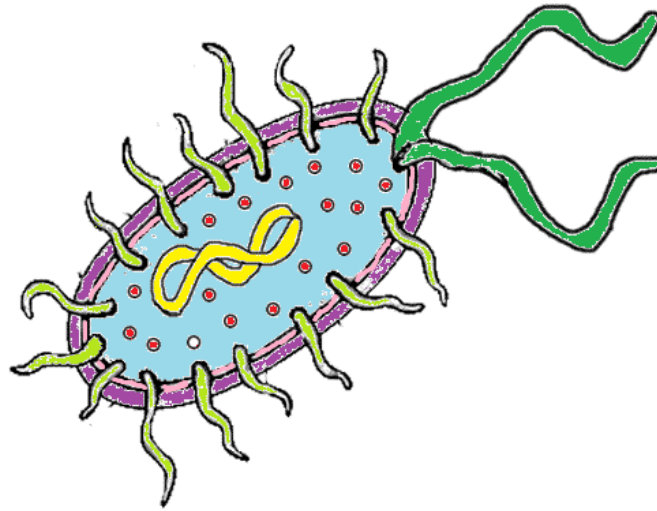


HETEROTROPHS cannot make their own food like Autotrophs(Plants).

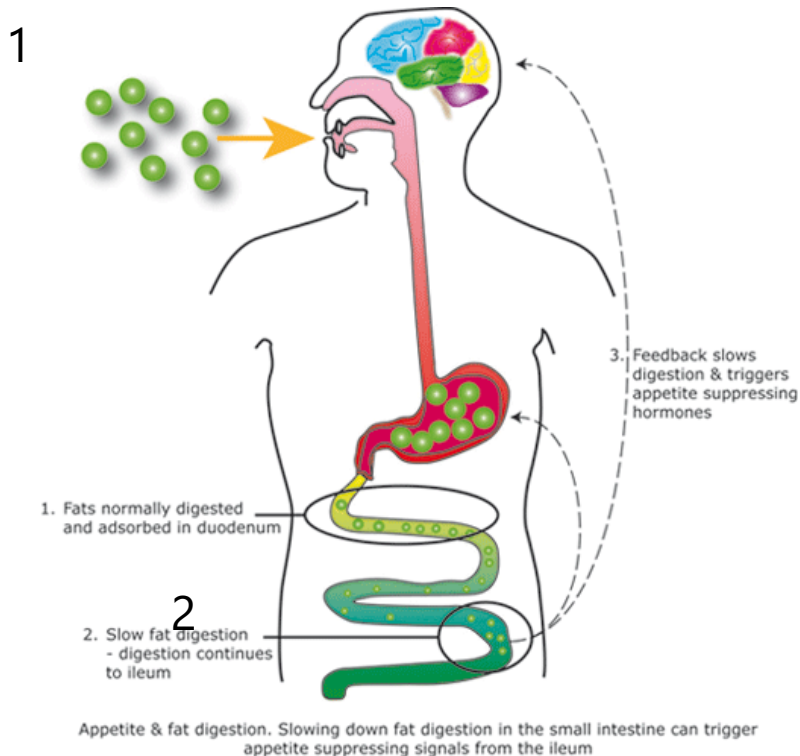


They must get their nutrition from their surrounding environment.

Heterotrophic organisms are most bacteria, some protists, and ALL fungi and animals.



# Heterotrophic nutrition involves 3 processes. ingestion, digestion, and egestion.



# Ingestion

- i. The process of taking in food through the mouth



Panda eating bamboo



Snake eating an egg



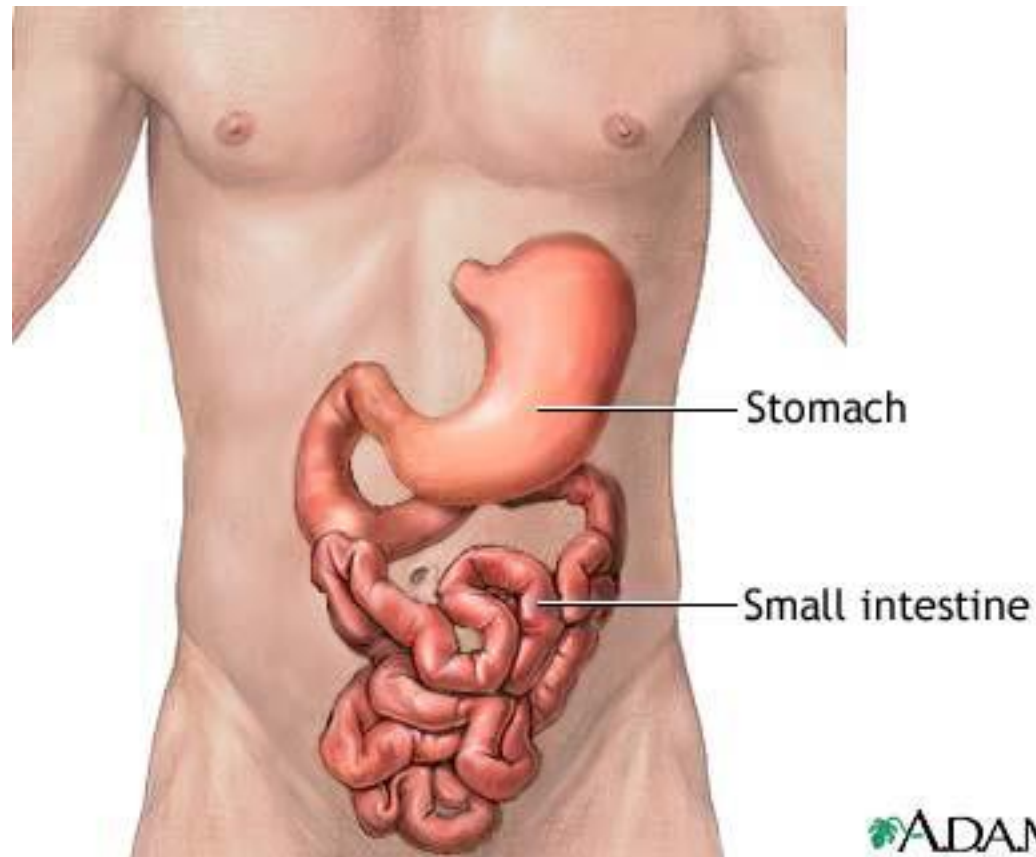
Ingestion is often accompanied by **MECHANICAL DIGESTION** of food.

Large pieces of food are broken down into smaller pieces by cutting, grinding, and tearing.



Mechanical digestion increases the surface area of food. <sup>6</sup>

CHEMICAL DIGESTION breaks down large, pieces of food into smaller pieces.

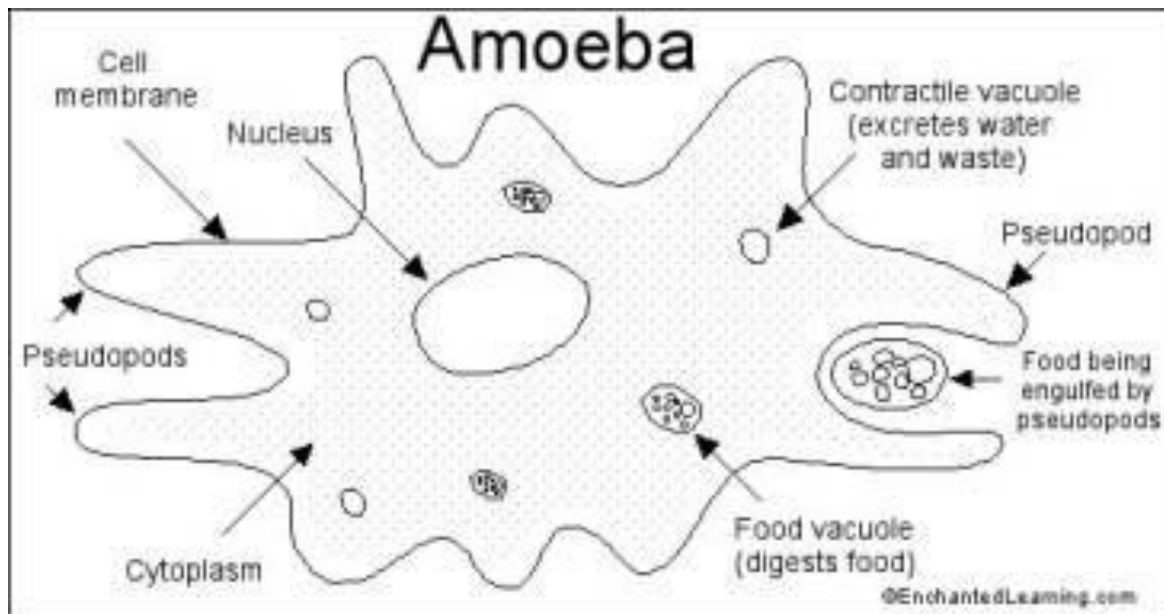


ADAM.

<http://www.youtube.com/watch?v=b20VRR9C37Q>

In a paramecium and ameba  
chemical digestion is

**INTRACELLULAR.**  
(INTRA--> Inside the Cell)



<http://www.youtube.com/watch?v=pvOz4V699gk>



The AMEBA catches it's food particles by engulfing them (surrounding them)

This process is known as **PHAGOCYTOSIS.**

The food is digested in a FOOD VACULE.  
With the help of Lysosomes.

