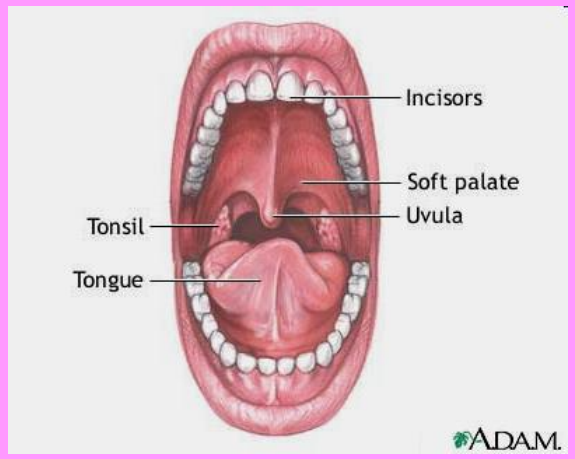
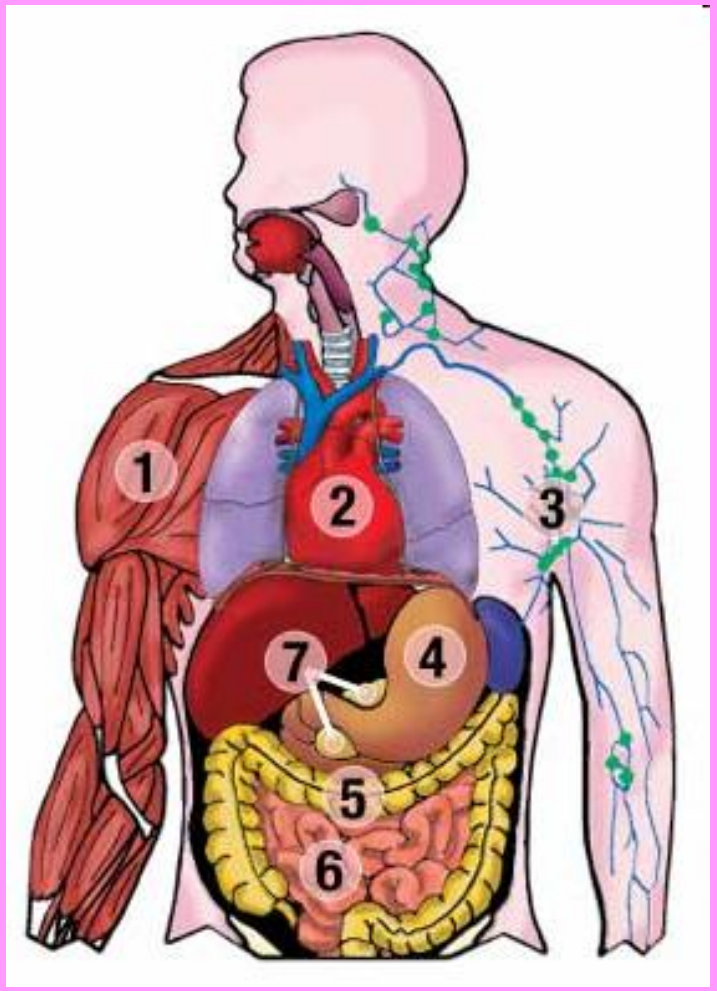
Digestion Introduction Lecture

MMHS Science

Chitraroff





Digestion is the process that changes food into a form that is usable by your body.

The Alimentary Canal

- The pathway of food from your mouth to your anus.

A. <u>Eight Parts of the Alimentary Canal</u>

1. Mouth
2. Pharynx
3. Esophagus
4. Stomach
5. Small Intestine
6. Large Intestine (colon)
7. Rectum
8. Anus

Accessory Organs

Food does no pass directly through here, but these organs aid in digestion with the use of enzymes and bile salts.

- Liver = produces bile salts that emulsify fats in the small intestine.
- Gall Bladder = small, thin sac near the liver that stores bile.
- Pancreas = found near the spleen and produces enzymes for the breakdown of all categories of food.

