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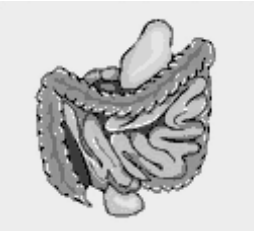


The Digestive System

Purpose: To describe how food moves through the digestive system.

Materials:
Markers
Ruler
1,000 cm string
Map Pencils

Digestive Organ	***Length in cm***
Mouth	11
Esophagus	25
Stomach	22
Small Intestine	690
Large Intestine	152
Rectum	14

Procedure:

1. Use the chart above to measure out the length of each organ of the digestive tract. Start at the beginning of the string, which represents the mouth. The mouth is about 11 cm long, so use a marker to color the first 11 cm of the string.
2. The next 25 cm represents the esophagus; color it in a different color.
3. Continue measuring and coloring until you reach the end of the rectum, which is the anus.
4. Read the following:

Food provides us with fuel to live, energy to work and play, and the raw materials to build new cells. All the different kinds of food we eat are broken down by our digestive system and moved to every part of our body by our circulatory system.

The ***digestive system*** is a group of organs that work together to break down the chemical components of food into small nutrients that can be absorbed by cells to create energy for the body. This system also builds and replaces cells and tissues, which are constantly dying.

Digestion involves the mixing of food, its movement through the digestive tract, and chemical breakdown of the large molecules of food into smaller molecules. Digestion starts in the mouth, when we

chew and swallow, and is finished in the small intestine. The chemical process changes with different kinds of food.

Movement of Food Through the System

The large, hollow organs of the digestive system contain *muscle* that the organ walls move. The movement of organ walls can push food and liquid and can mix the contents within each organ.

The movement of the esophagus, stomach, and intestine is a muscle action called ***peristalsis***. The action of peristalsis looks like an ocean wave moving through the muscle. The muscle of the organ produces a narrowing and then pushes the narrowed portion slowly down the length of the organ. These waves of narrowing push the food and fluid in front of them through each hollow organ.

Mouth

Teeth bite off and chew food into a soft mush that is easy to swallow. Chewing mixes the food with saliva, from the 6 salivary glands around the mouth and face, to make it moist and slippery, so it can move down the digestive tract easily. Although we are able to start swallowing by choice, once the swallow begins, it becomes involuntary and is then under the control of the nervous system.

Esophagus

The esophagus is a muscular tube. It takes food from the throat and pushes it down through the neck, and into the stomach. It moves food by the waves of ***muscle contraction*** called peristalsis.

Stomach

The stomach has thick muscles in its wall. These muscles ***contract*** to mash the food into a sloppy soup. The stomach lining produces strong digestive juices. These start ***chemical reactions*** in food, breaking down ***macromolecules*** and dissolving its nutrients. The stomach really has three mechanical tasks to do.
First, the stomach must ***store the swallowed food and liquid***. This requires the muscle of the upper part of the stomach to relax and accept large amounts of swallowed food.
The second job is to ***mix up the food, liquid, and digestive juic***e produced by the stomach. The lower part of the stomach mixes these materials by its muscle action.

The third task of the stomach is to ***empty its contents*** slowly into the small intestine.

Pancreas

The pancreas, like the stomach, makes powerful digestive juices called ***enzymes,*** which help to digest food further as it enters the small intestines. Food does not actually move through the pancreas.

Gall Bladder

This small baglike part is tucked under the liver. It stores fluid called ***bile***, which is made in the ***liver***. As food arrives in the small intestine, bile flows from the gall bladder along the ***bile duct*** into the intestine. It helps to digest ***fatty foods*** and contains wastes for removal. Food does not actually move through the gall bladder.

Small Intestines

This part of the digestive tract is narrow, but very long - about 20 feet. In the small intestine more enzymes continue the chemical reactions, breaking down macromolecules into smaller ones. When the nutrients are small enough, they *pass through the lining of the small intestine, and into the blood*. They are carried away to the liver and other body parts to be processed, stored and distributed.

Liver

Blood from the intestines flows to the liver, carrying nutrients, vitamins and minerals, and other products from digestion. The liver is like a food-processing factory with more than 200 different jobs. It stores some nutrients, changes them from one form to another, and releases them into the blood according to the activities and needs of the body. Food does not actually move through the liver.

Large Intestine

Any useful substances in the leftovers, such as spare water and body minerals, are absorbed through the walls of the large intestine, back into the blood. The left-overs are formed into brown, semi-solid feces, ready to be removed from the body.

Rectum and Anus

Not all that we eat can be digested, so the waste must be disposed of in an efficient way. The waste products of this process include

undigested parts of the food, known as fiber, and older cells that have been shed from the mucus. The end of the large intestine and the next part of the tract, the rectum, store the feces. These are finally squeezed through a ring of muscle, the anus, and out of the body.

Production of Digestive Juices

The glands that act first are in the mouth, they are the salivary glands. ***Saliva*** produced by these glands contains an enzyme that begins to break down (digest) the starch from food into smaller molecules.

