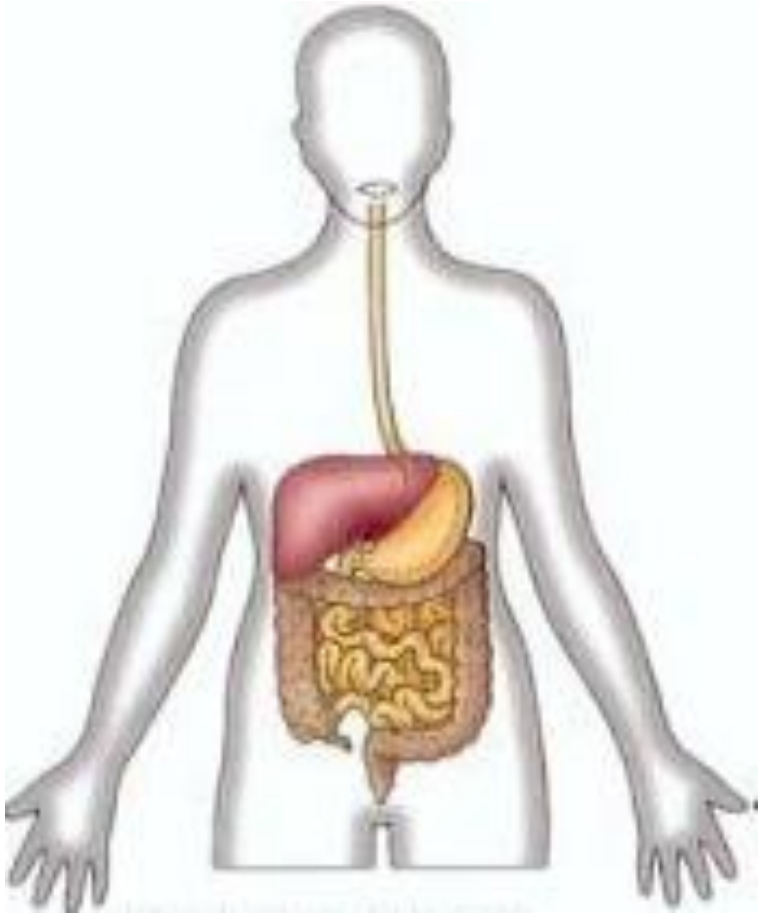
The HUMAN digestive system is essentially like that of the grasshopper and earthworm.



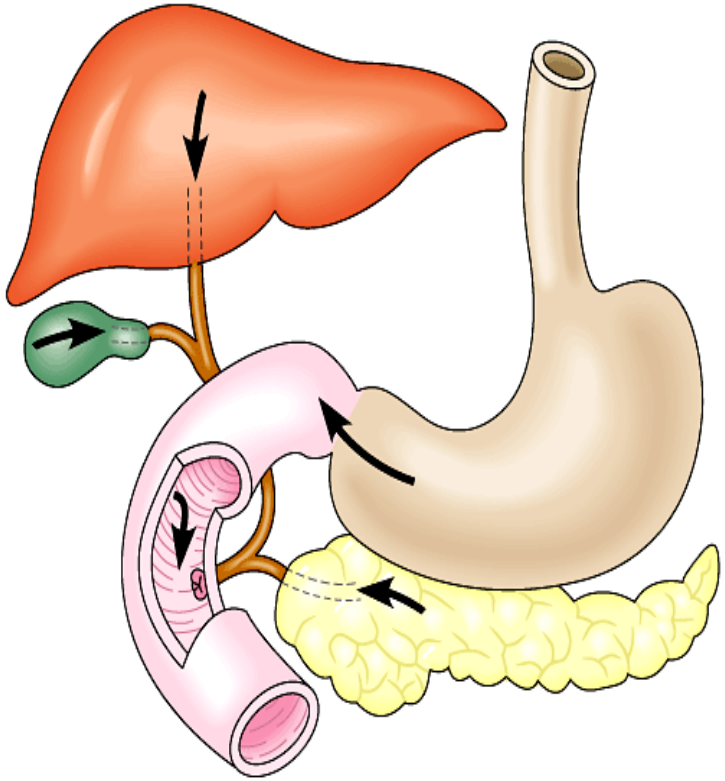
Food moves in one direction through a tube called the GASTROINTESTINAL (GI) TRACT.

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

The human also has many specialized ACCESSORY ORGANS,

including the LIVER, GALLBLADDER and PANCREAS

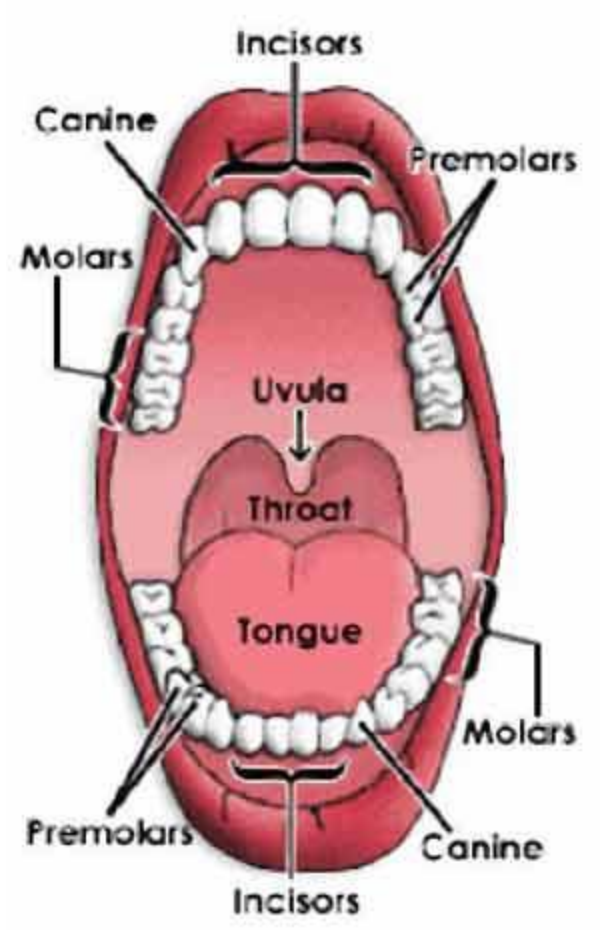
that secrete enzymes and bile into the digestive tract.



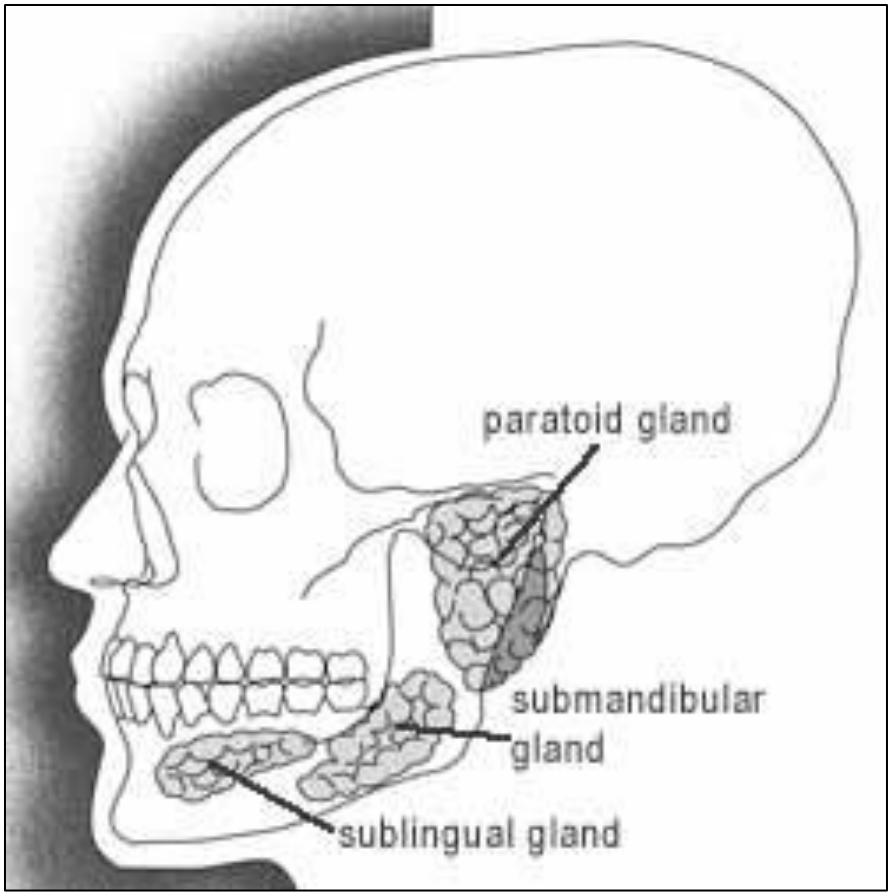
Food is ingested through the MOUTH, and digestion begins there.

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

Mechanical digestion provides a larger surface area for the action of digestive enzymes.



