Review

- What is pasteurization? Why do we still use it?
- What is a GMO?

Digestive System

What is Digestion?

- The **break down of food** into molecules that are **small enough** to be **absorbed** and used by the body

What is Digestion?

- This involves:
  - **Ingestion** and **propulsion** of food along digestive tract
  - **Break down** of food
  - **Absorption** of nutrients
  - **Elimination** of **waste** (fecal matter)

What Belongs to the Digestive System?

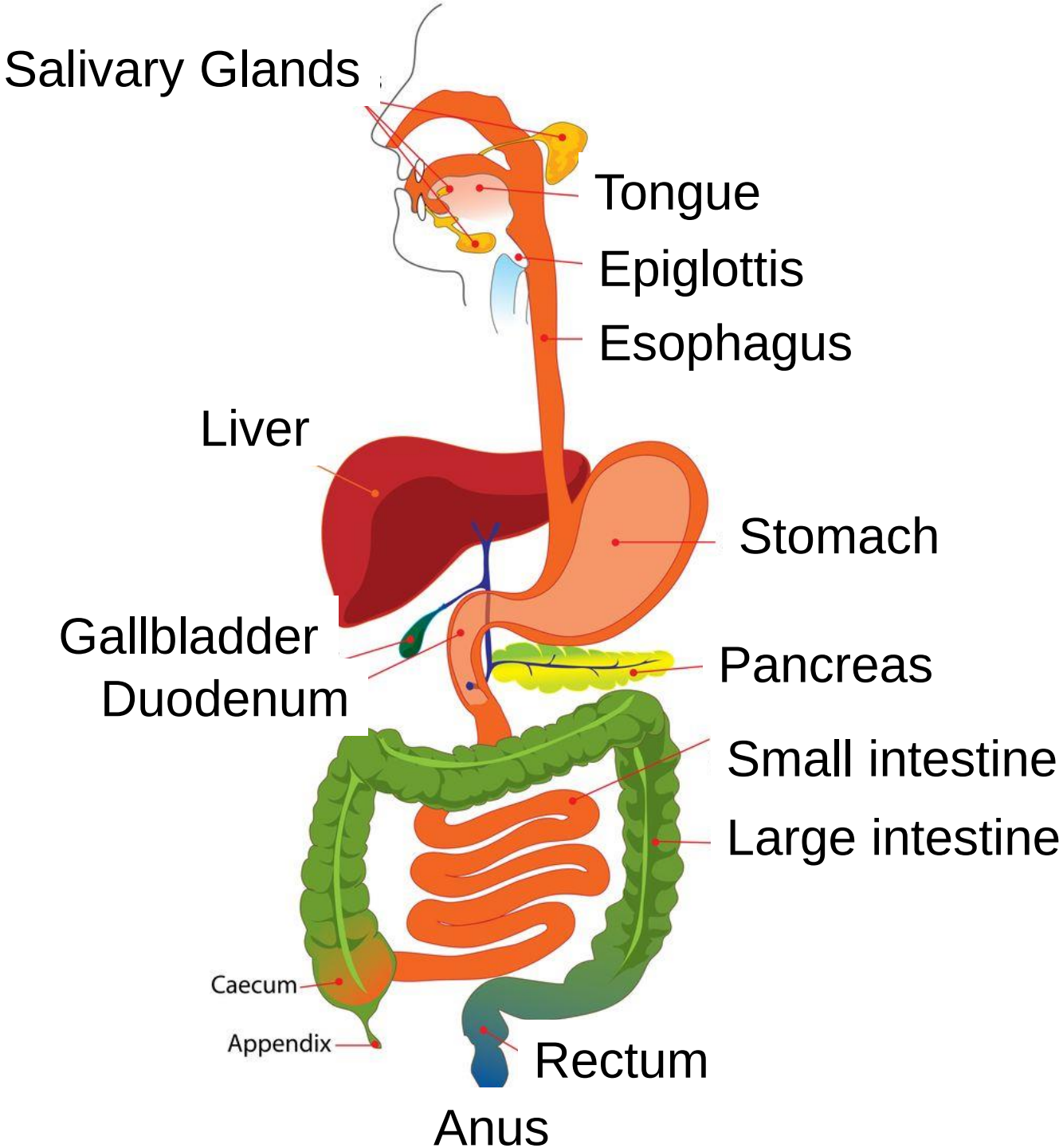
- The digestive system can be broken down into two main parts:
  - The **digestive tract**
    - The **path** that food travels along
  - The **digestive glands**
    - These produce the **chemical secretions** necessary to digest (break down) the food