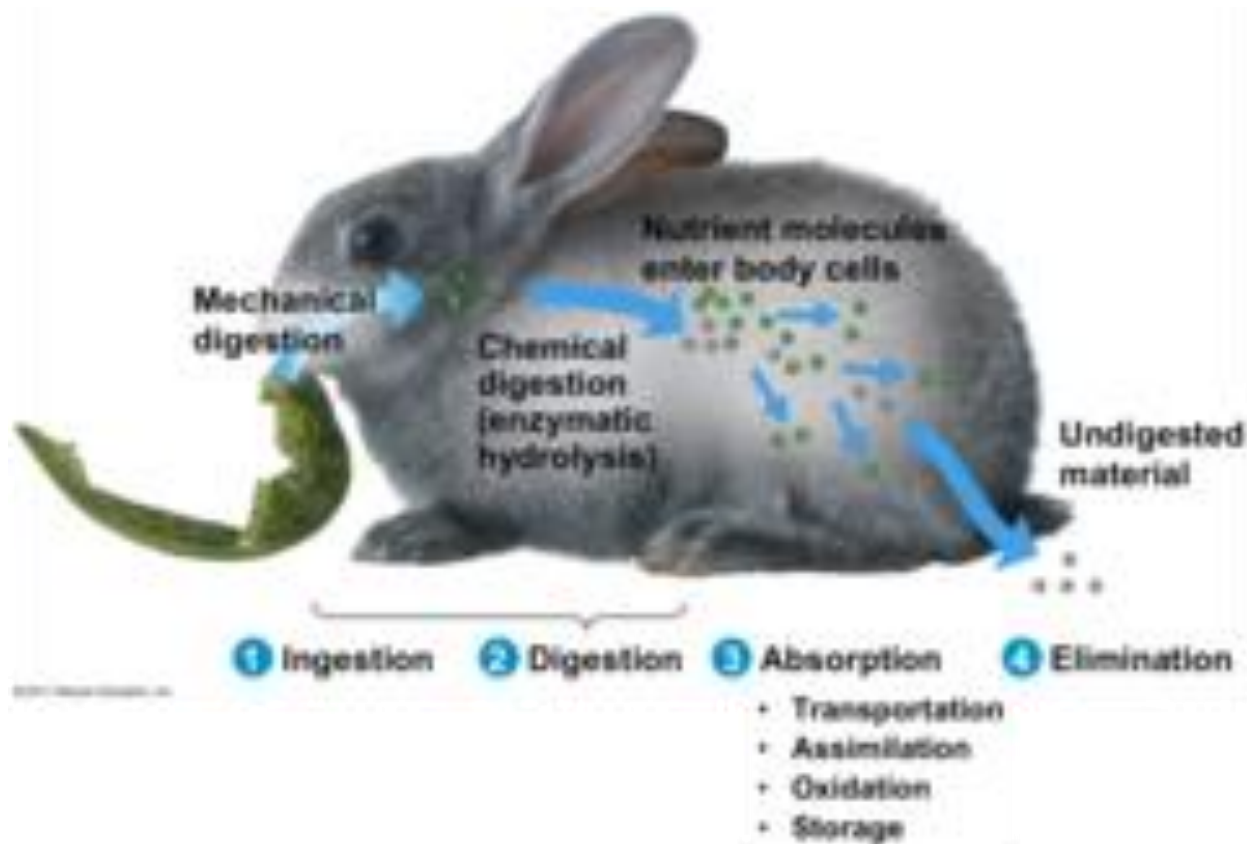


White Blood cell Chase

In most heterotrophs like us\*,  
digestion is

**EXTRACELLULAR (outside the cells)**

The products(nutrients) are then absorbed by the cells



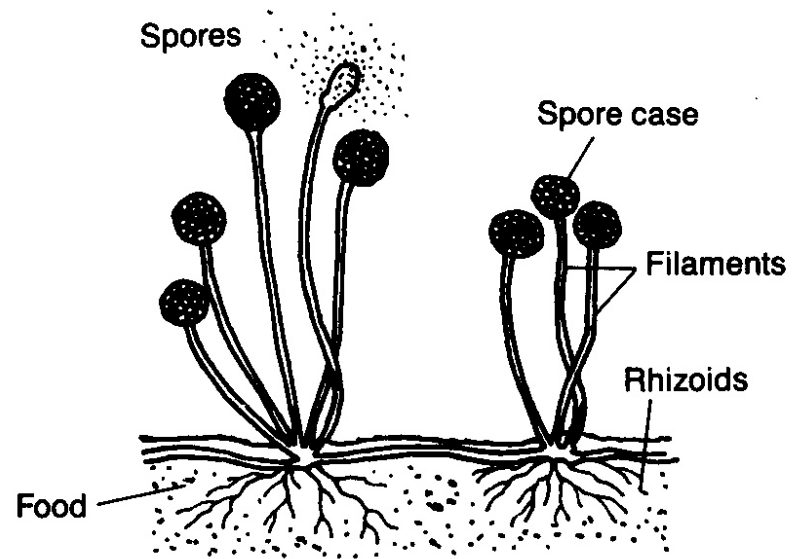
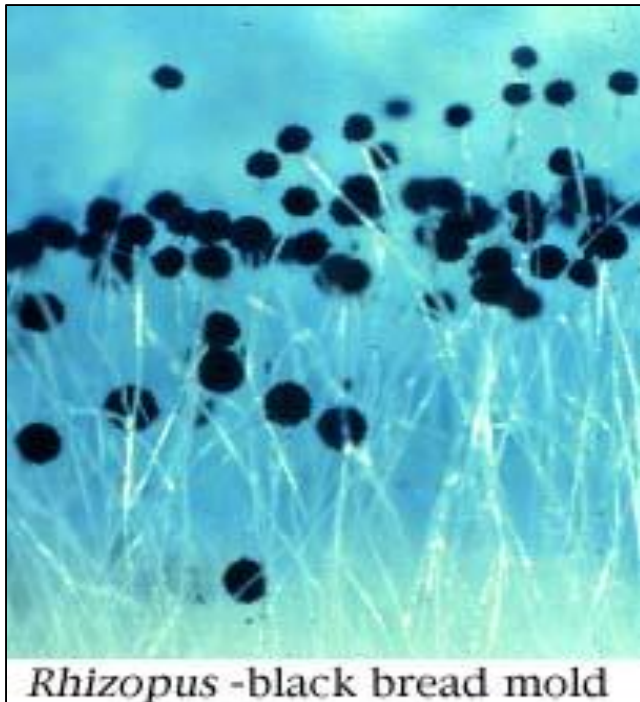
# EGESTION

Indigestible materials are removed from an organism.



FUNGI (mushrooms) live in or on their food supply.

They secrete chemicals that digest materials. The materials are then absorbed into the cells.