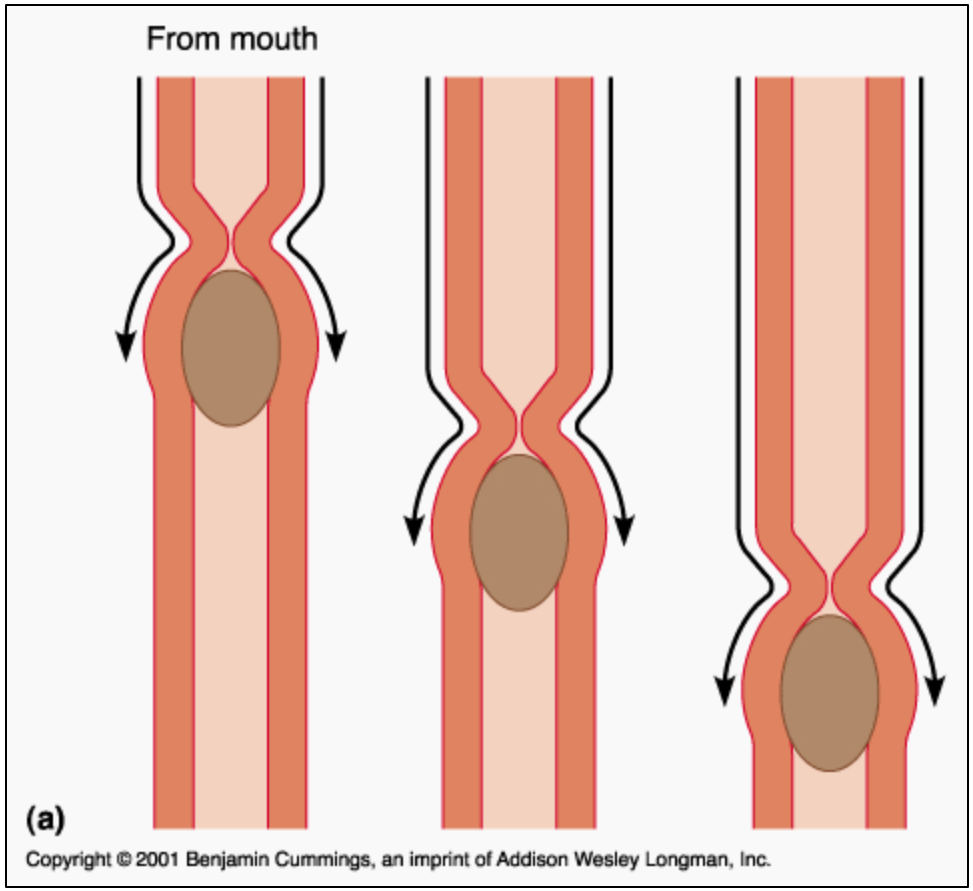
The SALIVARY GLANDS secrete saliva, a fluid that contains an enzyme (amylase) that begins the chemical digestion of starch.



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.

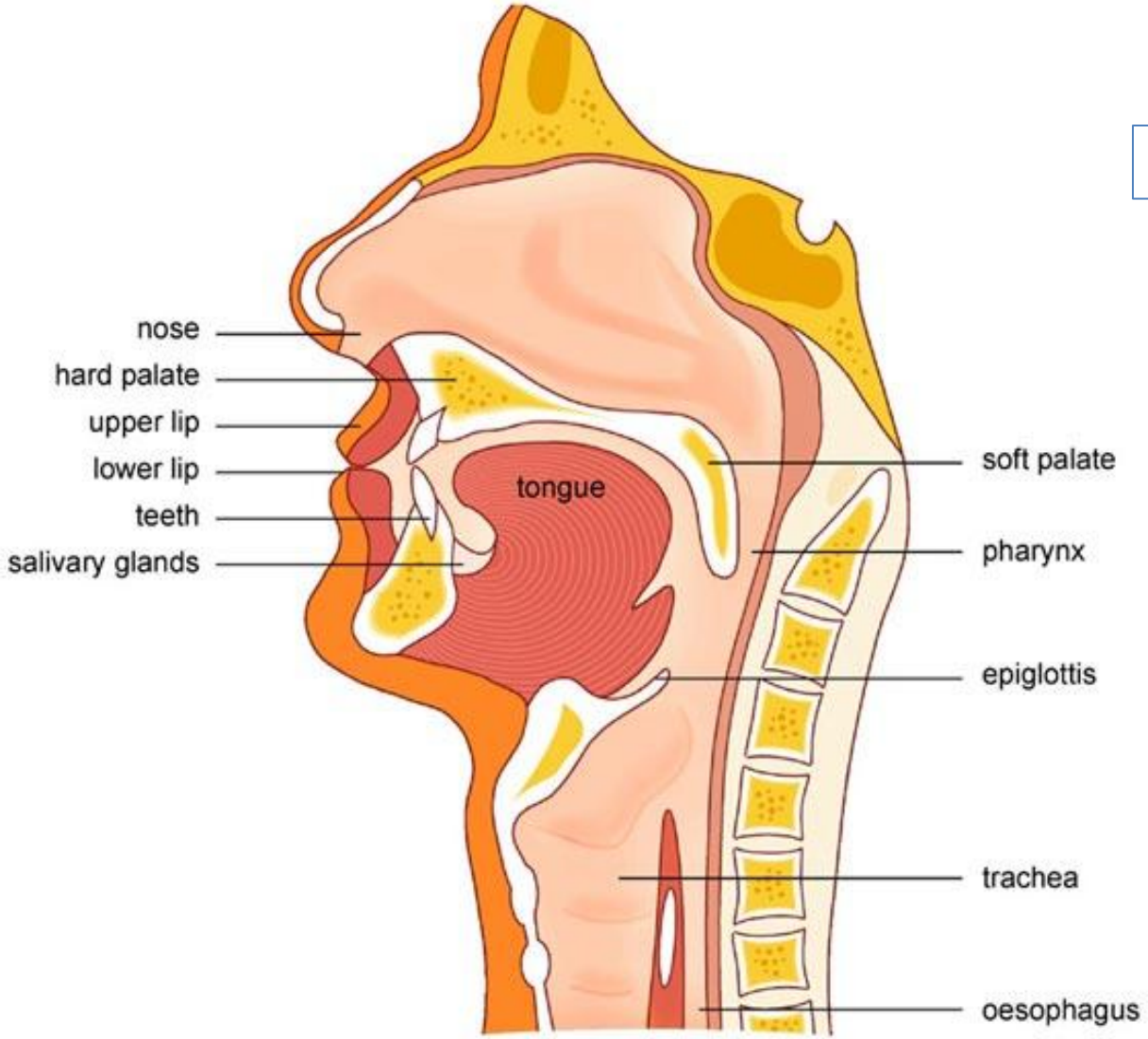
When food is swallowed, it passes into the ESOPHAGUS, and PERISTALSIS moves it downward to the stomach.



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

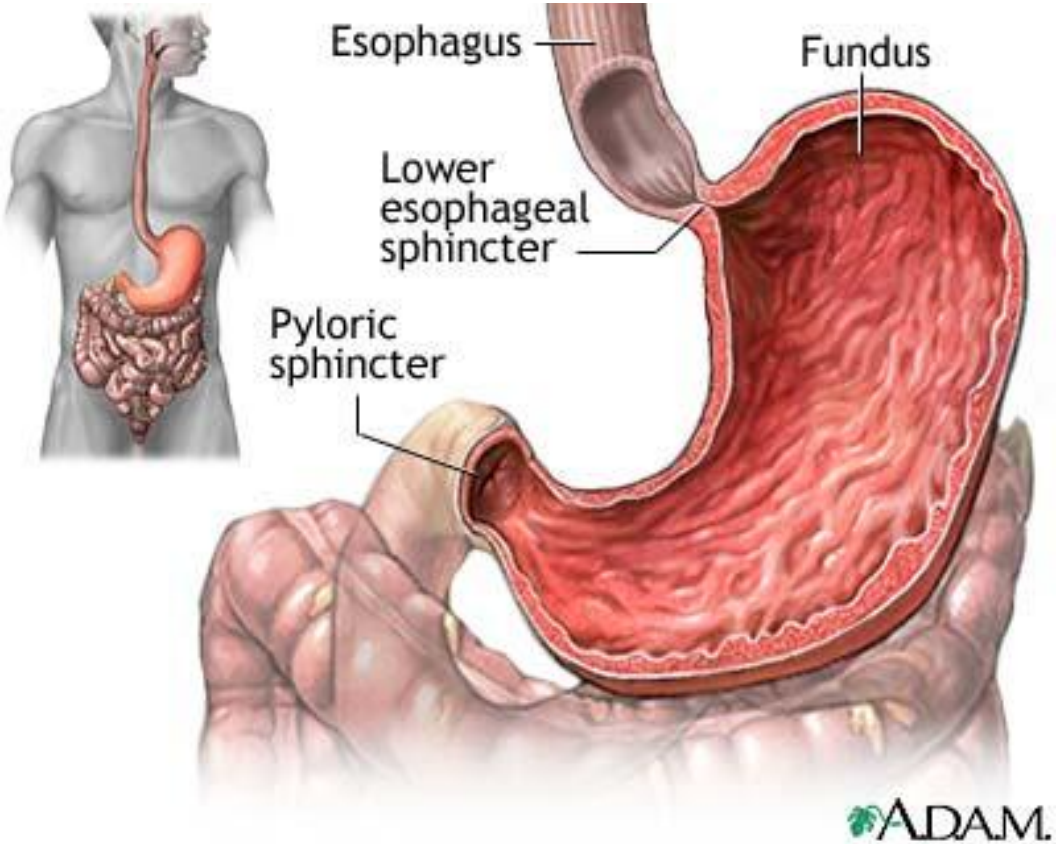
As it is swallowed, food passes the EPIGLOTTIS, which prevents the food from entering the trachea.

peristalsis



Food enters the STOMACH where it is mixed and liquefied.

GASTRIC GLANDS secrete hydrochloric acid and an enzyme (gastric protease) which begins the digestion of proteins.