Mechanical vs Chemical

- **Mechanical transformation:**
  - **Physically** breaking down food into **smaller** bits **without** changing its **chemical** nature

Mechanical vs Chemical

- **Chemical transformation:**
  - **Complex** molecules are broken down into **simpler** molecules that can be **absorbed** by the body; **chemical** nature **is changed**


Salivary Glands
Tongue
Epiglottis
Esophagus
Liver
Stomach
Gallbladder
Duodenum
Pancreas
Small intestine
Large intestine
Caecum
Appendix
Rectum
Anus

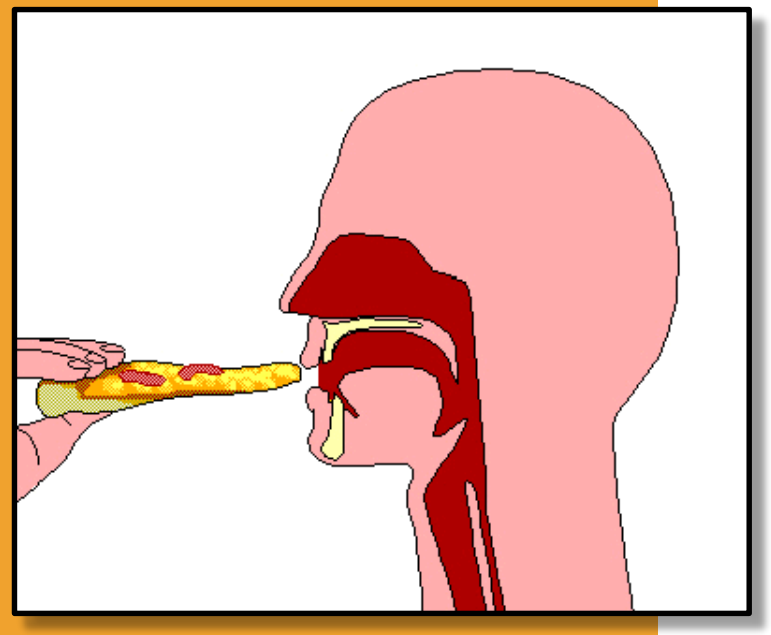
The Digestive Tract

- The digestive tract is made up of:
  - The **mouth**
  - The **pharynx**
  - The **esophagus**
  - The **stomach**
  - The **small intestine** (ileum)
  - The **large intestine** (colon)

