The cases which led me to believe that, in certain instances, death begins in the gut from entire cessation of action in the intestinal muscular fibre, and that the cessation was due to fatty degeneration, I now briefly cite.

Several years ago, a lady so stout that she had long been confined to her room—the staircase of her house was also narrow and awkward—without any previous complaint, began to vomit. The vomiting, at first occasional, became incessant and fecal in character, and she sank in two or three days. I examined the body. The intestinal canal was from end to end enormously distended with gas; but there was nowhere any localised obstruction of any kind. The bowel was strikingly yellow in appearance; and the amount of fat, not only on the body, but within the abdomen, could only be described in words that would savour of caricature. After the most careful examination, no other appearances could be found to account for death.

Another case, which made a vivid impression on my mind, was that of an exceedingly stout man. He got out of doors a little in a specially made phaeton with a bottom so low that it just cleared the road, and was reached with one short step. Without injury or premonitory incident of any kind, symptoms of intestinal obstruction (sometimes urgent and sometimes with intervals of ease) set in, and in a few days he died. A very yellow distended bowel was seen; indeed, I remarked in this case, as I have in others, "The bowel seems a tube of fat". The distension was not uniform, but more in some coils than in others. There was, however, no band, or twist, or stricture, or cause of obstruction of any kind. I had not yet concluded that death might be caused by fatty failure of the gut. I was merely suspicious, and afraid that it might be so, or I should have called in the aid of the microscope.

In a case of strangulated hernia in a very stout man, the bowel was reduced easily and with marked gurgling, and for a few hours he seemed better; but vomiting returned, and he died. On examination, no inflammation, or gangrene, or apparently adequate cause for death, was found. The abdominal organs were greatly loaded with fat. The heart was somewhat softer than natural. The extreme yellowness of the bowel so struck me, and my reflections and fears had now taken so clear a shape, that I determined to have a microscopical examination of the muscular fibre of the bowel. This was carefully made for me by an experienced microscopist, Dr. Wood (one of our staff), and left no doubt of the marked fatty change in the suspected structure. Dr. Wood did not content himself with the appearance of the fatty intestine; he examined portions of healthy intestine, and found a striking contrast.

Not long ago, I had two cases of lithotomy, both of which ended fatally within twenty-four hours, after several hours of incessant vomiting. The cases were singularly alike, and a description of one will serve for both. A big fat "drinking" man of sixty had enlarged prostate and a large vesical calculus. There was no tangible evidence of renal or other visceral disease. There was no peculiarity in the operative steps to account for the result. I could not to-day alter any single step in the operation for the better. He was free from hæmorrhage or marked shock. His condition for a few hours was quite comfortable; then occasional vomiting set in, and tympany of the abdomen appeared. The vomiting became frequent and was associated with great exhaustion, and ended fatally. In a subsequent examination, a description of the appearances would answer for both bodies. The internal organs were loaded with fat; the heart was somewhat pale and soft; and the kidneys were not healthy. The intestinal canal was singularly and uniformly yellow, and everywhere enormously distended. There were no signs anywhere of inflammation, or peritoneal injury, or extravasation of blood, or infiltration of urine.

I believe the operation here destroyed the vitality, so far as contractility was concerned, of the bowel. Flatulent distension followed, and irretrievably spoiled the gut. This condition, affecting all or a large portion of the canal, and affecting it even to the vicinity of the stomach, was practically a condition of acute, high-up, and complete obstruction.

