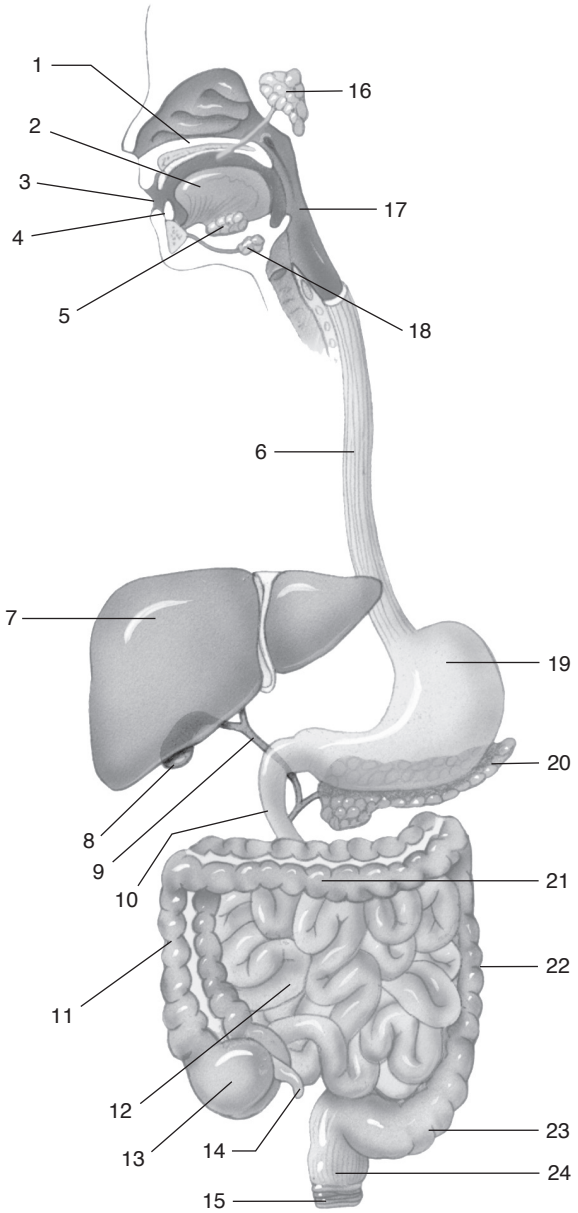
1. Digestion: An Overview

Indicate the substances that perform these roles in chemical digestion.

1) Combines with food molecules and splits them into smaller molecules. **Water**
2) Speed up hydrolysis of food molecules. **Digestive enzymes**

2. Alimentary Canal: General Characteristics

a. Label the parts of the digestive system by placing the numbers of the structures in the spaces by the correct labels.



15 Anus
14 Appendix
13 Cecum
11 Colon, ascending
22 Colon, descending
23 Colon, sigmoid
21 Colon, transverse
9 Common bile duct
10 Duodenum
6 Esophagus
8 Gallbladder
7 Liver
3 Mouth
1 Palate
20 Pancreas
16 Parotid gland
17 Pharynx
24 Rectum
12 Small intestine
19 Stomach
5 Sublingual gland
18 Submandibular gland
2 Tongue
4 Tooth

b. List the layers of the wall of the alimentary canal from inside out.

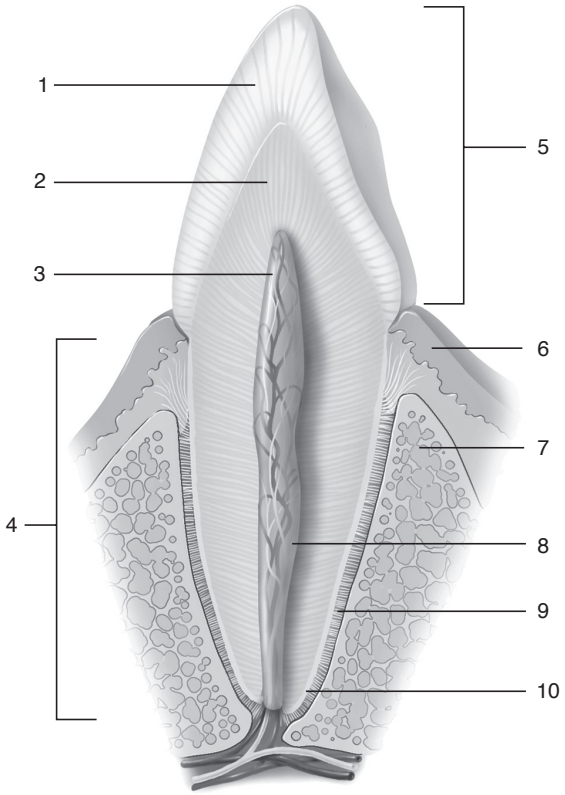
1) **Mucosa** 3) **Muscle layer**

2) **Submucosa** 4) **Serosa**

c. What contractions propel food through the canal?