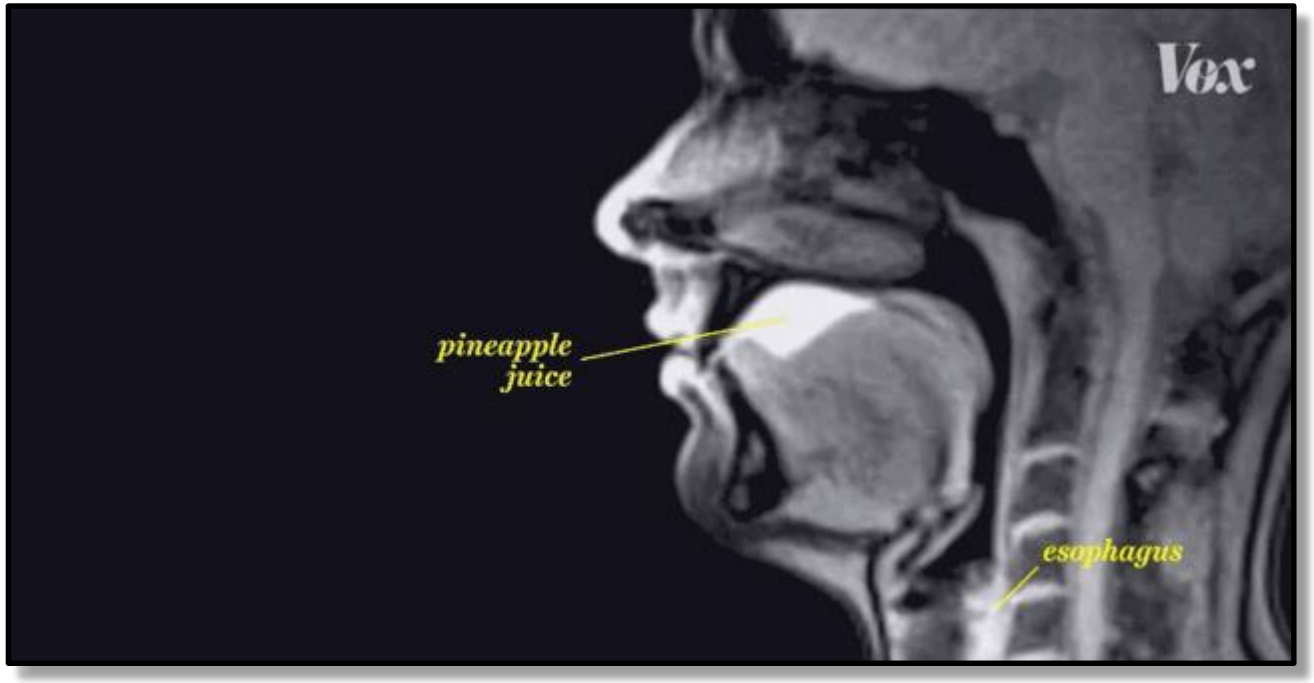
The Digestive Glands

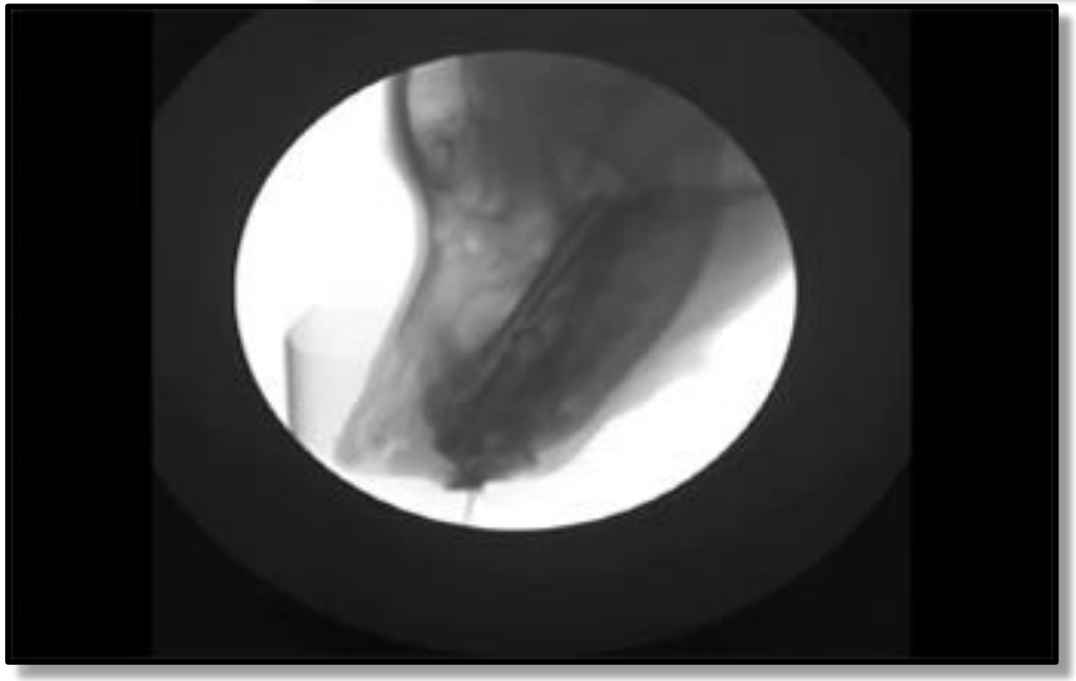
- The digestive glands:
  - The **salivary** glands
  - The **gastric** glands
  - The **liver**
  - The **pancreas**
  - The **intestinal** glands