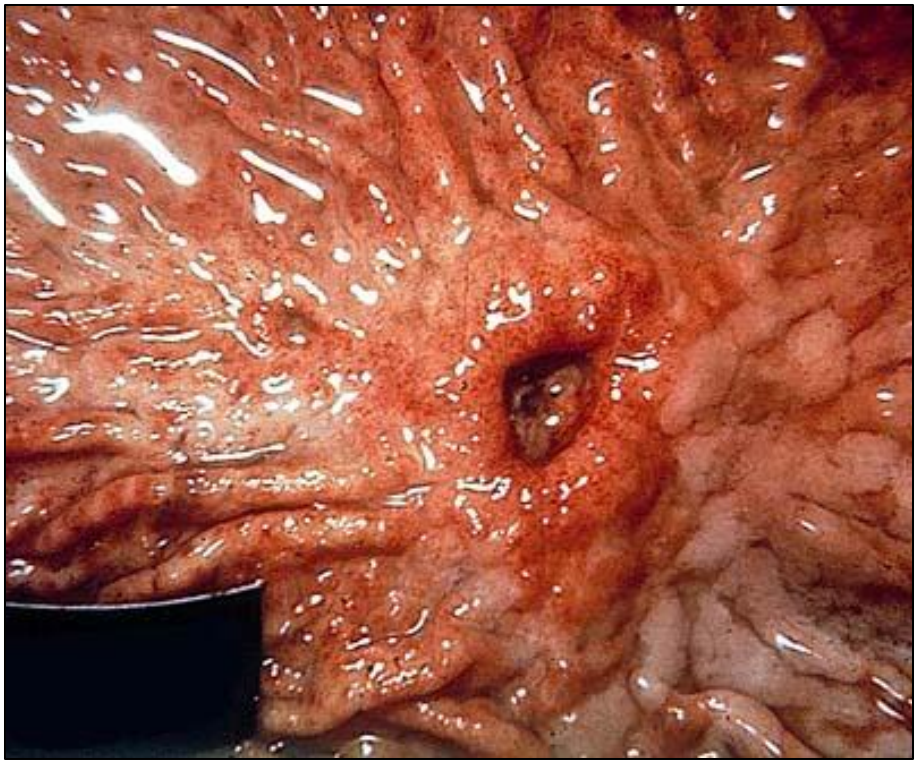


Pepsinogen (inactive Protease)→ Pepsin (activated protease)

Hydrochloric acid provides the proper pH required for effective functioning of gastric protease.

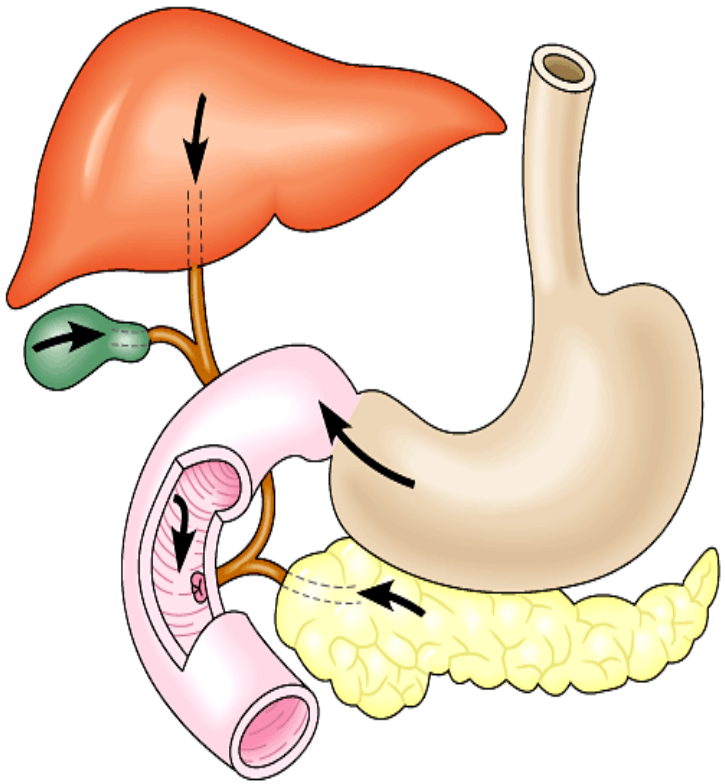
The stomach produces a MUCUS lining
to protect its surface from erosion by acid and enzymes.

Stress and
bacterial infections
can increase the
risk of developing
stomach ULCERS.



The same acids and enzymes cause
HEARTBURN in the esophagus.

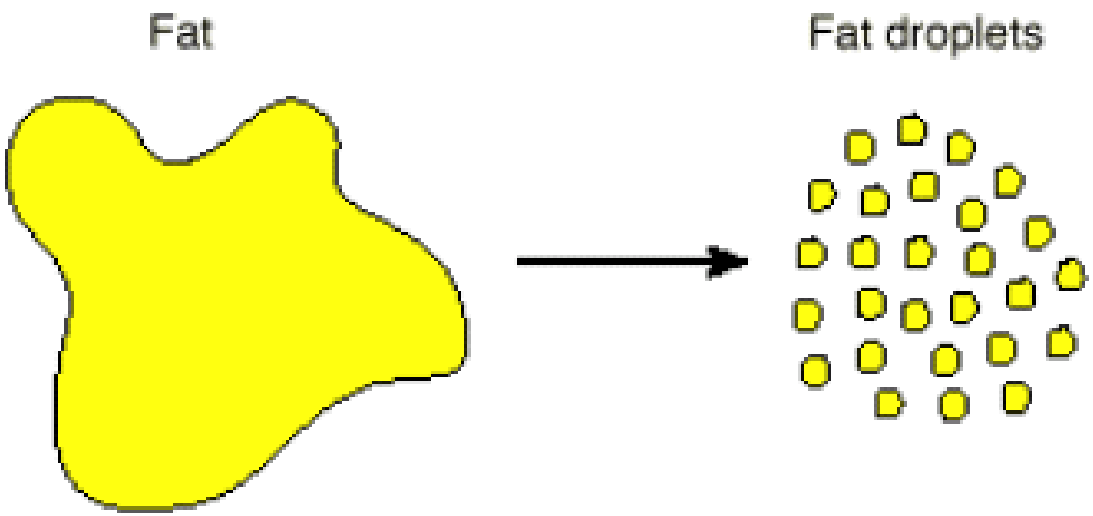
The liver, gallbladder, and pancreas secrete substances into the small intestine.



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.

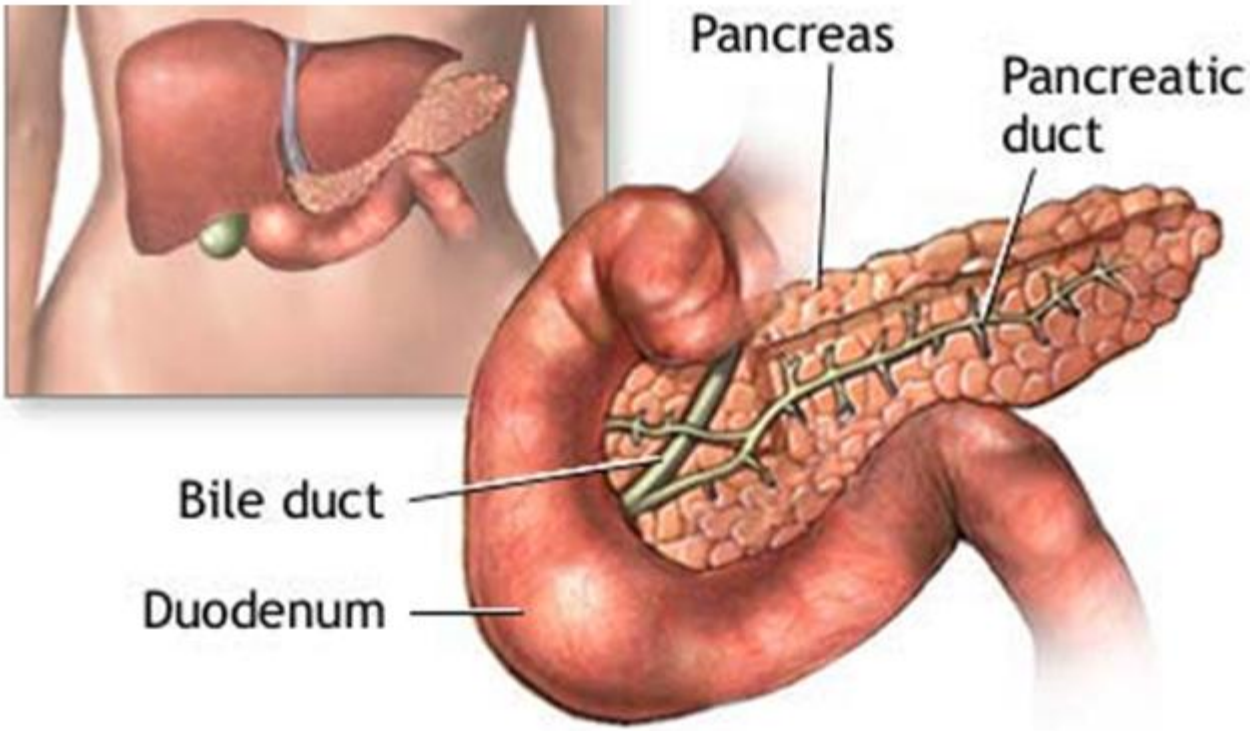
This process is known as EMULSIFICATION.
It increases the surface area of fats.
Bile Also Neutralizes the PH to 7!



Some people have trouble with the crystallization of bile salts and cholesterol in their gall bladders that forms GALLSTONES.

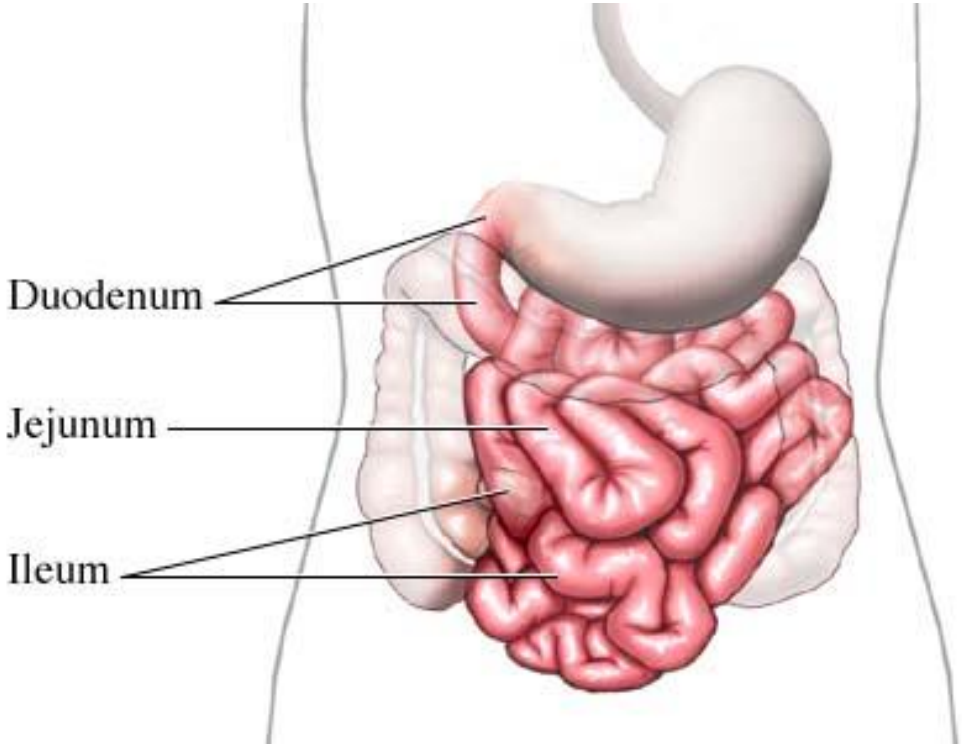
These stones block the bile duct, preventing the digestion of fats, and can cause severe abdominal pain.

