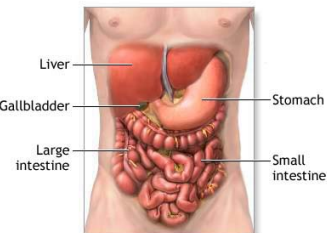


## Digestive System

**\*3) Digestive System:** Mouth, Saliva, Esophagus, Peristalsis, Chyme, Stomach, Small Intestine, Pancreas, Liver, Villi, Large Intestine,  
**Excretory System:** Kidneys, Ureter, Urinary Bladder, Nephrons, Filtration, Reabsorption, Urethra, Rectum.

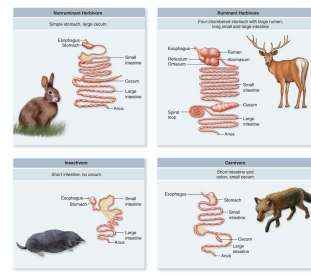



### Types of Digestion

1. Mechanical Breakdown
2. Chemical Breakdown

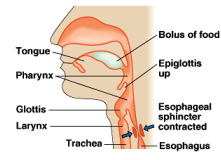
## Different diets; different lives

- All animals eat other organisms
  - Herbivores**
    - eat mainly **plants**
    - gorillas, cows, rabbits, snails
  - Carnivores**
    - eat other **animals**
    - sharks, hawks, spiders, snakes
  - Omnivores**
    - eat **animals & plants**
    - cockroaches, bears, raccoons, humans
    - humans evolved as hunters, scavengers & gatherers


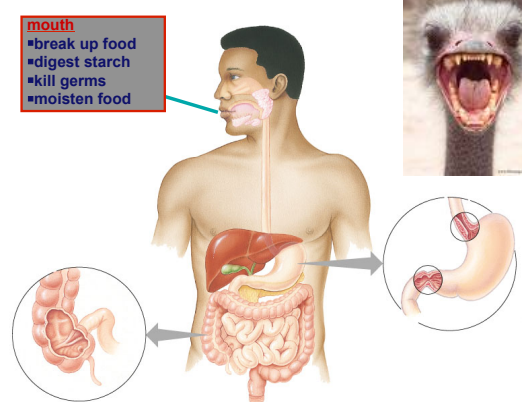



## Mouth

- Functions**
  - mechanical digestion**
    - teeth**
      - break up food
  - chemical digestion (saliva)**
    - amylase enzyme**
      - digests starch
  - mucus**
    - protects soft lining of digestive system
    - lubricates food for easier swallowing



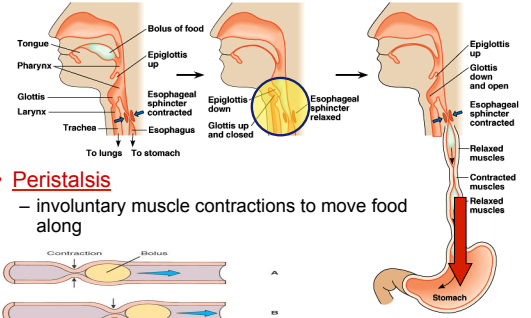
All that in spit!

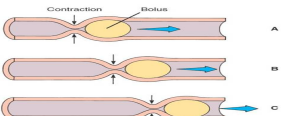
**mouth**

- break up food
- digest starch
- kill germs
- moisten food

## Swallowing (& not choking)

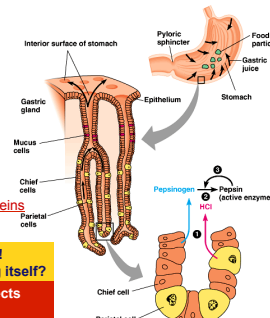


- Peristalsis**
  - involuntary muscle contractions to move food along

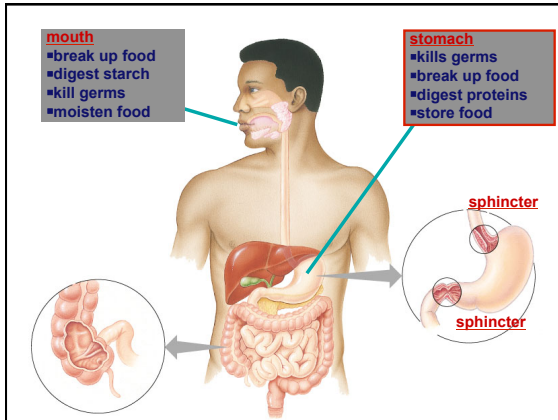


## Stomach

- Functions**
  - food storage**
    - can stretch to fit ~2L food
  - disinfect food**
    - HCl = pH 2
      - kills bacteria
  - chemical digestion**
    - pepsin**
      - enzyme breaks down proteins




