

ceive an admixture of saliva. The saliva is a fluid arising from certain glands in and near the mouth, and approaching in character to the gastric juice afterwards to be described. Unless food be well broken down or masticated, and also well mixed up with the salivary fluid, it will be difficult of digestion. The stomach is then called upon to perform, besides its own proper function, that which properly belongs to the teeth and saliva, and it is thus overburdened often in a very serious manner. The pains of indigestion are the immediate consequence, and more remote injuries are likely to follow.

The importance of the saliva has been shown in a striking manner on several occasions when food was received into the stomach otherwise than through the mouth. A gentleman, who, in consequence of a stricture in the gullet, had his food introduced by an aperture into that tube, used to suffer severely from indigestion. It is recorded of a criminal, who, having cut his throat in prison without fatal consequences, required to get his food introduced by means of a tube inserted by the mouth, that every time he was fed there was an effusion of saliva to the amount of from six to eight ounces. We cannot suppose that a fluid of a peculiar character would have been prepared in such quantity, when water would serve as well merely to moisten the food, if it had not been designed to act an important part in the business of nutrition.

With regard to mastication, the evidence of its importance is still more decided. A few years ago, a young Canadian, named Alexis St. Martin, had a hole made by a shot into his stomach, which healed without becoming closed. It was therefore possible to observe the whole operations of the stomach with the eye. His medical attendant, Dr. Beaumont, by these means ascertained that when a piece of solid food was introduced, the gastric juices acted merely on its outside. It was only when the food was comminuted, or made small, that this fluid could fully perform its function. When the stomach finds itself totally unable to digest a solid piece of food, it either rejects it by vomiting, or passes it into the gut, where it produces an irritating effect, and is apt to occasion an attack of cholera or flatulency. It must therefore be concluded that a deliberate mastication of our food is conducive to health, and that fast eating is injurious, and sometimes even dangerous.

The food, having been properly masticated, is by the action of the tongue thrown into the gullet. It then descends into the stomach, not so much by its own gravity, as by its being urged along by the contractions and motions of the gullet itself. The stomach may be considered as an expansion of the gullet, and the chief part of the alimentary canal. It is, in fact, a membranous pouch or bag, very similar in shape to a bagpipe, having two openings, the one by which the food is admitted, the other that by which it is passed onward. It is into the greater curvature of the bag that the gullet enters; it is at its lesser that it opens into that adjoining portion of the canal into which the half-digested mass is next propelled.

When food has been introduced, the two orifices close, and that which we may term the second stage in the process of digestion commences. The mass, already saturated with saliva, and so broken down as to expose all its particles to the action of the gastric juice, is now submitted to the action of that fluid, which, during digestion, is freely secreted by the vessels of the stomach. The most remarkable quality of this juice is its solvent power, which is prodigious.

The food exposed to this dissolving agency is converted into a soft, gray, pulpy mass, called *chyme*, which, by the muscular contraction of the stomach, is urged on into the adjoining part of the alimentary canal, called the *duodenum*. This is generally completed in the space of from half an hour to two or three hours; the period varying according to the nature and volume of the food taken, and the degree of mastication and insalivation it has undergone.

In the duodenum, the chyme becomes intimately mixed and incorporated with the bile and pancreatic juices; also with a fluid secreted by the mucuous follicles of the intestine itself. The bile is a greenish, bitter and somewhat viscid fluid, secreted by the liver, which occupies a considerable space on the right side of the body immediately under the ribs. From this organ the bile, after a portion of it has passed up into the adjacent gall-bladder, descends through a small duct, about the size of a goose-quill, into the duodenum. The chyme, when mixed with these fluids, undergoes a change in its appearance: it assumes a yellow colour and bitter taste, owing to the predominance of the bile in the mass; but its character varies according to the nature of the food that has been taken. Fatty matters, tendons, cartilages, white of eggs, &c., are not so readily converted into chyme as fibrous or fleshy, cheesy, and gelatinous substances. The chyme, having undergone the changes adverted to, is urged by the peristaltic motion of the intestines onwards through the alimentary canal. This curious motion of the intestines is caused by the contraction of the muscular coat which enters into their structure, and one of the principal uses ascribed to the bile is that of stimulating them to this motion. If the peristaltic motion be diminished, owing to a deficiency of bile, then the progress of digestion is retarded, and the intestines become constipated. In such cases, calomel, the blue pill, and other medicines, are administered for the purpose of stimulating the liver to secrete the biliary fluid, that it may quicken, by its stimulating properties, the peristaltic action.

The preceding, however, is not the only use of the bile: it also assists in separating the nutritious from the non-nutritious portion of the alimentary mass, for the chyme now presents a mixture of a fluid termed *chyle*, which is in reality the nutritious portion eliminated from the food. The chyme thus mixed with chyle arrives in the small intestines; on the mass of which a series of exquisitely delicate vessels ramify in every direction. These vessels absorb or take up the chyle, leaving the rest of the mass to be ejected from the body. The chyle, thus taken up, is carried into little bodies or glands, where it is still further elaborated, acquiring additional nutritious properties; after which corresponding vessels, emerging from these glands, carry along the fluid to a comparatively large vessel, called the thoracic duct, which ascends in the abdomen along the side of the backbone, and pours it into that side of the heart to which the blood that has already circulated through the body returns. Here the chyle is intimately mixed with the blood, which fluid is now propelled into the lungs, where it undergoes, from being exposed to the action of the air we breathe, the changes necessary to render it again fit for circulation. It is in the lungs, therefore, that the process of digestion is completed; the blood has now acquired those nutritive properties from which it secretes the new particles of matter adapted to supply the waste of the different textures of the body.