The PANCREAS produces enzymes that digest all types of food – carbs, lipids, and proteins.



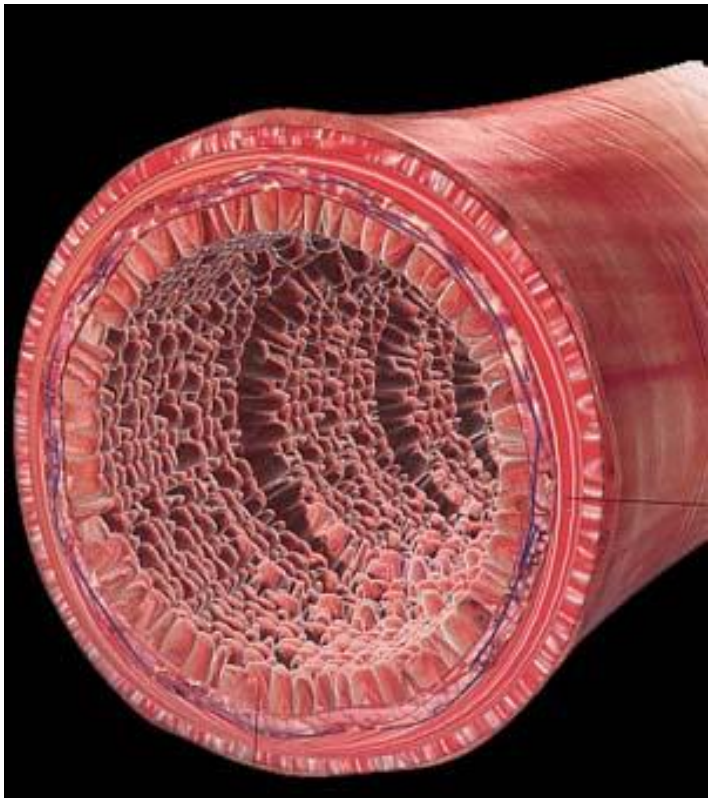
These enzymes are used in the small intestine.

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.

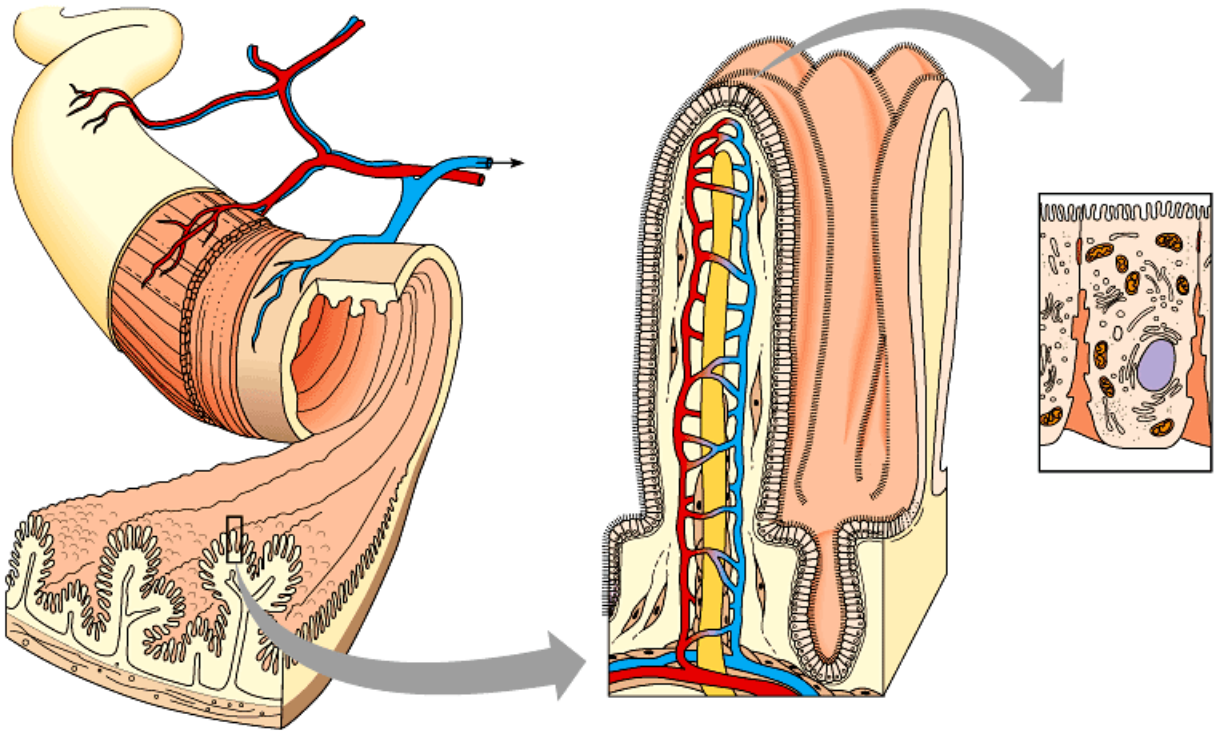
The walls of the SI are lined with
INTESTINAL GLANDS
that secrete several different enzymes for digesting proteins, lipids, and disaccharides.



ALL OF THE REMAINING NUTRIENTS ARE DIGESTED IN THE SMALL INTESTINE with the help of secretions 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.



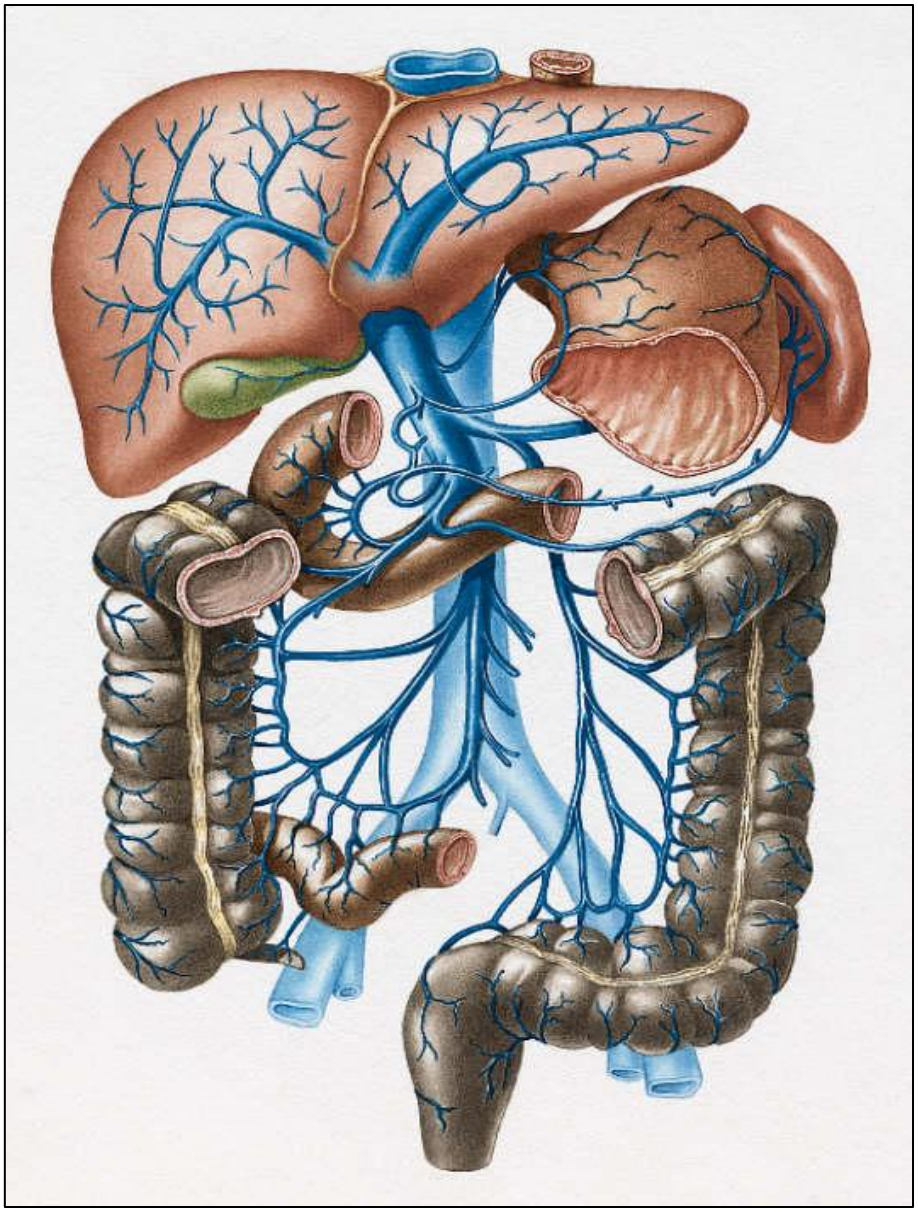
The villi provide a tremendous surface area where nutrients can be absorbed.

