

JOHNSTON (W. W.) *al*

ON THE NATURE AND TREATMENT OF FORMS
OF DISEASE CHARACTERIZED BY INDIGES-
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AND URIC ACID IN THE URINE, AND
BY NERVOUS SYMPTOMS.

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THERE is a group of cases often met with in practice that has a great interest for us, on account of the large number of the associated symptoms, the obscurity of their origin, the differences of opinion as to their nature, and the difficulties encountered in their treatment.

The patients included in the group to which I refer give us histories that are more or less alike in their essential features, although the complaint for which relief is sought may be very different in different cases. It may be that distress after taking food, or obstinate constipation, or loss of flesh and color are the reasons for their applying for treatment; or any one of a very large number of symptoms of functional disorder of the nervous system

¹ Monthly essay read before the Medical Society of the District of Columbia on November 25, 1891.



may have excited their apprehension of the existence of some serious organic disease. These symptoms range all the way from simple headache or vertigo to absolute inability to perform any mental work. The history of the case is generally something like this:¹

The disorder began many years ago. The patient's life has probably been a sedentary one, or one filled with great care and anxiety; his hours of eating and sleeping have been irregular, and all the influences have been excited that are likely to disturb the working of many parts of this delicately adjusted piece of vital machinery, which was not made to run forever without friction or break, if no attention whatever is paid to the conditions necessary to its perfect working. Among the earlier symptoms were a loss of appetite, a coated tongue, distress after eating, and constipation. These have continued and exist at the present time. The distress after eating includes a sense of fulness or weight in the abdomen, which may begin almost immediately after taking food, but is more marked in from one to two hours, and is accompanied by borborygmi and flatulent distention. The patient is depressed in spirits concerning his health and his inability to work with his former energy and interest. Mental depression may be the most marked symptom presented to us. There is frequently insomnia, but more frequently drowsiness, and a

¹ All cases are excluded here that at any period in their history show any decided alteration in any organ, as dilatation of the stomach, cirrhosis of the liver, degeneration or other changes in the kidney, etc.

sense of weakness and lassitude or inertia after a meal, and, as a rule, after the midday meal.

There are many other ways in which the nervous system may be implicated. Irritability of temper, hypochondriasis or melancholia, hyperesthesia, paresthesia, or anesthesia may all be seen; pruritus is not uncommon, and there may be urticaria. The other special senses may show some slight disturbances. Suddenly developed symptoms appear, as vertigo, which is sometimes only noticed on turning the head to look behind, or on stooping and rising, and there may be palpitation of the heart and dyspnea.

If the urine is examined it is rarely normal. I have before me now the report of the urinary examination of a patient who had suffered for years with the most obstinate constipation, with other symptoms like those mentioned. The color was amber, the specific gravity 1020, the reaction acid. The urates were in excess; there was no sugar, and no albumin, but there was a large quantity of bile. On microscopic examination there were found many uric acid crystals and amorphous urates. The skin of these patients is almost always pale; the proverbial muddiness may be present.

This brief description will give as good an idea of what is usually found as if I were to give the record of cases, but the following brief histories will perhaps illustrate the association of symptoms most usually found. The first of these is in the words of the patient, who wrote it at my request, and if his description may be thought to include exaggerations or perversions of statement, these

exaggerations or perversions of subjective symptoms must be taken as symptoms showing the mental state that is more or less characteristic :

CASE I.—“ My age is twenty-five ; my occupation is that of a stenographer and typewriter. I have done much mental work ; I have not used liquor. My diet has consisted of condiments, much meat, potatoes, fats, sugar. I have always eaten everything hurriedly, and improperly masticated ; I drink much water. I have taken very little exercise. My previous health was good until I was nineteen or twenty years old ; then emissions (nocturnal) began—from one or two per week to one in two weeks. There was the gradual development of acne. I was also drowsy in the evening, and unable to keep awake. In November, 1889, I began active stenography and typewriting, and study at night. The acne increased. There was bad digestion, coated tongue continually, thirst after supper, heavy stomach, and great appetite. I always got sleepy about 10 or 11 o'clock in the morning when at work ; sometimes, about 2 or 3 o'clock in the afternoon. I also had nasal catarrh. Sometimes I felt well, and at others ill ; I was always very sleepy from one to two hours after eating. Nose red and shiny. During the forenoon, while typewriting, my head felt as if it were too full, and I had a sensation of heat about the scrotum and anus.

“ Milk and food containing much sugar caused greatest heat and sweating of scrotum. My hands and feet were cold at times, but not moist. I was also more or less constipated. Nocturnal emissions continued ; memory became poor. This condition was the same until 1890, when I began to have a feeling of a band around the top of my head after work, and heat of back of neck, oppression in back

of head, with occasional headache; drowsiness continued.