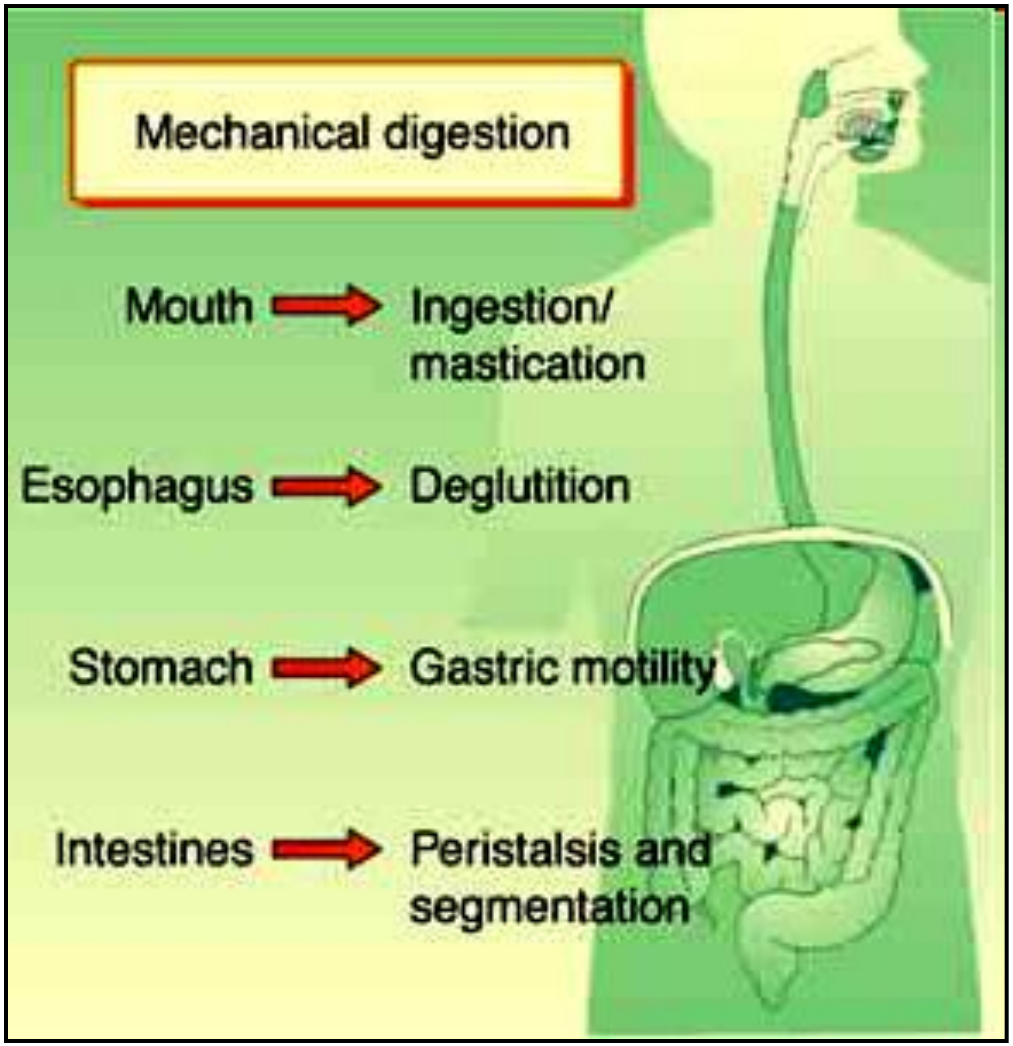
Phases of Digestion

1. <u>Mechanical Digestion</u>
   - → Chewing, churning, and mixing done by the mouth and the stomach.
   - → Physical breakdown of large food globules to smaller food globules.
2. <u>Chemical Digestion</u>
   - → use of enzymes from glands to chemically break the bonds between the molecules.
   - → Polymers break down into Monomers.

Mechanical Digestion

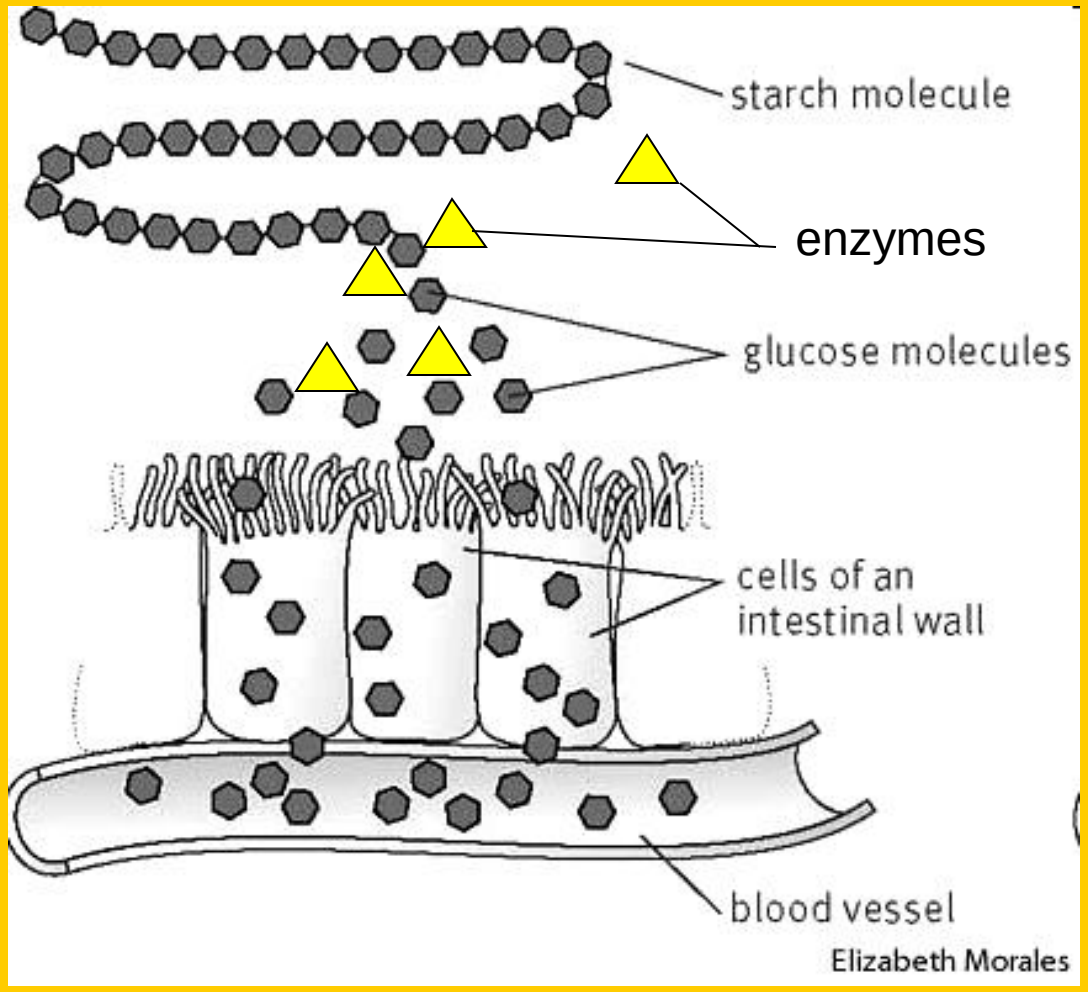
Terms Associated with Mechanical Digestion

1. Ingestion
2. Mastication
3. Deglutination
4. Gastric Motility
5. Peristalsis
6. Segmentation



Chemical Digestion

Chemical Digestion uses *enzymes* that break larger molecules into smaller ones so they can be absorbed.



Draw this Figure in the box at the end of your notes.