The nutrients circulate to the entire body, including to the LIVER, where excess glucose is converted into glycogen and stored for later use.

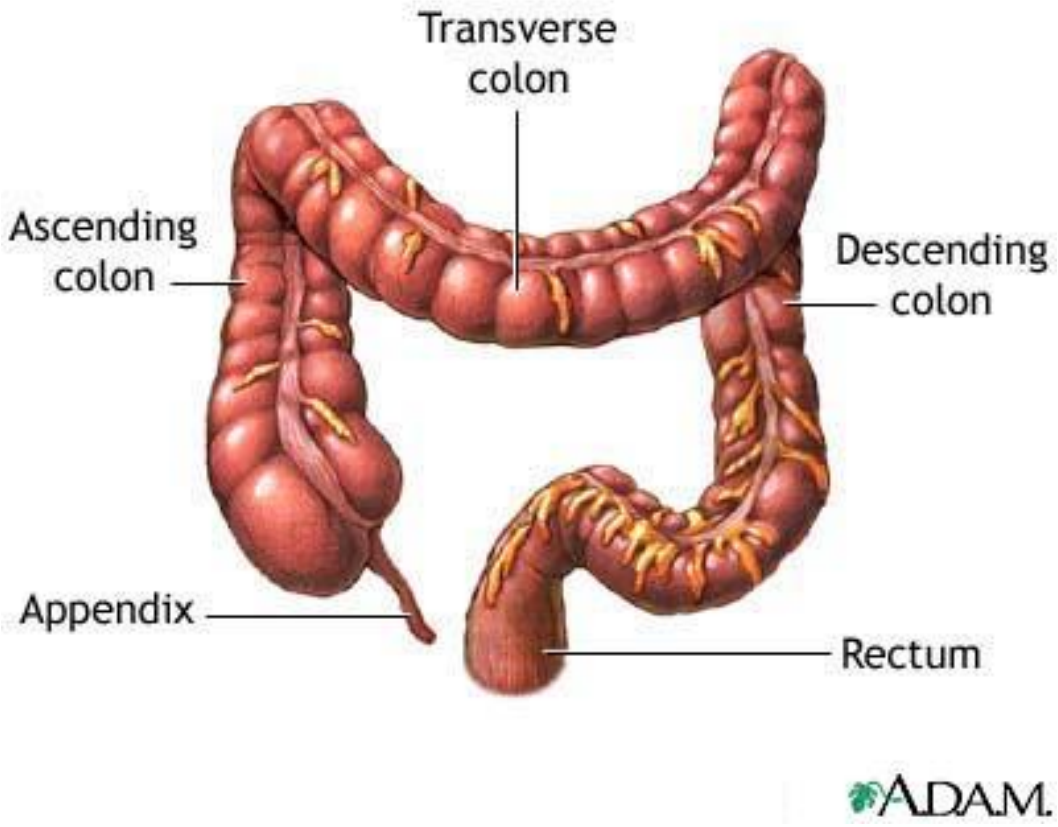
GLUCOSE

↓

GLYCOGEN



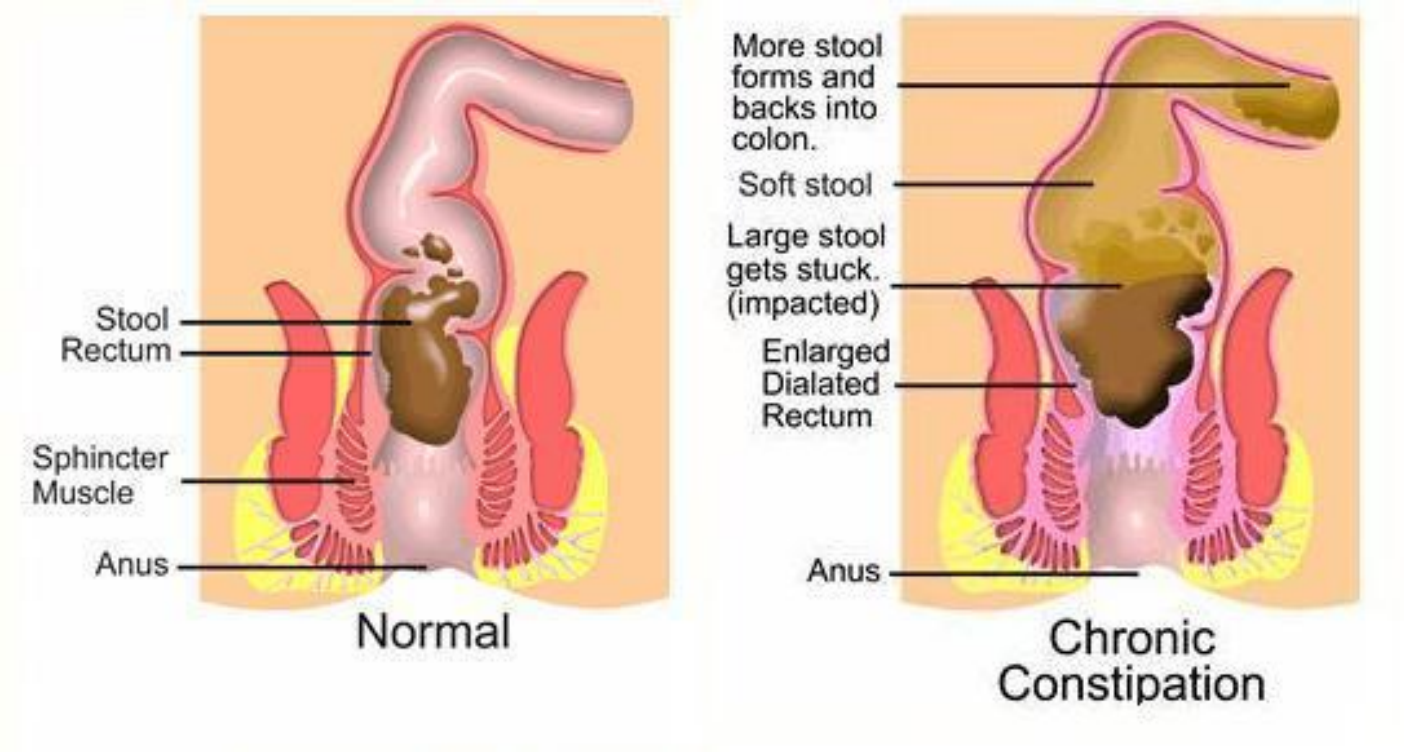
Finally, the material passes into the LARGE INTESTINE where water is absorbed and feces are formed.



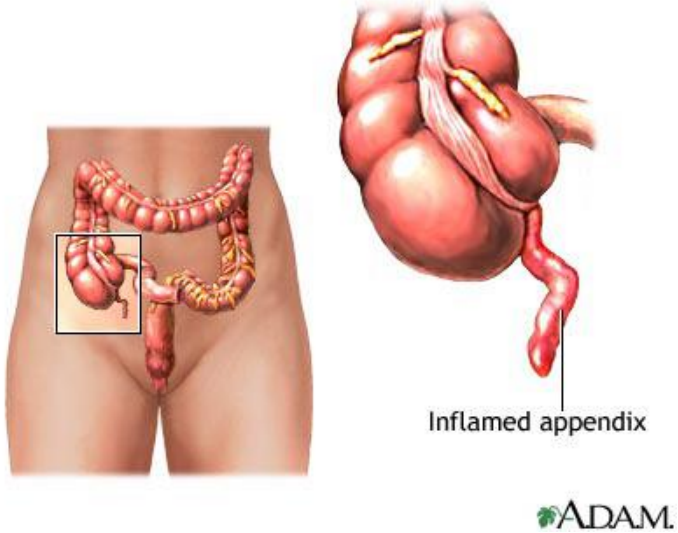
Intestinal bacteria digest the remains of your food and produce vitamins.

They also produce intestinal gas.

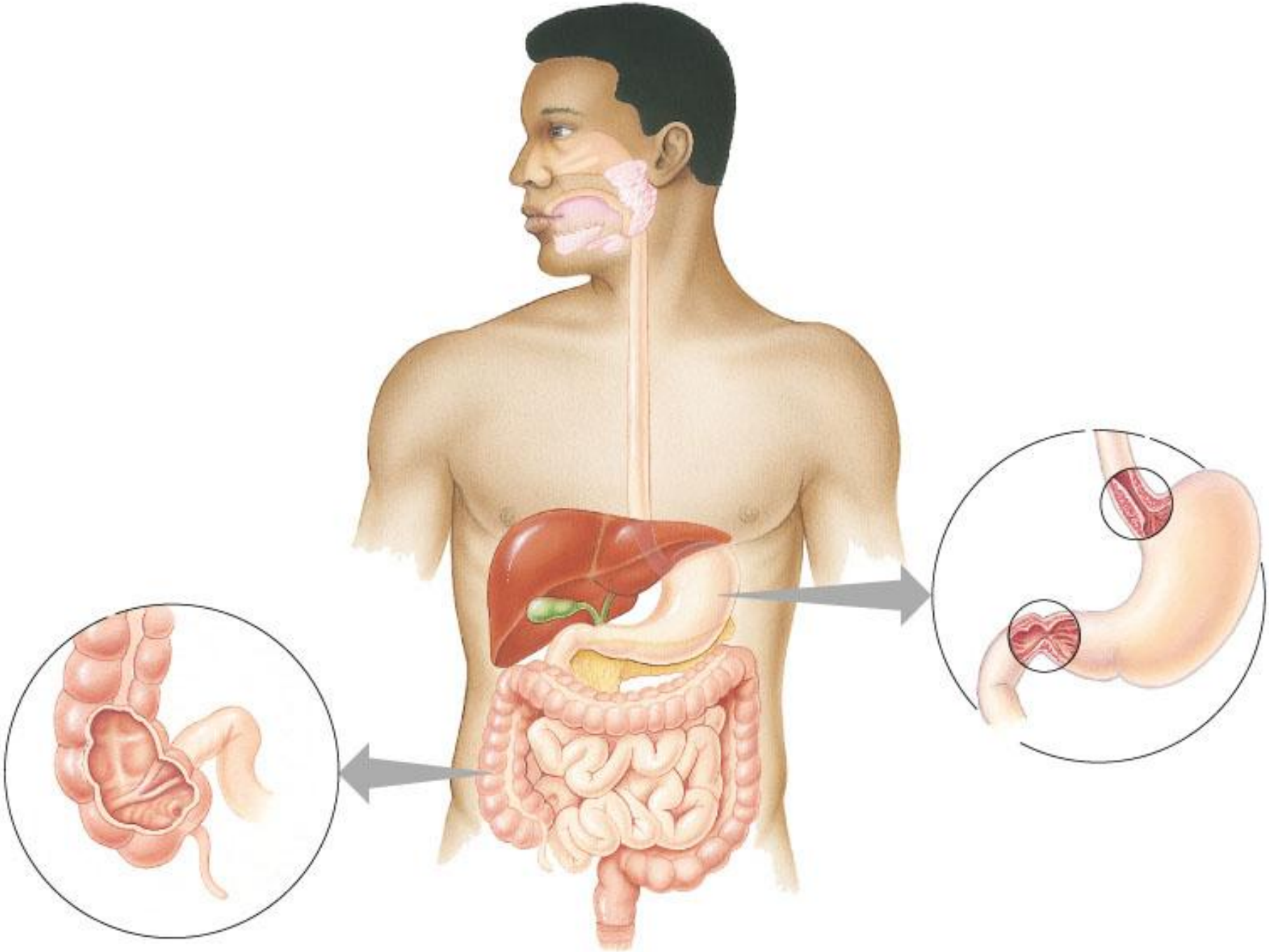
DIARRHEA and CONSTIPATION occur when the large intestine fails to function properly and homeostasis is disrupted.