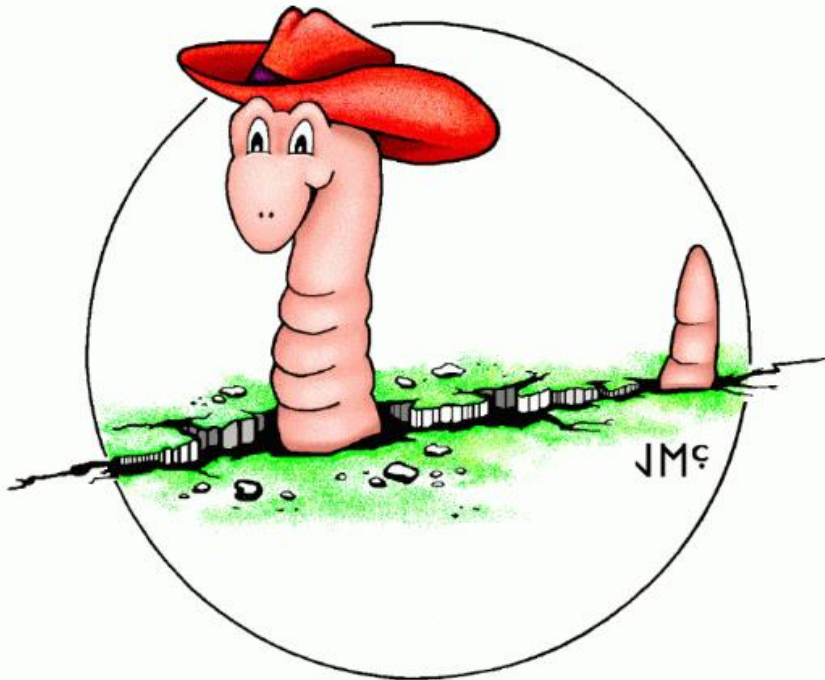


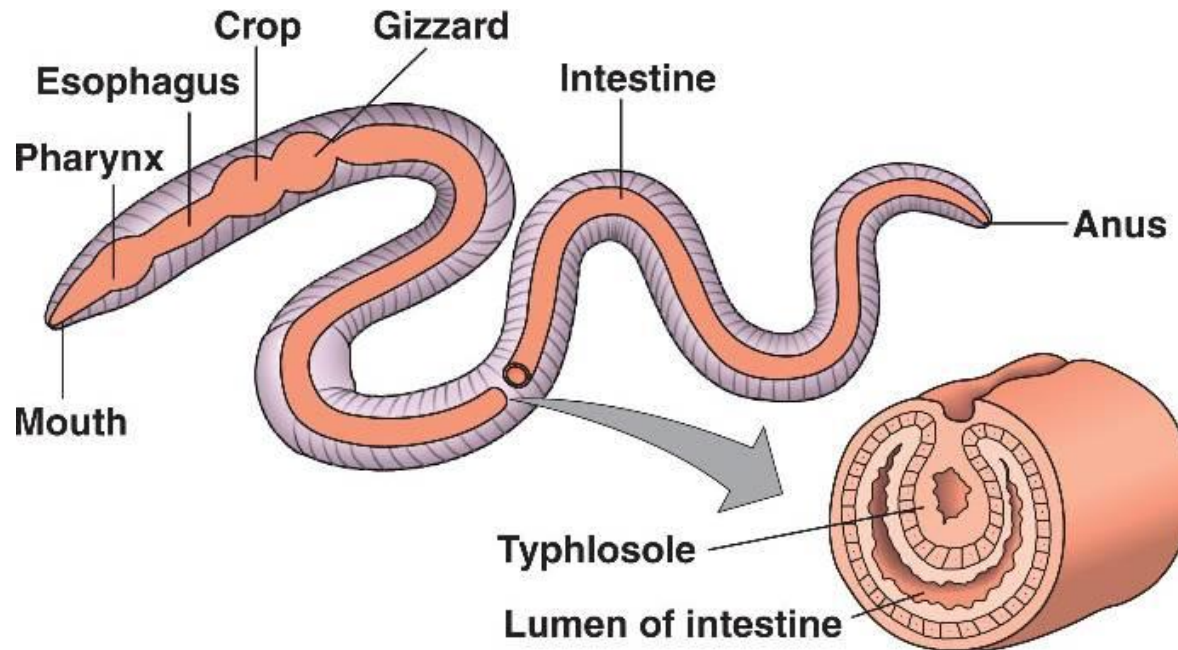
When we want to look at how Humans Digest, we can start by looking at simpler organisms.



The EARTHWORM has a tube-like digestive tract with two openings: **the MOUTH and the ANUS.**

**Food is digested as it passes in one direction through the organs of the digestive tract.**

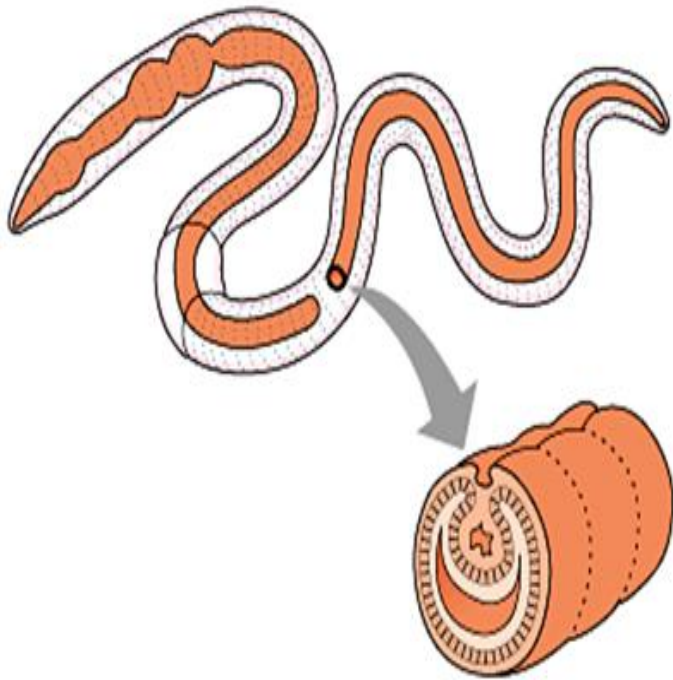




- 1. Food is ingested through the mouth.**
- 2 Then passes through the esophagus to the CROP.**
- 4 The Crop stores food.**
- 5 Then the GIZZARD breaks down the food by grinding it mechanically.**

The food passes into the **INTESTINE**, where it is **chemically digested**.

The end products are absorbed into the **bloodstream**.



The design of the intestine is to create a large surface area.

Digestion occurs in the food tube (outside of the cells).

It is **EXTRACELLULAR**.



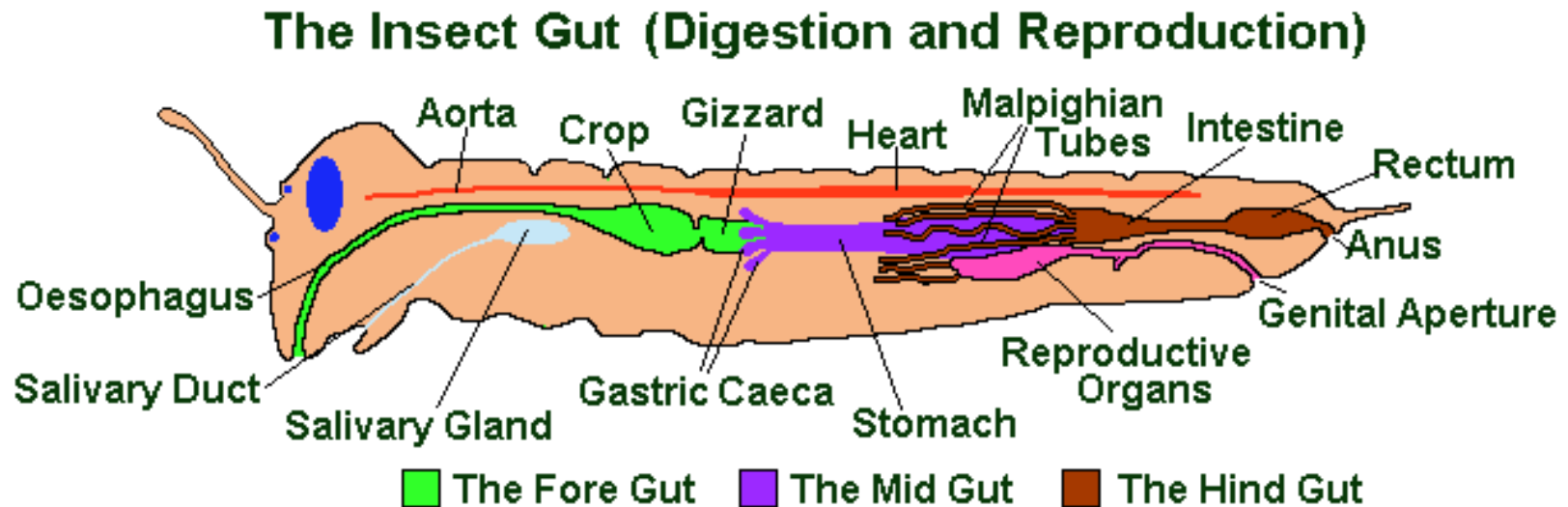
Wastes are egested through the ANUS.



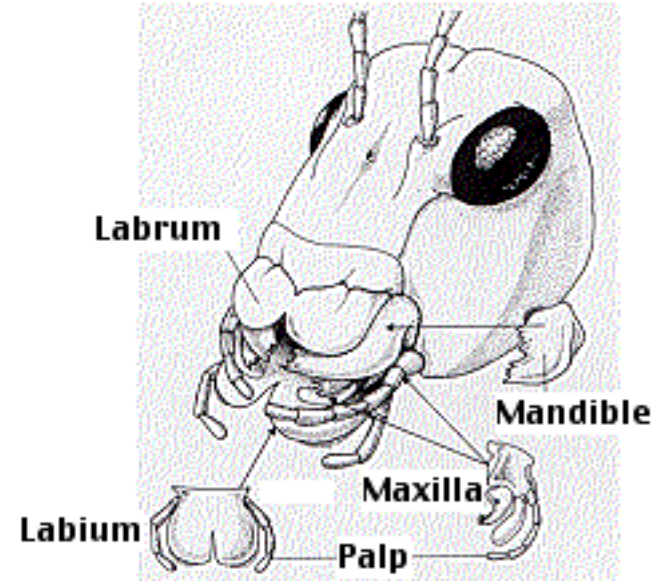
earthworm castings

The GRASSHOPPER's digestive system is similar to the earthworm's.

