

## AP Biology—Chapter 41 Lecture Notes

The Process (not science) of Nutrition involves four steps:

Ingestion → Digestion → Absorption → Egestion (not to be confused with excretion)

--simpler animals have a two-way digestive tube with one opening (hydra, flatworms, etc.)

--one-way, two-opening digestive tubes allow for more complexity in the nutrition process

1. Ingestion—occurs in some structure that resembles a mouth

2. Digestion—can be mechanical or chemical

A. Mechanical—breaking the food into smaller pieces but not chemically changing that food

--earthworms have a **gizzard** for **grinding**; snails have a **radula**; grasshoppers have **mandibles**; humans have **teeth**

B. Chemical—digestive enzymes hydrolyze the food into smaller pieces while chemically changing them

--even a simple hydra produces digestive enzymes that break its food down

--Pepsin, which breaks down proteins is produced in the stomach and works at optimum at a low pH (2)

--Bile, produced in the liver and acting in the small intestine, emulsifies fat droplets, which allows lipase to degrade them to fatty acids for absorption

--the Pancreas produces many enzymes that are secreted to the small intestine in the duodenum (just after the stomach)

3. Absorption—absorption of most substances occurs in the small intestine; that of water and some vitamins occurs in the large intestine (colon)

--sm. Intestine contains villi w/microvilli on them; these increase surface area for absorption of materials

--microvilli contain capillaries that allow material to diffuse into blood

--many animals have a long intestine that helps increase the surface area for absorption

4. Egestion—the rectum is a muscular section of the colon that allows undigested material to be squeezed out the anus

\*Material is moved through the digestive system by peristaltic action, *involuntary*, smooth muscle control, which is coordinated by the *autonomic* section of the *peripheral nervous system*