But the stomach is made out of protein!  
 What stops the stomach from digesting itself?  
 mucus secreted by stomach cells protects stomach lining



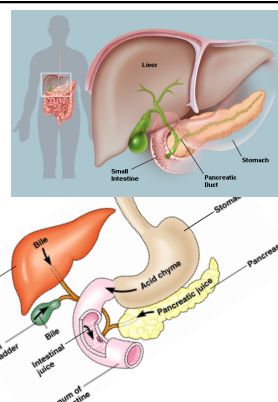
## Gastric Juices

- Secreted by the stomach.
- **Acidic** (pH 1.5-2.5) (HCl).
- Food is further broken down into a thin liquid called **chyme**.



## Pancreas

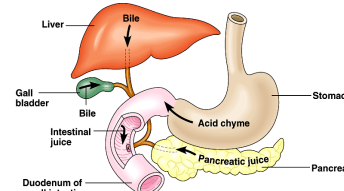
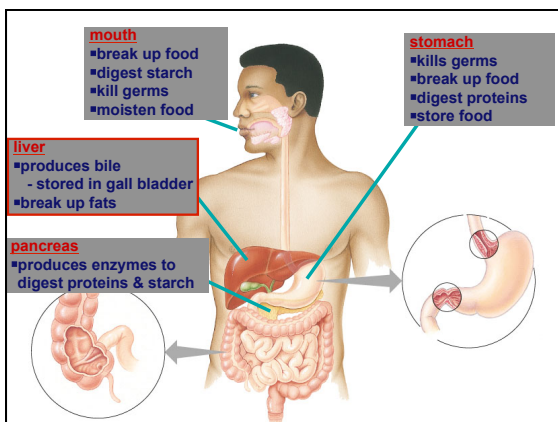
- Digestive enzymes
  - digest proteins
    - trypsin, chymotrypsin
  - digest starch
    - amylase
- Buffers
  - neutralizes acid from stomach



## Liver


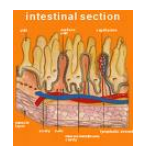
- Function
  - produces bile
    - bile stored in gallbladder until needed
    - breaks up fats
      - act like detergents to break up fats

**bile contains colors from old red blood cells collected in liver = iron in RBC rusts & makes feces brown**

## Small Intestine

- Most **chemical digestion** takes place here.
- Simple **sugars** and **proteins** are absorbed into the inner lining.
- **Fatty acids** and **glycerol** go to lymphatic system.
- Lined with **villi**, which increase surface area for absorption, one cell thick.

### Small intestine

- Function
  - **chemical digestion**
    - major organ of **digestion** & **absorption**
  - **absorption through lining**
    - over 6 meters!
    - small intestine has huge surface area = 300m<sup>2</sup> (~size of tennis court)
- Structure
  - 3 sections
    - **duodenum** = most digestion
    - **jejunum** = absorption of nutrients & water
    - **ileum** = absorption of nutrients & water

**mouth**

- break up food
- digest starch
- kill germs
- moisten food

**stomach**

- kills germs
- break up food
- digest proteins
- store food

**pancreas**

- produces enzymes to digest proteins & starch

### Absorption by Small Intestines

- **Absorption through villi & microvilli**
  - finger-like projections
  - **increase surface area for absorption**

**Small Intestine**

**VILLI**  
Job: INCREASE SURFACE AREA

**Microvilli**

**Small Intestine Wall Layers:** Mucosa, Submucosa, Muscularis

**Microvilli Structure:** Epithelial cell, Capillary, Lactical, Villus, Nucleus, Cell membrane, Vein, Artery, Lymphatic duct

### Large Intestines (colon)

- Function
  - **re-absorb water**
    - use ~9 liters of water every day in digestive juices
    - > 90% of water reabsorbed
      - not enough water absorbed
        - » **diarrhea**
      - too much water absorbed
        - » **constipation**

### BACTERIA

- Living in the large intestine is a community of helpful bacteria
  - **Escherichia coli (E. coli)**
    - produce vitamins
      - vitamin K, B vitamins

**Friendly Bacteria**

*L. acidophilus, L. salivarius, L. casei, L. thermophilus, B. bifidum, B. longum, etc.*

**Unfriendly Bacteria**

Pathogenic bacteria & fungi, such as *Candida albicans*, etc.