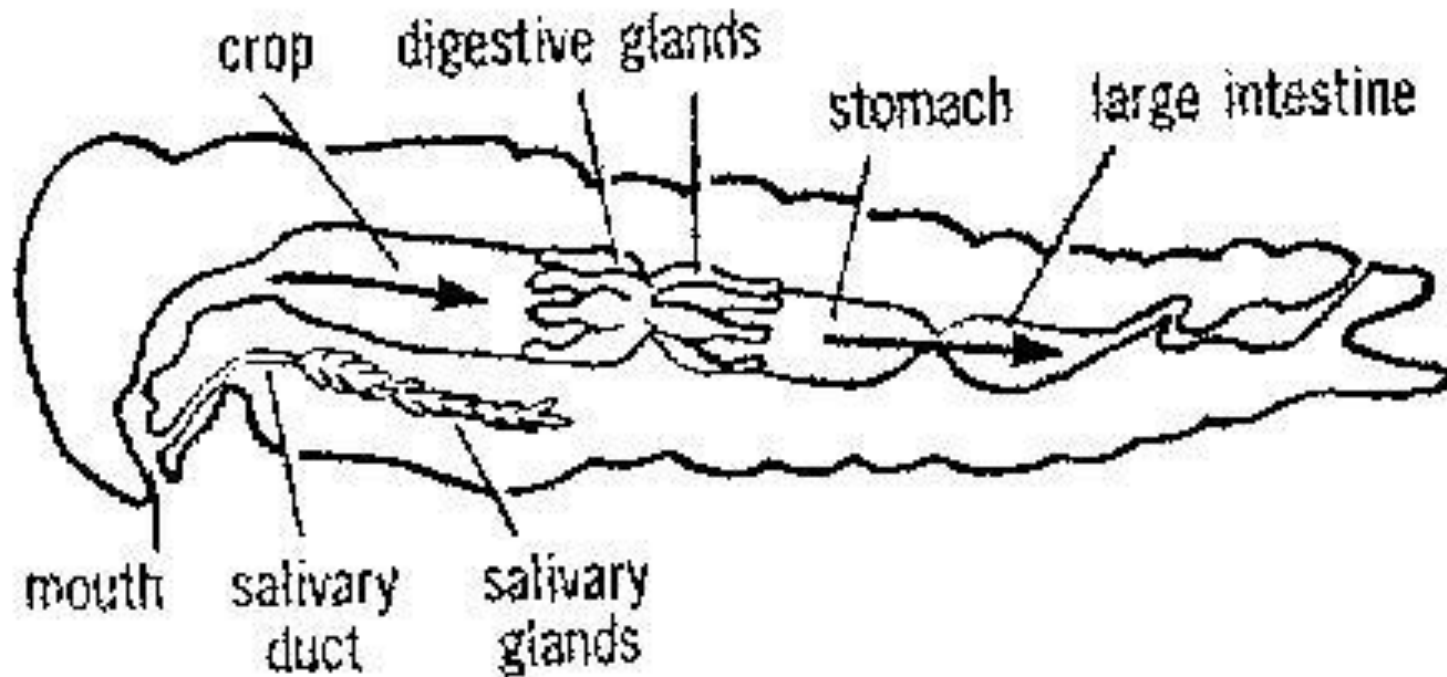
It is one way.



The grasshopper has highly specialized mouthparts for cutting and tearing food.



It also has **SALIVARY GLANDS** and **GASTRIC CAECA**, which release chemicals into the digestive tract to aid in chemical digestion.



The **CROP** stores food.

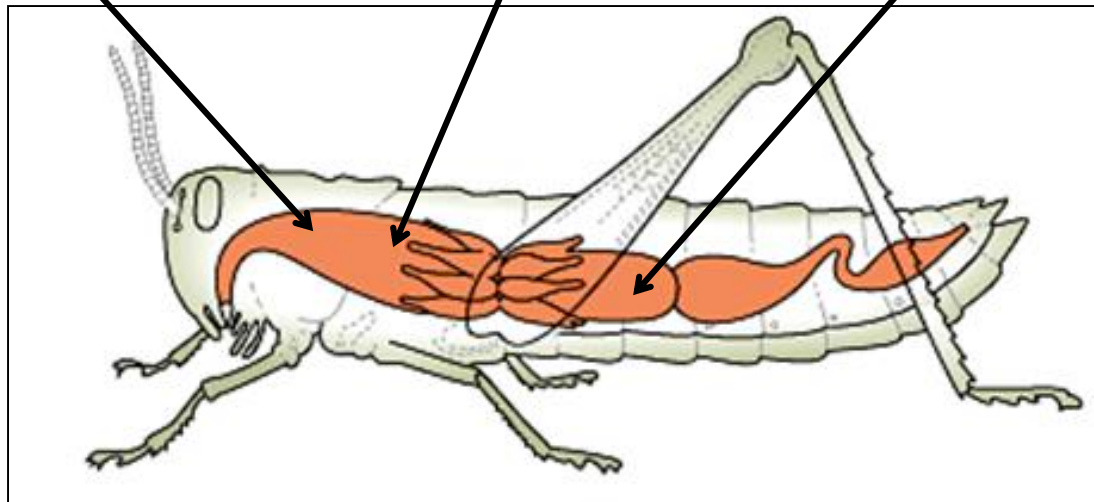
The **GIZZARD** mechanically digests food.

The **STOMACH** chemically digests food using the enzymes produced in specialized glands (the gastric caeca).

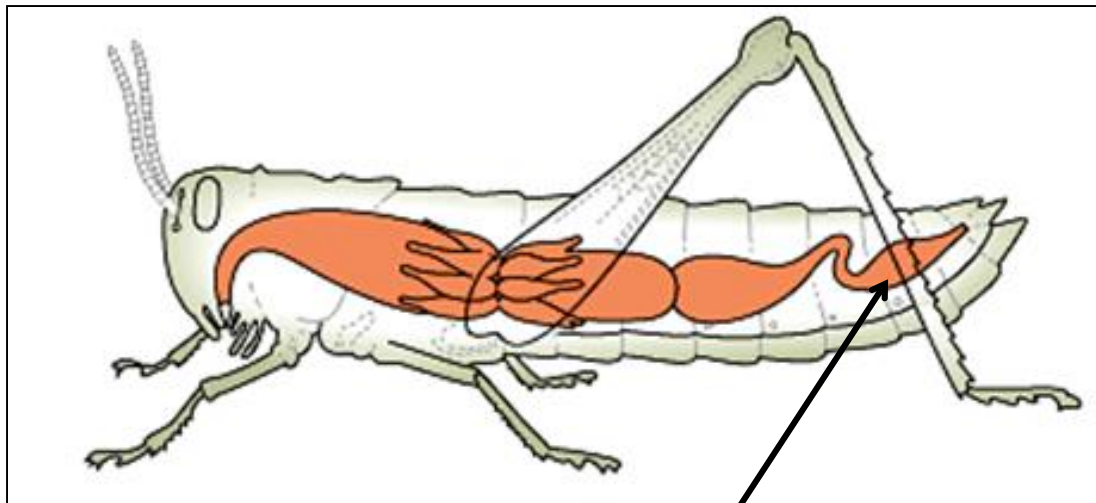
CROP

GIZZARD

STOMACH



The grasshopper also has a RECTUM which absorbs water from the food waste.



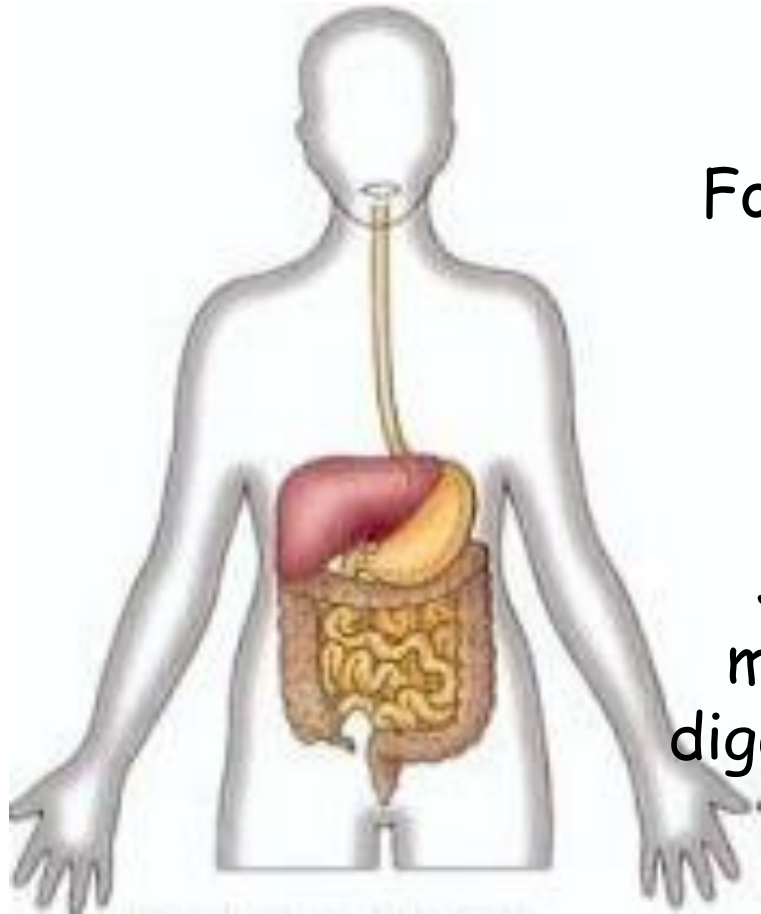
RECTUM

# HUMAN DIGESTION



Brain  
Pop

The HUMAN digestive system is a lot like that of the grasshopper and earthworm.



