

The digestive system consists of the alimentary canal and associated glands. The function of the system is to break food down into molecules small enough to be absorbed by the capillaries that carry both blood and lymph and be transported to the liver for processing and distribution.

Color titles A through F and the related structures in the figure at the right.

The digestive structures of the *oral cavity* include 32 *teeth* (20 in a child) arranged on two dental arches, upper and lower, and the *tongue*. The tongue is composed of several muscles, many of them attached to bony projections around the jaw. It can move food around the oral cavity for selective tooth work (chewing, tearing, macerating) or back to the *pharynx* for swallowing. Three pairs of *salivary glands* have ducts that open into the oral cavity. These glands secrete saliva, which wets the food and contains an enzyme that digests complex carbohydrates, such as starches. Thus a considerable amount of mechanical and chemical digestion goes on in the mouth before the food is even swallowed.

Food to be swallowed is thrust into the *esophagus* by a complex swallowing reflex involving several muscles in the tongue, plate, and pharynx. The bolus ("ball") of food is moved down the esophagus by peristaltic contractions of the muscles in the esophageal wall. The esophagus is a fibromuscular tube lying in front of the vertebral column, behind the larynx, trachea, great vessels (veins and arteries entering and leaving the heart), and heart. Like the oral cavity and pharynx, it is lined with stratified squamous epithelial tissue—a wear-and-tear type of tissue. It passes through the muscular diaphragm on the left side of center and merges with the stomach.

Color the headings Upper Gastrointestinal Tract, Small Intestine, Lower Gastrointestinal Tract, and Large Intestine, titles G through L, and the related structures at the right. Use a light color for G if you intend to color over structure P.

The *stomach* continues the mechanical breakdown of food that began with the teeth by adding hydrochloric acid and digestive enzymes to the bolus in the stomach (gastric cavity). (Recall the glands described in Plate 99.) In this way the digestion of proteins begins (other kinds of molecules are not digested until they arrive at the small intestine). When the food is digested to a semiliquid state, it passes a little at a time through the muscular

pyloric sphincter (a valve) into the first part of the small intestine.

The small intestine consists of three parts: the *duodenum* (about 25 centimeters long), the *jejunum* (2.5 meters), and the *ileum* (3.6 meters). The duodenum receives bile from the liver and numerous digestive enzymes from the pancreas (see below), which act on the food throughout the small intestine. Additional enzymes are secreted by glands in the intestinal wall. Peristaltic contractions of the wall accomplish a thorough mixing.

The tissue lining the small intestine is extensively modified into fingerlike projections called villi (singular, villus), which move like undulating fingers, adding to the mixing action. The area of contact between intestinal contents and intestinal surfaces is further increased by numerous microvilli (Plate 42). Digestion and absorption of nutrients are complete by the time the contents reach the end of the small intestine.

The lower gastrointestinal tract (or large intestine) begins in the lower right quadrant of the abdomen as a blind pocket, the *cecum*, attached to which is the *appendix*. From there the large intestine proceeds as the ascending *colon*, transverse *colon*, descending *colon*, and sigmoid ("S-shaped") *colon*, straightens out to form the *rectum*, and opens to the outside as the *anal canal* and anus. The large intestine absorbs most of the remaining water and compacts the residual matter as feces.

Color the heading Glands, titles M through P, and the related structures. Structures H and H' can also be colored at lower left. A light color for M is recommended.

The *liver* is the largest gland in the body and performs a very large number of functions, many of them related to digestion. The liver receives all the blood returning from the digestive tract and processes protein, fats, and carbohydrates, metering their release into the circulation according to the body's needs. It also produces bile, which emulsifies fats in the small intestine to aid in their digestion. Bile is discharged into the *hepatic ducts*, which form the *common bile duct*, through which the bile reaches the *cystic duct* and the *gallbladder*. Bile is stored in the gallbladder and is released via the cystic duct into the common bile duct, which conducts it to the duodenum.