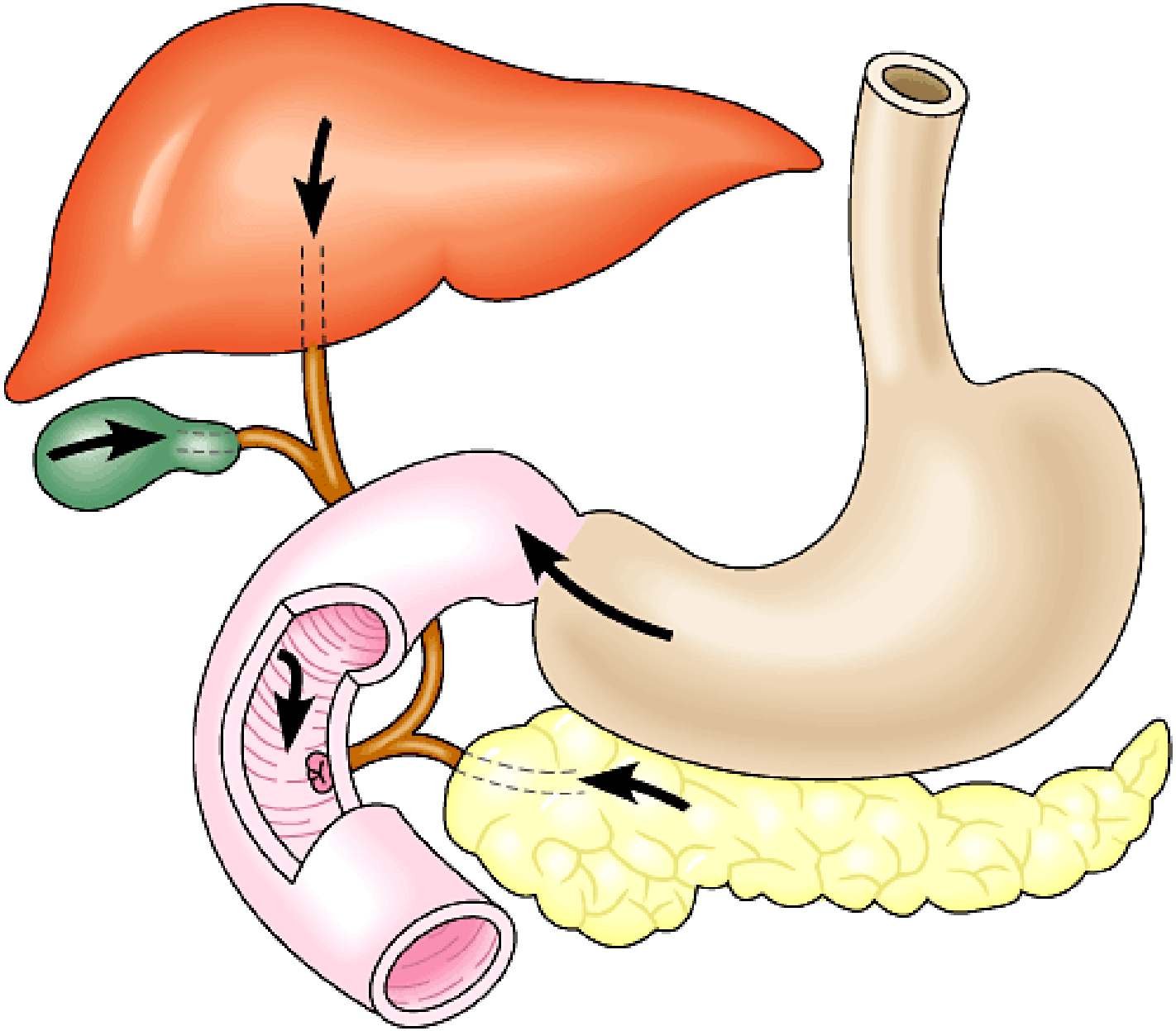


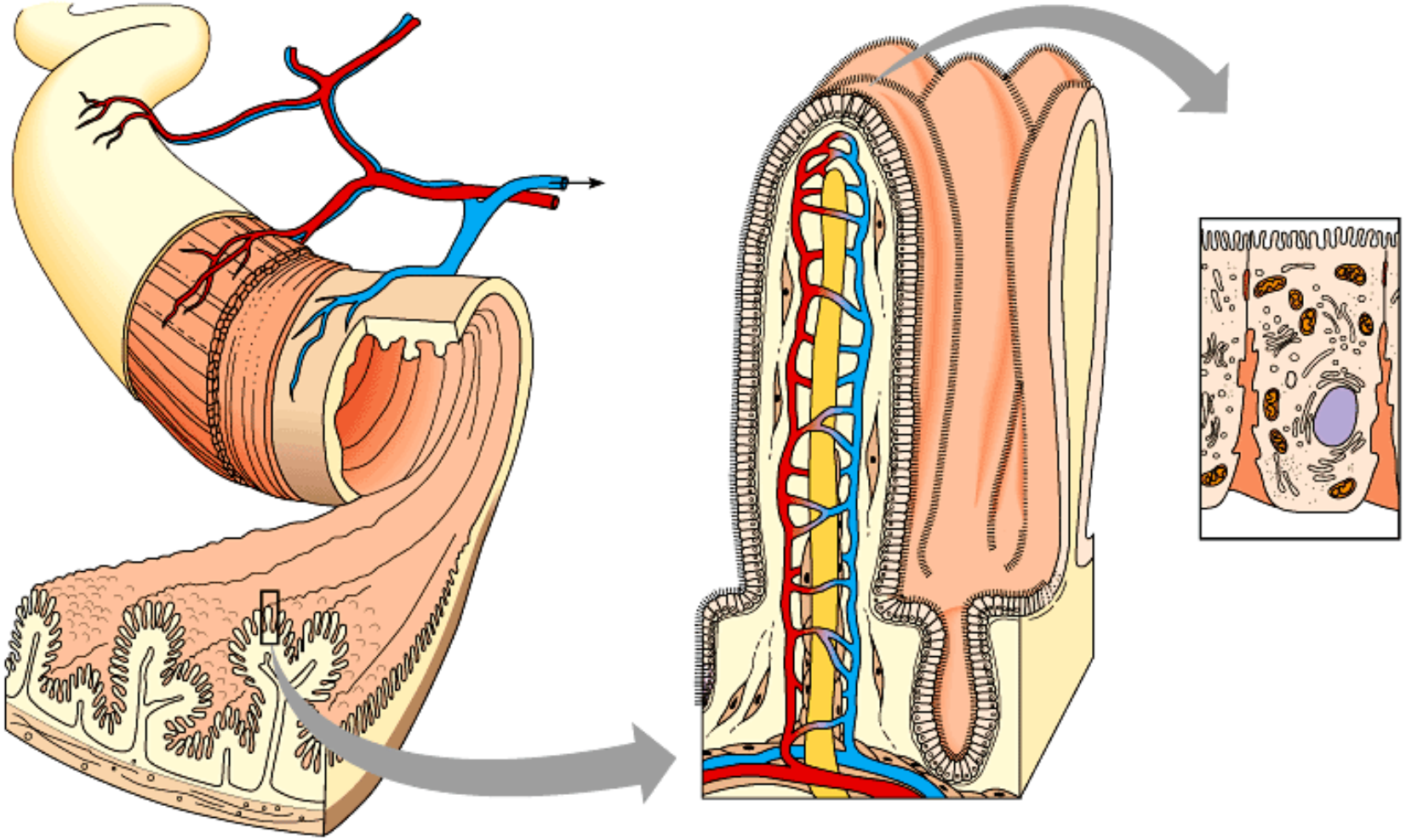
The APPENDIX is found where the small intestine meets the large intestine.

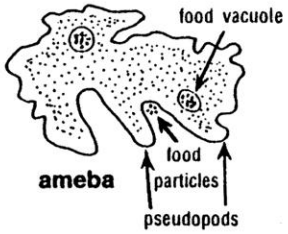


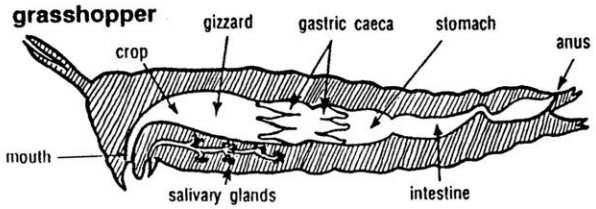
It has no important function in the digestive system and can be removed if it becomes infected.