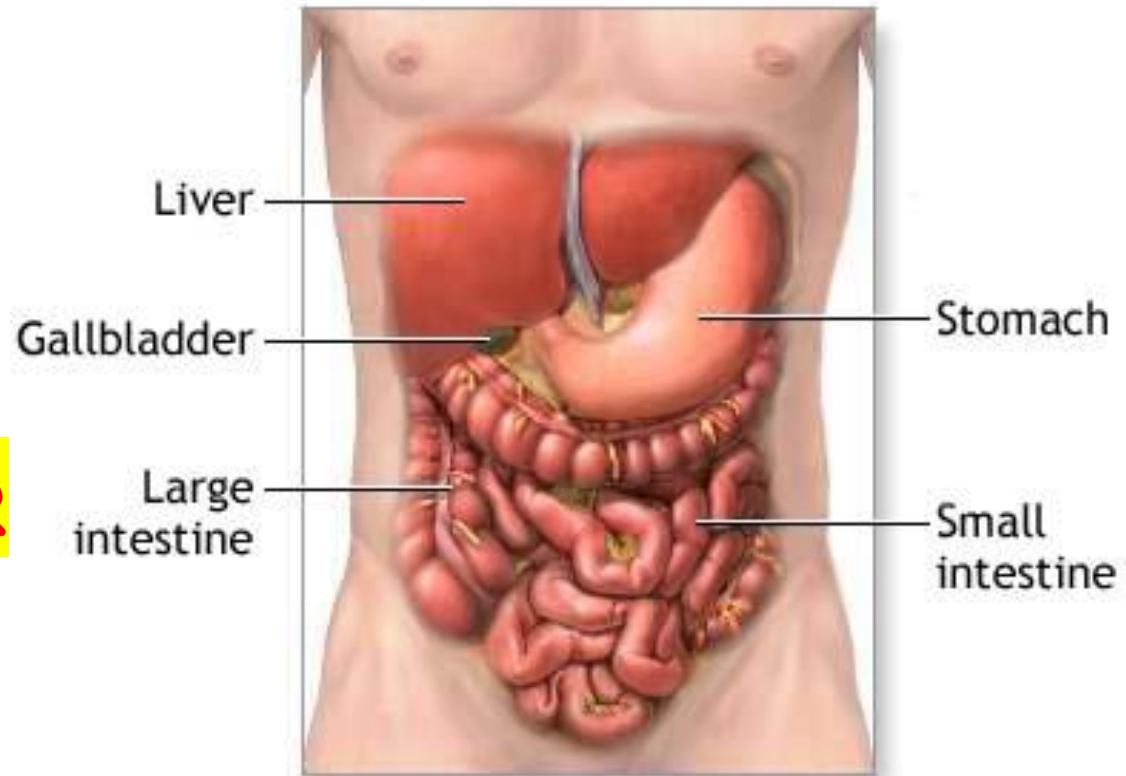
Food moves in **one direction** through a tube called the **GASTROINTESTINAL (GI) TRACT**.

Specialized organs carry out mechanical digestion, chemical digestion, absorption of nutrients, and elimination of waste.



Humans have special  
Extra ORGANS,

1. LIVER,
2. GALLBLADDER
3. and  
PANCREAS

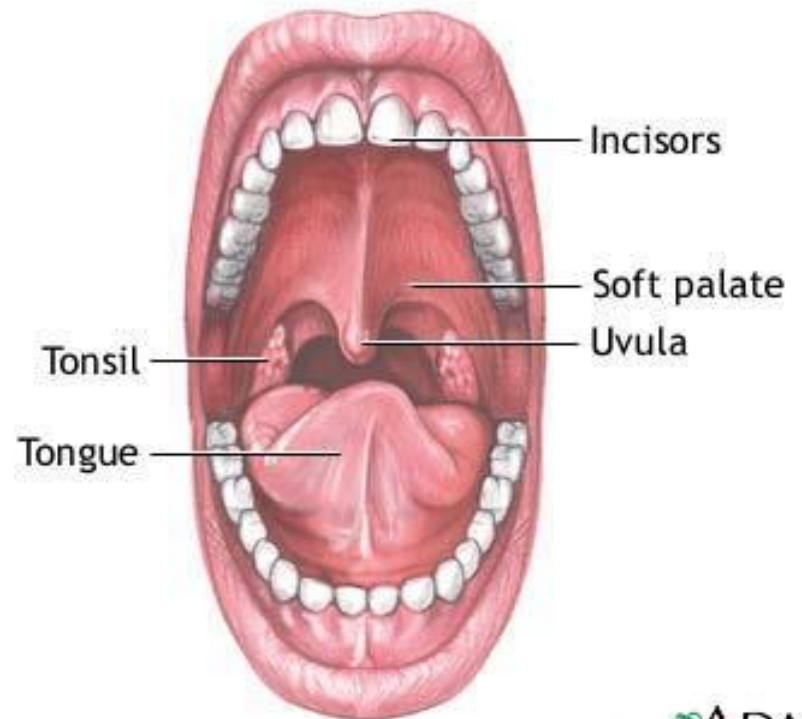


They secrete chemicals  
like bile into the digestive  
tract.

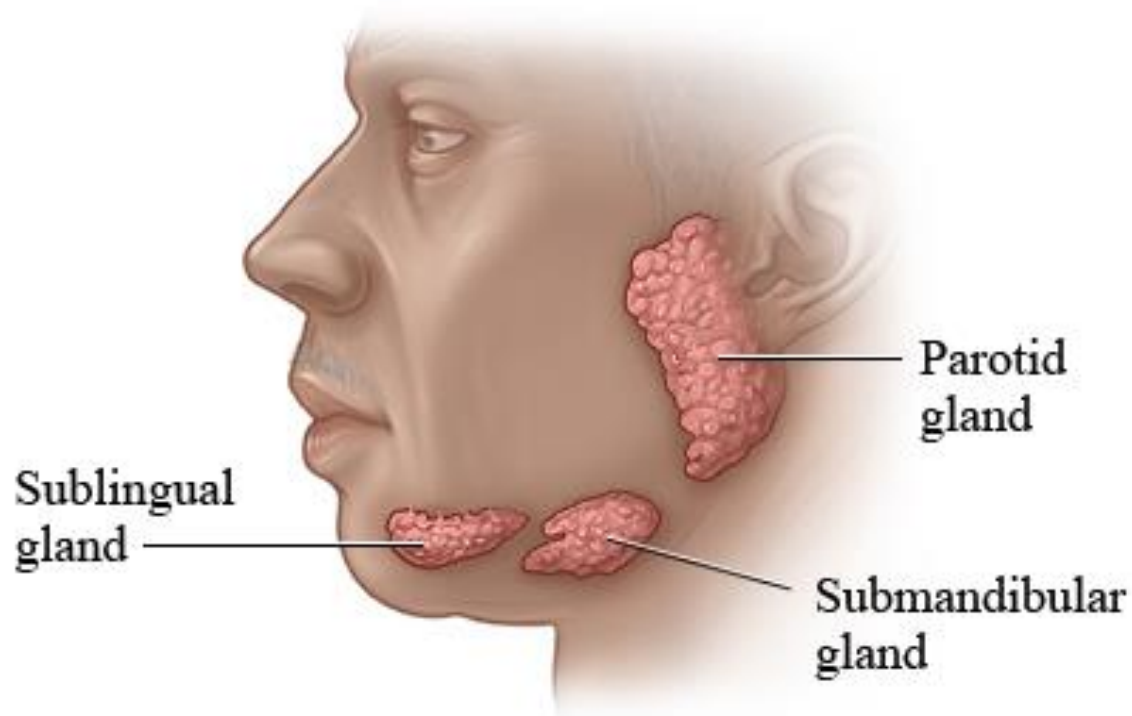
Food is ingested in the MOUTH,  
and mechanically digested.

The TEETH function in the  
mechanical breakdown of food  
into smaller pieces.

What does  
Mechanical  
digestion  
increase ?



The **SALIVARY GLANDS** secrete saliva,  
**a fluid that contains an enzyme (amylase)**  
that begins the chemical digestion of starch.

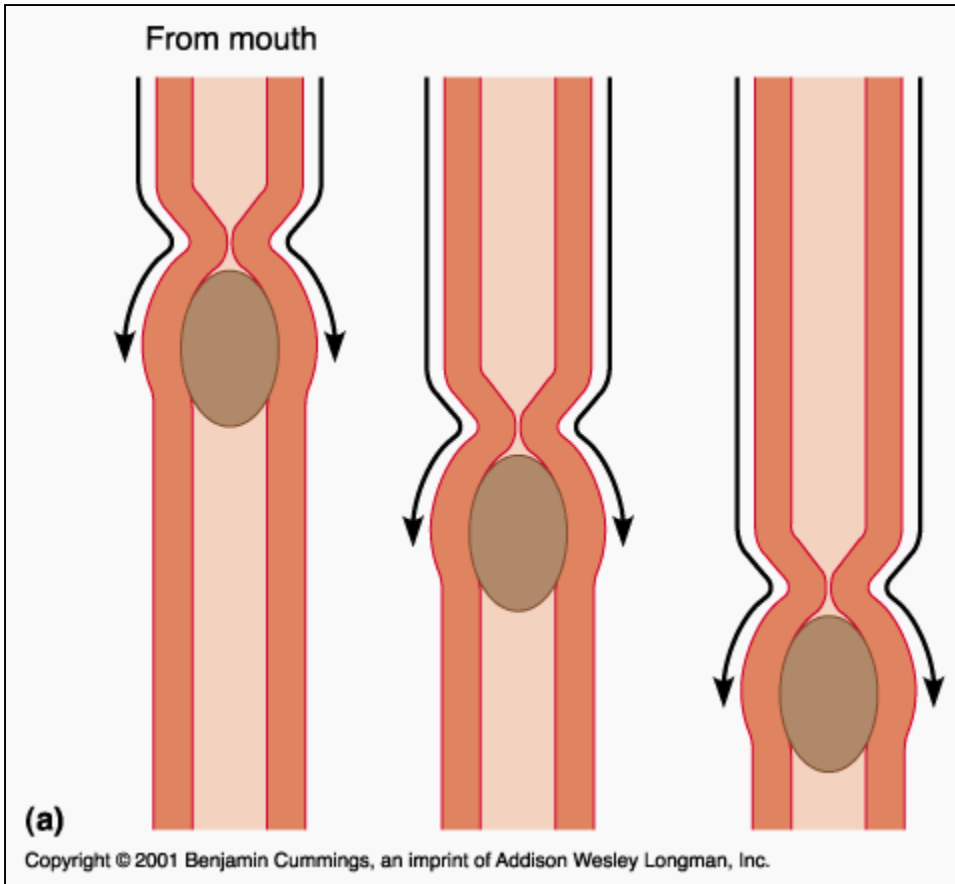


The TONGUE mixes saliva with the food by moving the food around in the mouth.