3. Mouth

a. Label the figure by placing the numbers of the structures in the spaces by the correct labels.



7 Alveolar bone
10 Cementum
5 Crown
2 Dentin
1 Enamel
6 Gingiva
9 Periodontal ligament
3 Pulp cavity
4 Root
8 Root canal

b. Write the terms that match the statements in the spaces at the right.

1) Form lateral walls of the mouth. **Cheeks**

2) Separates oral and nasal cavities. **Palate**

3) Manipulates food during chewing. **Tongue**

4) Tiny projections containing taste buds. **Papillae**

5) Number of deciduous and permanent teeth. **20; 32**

6) Teeth used to bite off pieces of food. **Incisors**

7) Teeth used to grasp and tear food. **Cuspids**

8) Teeth used to crush and grind food. **Bicuspids and molars**

9) Three pairs of salivary glands. **Parotid**
Submandibular
Sublingual

10) Cleanses and lubricates mouth. **Saliva**

11) Salivary enzyme acting on starch. **Salivary amylase**

12) End product of digestion in mouth. **Maltose**

13) Saliva secretion is regulated by _____ (neural or hormonal) means. **Neural**

4. Pharynx and Esophagus

Write the terms that match the statements in the spaces at the right.

1) Tube carrying food to the stomach. **Esophagus**
2) Relaxes to let food enter stomach. **Cardiac sphincter**
3) Carries food from mouth to esophagus. **Pharynx**
4) Covers laryngeal opening in swallowing. **Epiglottis**

5. Stomach

Write the terms that match the statements in the spaces at the right.

1) Region of stomach joining esophagus. **Cardiac**
2) Region of stomach joining duodenum. **Pyloric**
3) Glands of mucosa secreting gastric juice. **Gastric glands**
4) Hormone stimulating gastric secretion. **Gastrin**
5) Hormones inhibiting gastric secretion. **CCK and secretin**
6) Autonomic impulses stimulating gastric secretion. **Parasympathetic**
7) Hormone secreted by gastric mucosa. **Gastrin**
8) Acid in gastric juice. **Hydrochloric acid**
9) Gastric enzyme acting on proteins. **Pepsin**
10) Gastric enzyme curdling milk. **Rennin**
11) Products of gastric protein digestion. **Peptides**
12) Gastric substance enabling absorption of vitamin B_{12} by small intestine. **Intrinsic factor**

6. Pancreas

Write the terms that match the statements in the spaces at the right.

1) Carries pancreatic juice from pancreatic duct to duodenum. **Pancreatic duct**
2) Two hormones stimulating secretion of pancreatic juice. **Cholecystokinin and Secretin**
3) Source of these hormones. **Intestinal mucosa**
4) Pancreatic enzyme acting on starch. **Pancreatic amylase**
5) Product of pancreatic starch digestion. **Maltose**
6) Pancreatic enzyme acting on fats. **Lipase**
7) Products of pancreatic fat digestion. **Monoglycerides and fatty acids**
8) Pancreatic enzyme acting on proteins. **Trypsin**
9) Products of pancreatic protein digestion. **Peptides**

7. Liver

Write the terms that match the statements in the spaces at the right.

1) Removed from amino acids and converted to urea. **Amine groups**
2) Vessels carrying blood to liver:
   a) carries oxygen-rich blood. **Hepatic artery**
   b) carries nutrient-rich blood. **Hepatic-portal vein**
3) Vessel carrying blood from liver. **Hepatic vein**
4) Carbohydrate stored in liver. **Glycogen**
5) Secretion formed by liver. **Bile**
6) Stores excess bile. **Gallbladder**
7) Carries bile to duodenum. **Common bile duct**
8) Hormone contracting gallbladder. **Cholecystokinin**
9) Bile component emulsifying lipids. **Bile salts**
10) Bile component from hemoglobin breakdown. **Bile pigments**

8. Small Intestine

a. Write the terms that match the statements in the spaces at the right.

1) Segment continuous with the stomach. **Duodenum**
2) Segment continuous with the cecum. **Ileum**
3) Membranes supporting small intestine. **Mesentery**
4) Relaxes to allow chyme to enter the small intestine. **Pyloric sphincter**
5) Secretion of intestinal glands. **Intestinal juice**
6) Fingerlike projections of the mucosa. **Villi**
7) Microscopic folds of exposed epithelial cell membranes. **Microvilli**
8) Hormone released by mucosa due to presence of fat-laden chyme. **Cholecystokinin**
9) Hormone released by mucosa due to presence of acid chyme. **Secretin**
10) Mechanism (neural or hormonal) that stimulates secretion of intestinal juice. **Neural**
11) Enzyme acting on sucrose. **Sucrase**
12) End products of sucrose digestion. **Glucose; fructose**
13) Enzyme acting on lactose. **Lactase**
14) Enzyme acting on maltose. **Maltase**
15) End product of maltose digestion. **Glucose**
16) End products of lactose digestion. **Glucose; galactose**
17) Enzyme acting on fats. **Lipase**
18) End products of fat digestion. **Monoglycerides**; **Fatty acids**
19) Enzyme acting on peptides. **Peptidase**
20) End products of peptide digestion. **Amino acids**

b. Write the terms that complete the sentences in the spaces at the right.