### Appendix

**Vestigial organ**

**Ascending portion of large intestine**

**Small intestine**

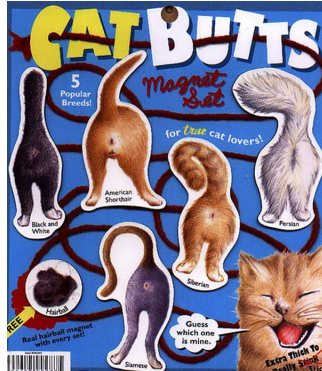
**Large intestine**

**Rectum**

**Anus**

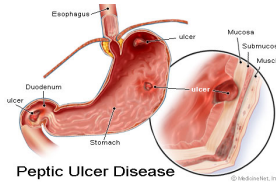
### Rectum

- Last section of colon (large intestines)
  - eliminate feces
    - undigested materials**
      - extracellular waste
        - mainly cellulose from plants
        - roughage or fiber**
      - masses of bacteria



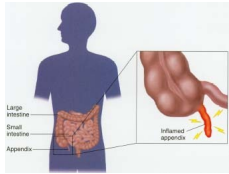
### Digestive Homeostasis Disorders

- ULCERS** – erosion of the surface of the alimentary canal generally associated with some kind of irritant



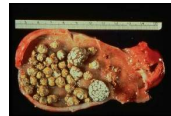
### Digestive Homeostasis Disorders

- APPENDICITIS** – an inflammation of the appendix due to infection
- Common treatment is removal of the appendix via surgery



### Digestive Homeostasis Disorders

- GALLSTONES** – an accumulation of hardened cholesterol and/or calcium deposits in the gallbladder
- Can either be “passed” (OUCH!!) or surgically removed

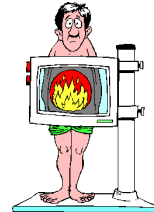
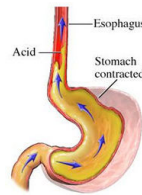


### Digestive Homeostasis Disorders

- ANOREXIA NERVOSA** - a psychological condition where an individual thinks they appear overweight and refuses to eat.
- Weights 85% or less than what is developmentally expected for age and height
- Young girls do not begin to menstruate at the appropriate age.

### Digestive Homeostasis Disorders

- HEART BURN** – ACID from the stomach backs up into the esophagus.



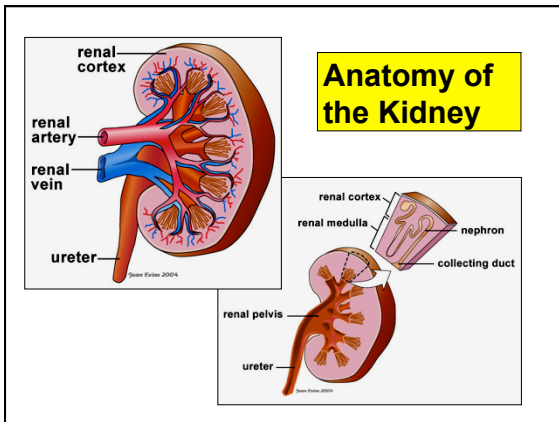
Which type of digestion is the following?

1. Chewing a saltine? - **Mechanical**
2. Saliva breaking the saltine down into molecules of glucose? - **Chemical**
3. Your tongue breaking pieces of a hamburger apart? **Mechanical**
4. Pepsin (an enzyme) in your stomach breaking the hamburger into amino acids? **Chemical**

**Excretory System:  
THE KIDNEY**

Organ of osmoregulation and excretion

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**Urine Formation by Nephron**

**Job: Take water from blood and remove waste**

- Mostly Nitrogen Waste
- Let out of body
- Try not to let out too much water

**Urine moves from the collecting ducts through the kidney pelvis to the ureter**

The diagram shows a cross-section of a kidney with labels: renal cortex, renal medulla, nephron, collecting duct, renal pelvis, and ureter. It illustrates the path of urine from the collecting ducts through the renal pelvis to the ureter.