The tongue also moves the food mass to the back of the mouth for swallowing.



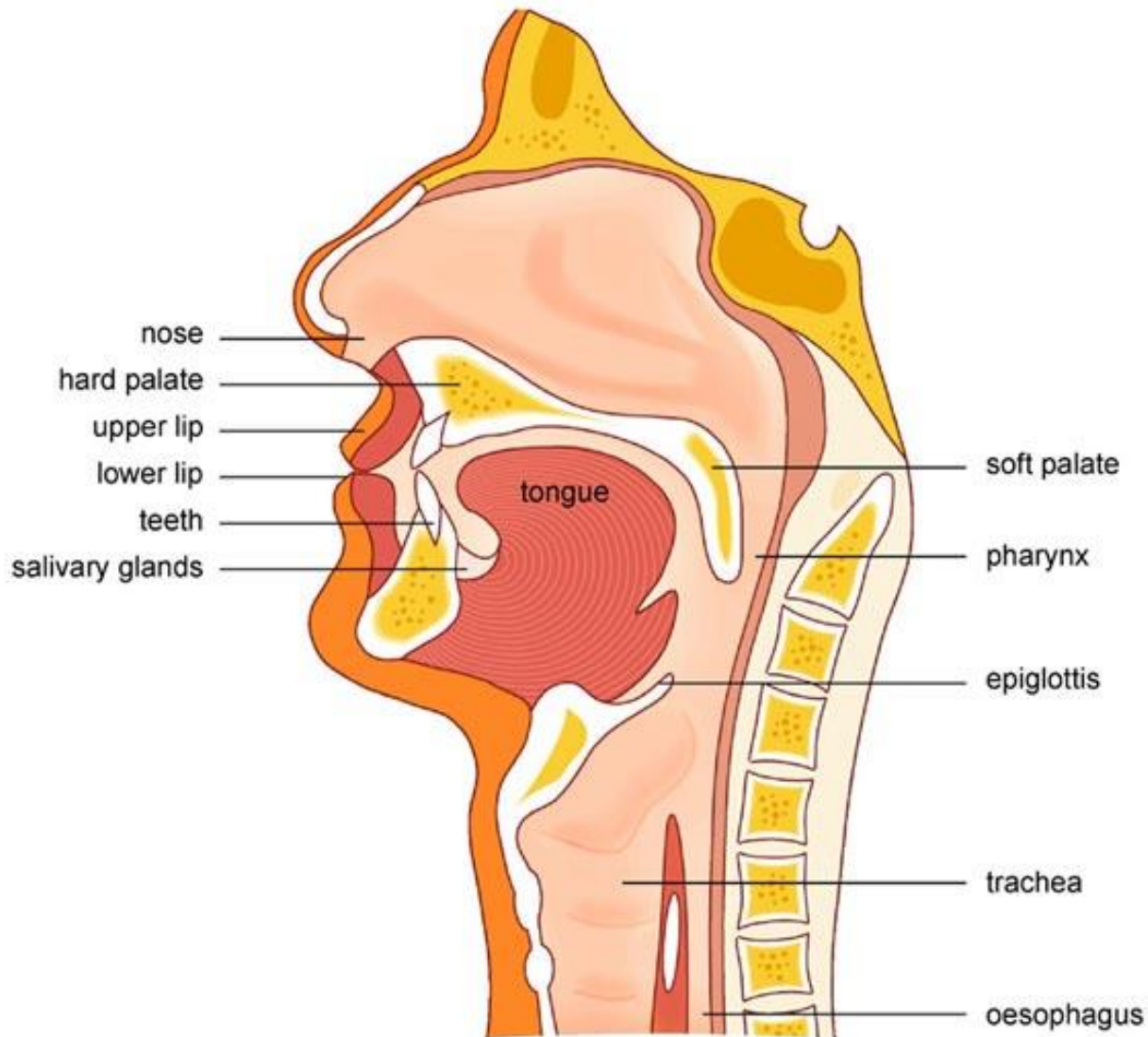
When food is swallowed, it passes into the **ESOPHAGUS**, and **PERISTALSIS** moves it downward to the stomach.



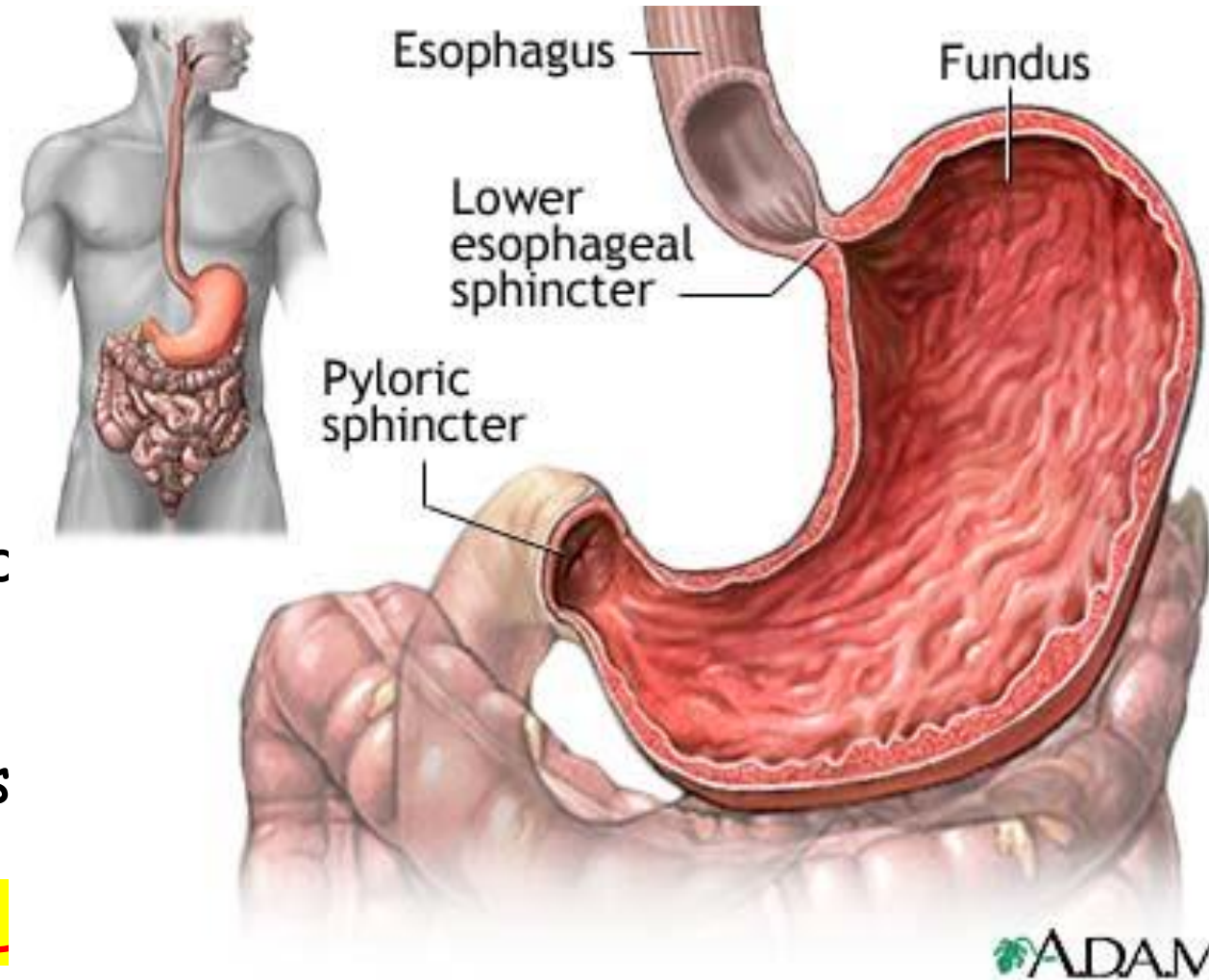
Digestion of starch continues while the food is in the esophagus.

Swallowing

As it is swallowed, food passes the **EPIGLOTTIS**, which prevents the food from entering the trachea.



Food enters the **STOMACH** where it is mixed and liquefied.