“At present (November 22d) I suffer most from bad feelings about my head, from a sense of oppression and drowsiness after eating. My complexion is muddy, and the acne continues, but is not so bad. My hands and feet are cold and clammy on taking exercise. I have a feeling of constriction at the pit of the stomach, and I have also a feeling of pulsation there. I wake up every morning about 4 o'clock.

“In May last, after one month's rest, I felt much better, and have not suffered so much since; I was at that time, and have been since, on light diet, avoiding much beef, all fats, and indigestible food. The emissions have almost stopped. I still have weakness in the knees, and am not inclined to make any effort, mental or physical. The bowels are constipated, the movements small and hard.”

CASE II.—Mrs. X. in her early life had been in perfectly good health, but at the age of twenty-five found that she was growing very stout, and devoted herself for some years to persistent dieting to reduce her weight. Her plan consisted of eating almost nothing—one chop and a piece of bread in the day, and some indulgence, as ice-cream, at night. She walked many miles daily, and, in time, had the satisfaction of reducing her weight by many pounds. After this she suffered from a severe nervous shock, and for some years she was much depressed in spirits, and travelled about from place to place. She had always been more or less constipated, but there was a gradual aggravation of this condition, and, at the time of which I speak, the bowels were not moved except by purgatives.

During the winter of 1889-90 her nervous system was extremely irritable; she suffered from

the most obstinate urticaria, which, from this time until I saw her first in the winter of 1890-91, continued to be her most troublesome symptom. The slightest pressure of her collar or clothing at any point would produce an immediate outbreak of the rash; at no hour of the day or night was she entirely free from it, and life was, in consequence, a burden. For a short time I tried to benefit the urticaria by using the galvanic current, applying one electrode to the base of the brain and spine, and the other to the periphery, but no good resulted from this; on the contrary, the electricity always provoked an outbreak of the rash.

From the abuses to which her digestive organs had been subjected, her digestion was more or less disturbed, the appetite was capricious, and she suffered after eating. Headaches were also of frequent occurrence, and were connected with constipation and unusual indigestion. There was no loss of flesh and no anemia, but her complexion was never clear, the skin having a yellowish, muddy look. I have three separate analyses of her urine before me as I write. The specific gravity was in the first 1031, in the next 1020, and in the most recent 1014. Urates were in excess in all, and in all but the last uric acid crystals were numerous. Bile was present in varying quantity in the first two, absent in the last. There was no albumin and no sugar.

The treatment was chiefly dietetic; beef, mutton, eggs, ham, etc., being forbidden, and chicken, fish, and oysters advised. Vegetables with excess of starch, and all indigestible foods were excluded; she was advised to masticate her food well. A purgative was given regularly every other night, and pepsin and pancreatin were prescribed after food.

Under this treatment the digestion improved, and she had fewer headaches; the bile disappeared from

the urine, and the urticaria lessened, but constipation continued. After a summer's stay in an elevated region, where she lived out in the open air nearly all of the time, she returned to the city. She now has urticaria occasionally only, the bowels are frequently moved spontaneously, and her nervous symptoms are less marked. The diet is still continued.

CASE III.—Mr. F., forty-eight years of age, was a chronic dyspeptic for years as the result of overwork and over-eating. Being rich, he abandoned business, and lived abroad under treatment for some years, and returned to this country five years ago. When he came under my care he was better, but was compelled to live strictly according to rule, to avoid subacute attacks of gastro-intestinal indigestion. He had all the appearances of an intestinal dyspeptic—bad complexion, anemic skin, with flabby muscles and reduced weight; tongue always coated and bowels irregular. He was nervous, irritable, and disposed to hypochondriasis. The urine, on repeated examinations, was found to have a high specific gravity, contained urates in excess, uric acid crystals and bile in considerable quantity. He finds relief only by strict diet, and as the temptation to imprudence is very great in his life, he has numerous occasions for practising self-control. In this way he is usually comparatively well.

CASE IV.—Mr. S. is an overworked professional man, having had a continued strain on his nervous strength for years. His hours of eating have been very irregular, and he has eaten heartily of nitrogenous foods, using stimulants in moderation. For ten years he has been gaining in flesh and now weighs much more than a man of his size should weigh. Several years ago he consulted me; his urine con-

tained lithates in excess and had a high density. I advised diet and lessened work and called his case "lithemia." He has not followed my advice strictly, and has just been passing through an attack of "lithemic fever," suffering from epigastric and costal pains, loss of appetite, gaseous distention of the abdomen, and constipation. The urine has been loaded with urates, has contained some bile, uric acid crystals, a few fatty casts, and 4 per cent. of albumin. For years his nervous system has been irritable in the highest degree, and he has had a restless, unnatural energy which has been a part of his excess of work.