The Mouth

A. Gets food ready for digestion.

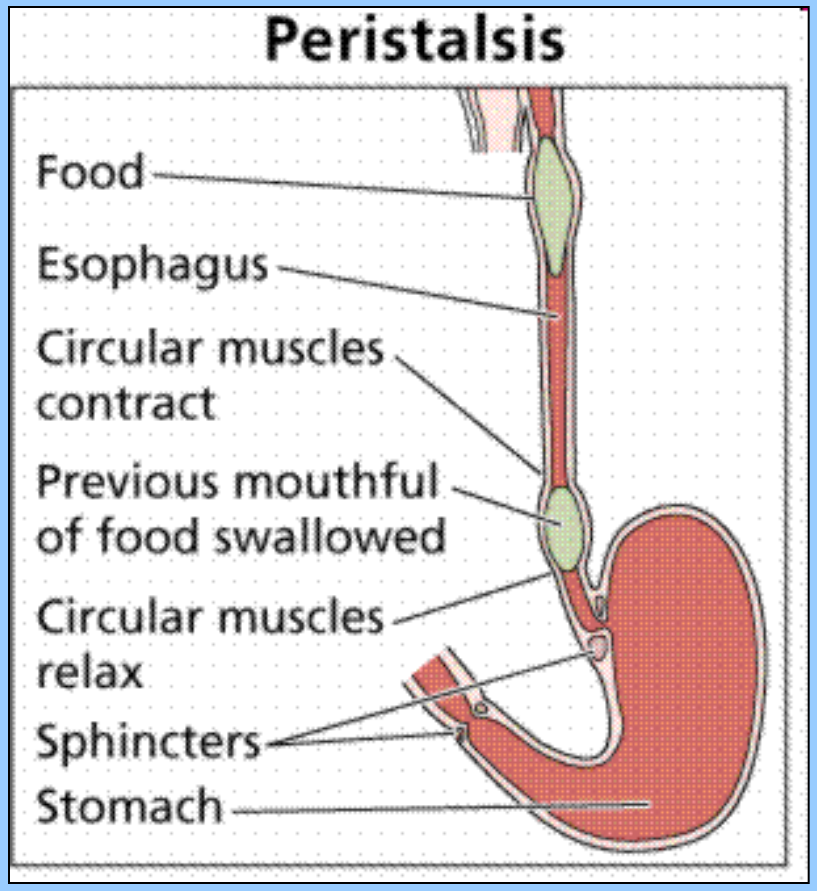
B. Teeth physically break up food making it easier to digest.

C. Salivary glands secrete mucous and enzymes (Salivary Amylase) that digests carbohydrates.

1. Parotid Gland = largest, swells when you have the mumps.
2. Submaxillary Gland = located at the angles of the jaw.
3. Lingual Gland = located under the tongue and causes the mouth to water.

D. The tongue is a muscular organ that helps in chewing and swallowing and moves around to keep the teeth clean.

The Esophagus



A. Connects the mouth to the stomach.
B. Circular and Longitudinal (smooth) muscles move the food rhythmically to the stomach via ***Peristalsis.***
C. Located posterior to the trachea.

The Stomach

The Stomach twists and churns food.

A. Gastric Glands in the stomach lining…

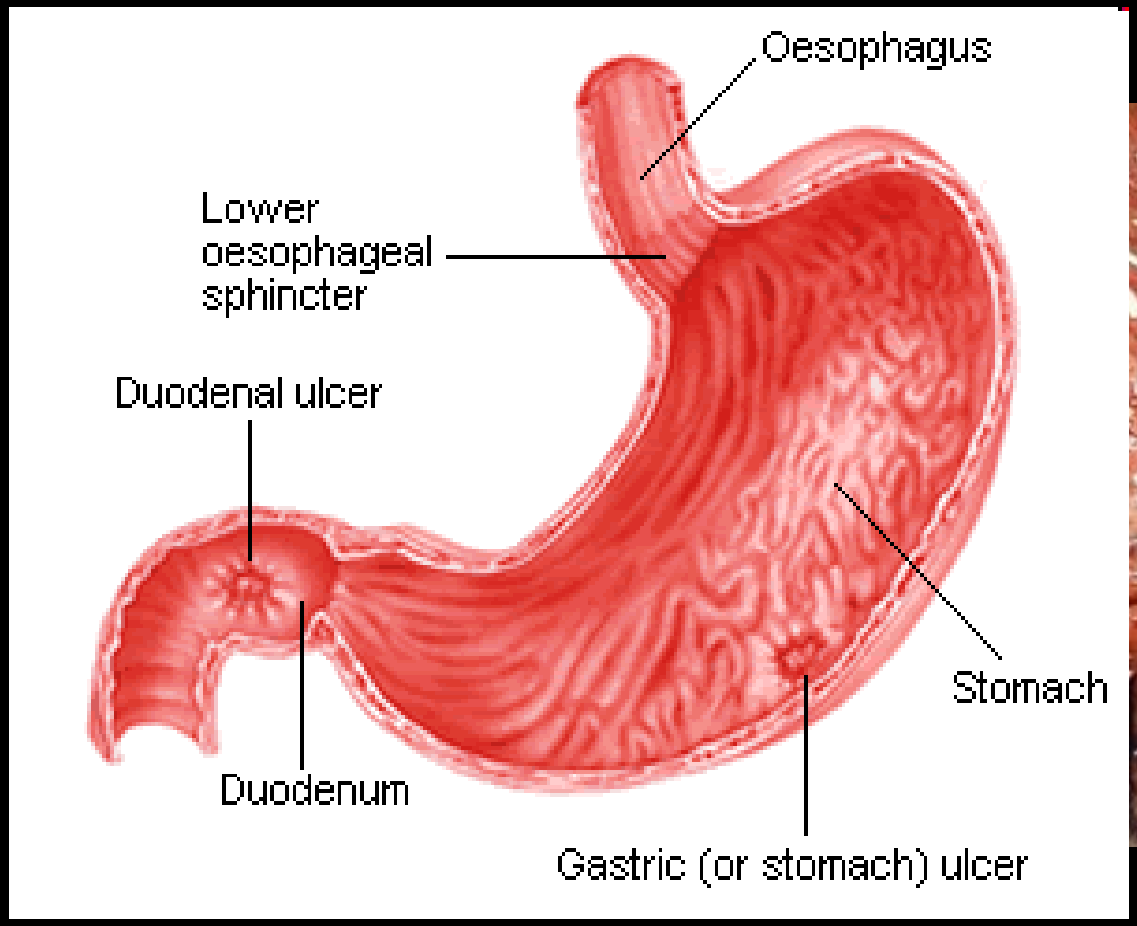
1. Secretes Hydrochloric Acid (HCl)
   a) Kills bad bacteria present on the food.
   b) Regulates the lower pyloric sphincter valve.
   c) Controls the stomach pH level.
2. Secretes the enzyme **Pepsin**.
   a) Pepsin is the first step in protein digestion—breaks down protein polymers into smaller chains of amino acids called polypeptides and dipeptides.