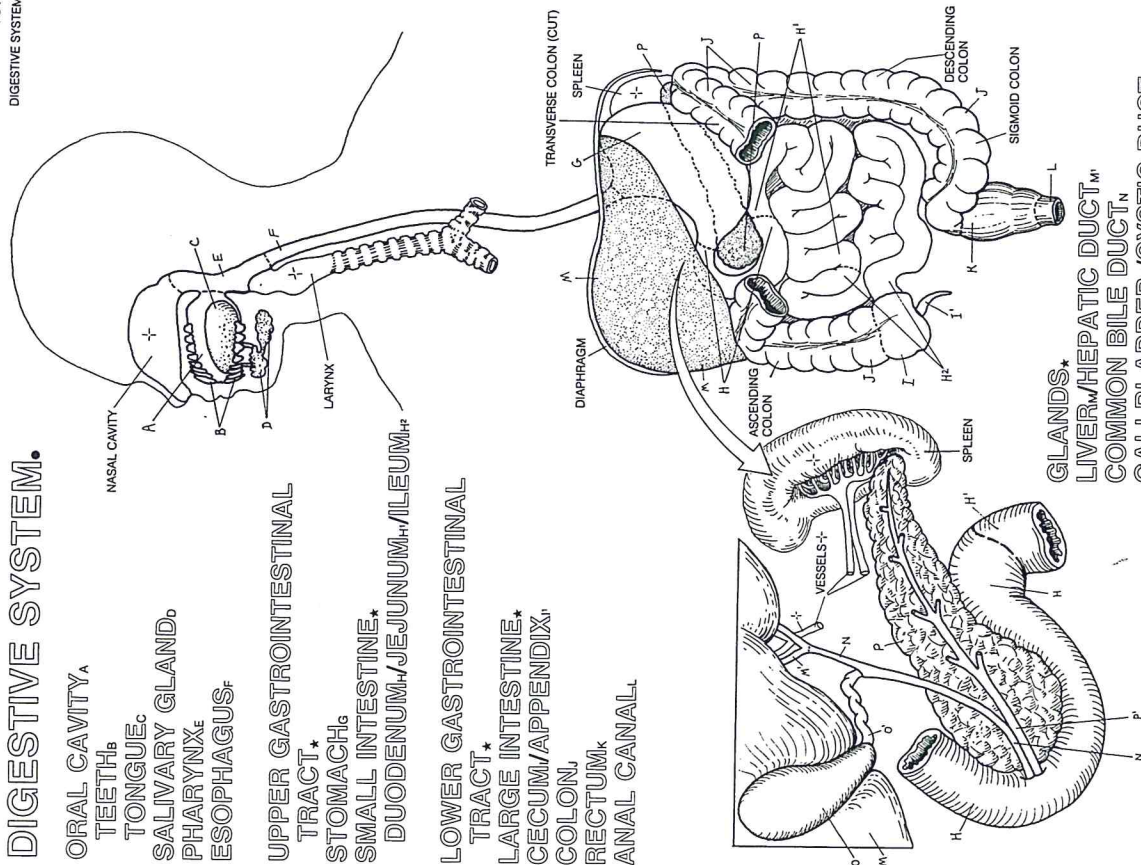
The *pancreas* is two glands in one. The exocrine portion produces enzymes that digest fats, proteins, carbohydrates, and nucleic acids. Those enzymes are secreted into ducts that merge to form a main *pancreatic duct*. The endocrine portion is discussed in the next plate.

DIGESTIVE SYSTEM.