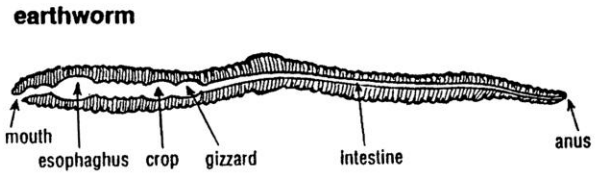


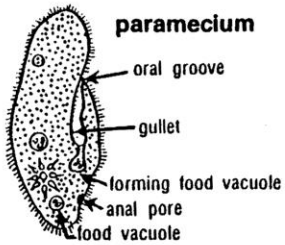


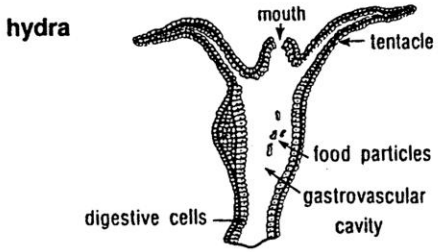


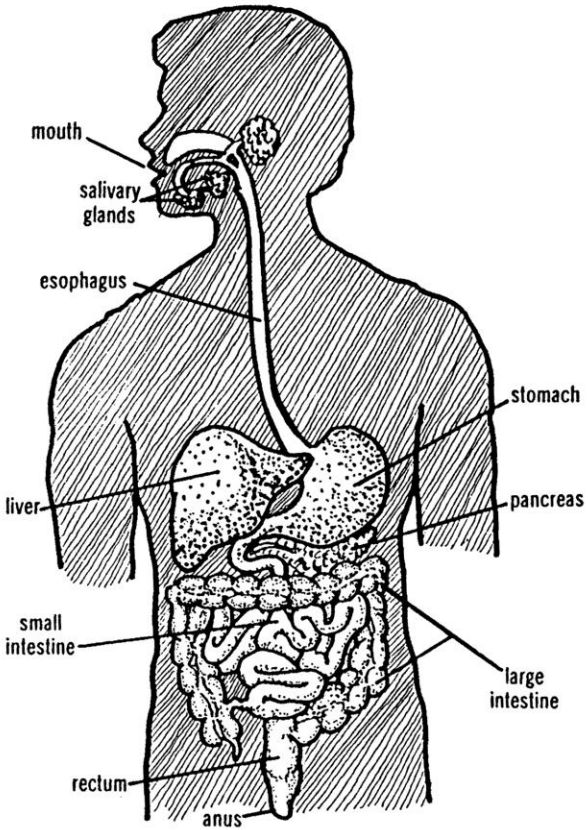

food vacuole
ameba
food particles
pseudopods

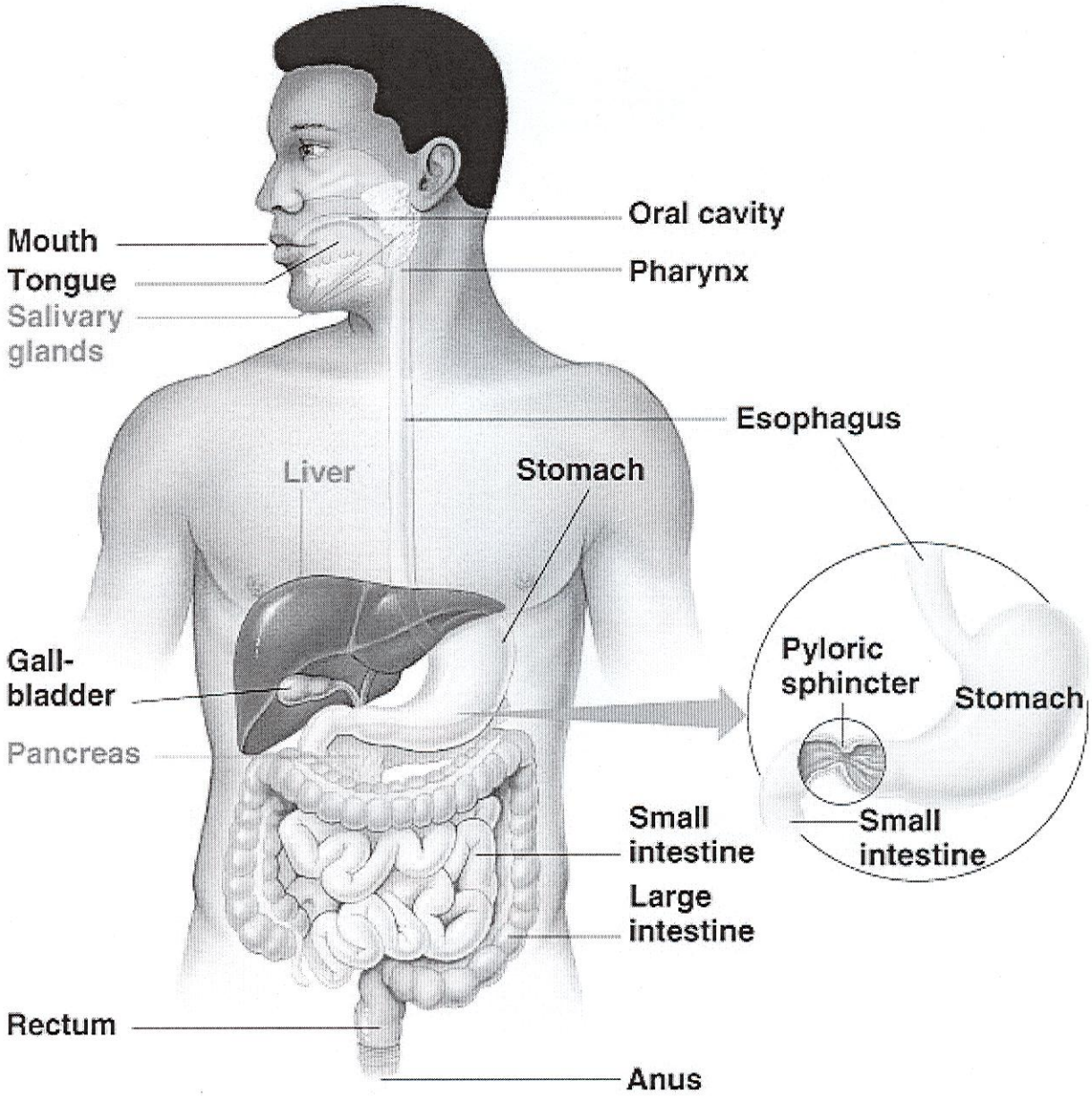

grasshopper
gizzard
gastric caeca
stomach
crop
anus
mouth
salivary glands
intestine

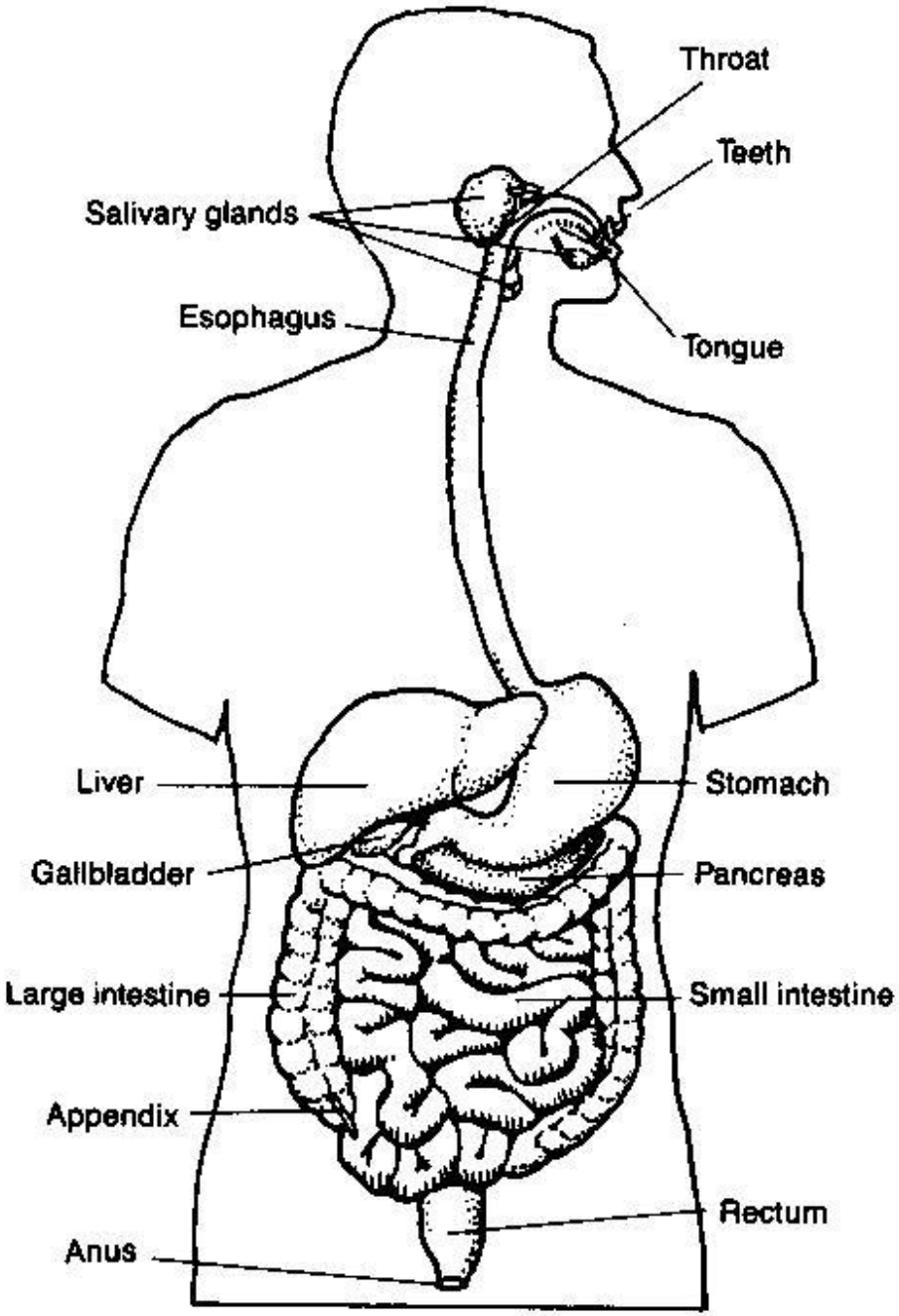

earthworm
mouth
esophaghus
crop
gizzard
intestine
anus


paramecium
oral groove
gullet
forming food vacuole
anal pore
food vacuole


hydra
mouth
tentacle
food particles
gastrovascular cavity
digestive cells


mouth
salivary glands
esophagus
stomach
liver
pancreas
small intestine
large intestine
rectum
anus