3. Secretes Mucous.
    a) Mucous protects the stomach lining from digesting itself.
    b) If mucous levels are low in a body, then that person may develop **ulcers** = a sore or raw area in the stomach lining or duodenum of the small intestine.

B) Food stays in the stomach for 3-5 hours.

C) Food (chyme) enters into the small intestine through the Pyloric Valve (sphincter).

Gastric vs. Duodenal Ulcers



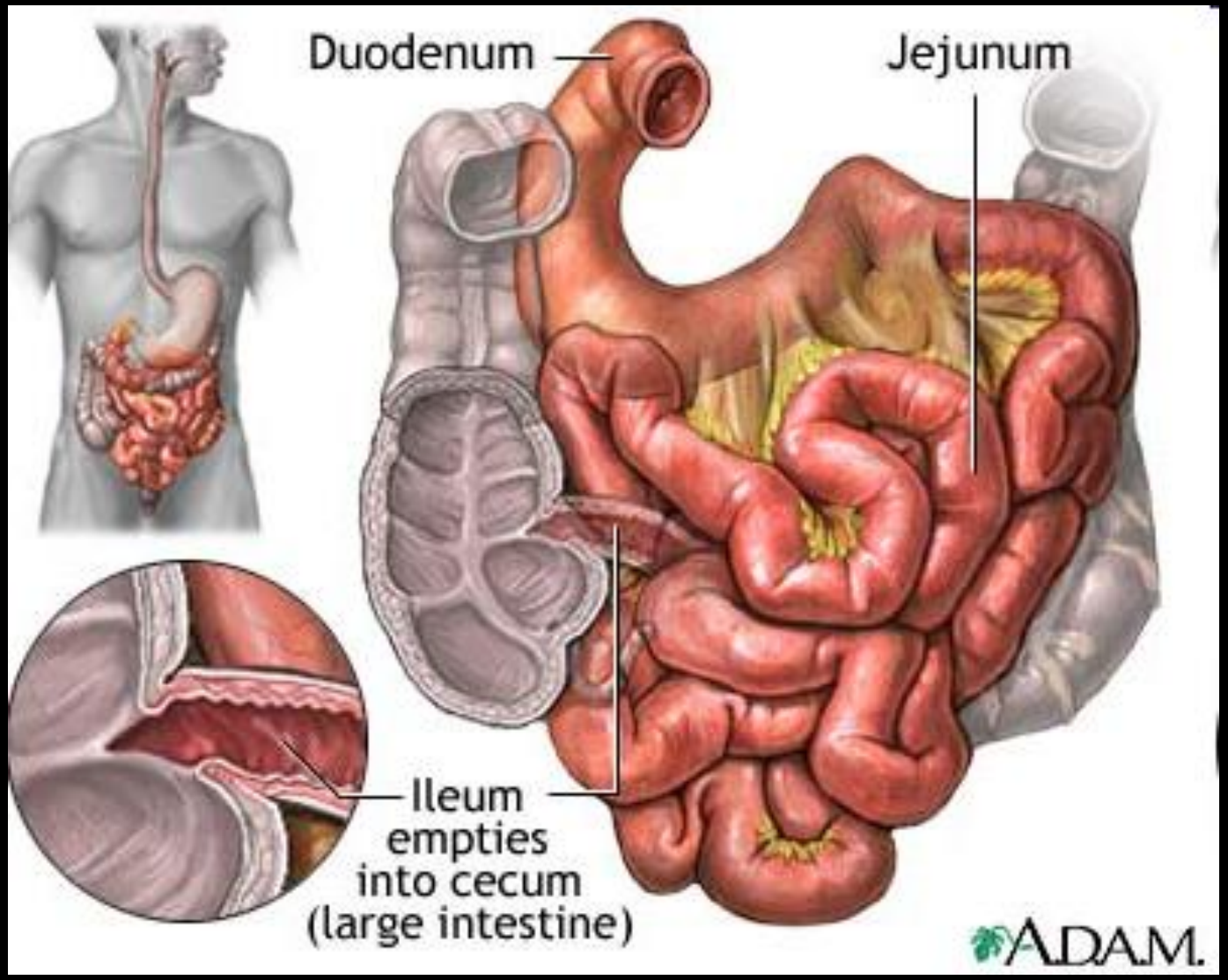
The Small Intestine

A. Small Intestine divided into 3 regions:

***Remember **D.J.I.** !!!

1. **Duodenum** (10-12 in)—attached to the inferior stomach. **a)** Receives bile from the Gall Bladder and enzymes from the pancreas. **b)** High pH bicarbonate here neutralizes acids from the stomach.
2. **Jejunum** (8 feet)—middle section of small intestine. Mesentary binds & coils intestine.
3. **Illium** (12 feet)—last section that connects jejunum to the large intestine. The appendix (cecum)is found in this region.