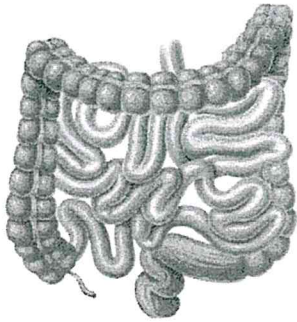
ORAL CAVITY^A
TEETH^B
TONGUE^C
SALIVARY GLAND^D
PHARYNX^E
ESOPHAGUS^F

UPPER GASTROINTESTINAL TRACT^{*}
STOMACH^G
SMALL INTESTINE^{*}
DUODENUM^H/JEJUNUM^{H'}/ILEUM^{H''}

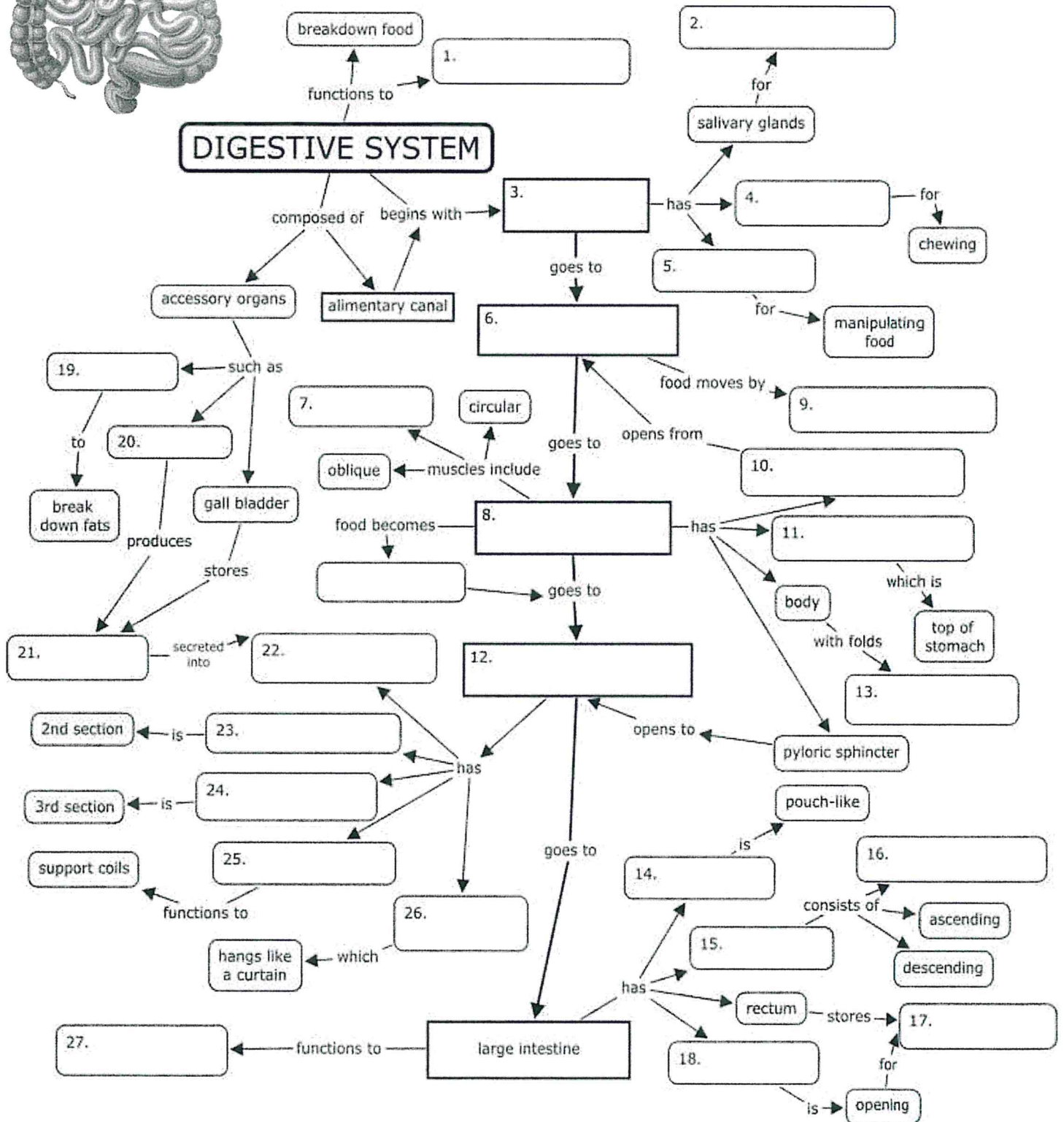
LOWER GASTROINTESTINAL TRACT^{*}
LARGE INTESTINE^{*}
CECUM/APPENDIX^{*}
COLON^K
RECTUM^K
ANAL CANAL



GLANDS^{*}
LIVER^M/HEPATIC DUCT^{M'}
COMMON BILE DUCT^N
GALLBLADDER/CYSTIC DUCT^O
PANCREAS^P/DUCT^{P'}



Name _____



WORD BANK From: <http://www.biologycorner.com/anatomy/chap15.html>

esophagus | longitudinal | jejunum | waste | pancreas | ileum | producing amylase | cardiac sphincter | mesentery | cecum | anus | mouth | rugae | peristalsis | tongue | transverse | small intestine | teeth | absorb nutrients | stomach | greater omentum | bile | fundus | duodenum | chyme | absorb water | colon | liver