Monosaccharides and amino acids are absorbed into the ____1___ networks of ____2___ . Monoglycerides and fatty acids are absorbed into ____3___ cells, where they reunite to form ____4___ . Clusters of triglycerides are coated with protein, forming ____5___ that enter the ____6___ of the ____7___ .

1) **Capillary**
2) **Villi**
3) **Epithelial**
4) **Triglycerides**
5) **Chylomicrons**
6) **Lacteal**
7) **Villi**

9. Large Intestine

Write the terms that match the statements in the spaces at the right.

1) Pouchlike first part of large intestine. **Cecum**
2) External opening of large intestine. **Anus**
3) Colon segment along left side of abdomen. **Descending colon**
4) Colon segment along right side of abdomen. **Ascending colon**
5) Colon segment continuous with rectum. **Sigmoid colon**
6) Wormlike extension of cecum. **Appendix**
7) Involuntarily controlled anal sphincter. **Internal anal sphincter**
8) Voluntarily controlled anal sphincter. **External anal sphincter**
9) Decompose undigested materials. **Colon bacteria**
10) Fluid absorbed by large intestine. **Water**
11) Relaxes, allowing chyme to enter cecum. **Ileocecal valve**
12) Reflex activated by filling of rectum with feces. **Defecation reflex**

10. Nutrients: Sources and Uses

Write the terms that match the statements in the spaces at the right.

1) Dietary source of most carbohydrates. **Plants**
2) Plant polysaccharide providing fiber. **Cellulose**
3) Preferred energy source for body cells. **Glucose**
4) Organs regulating blood glucose levels. **Liver and pancreas**
5) Most common lipids in the diet. **Triglycerides**
6) Type of fats common in animal foods. **Saturated**
7) Type of fats common in plant foods. **Unsaturated**
8) Lipid abundant in egg yolks. **Cholesterol**
9) Lipid used to form steroid hormones. **Cholesterol**
10) Lipid forming much of plasma membranes. **Phospholipids**
11) Molecules transporting lipids in blood. **Lipoproteins**
12) Organ helping to regulate blood levels of triglycerides and cholesterol. **Liver**
13) Amino acids that cannot be made by liver. **Essential amino acids**

11. Disorders of the Digestive System

Write the names of the disorders that match the statements.

1) Inflammation of the large intestine. **Colitis**
2) Self-induced starvation due to an abnormal concern about weight-control. **Anorexia nervosa**
3) Decay of the teeth due to acids formed by certain oral microorganisms. **Dental caries**
4) Dry, hard feces making defecation difficult. **Constipation**
5) Crystallization of cholesterol in bile within the gallbladder. **Gallstones**
6) Replacement of destroyed liver cells by connective tissue. **Cirrhosis**
7) Repeated overeating and purging. **Bulemia**
8) Inflammation of the liver. **Hepatitis**
9) Digestion of stomach mucosa by gastric juice. **Gastric ulcers**
10) Inflammation, bleeding, and degeneration of the gingivae and alveolar bone. **Peridontal disease**
11) Watery feces due to excessive peristalsis. **Diarrhea**
12) Enlarged and inflamed veins in anal canal. **Hemorrhoids**
13) Inflammation of the appendix. **Appendicitis**
14) Inflammation of the peritoneum. **Peritonitis**
15) Inflammation of colon diverticula. **Diverticulitis**

12. Clinical Applications 

a. Severe diarrhea in infants or small children can be a life-threatening event. Explain why. **The relatively small quantity of body fluids can quickly be depleted resulting in severe dehydration that could be fatal without treatment.**

b. A patient is found to have a gastric ulcer. Antibiotics and a drug to reduce the secretion of gastric juice are prescribed. Explain the basis for the prescriptions. **Antibiotics are used to kill the bacterium eroding the stomach lining. Reducing the secretion of gastric juice helps curtail the digestion of the stomach wall at the ulcer site.**

What serious results may occur with an untreated ulcer? **Blood vessels of the stomach wall may be damaged resulting in a bleeding ulcer. Excessive bleeding can result in death.**

c. A patient is admitted to the emergency room complaining of severe and spasmodic pain in the epigastric region, and the whites of his eyes are yellowish. He informs the physician that he has had similar, but milder, pains after meals for four to six weeks. What is the likely problem and the likely solution? **Gallstones are probably blocking the release of bile from the gallbladder. If this is so, surgical removal of the gallbladder is the usual treatment.**