The 3 Regions of the Small Intestine



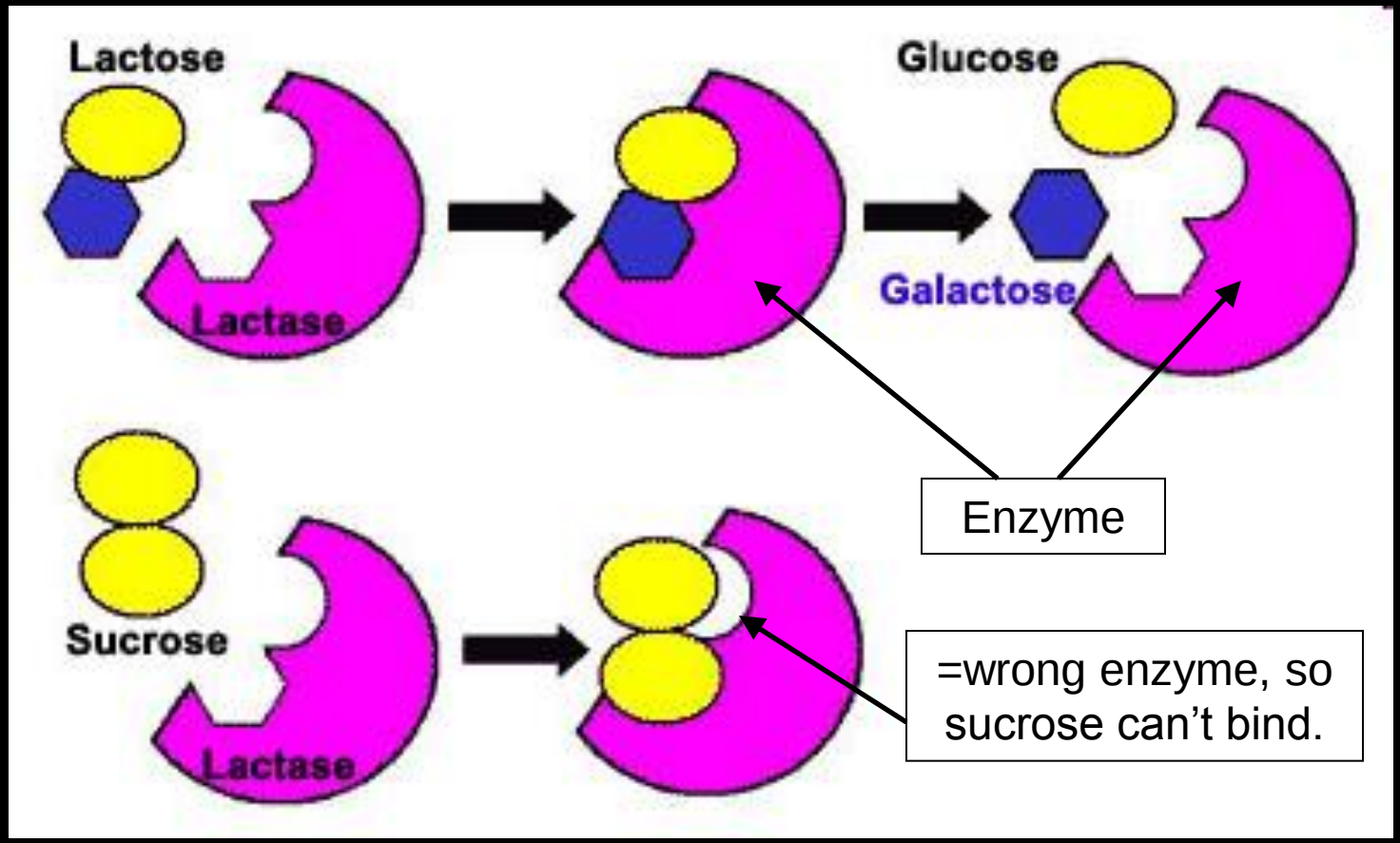
Enzymes from the Small Intestine

Four Different Enzymes Secreted Here:

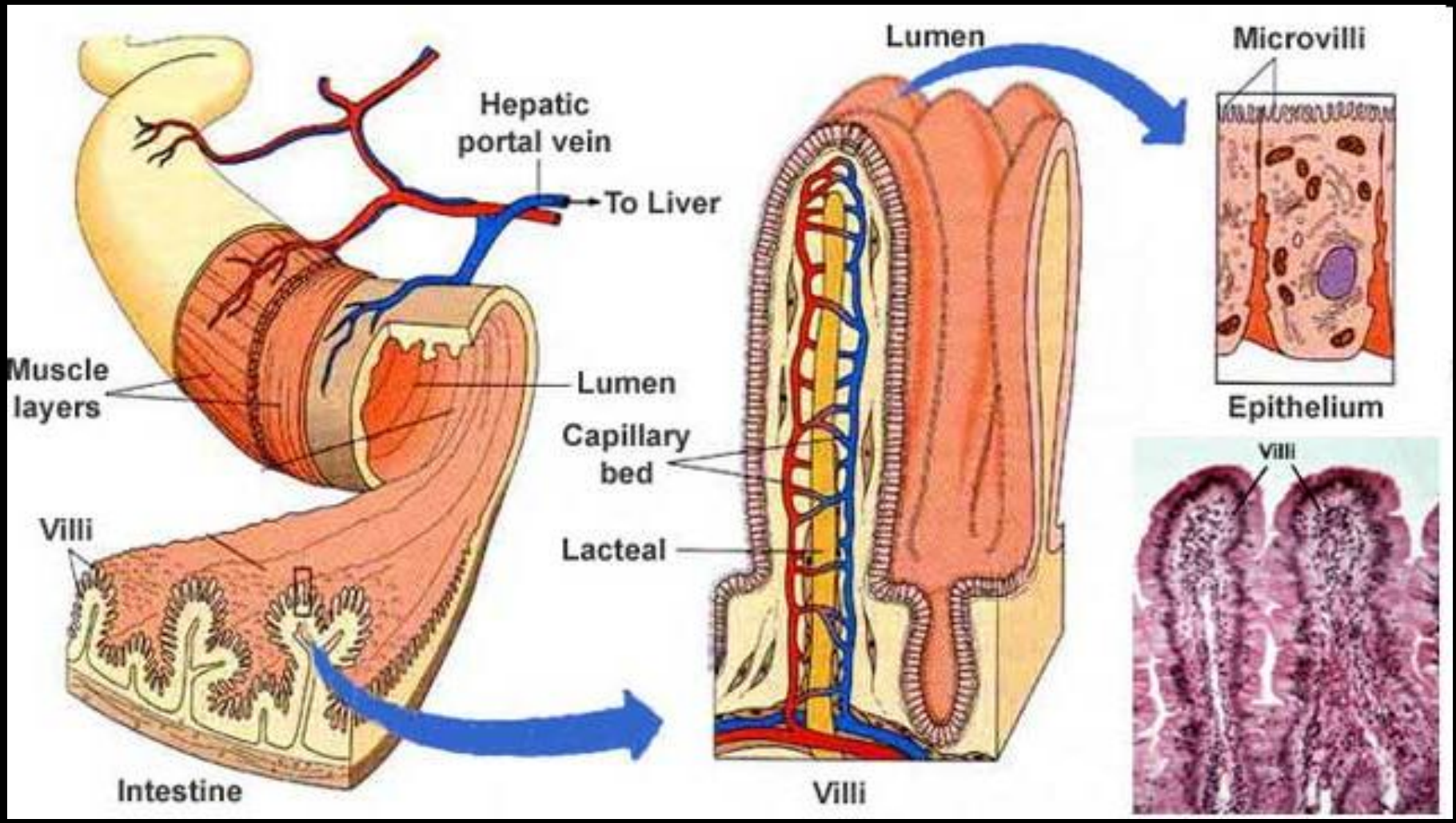
1. **Peptidase**—finishes protein digestion that started in the stomach.
   a) digests dipeptides into amino acids.
2. **Maltase**—changes maltose to glucose.
3. **Lactase**—changes lactose to glucose.
4. **Sucrase**—changes sucrose to glucose.

*Notice that enzymes all end in ***-ase*** and the root words are the same as the sugars.

Enzymatic Digestion of Lactose



Simple Columnar Cells of Intestine



Accessory Organs of the Digestive System

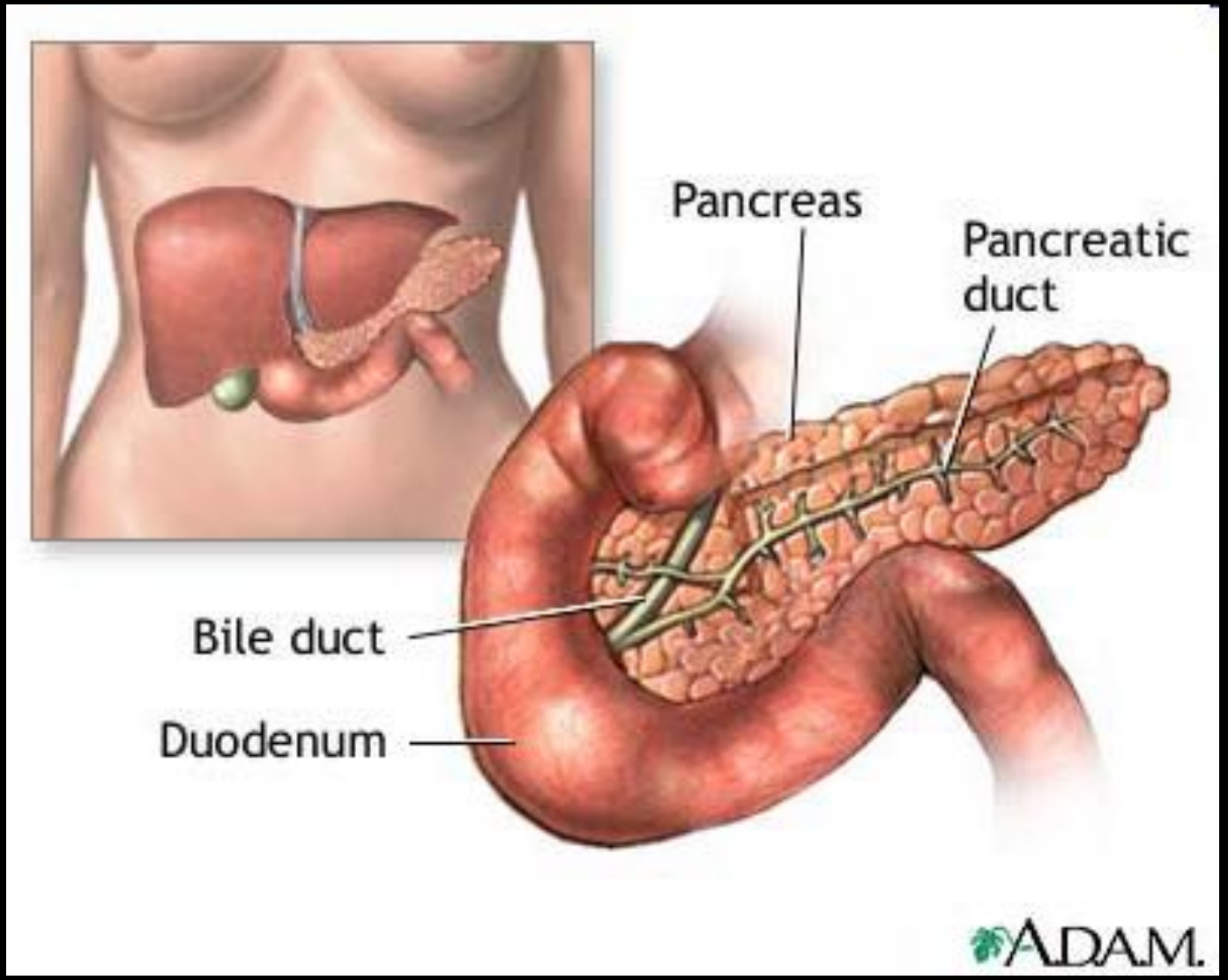
Enzymes from the Pancreas

Pancreas = an accessory organ found below the liver near the spleen.