Functions of the Digestive Tract



- **Mouth:**
  - **Ingestion** of food
    - This is where **food enters** the digestive tract
  - **Mechanical breakdown** of food through **mastication** (chewing)
  - **Chemical breakdown** of **starches** thanks to **saliva**
  - **Deglutination** (swallowing)


Vox
pineapple juice
esophagus

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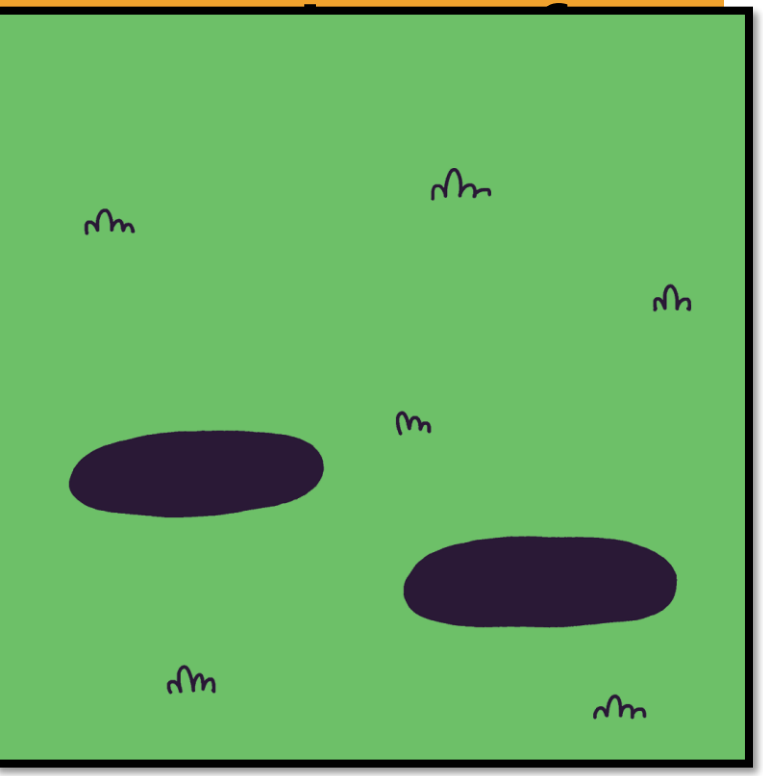
Swallowing

- During swallowing:
  - **Uvula** moves up to block the **nasal cavity**
    - So no food goes up your nose
  - **Epiglottis** covers the **trachea** (airway)
    - So no food goes into your lungs

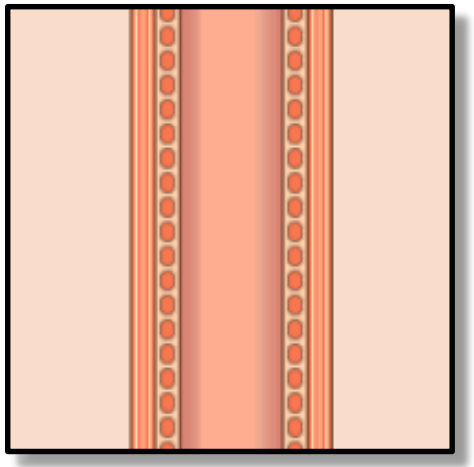
Functions of the Digestive Tract

- **Pharynx:**
  - The next step in the digestive tract
  - Moves food **from mouth to esophagus**

- **Esophagus:**
  - Propels food **towards the stomach**
  - Uses **peristalsis**; a type of muscular contraction to move the food down the esophagus



Never Google "worm GIFs"