Here the question naturally arises, What are the customary explanations, now and heretofore, of the causes of death after continuous vomiting which follows the reduction of strangulated hernia, which follows also operations for uncomplicated herniæ, which follows lithotomy and other operations on the pelvis and abdomen. The very variety of the explanations testifies to their improbability. One says shock; another says shock with feeble heart; another says ether or chloroform vomiting; another says rapid septic poisoning; another says incipient peritonitis. I am far from saying that these, or some of them, are inadequate causes of death under certain circumstances; but they do not satisfactorily account for death in the cases I bring forward. In pure shock, with or without cardiac degeneration, vomiting is rare; in cases of, say crushed knee-joint, or amputation at the hip, or even in severe abdominal injury (in healthy persons), nervo-muscular action dwindles down

to death without vomiting. That ether or chloroform vomiting should recur after some hours of comfort is at least hypothetical; hypothetical also is rapid septic poisoning without rigor, or rise of temperature, or any other likeness to the known septic state. Peritonitis without the slightest sign of peritonitis is too metaphysical a pathology to grasp. In fatty change and consequent failure of the gut, we have an explanation which is based on clinical and microscopic observation, which clears up all difficulties, and which is consistent with known pathological laws.

A NEGLECTED PROXIMATE CAUSE OF DYSPEPSIA, WITH A NEW DIVISION OF THE DISEASE.*

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IN systematic works, dyspepsia is usually divided into two primary classes; namely, atonic dyspepsia, and dyspepsia caused by gastritis in its various degrees. These classes are then subdivided into many varieties, all of which may be traced to a single functional cause, namely, a defect in the reduction of food to chyme.

A person becomes conscious of stomach-disorder in its mildest form, by a feeling of uneasiness at the epigastrium, and this may or may not be succeeded by a sense of distention from flatulence. In severer cases, various other sensations, pain included, are experienced in the gastric region.

The instant a morsel reaches the healthy stomach, it is subjected to an unfeet process, by which its bulk is gradually diminished. Food is thus entirely reduced to a fluid state within a period which is found to vary somewhat when individuals are compared. But if the time of reduction natural to each be prolonged, more or less gastric uneasiness will be experienced. The inference is plain, that the energy of the nerves, upon which the stomach depends for the exercise of its functions, is excited by the ingesta, and that the organ can perform its task without sensation only within certain limits of time. If these limits be exceeded, dyspepsia will be produced.

A defect in the gastric juice may be one either of quantity or of quality; yet it sometimes happens, in severe cases of dyspepsia, when the opportunity of *post mortem* examination is afforded, that the cause is sought for in vain. There is no gastritis; the secreting follicles, and, in a word, the stomach, are apparently normal. There is, in fact, a large class of cases in which digestible food, even in moderate quantities, is not digested with ease. In many such cases, notwithstanding much daily discomfort, the general health is hardly affected. The food, although digested slowly, is digested effectually; there is no loss of flesh or of strength. The appetite is unimpaired, and the patient feels that, if he had not to eat, he would be well. The defect in such instances does not lie in the gastric juice. If it did so lie, nutrition would suffer; wasting and debility would ensue.

Experiment and observation show that a disproportion may exist between food and the quantity of gastric juice necessary to dissolve it; and it is certain, also, that this fluid is sometimes defective in solvent qualities. The form of dyspepsia which ensues in either case is of a severer type than that first considered. In most cases, there are gastric pain and anorexia, with failure of flesh and strength.

In by far the larger number of dyspeptic cases, the lesion is not one of secretion, but of the proper movements of the stomach.

The solution of any soluble substance in a liquid is greatly aided by motion. Put some crystals of sulphate of magnesia, or any similar salt, into a glass of water, and the same quantity of the salt into another glass containing the same amount of water. Let one glass remain at rest, while the other glass is gently rotated. The difference in time required for complete solution in the two cases will be very remarkable. This is clearly due to solution and removal by the water of successive layers of the salt in the glass that has been rotated.

In making experiments on artificial digestion, it is necessary to imitate the movements of the stomach. For this purpose, I have had glass cylinders made, the interiors of which are corrugated. The effect of this is that when, by means of clockwork, the cylinders are rotated, their contents are slowly shifted. (Cylinder shown.) By this means, reduction of nitrogenous substances with pepsin is much sooner accomplished, than if the experiment be conducted in bottles allowed to remain at rest, or only occasionally shaken.