Enzymes pass from the pancreas through the pancreatic duct into the duodenum.

1. **Trypsin**—converts polypeptides to dipeptides.
2. **Pancreatic amylase**—digests carbohydrates.
3. **Lipase**—digests small fats.

The Pancreas



The Liver

*An accessory organ found in the upper abdominal cavity

A. The Liver makes Bile:

1. **Bile** is a salt that emulsifies (breaks up) large fat globules into smaller ones.
2. **Bile** activates the enzyme lipase to break down fats.
3. **Bile** enters the duodenum through the common bile duct..

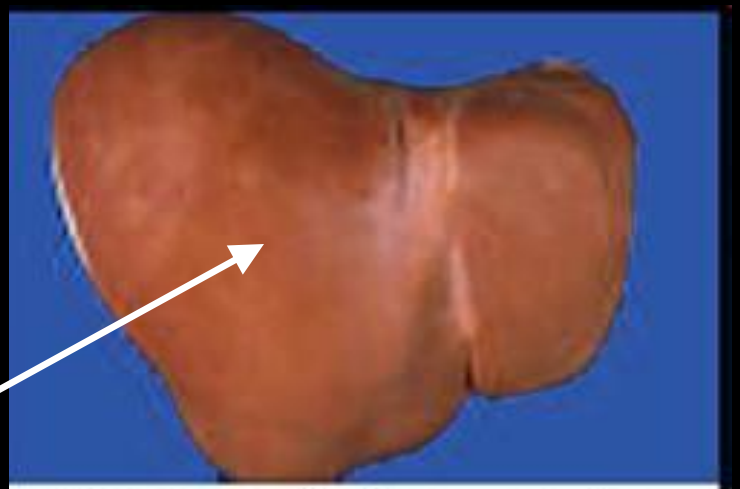
The Liver

B. <u>The Liver has other functions</u>:

1. Removes glucose from the blood and stores it as glycogen (medium-term)
2. Breaks down amino acids (=deamination) for energy.
3. Detoxifies the blood of any impurities.

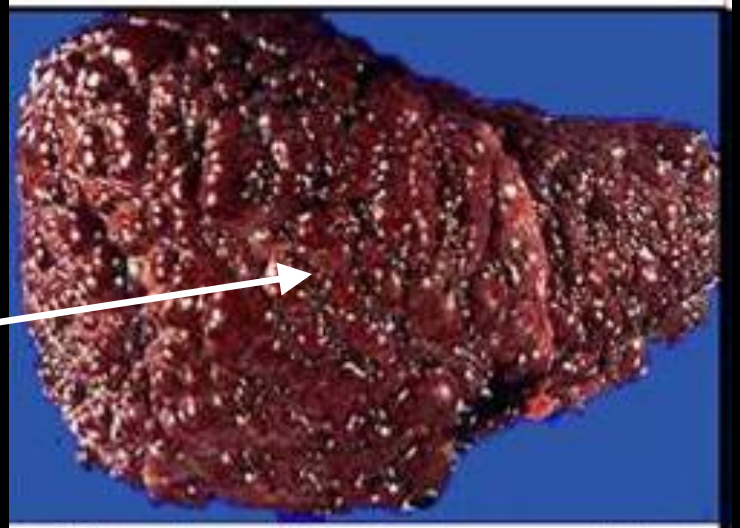
The Liver

Healthy Liver



This is a normal healthy appearing liver. The surface is smooth and uninform.

Unhealthy Cirrhotic Liver [=Alcoholic]



The surface of this liver is very nodular and deformed from severe cirrhosis.

The Colon (=Large Intestine)

*<u>The last part of the alimentary canal attached to the small intestine.</u>

A. Receives undigestible food from sm.Intestine.

B. <u>Function</u>: it squeezes out water to solidify the feces.

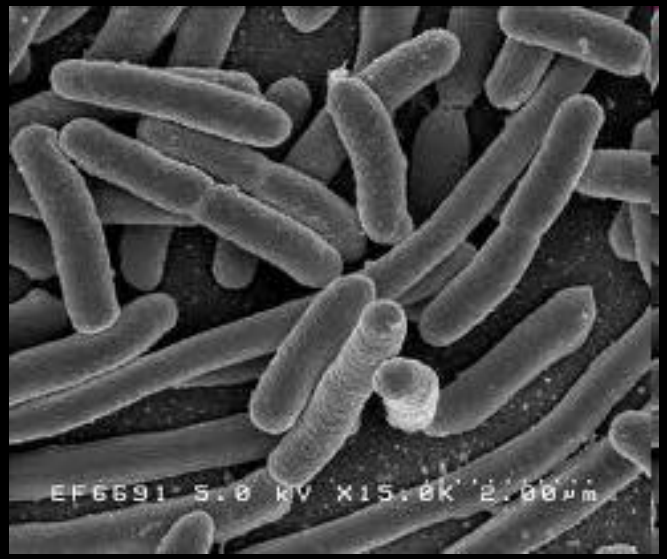
C. If material passes slow = **hard stools**. (constipation)
   If material passes quick = **soft stools**. (diarrhea)
   If material doesn't move = **fecal impaction** ☹!

D. Feces collect in the rectum. The <u>anal sphincter</u> contracts to hold in the poo! When it relaxes, then you **<u>defecate</u>**.