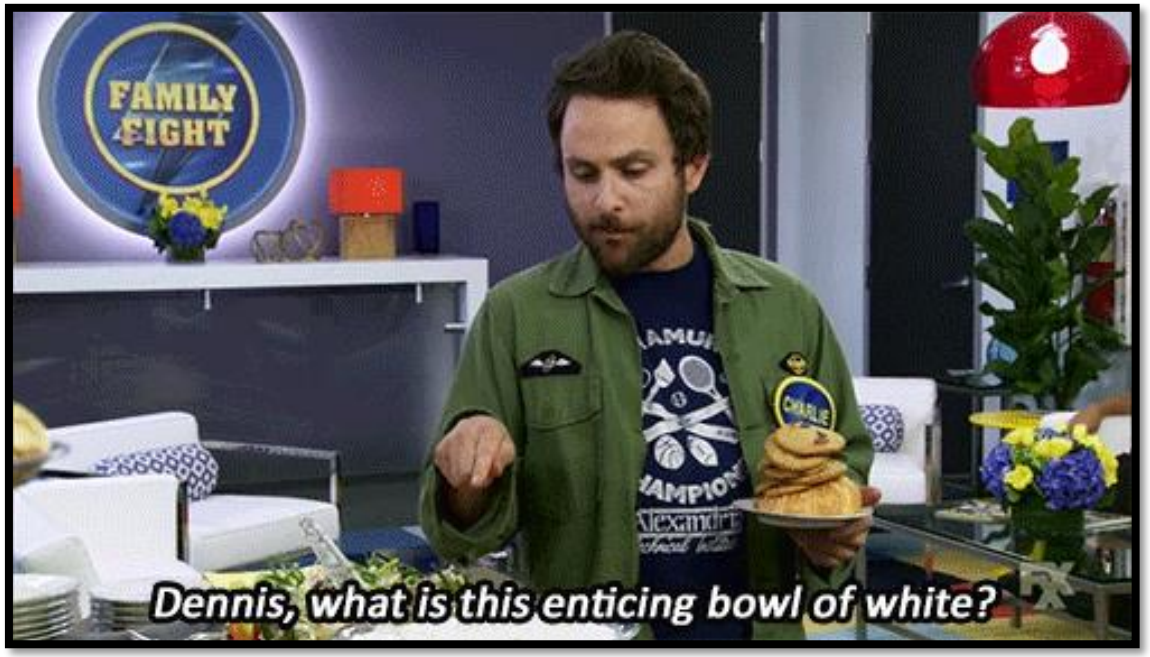


Functions of the Digestive Tract

- **Stomach:**
  - **Churning** of food to **mix** the chewed up **food** with **secretions** from digestive glands
  - Secretion of **gastric juices (hydrochloric acid and enzymes)** to break down **proteins**

Functions of the Digestive Tract

We refer to the partially digested food as **chyme**



It has the consistency of cottage cheese… yum!

Functions of the Digestive Tract

- **Small intestine:**
  - More chemical breakdown of food:
    - Release of **intestinal** and **pancreatic juices** to break down proteins, carbohydrates and fats

Functions of the Digestive Tract

- **Small intestine:**
- Proteins → **amino acids**
- Carbohydrates → **simple sugars** (glucose mostly)
- Fats → **glycerol** and **fatty acids**

Also has **bile** from the **liver** to help breakdown fats (mechanical)

Functions of the Digestive Tract

- **Small intestine:**
  - **Absorption**
    - The **passage** of nutrients from the digestive tract into the **blood stream** (or **lymph**)
    - Most absorption occurs in the small intestine
      - Covered in many small folds called **villi** that increase the **surface area** for absorption

Functions of the Digestive Tract

- **Large intestine:**
  - Absorption of **water**
    - Only **waste** products left afterwards
  - **Feces** is expelled from the **rectum** through the **anus**

Digestive Glands

Functions of the Digestive Glands

- **Salivary Glands:**
  - Secrete saliva
    - **Lubricates the mashed food**
      - Makes it easier to pass along the pharynx and esophagus
    - Starts the **chemical breakdown** of **starches**
      - Thanks to an enzyme called **amylase**

Functions of the Digestive Glands

- **Gastric Glands:**
  - Found on the inside lining of the stomach
  - **Secrete the gastric juices**
    - These contain hydrochloric acid and pepsin
    - Starts the **chemical digestion of proteins**