The powerful muscles which compose the gizzard in birds, by the action of which hard substances are mechanically prepared for solution,

* Read before the Medical Society of London.

are but feebly represented by the muscular layers of the human stomach. But it is by the action of its muscles that attrition, which has been shown to hasten so remarkably the solution of substances soluble in water, proportionately hastens reduction of the morsels of food.

The whole intestinal tube is provided with muscular fibres, by which its proper motions are accomplished. In the intestines, there are two layers, a longitudinal and a circular layer, which cross each other at right angles. But, in the stomach, there are three planes of fibres, and their arrangement is different. The external or longitudinal layer is continuous with the same structure of the oesophagus, and radiates over the cardiac end of the stomach. The fibres of this layer are most numerous on the lesser curvature. Other longitudinal fibres seem to have an independent origin in the middle of the stomach, and these converge in the direction of the pylorus. Beneath, and in contact with the longitudinal, is the thicker circular layer. It increases in substance from the cardiac to the pyloric end, and at the latter is developed into a valve-like structure. Between the circular layer and the mucous membrane, lies the oblique layer. The fibres of this layer pass obliquely from the cardia in such a way that, by their decussation from opposite sides of the stomach, its middle and greater extremity are embraced. By this arrangement of fibres, a very efficient apparatus for performing various movements is provided. These movements are well known, and have even been witnessed in the human subject. But the vast importance of their impairment, as a factor in causing dyspepsia, has been neglected. Dr. Beaumont has graphically described what he saw of these movements in the well-known case of St. Martin. He says that, as soon as a morsel of food dropped into the stomach, it commenced a series of revolutions from right to left, that is to say, round the greater curvature to the pylorus, and thence by the lesser curvature to the point of departure to commence a fresh revolution. The entire circuit was made in from one to three minutes; the morsels soon began to lose in substance, and, as reduction proceeded, the movements became quicker.

If this systematic agitation of the contents of the stomach be kept clearly before the mind, its importance to digestion will be realised. The solution of a salt at rest in water, is, as we have seen, comparatively very slow; and if the surface of the morsels of food be not duly agitated, so that the gastric juice may come into contact with fresh surfaces as solution proceeds, the formation of chyme will be greatly impeded.

Here we see the correlation of the functional disturbances of gastric digestion; for such an arrest of solution would be the same in effect as if the solvent fluid were defective either in quality or in quantity. But, as already said, the symptoms caused by impaired movements are less acute than those caused by imperfect secretion. In the one case, extension of time is often only required for the completion of digestion; while in the other, the absolute defect in solution implies a higher degree of gastric suffering. Notwithstanding his unequalled opportunities for seeing the stomach in action, Dr. Beaumont did not grasp the idea that a failure of the gastric movements must be a cause of dyspepsia. The reason of this was, perhaps, that St. Martin's stomach, owing to the fistulous opening, was never distended by gas; and, as we shall presently see, flatulence is the most prominent symptom of the condition under consideration.

In ordinary cases, whenever the contractile movements of the stomach are considerably lessened, flatulent distension soon follows. There are two reasons for this; first, the food lies passive, or nearly so, in the lowest parts of the stomach, where it is so slowly reduced that common fermentation takes place; second, the relaxed organ fills with the gases evolved, and also probably with gases regurgitated from the small intestine. It will now be easily understood why, in this form of dyspepsia, flatulence is a leading symptom, and also why it becomes a valuable aid in diagnosis.

The predominance of particular symptoms in cases of dyspepsia forms a practical mode of dividing the disease. Out of 460 cases of which I have preserved notes, in which this division was adopted, flatulence was found to be the leading feature in 179 cases, against 281 in which other symptoms were more prominent. In many of the latter, flatulence, although present, was regarded by the patient as less urgent than some other symptom, such as pain or acidity, etc.; but the flatulent class was found to be by far most numerous.

A great evil arising from flatulence is, that frequent distention of the stomach, by stretching its muscular fibres, impairs their tonicity more and more. The evil is thus propagated in a circle, because, while relaxation in the first instance is the cause of flatulence, this, in its turn, becomes a cause of relaxation.