The next set of digestive glands is in the ***stomach lining***. They produce stomach acid and an enzyme that digests protein.

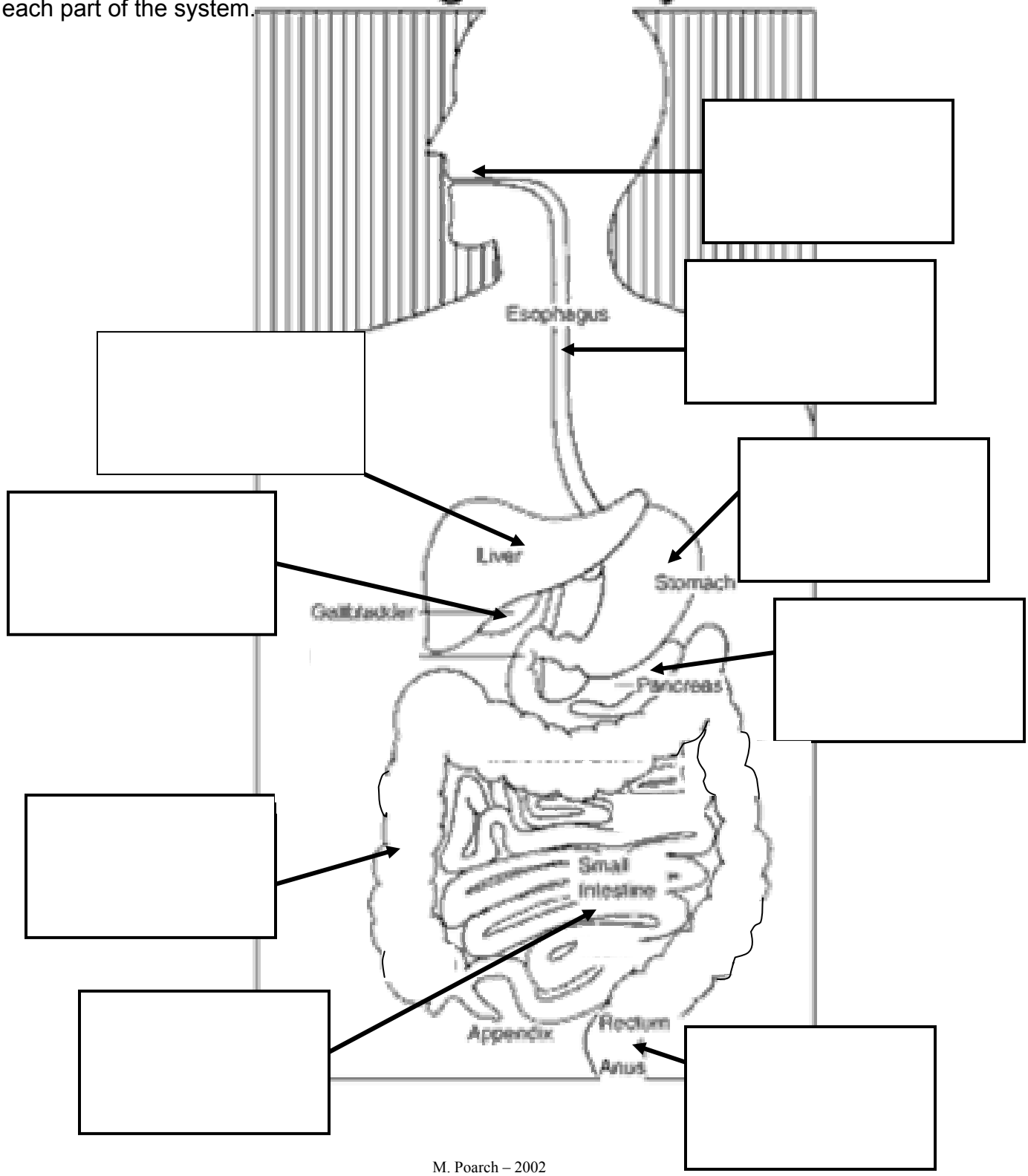
After the stomach empties the food and its juice into the small intestine, the juices of the ***pancreas*** and ***liver*** mix with the food to continue the process of digestion.

The pancreas produces a juice that contain enzymes to break down the carbohydrates, fat, and protein in food. Other enzymes that are active in the process come from glands in the wall of the intestine or even a part of that wall.

The liver produces another digestive juice; bile. The bile is stored between meals in the gall bladder. After eating, it is squeezed out of the gallbladder into the bile ducts to reach the intestine and mix with the fat in our food. The bile acids dissolve the fat into the watery contents of the intestine, much like detergents that dissolve grease from a frying pan. After the fat is dissolved, enzymes from the pancreas and the lining of the intestine digest it.

Absorption and Transport of Nutrients

Digested molecules of food, as well as water and minerals from the diet, are absorbed from the upper small intestine. The absorbed materials cross by ***osmosis*** into the blood, mainly, and are carried off in the bloodstream to other parts of the body for storage or further chemical change.

1. Use map pencils to color each part of the digestive system.
2. Briefly describe what happens to food in each part of the system.

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