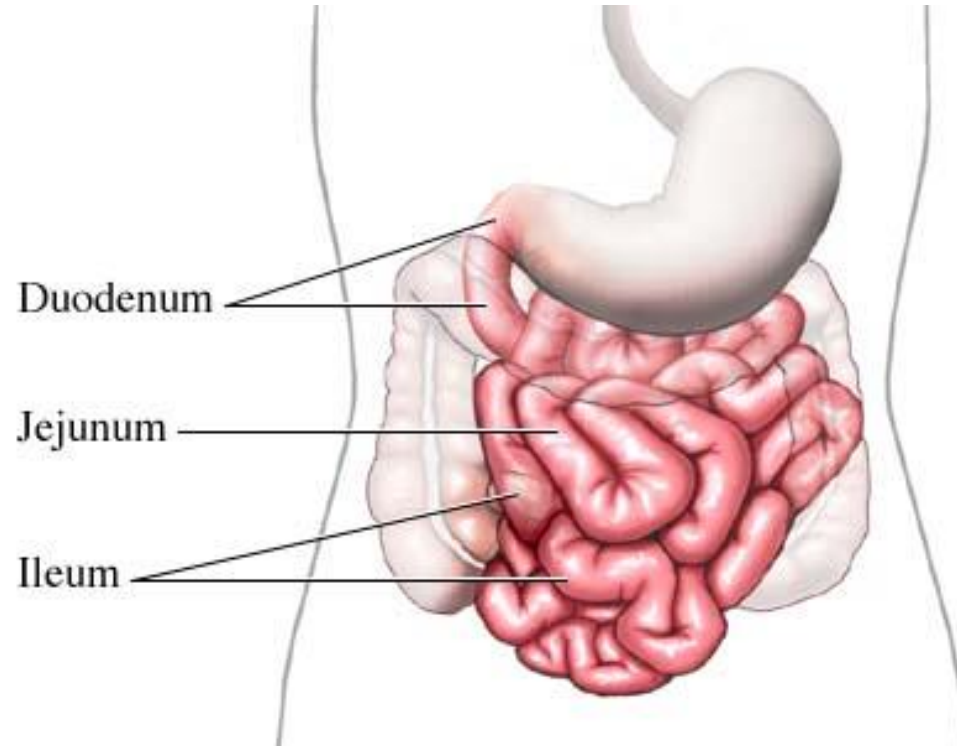


ADAM.

**GASTRIC GLANDS**  
release stomach acid  
and an enzyme  
which begins the  
digestion of proteins

**THIS IS CHEMICAL  
DIGESTION**

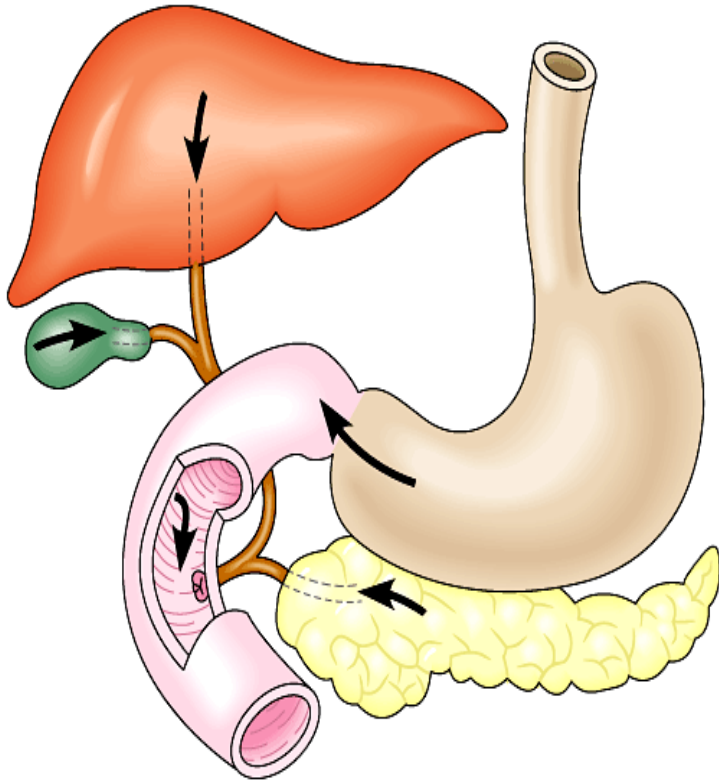
Partially digested food moves from the stomach into the **SMALL INTESTINE**.



The small intestine **DIGESTS** all kinds of food and **ABSORBS** nutrients into the bloodstream.



The liver, gallbladder, and pancreas secrete substances into the small intestine.

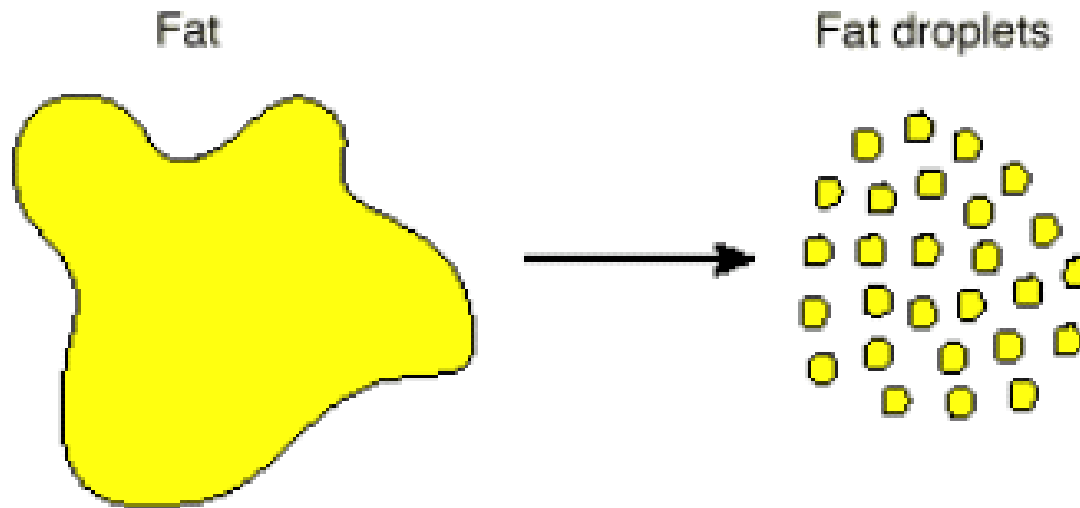


The LIVER produces BILE, which passes into the

GALLBLADDER, where it is stored temporarily.

Normally, bile passes into the small intestine, where it breaks down fats into tiny droplets.

This process is known as **EMULSIFICATION**.  
It increases the surface area of fats.

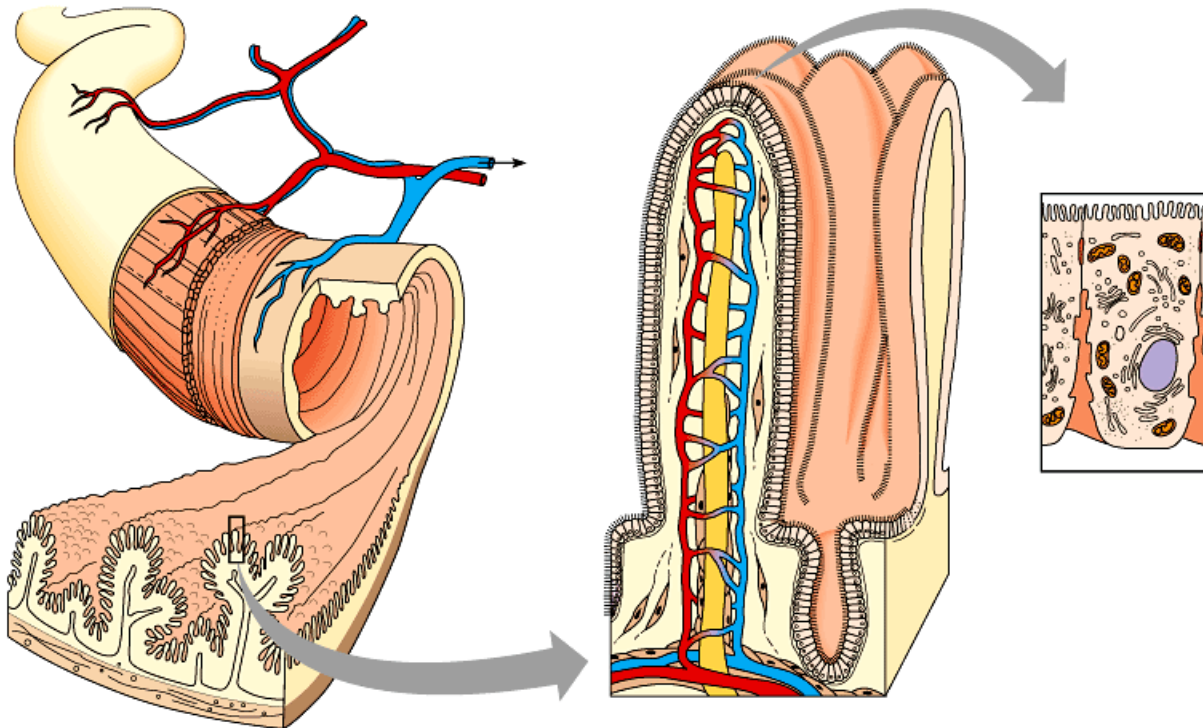


ALL OF THE REMAINING  
NUTRIENTS ARE DIGESTED IN  
THE SMALL INTESTINE

with the help of chemicals from the  
liver, the gall bladder,  
the pancreas, and the  
intestine wall.

Then the nutrients are absorbed into  
the bloodstream.