In obstruction of the pyloric orifice, we sometimes see gastric distension reach its extreme limits, owing to retention of the ingesta and the consequent evolution of gas. In such cases, the stomach is virtually

paralysed, and vomiting is effected, not by its proper muscles, but by means of the abdominal muscles. The gastric contents gush from the mouth with little apparent effort. The well-known experiment of Magendie, in which a dog was caused to vomit after the stomach had been replaced by a bladder, proved that vomiting may be effected independently of the proper gastric muscles.

More rarely, cases of extreme gastric dilatation without pyloric obstruction occur. Some of these are instances of true paralysis of the stomach from lesions of the nervous centres. Dr. Habershon has pointed out that extreme dilatation of the stomach may be due to inflammation affecting its muscular coat.

The origin and connections of the pneumogastric nerves with the cerebro-spinal centres, as well as with the solar plexus, afford a key to a great number of results. They show how it is that purely mental impressions, such as are caused by bad news or fright, or impressions of the special senses, such as from disagreeable sights or smells, may disturb digestion, or even cause vomiting. In all such instances, the sudden formation of flatus, by which the antecedent occurrence of gastric relaxation may be surely inferred, is the most constant symptom.

There is no need to discuss here the difficult question of the sudden production of flatulence in these and other cases, or what gases compose it. The sequence of facts is alone necessary for the argument. One point only, on account of its bearings on the contractile state of the stomach, claims attention. A plausible explanation of the sudden development of gastric flatus was given by the late Dr. Brinton, as follows. He asserted that the gases of the stomach were at times subjected to so much pressure, that their volume was much diminished, and that sudden relaxation of the stomach, by removing pressure, allowed expansion of these gases, by which an immediate distention of the organ was produced. I have disproved this supposition by experimentally showing that no such pressure can ever exist in the stomach, by the removal of which such expansion of gases could take place.

Extreme dilatation of the stomach implies that its peristaltic movements are in abeyance. Soft and semi-liquid food can alone be taken, and this is either rejected in part daily, or at longer intervals, when the accumulated mass has fermented; and then, in addition to the common yeast-plant, *sarcinae ventriculi* are developed. But, since paresis of the gastric muscles exists in every degree, so must impairment of the gastric movements exist in the same degree.

[To be concluded.]

MEDICINE IN PERSIA.

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[Communicated by Dr. HORACE DOBELL.]

THE system of medicine in vogue in Persia is a pure empiricism. Diseases and remedies are divided into two classes, *hot* and *cold*; a hot disorder being treated by the administration of cold remedies, and *vice versa*.

Diagnosis is not attempted; and if the ailment do not give way under the one class of drugs, the native practitioner simply tries the other. When the patient has obtained his prescription, he, after repeating a prayer, opens his Koran haphazard; and looking at the first passage to his right, or at some other part of the page that is previously decided on, he determines whether he shall act on it or not. Should the omen prove favourable, he swallows the dose, however large (a quart is a common quantity) or nauseous, in perfect faith, having previously fixed on a fortunate hour. This important point is settled by the astrologer, who is much consulted in this country, no important affair being undertaken without his advice, or commenced save at the particular moment that he may choose as fortunate. Prior to calling in the medical attendant, a list of the principal practitioners is gone through, and each one is tried with an omen as described, from the Koran, till he whose name coincides with some especially lucky verse is selected.

Charms written by dervishes (wanderers vowed to a mendicant life), and either the writing washed off into water and swallowed, or the whole taken as a pill, or some form of prayer or incantation, are common; also propitiatory sacrifices, and, in case of the rich, money given to the poor, or to holy men. If the disorder prove obstinate, the bystanders each prescribe a remedy more or less ludicrous; and, save in the case of the very rich, or until the patient is *in extremis*, the European practitioner is seldom called in.

Purgings, principally by means of calomel, is the almost universal commencement of treatment; for the Persian, like the sailor, thinks little of medicine unless it be heroic. This is followed by bleeding to at