping return the system to homeostasis.

The body has several different types of receptors that are continually monitoring the environment to ensure it remains stable. Here is a list of some of the body's receptor types and what they are responsible for detecting:

- Chemoreceptors detect chemical concentrations
- Osmoreceptors detect changes in osmolarity
- Tactile receptors detect touch, pressure and vibration
- Baroreceptors detect blood pressure
- Mechanoreceptors detect stretching
- Proprioceptors detect body position
- Nociceptors detect pain

Now that we understand the key elements of a feedback system, we can look at two types of feedback systems found in the human body.

The first is negative feedback. This type of feedback system is responsible for most of the homeostatic control mechanisms of the human body. It works like a household thermostat. It shuts off the original stimulus or reduces its intensity to bring the body back to homeostasis. There are many examples of this in the human body. One example is blood sugar regulation. When blood glucose levels are high, insulin is released and causes the blood glucose levels to decrease. When blood glucose levels are too low, glucagon is released and causes the blood glucose to increase.

The second type of feedback system is positive feedback. In this type, the original stimulus increases to push the variable farther. The reaction ends up occurring at a faster rate. In our bodies a couple examples of positive feedback are blood clotting and childbirth.