

OUR PRIZE COMPETITION.

DESCRIBE THE VARIOUS DIGESTIVE JUICES AND THEIR ACTION.

We have pleasure in awarding the prize this week to Miss Ethel E. Hall, Whitworth Road, Dublin.

PRIZE PAPER.

The two great ends achieved by digestion are, that it renders food soluble, and that it makes it capable of being absorbed into the blood vessels. The process by which the fluid food passes through the living tissues is called osmosis. There are some fluids, however, which cannot undergo osmosis, such as watery mixtures of meat and starch. In the process of digestion certain foods are simply dissolved, whilst others need to be changed entirely in character before they can be dissolved.

Working under the influence of the heat of the body, the chief agents of digestion are the fluids which are secreted by various organs.

These fluids are:—The saliva, formed by glands in the neighbourhood of the mouth; the gastric juice, which is abundantly poured out into the stomach; the bile, which comes from the liver; the pancreatic juice, which comes from the pancreas, or sweetbread; and the intestinal juice, which is poured into the whole length of the bowel from the membrane which lines it.

The proper division of the food by the teeth is essential for the healthy performance of digestion.

The first digestive fluid is the saliva, found in the mouth; this fluid is furnished by three sets of glands. Those in front of the ears are the parotid glands, and the other two pairs, called sub-maxillary and sub-lingual glands, are situated in the floor of the mouth. The saliva acts only on carbo-hydrates, transforming the starch contained in them into a variety of sugar called maltose. This action is due to a substance in the saliva known as ptyalin. The saliva is a colourless fluid.

The food is next acted upon by the gastric juice in the stomach. The great action of the gastric juice is to convert the proteids into peptones. The gastric juice contains a trace of hydrochloric acid and a principle called pepsin. The action of the gastric juice on milk is to form a substance called casein. The only effect the gastric juice has on fat is to break it up into very small particles.

When the food is reduced to an evenly fluid mass (chyme) by the action of the gastric juice and by the movements of the stomach, the muscular fibres relax and the food passes into

the intestines. There it is subjected to the action of three juices, the bile, the pancreatic juice, and the intestinal juice.

The pancreatic juice is secreted by the pancreas, and is conveyed by a duct into the duodenum, where it meets the acid chyme. It acts on the proteids, the fats, and the carbohydrates. The proteids are converted into peptons; but whereas the gastric juice acts only in the presence of an acid, the pancreatic juice fails to convert the proteids into peptons when an acid is present. The substance which brings about the change in the pancreatic juice is called trypsin; a second ferment is that known as amylopsin, changing starch into sugar. A third ferment called steapsin acts on fats by emulsifying them, whilst a fourth ferment is known as rennin, this last curdling milk.

The pancreatic juice acts more powerfully on the carbo-hydrates than the saliva does, the starch being rapidly changed into maltose.

The intestinal juice is secreted by glands in the wall of the small intestine. Its action is not so rapid nor definite as that of the gastric or pancreatic juices. It acts, however, on the food substances, as does the pancreatic juice, and it also has the power of curdling milk. The bile, which is secreted by the liver and stored in the gall bladder, is conveyed into the duodenum by the common bile duct. The reaction of bile is alkaline. It has no digestive action on proteids. In addition to its slight emulsifying power, the bile acts as a stimulant to the bowel, increasing its peristaltic action; it also plays the part of an antiseptic. The contents of the intestine are transformed by the emulsifying action of the digestive fluids into a thick whitish fluid called chyle. This fluid is absorbed into the blood, partly by the capillaries in the walls of the intestines and partly by the lymphatic vessels of the bowel. The blood vessels are responsible for the absorption of the chief part of the peptones, the sugar and salts and a little of the fats, while the lacteals carry into the blood the principal part of the fats, with a small quantity of peptone.

HONOURABLE MENTION.

The following competitors receive honourable mention:—Miss J. G. Gilchrist, Miss E. M. Chapman, Miss H. M. Springbett, Miss A. McClure, Miss D. Vine, Miss A. Phipps, Miss D. Maton, Miss M. Tobin, Miss A. Ballard, Miss A. Phillips, Miss G. M. Rainey, Miss F. Sheppard, Miss E. M. Fenn, Miss G. Davies, Miss A. Wood, Miss M. Rowntree, Miss C. G. Cheatley, Miss M. E. H. Meadley.

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