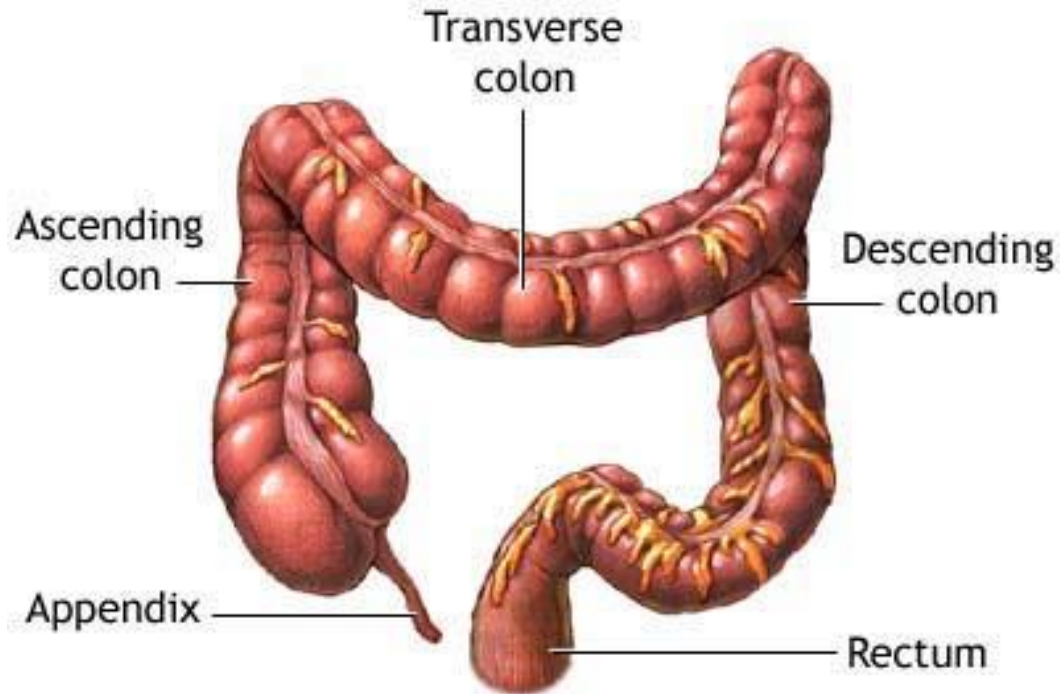
The intestine lining is covered in tiny projections called VILLI.



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The villi provide a tremendous surface area where nutrients can be absorbed.

Finally, the material passes into the **LARGE INTESTINE** where water is absorbed and feces are formed.



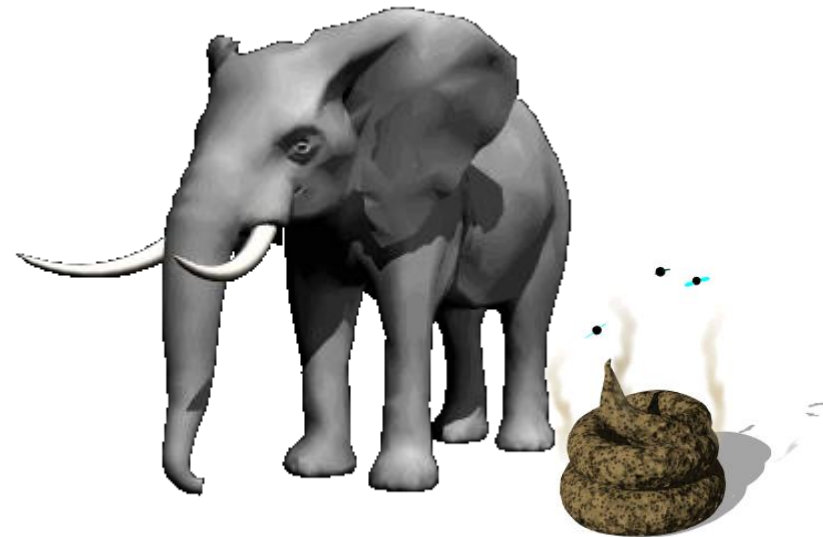
Intestinal bacteria digest the remains of your food and produce vitamins.

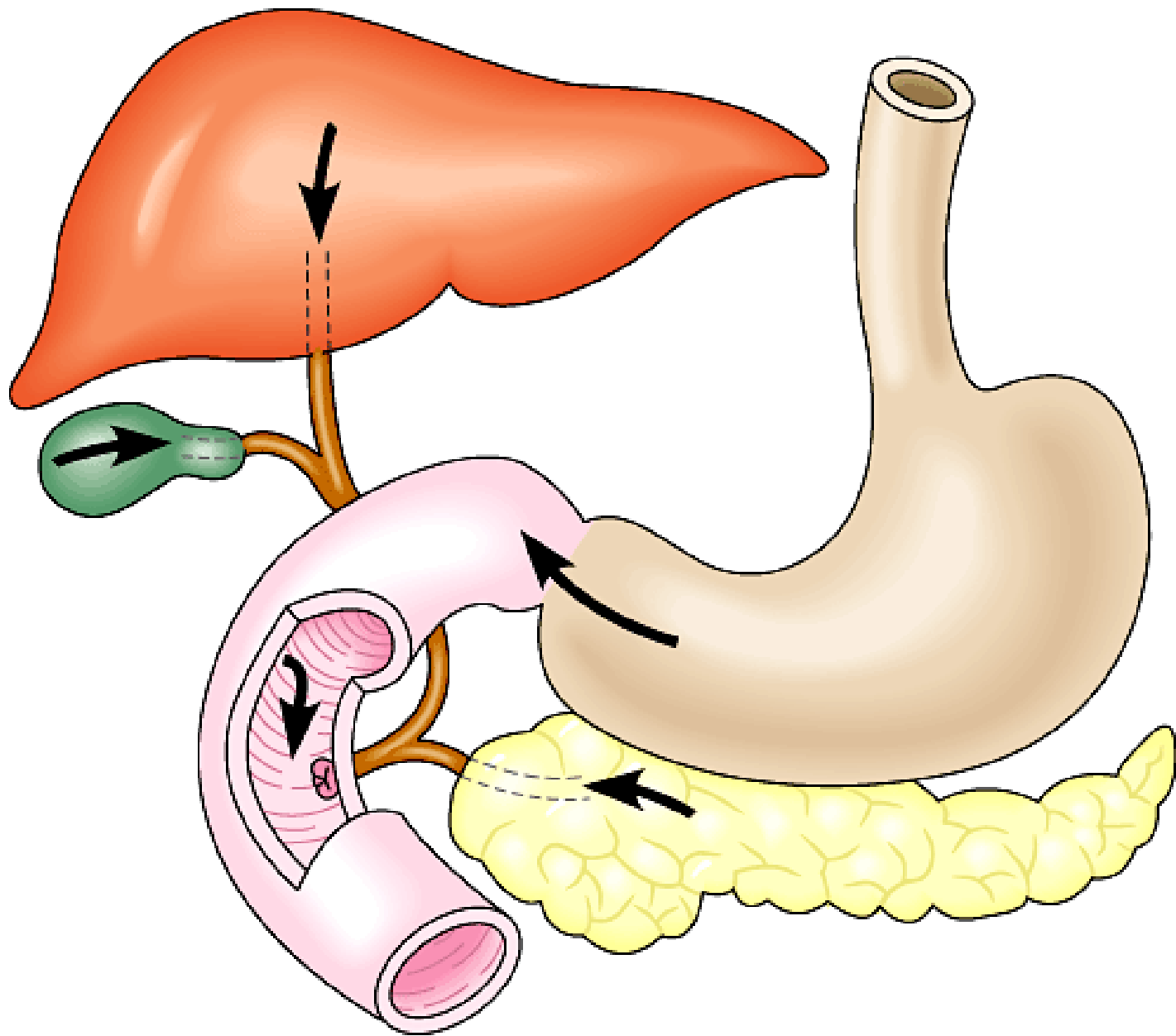
They also produce intestinal gas.



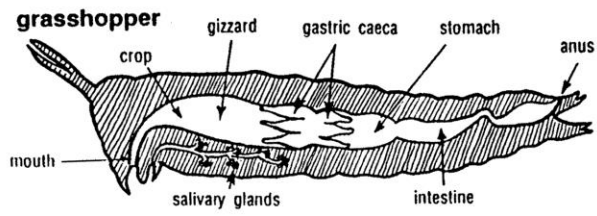
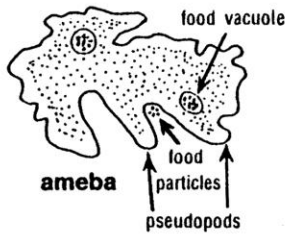
The last step is the removal  
of anything that was  
not used...

This passes through your rectum  
than  
The Anus.

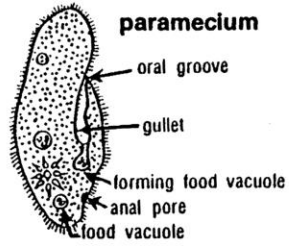
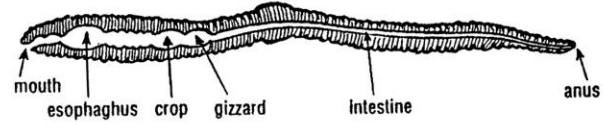








**earthworm**



**hydra**

