

AN
INAUGURAL DISSERTATION

ON
Digestion

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Digestion.

The food, upon which most all animals live, is generally of a solid form, which should be brought to a fluid state before it can be inservient to nutrition, hence the necessity for a digestive process; or some place for dissolving these solid materials, that they may be useful in supporting the wants of the system.

Digestion is the process, by which the solid parts of our food are reduced to such a condition, that the nutritious materials can be separated from that, which is not nutritious.

The animal body requires

= food for four different purposes. First, for the original construction or building up of the organism.

Second, to supply the loss occasioned by the continual decay, even when in repose. Third, to compensate for the waste occasioned by active exercise of the nervous and muscular system. Fourth, to supply the materials for the heat-producing process, by which the temperature of the body is kept up. The amount of food required for these several purposes, varies according to the condition of the body, as regards

exercise or repose, external heat or cold, and the age of the individual, a larger quantity being demanded in youth in proportion to the size of the body, than in manhood. There can be no universal law laid down, as to the amount required. So much depending upon the condition, under which the individual may be placed. The first-step, towards digestion, is the prehension of the food. This is performed mainly by the hands, assisted by the lips and cheeks, as well as the anterior teeth and tongue. The second, is that of Mas=

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tication, which has for its object the comminution of those parts of the food which require it; that it may pass through the channel leading to the stomach without any difficulty.

As soon as the food enters the mouth, the salivary glands are excited to action, pouring their fluids into the cavity of the mouth, to soften, and mingle with the food. The saliva, it is said, is not only important in the process of mastication, but that it is of the greatest importance in digestion: and without a thorough intermingling of the aliment

and saliva, the digestive process is retarded, and the stomach imposed upon.

Mastication is one of the most important parts in this great work of reducing food for the nourishment of the body; for unless the food be well masticated and intermingled with saliva, when the stomach receives it, not being able to masticate and digest too, then there is a disturbance in the regular actions of this organ — the stomach. So digestion does not go on as it should in such cases.

The teeth perform the principal part in mastication, assisted by the masseter, temporal

and buccinator muscles. By the action of the lower teeth upon the upper the food is comminuted. This movement of the lower jaw, is produced by the action of the masseter and temporal muscles.

The tongue, and buccinator muscle keep the morsel of food in a continual movement, while in the mouth; so that a thorough insalivation can take place.

The number of Salivary Glands, that is, the principal ones, are three; the parotid, the submaxillary and sublingual; and there are other small glands situated in the mucous membrane of the mouth. Some believe that the fluid secreted by the

sublingual gland principally aids the act of deglutition, because of its nature, being thick and glutinous. And the properties of the other two have been spoken of on another page. Having been properly masticated, the food is prepared for a transmission, in successive portions, to the stomach, by the act of deglutition or swallowing. In this process there are three stages. In the first, the particles, of food, are formed into a bolus, then this glides between the surface of the tongue and the palatine arch, till it has passed the anterior arch of the fauces. This is a purely voluntary movement.

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In the second stage, it is carried below the constrictors of the pharynx. In the third, it is passed to the stomach through the oesophagus. These three actions follow each other with extreme rapidity. The second: During this stage of deglutition, the tongue, the muscles of the anterior and posterior half arches, the superior muscles of the soft palate, and the constrictors of the pharynx are all in action. In this stage, by the retraction of the tongue and elevation of the larynx, the epiglottis is pressed down over the rima glottidis, which is also closed during this process. The communication between the fauces and posterior nares, during

the act of deglutition, is cut-off by the muscles of the posterior palatine arch; which is of very great-importance: for were it not for these muscles, in attempting to swallow; instead of the food passing into the pharynx, it would fall back into the posterior nares, but-for the want-of these muscles to thrust-the bolus into the grasp of the pharynx.

In the third act, in which, the food passes ~~through~~ the oesophagus, every part of the tube, as it-receives the bolus and dilated by it; is stimulated by some means to contract.

The movements of the oesophagus are entirely involuntary. The next action, to which the food is subjected, is that of the stomach,

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which has for its object the conversion of the food into chyme. This organ is a kind of conoidal sack, composed of four coats, the external or peritoneal, muscular, cellular, and mucous; and is situated in the left hypochondriac and epigastric regions; containing a cavity within its walls, for the reception of the alimentary substance, with two openings; one for the entrance of the food, the other for the exit of the Chyme. The former is called the cardiac, the latter, pyloric.