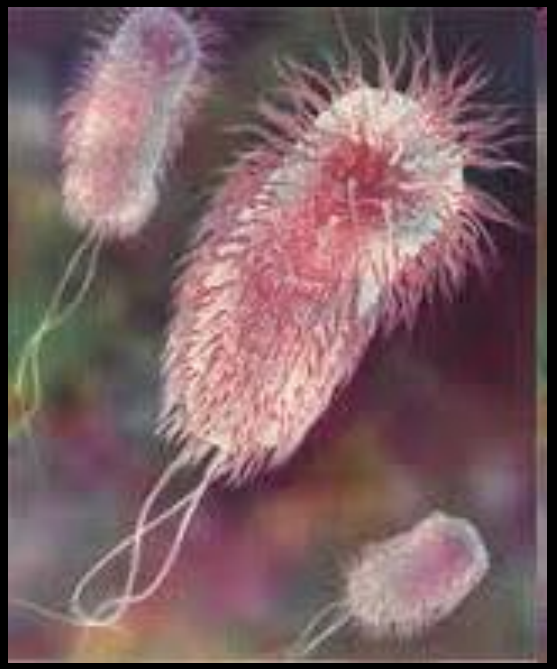
The Colon (=Large Intestine)

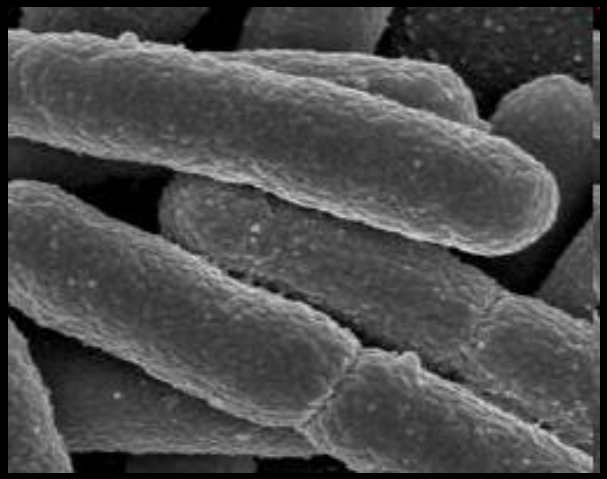
E. There's a bacterium in my colon!

1. *Escherichia coli* (aka E.coli) forms a symbiotic relationship with humans.
2. *E. coli* digests fiber (it's food source) that we can't breakdown.
3. Then, *E. coli* produces methane gas as a byproduct of digestion. (= flatulence)
4. If *E. coli* comes in contact with our food, we can get sick. <u>So, wash up children!</u>



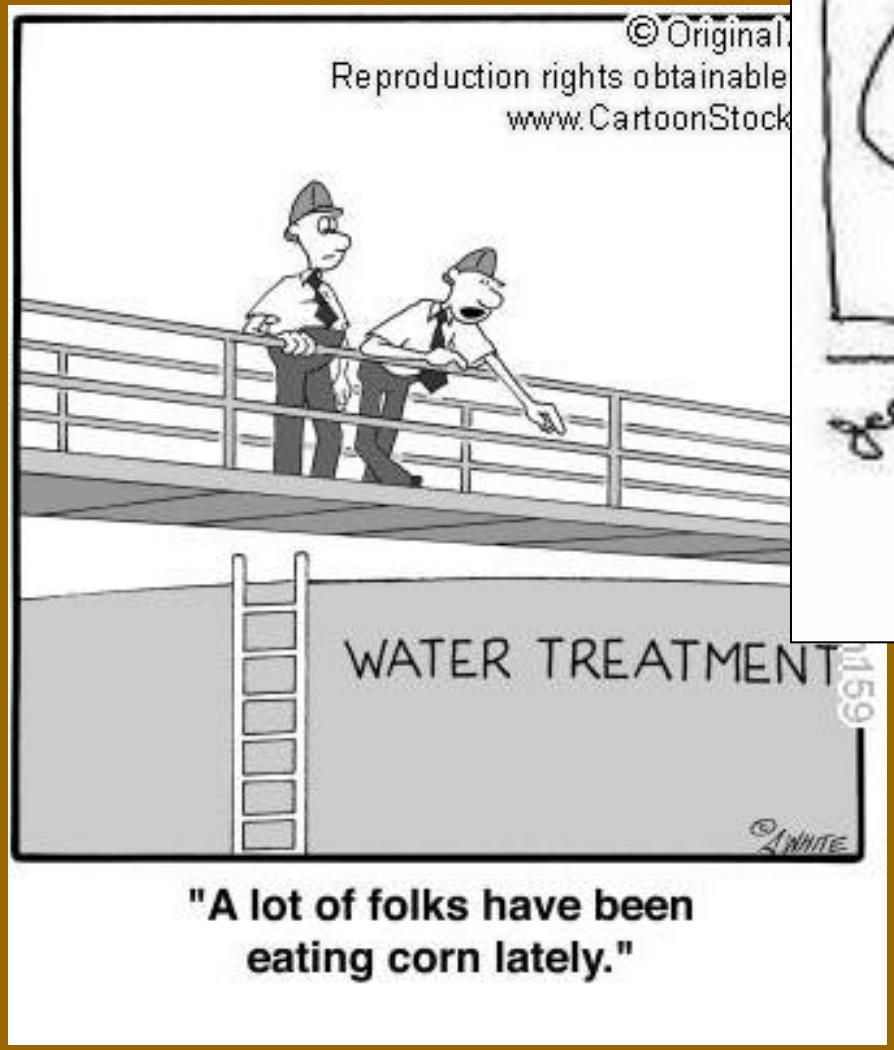
E. coli





Top 10 Slang for Going #2

10. Pinch a loaf.
9. Cut the cord.
8. Drop the kids off at the pool.
7. Back out the brown bus.
6. Build a log cabin.
5. Download a brownload.
4. Take the Browns to the Super Bowl.
3. Drop anchor.
2. Logging out.
1. Take the brownies out of the oven.



"A lot of folks have been eating corn lately."

"No, no, no - I said do me a ship in a bottle!"