Oral cavity
Mouth
Tongue
Pharynx
Salivary glands
Esophagus
Liver
Stomach
Pyloric sphincter
Stomach
Gall-bladder
Pancreas
Small intestine
Small intestine
Large intestine
Rectum
Anus

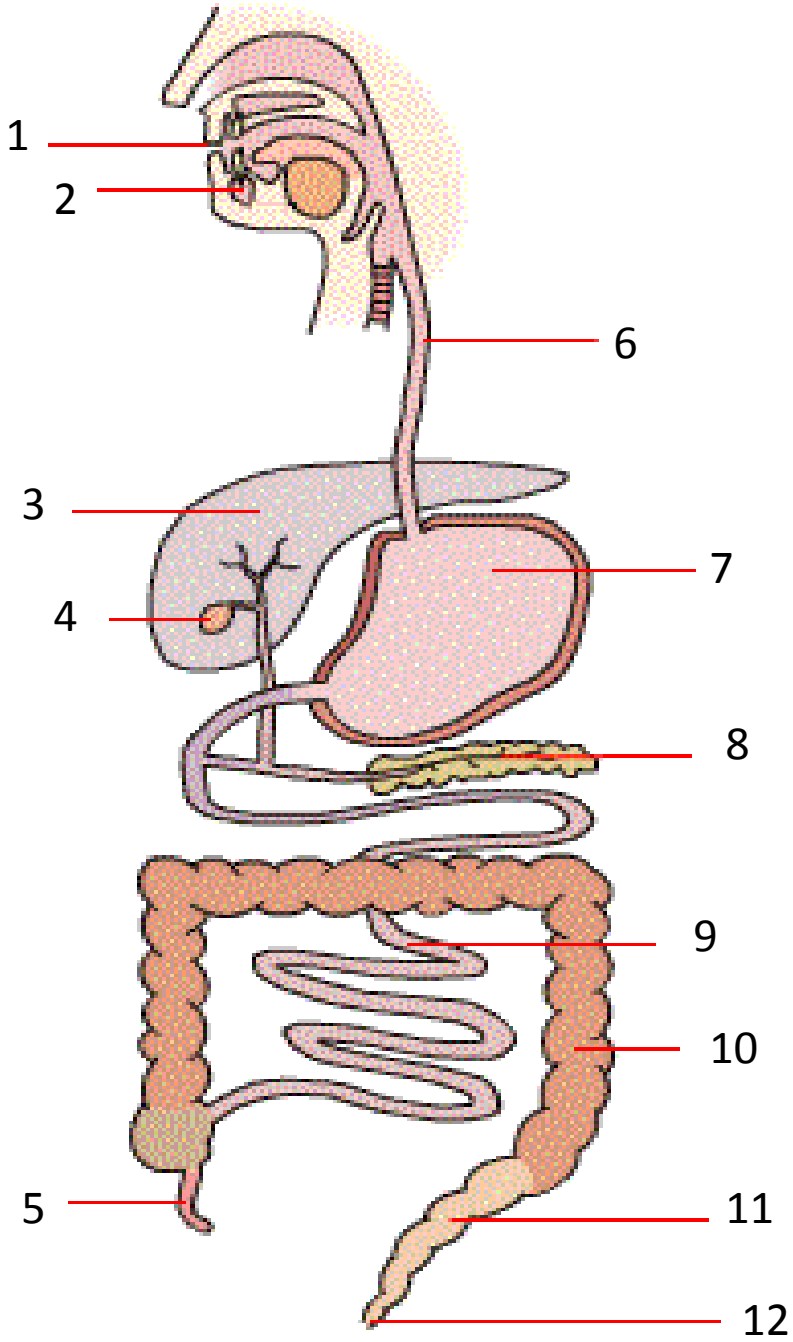

Throat
Teeth
Salivary glands
Esophagus
Tongue
Liver
Stomach
Gallbladder
Pancreas
Large intestine
Small intestine
Appendix
Rectum
Anus

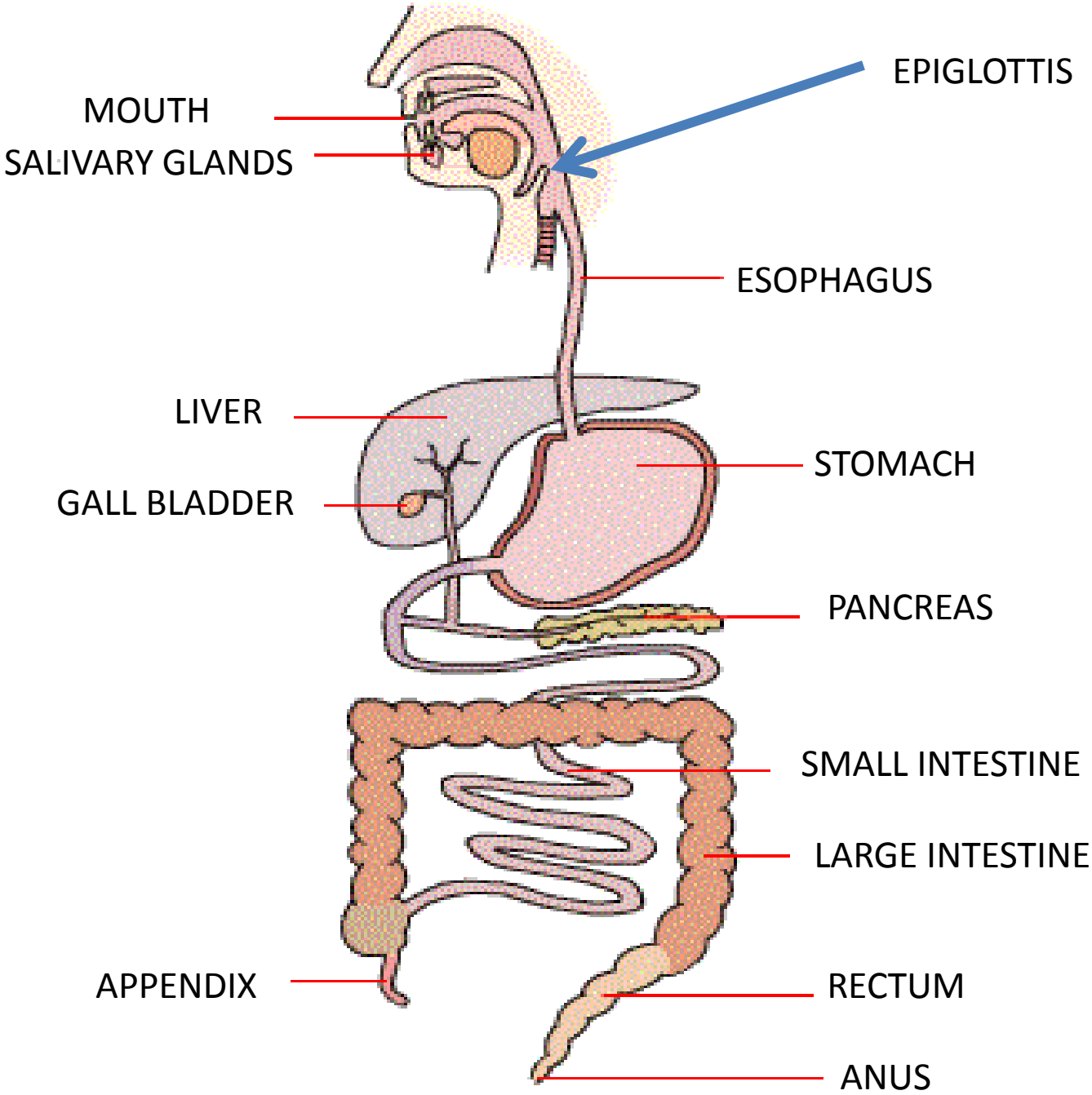
ORGAN	FOOD CHEMICALLY DIGESTED? YES/NO		
	CARBS	LIPIDS	PROTEINS
MOUTH			
ESOPHAGUS			
STOMACH			
SMALL INTESTINE			
LARGE INTESTINE			

When _____ are digested	_____ are the end products
CARBS	
LIPIDS	
PROTEINS	

ORGAN	FOOD CHEMICALLY DIGESTED? YES/NO		
	CARBS	LIPIDS	PROTEINS
MOUTH	Yes	No	No
ESOPHAGUS	(Yes)	No	No
STOMACH	No	No	Yes
SMALL INTESTINE	Yes	Yes	Yes
LARGE INTESTINE	No	No	No

When _____ are digested	_____ are the end products
CARBS	Simple sugars (glucose)
LIPIDS	Fatty acids and glycerol
PROTEINS	Amino acids


1
2
6
3
7
4
8
9
10
5
11
12


EPIGLOTTIS
MOUTH
SALIVARY GLANDS
ESOPHAGUS
LIVER
STOMACH
GALL BLADDER
PANCREAS
SMALL INTESTINE
LARGE INTESTINE
APPENDIX
RECTUM
ANUS