Functions of the Digestive Glands

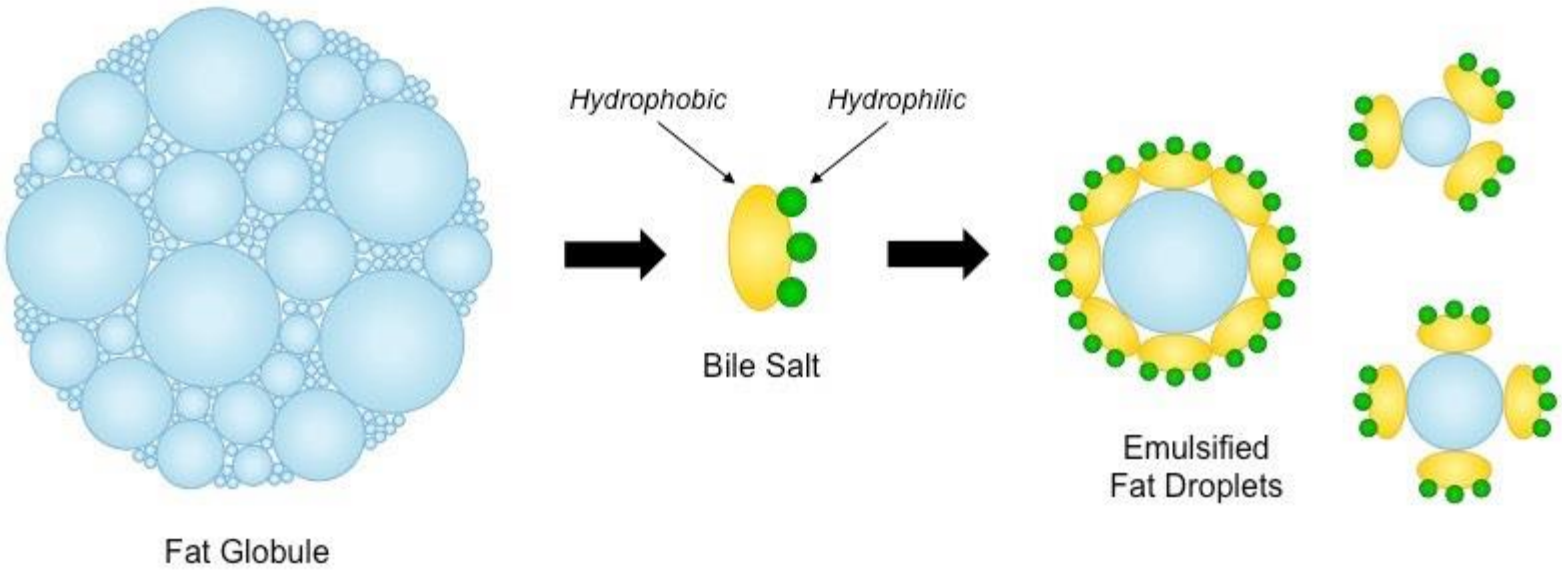
- **Intestinal Glands:**
  - Found on the inside lining of the small intestine
  - **Secrete the intestinal juices**
    - Start the **chemical digestion of fats**
    - Also helps in **chemical breakdown of proteins and carbohydrates**
    - And helps **neutralize the acid** of the stomach

Functions of the Digestive Glands

- **Pancreas:**
  - **Secretes the pancreatic juices**
    - Helps in **chemical breakdown of fats, proteins and carbohydrates**
    - Also secretes **insulin**
      - The **hormone** responsible for regulating **blood sugar**!

Functions of the Digestive Glands

- **Liver:**
  - Produces **bile**
    - Helps in **mechanical breakdown of fats**
      - **Emulsifies the fat** (breaks it up into smaller molecules)



Digestion and Absorption of Nutrients

- The whole point of digestion is to extract the required nutrients from the food we eat
  - In doing so, the digestive process is breaking each **macronutrient into its components**
    - Carbs → **simple sugars**
    - Proteins → **amino acids**
    - Fats → **glycerol and fatty acids**
    - Water**…. Stays as water**