When the stomach is empty, its walls are contracted or collapsed, seemingly to be perfectly quiescent. But on the introduction of food, immediately it is excited to action—awakened from its slum-

bers. Both openings are tightly closed. The mucous membrane becomes slightly turgid and reddened and its secretion aroused: but while it is empty, this membrane is somewhat pallid, and no secretion going on. During digestion the stomach secretes a peculiar fluid, known as the gastric juice; which acts chemically upon the alimentary substance.

The first action, that the morsel is exposed to, in the stomach is the successive movements of this organ, for the purpose of thoroughly intermingling its contents, as the food with the gastric secretion; and it seems to have another purpose in view, which is to bring the first digested

materials near the pyloric orifice, for it will admit them, to pass out, but will immediately close at the presence of the undigested particles.

The food is next exposed to the action of the gastric secretion which is the principal agent in converting it into chyme.

But to go further with the process of digestion; Chymification being completed, the chyme is transmitted to the intestinal canal through the pyloric orifice. From the stomach it is transmitted to the duodenum—a sort of second stomach. Here it is exposed to the influence of the bile, pancreatic fluid, and the secretions of the several glands, imbedded in the intestinal mucous membrane. The chyme, being acted upon by

These various secretions, undergoes further changes, which are for the purpose of more perfectly separating the nutritious material, from that, which is innutritious; preparing it for absorption.

The chyme, in its passage through the duodenum, comes in contact with the bile and pancreatic fluid. The ducts, for the conveyance of each of these, terminate in this part of the intestine. And it is only when digestion is going on, these fluids are poured into this canal, or especially the bile, because that which is secreted in the intervals of digestion, instead of being poured into the intestine, is deposited in the gall bladder

for the next process of digestion. This is sufficient evidence for the belief that the bile is a material agent in the process of digestion.

Having undergone these changes in the duodenum, by the action of the bile and pancreatic fluids, the chyme, in passing along the small intestines, is exposed to the action of the absorbent vessels. The vessels, that are concerned in this, are the lacteals, or the absorbents of the intestinal walls.

They are engaged almost exclusively, in the absorption of nutritious materials.

By imbibition the veins take up some portions of the digested food.

The lacteals commence in the

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villi of the mucous membrane of the intestinal tube, that is, that portion, which has these projections—the small intestines. Each villus contains a lacteal vessel, which is completely surrounded by a net work of small blood vessels.

The fluid, secreted by these chyliferous vessels, is called chyle, and they seem to have the power of selecting the constituents, of which, compose this fluid: the principal constituent being fatty matter. The chyliferous vessels convey the chyle to the receptaculum chyli, by passing through the mesenteric glands, thence into the thoracic duct, which empties its contents

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into the circulation at the point where the left internal jugular, and subclavian vein unite. The chyle undergoes several changes, during its conveyance to the point of its entrance into the circulation. First, near the intestine its principal constituent is fat. If the chyliferous vessels be examined between the mesenteric glands & thoracic duct, albumen will be the greatest constituent in the fluid which they contain. But if the chyle be examined in the thoracic duct, we find, of its constituents, fibrine to predominate, and is now distinctly coagulable, and has a slight rosy tint. These circumstances have given rise to the belief that the chyle, as it proceeds

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becomes more and more animalized. The contents of the alimentary canal become more consistent, and obtain more of the fecal character, as they pass down the intestinal tube; during which time there is also mixed with them the secretions of the various follicles, and glands of this tube. The movements, of the intestinal canal, are dependent upon the contraction of its muscular coat, and are directly excited by the contact, either of the fecal matter, or of the secretions poured into it. This movement is called the Peristaltic action of the bowels. That part, of the chyme which has been inadequate to nourishment - which the absorbents refuse to take

up, is passed off in the act of defecation per ani. The large intestines act as a reservoir and excretory canal for the faeces.

Andasthis excrementitious matter does not pass so rapid through them, as in the small intestines, it accumulates until a desire to expel it arises. The involuntary escape of the faeces is prevented by the action of the Sphincter ani muscle. The concurrence of voluntary muscles with the action of the intestines, is necessary to overcome the contraction of the Sphincter. The act is finally accomplished, principally by the contraction of the diaphragm and abdominal muscles upon a full and sustained inspiration; the glottis being closed, no air escapes.