CASE V.—Mr. C. was a business-man, engaged in work of great anxiety and responsibility. He suffered a great shock in the death of an only son, and after travelling for some months, returned home and devoted himself with renewed and excessive energy to his work. He had always had periodic "bilious attacks" with vomiting, headache, and constipation, but, after the shock referred to, these attacks became more severe and more frequent. His strength began to fail, and finally he was compelled to give up business, and he came to Washington for rest and diversion. I was consulted by him on account of general, obscure bad feelings. I found him thus—nervous, restless, hypochondriacal, complaining of indigestion and constipation. The urine, examined on several occasions, always contained urates and uric acid in excess, bile in quantity, and had a high density. The slightest illness of any sort caused great prostration (subjective) and compelled him to remain in bed for some days, from inability to take enough food to cause a rapid return of strength. Constipation was always marked at these times. Under the effect of a restricted diet, out-of-door life, and

rest from work, he gained strength and appetite, the digestion improved, and the condition of the urine changed for the better. But the susceptibility of the nervous system and the digestive system to disturbances from slight causes continues up to the present time.

CASE VI.—Mrs. G., aged fifty-eight years, was always a strong and healthy woman, with the exception of occasional subacute rheumatic attacks, involving the muscles chiefly. For this she has gone every summer to the Warm Springs of Virginia and has returned home improved. In June last she had an attack of subacute gastro-intestinal catarrh, which confined her to her room for a week. The urine then had a density of 1030, contained an excess of urates and uric acid, a large quantity of bile, and a trace of albumin. During the summer, under a strict diet and aids to digestion, she was able to eat more, but she continued to lose flesh, remained anemic, and was constipated, nervous, and depressed.

In September the urine was almost normal, containing only a trace of bile and her general symptoms were better, but she had gained no flesh and was still anemic. At the present time the urine contains bile, but is otherwise normal. She feels stronger, better, has a good appetite and better color, but has, as yet, gained no flesh. The nervous system has never been much disturbed. She has been depressed about her condition, but that is all.

These cases, and others like them, may be divided into two classes, both having associated digestional and nervous symptoms, but in one the nervous, and in the other the gastro-intestinal and hepatic disorder is more prominent. It is not difficult to

recognize the symptoms and to associate them with the organs with which they are connected. In a general way we know that digestion and nutrition are out of order, that the secretion of urine is abnormal, and that the nervous system is deranged, but it is not so easy to give a *name* to the affection or to decide as to the seat of the primary disorder.

What is the nature of the affection? Is it to be found described in text-books? I think in this case, as in many others, we will find that everyday experience with disease does not always conform to the clear-cut teachings of the text-book, and that we cannot always label our cases as satisfactorily as we would like. In other words, human beings have a way of being ill through and through sometimes; they associate their symptoms in such a complex way, that we are not able to call their maladies by any one name or even by any compound name. In cases such as those described, no one name can be given to the condition which might not be replaced by some other name equally applicable. Personal bias will lead to a varied choice of terms; functional disease of the liver, intestinal indigestion, catarrh of the small intestine, colon catarrh, constipation, neurasthenia, lithemia, chronic dyspepsia, atonic dyspepsia, anemia, and hypochondriasis are names used with more or less claim to correctness. Each is correct in so far as it points to some striking feature, but it does not explain or express its relationship to other associated symptoms. The problem is to find out what is the *pathologic basis upon which the symptoms rest* and what is the sequence of events in their history.

Two theories can be suggested, between which it is difficult to choose, since both offer a rational explanation of the mode of origin and symptoms, the one placing the initial disturbance in the digestive system, the other in the nervous system. According to the first, the earliest etiologic influence was in the patient's irregular habits of eating, his hurried meals and imperfect mastication; these made gastric digestion less perfect, and the acid mass passing through the pylorus was in a less perfectly digested state than it should have been.

Incompleted gastric digestion always involves fermentation; hence the duodenum is made to receive, in place of the soft, acid chyme, a mass containing much unaltered or partly altered nitrogenous matter, along with starches and fats, the whole in a state of fermentation, and bacterial multiplication. The task thus imposed upon the intestine is beyond its power to perform; its own work and the stomach's unfinished work must be done, and decomposition must be stopped. Up to a certain point the pancreatic and intestinal juices and the antiseptic bile are able to meet the demand, but sooner or later the time comes when the digestion of fats, starches, and albuminoid matters in the intestines is delayed or incomplete; decomposition must follow, with resulting formation of organic alkaloids. The liver function is deranged, for bile and urates in excess appear in the urine. These conditions are sufficient to explain many of the symptoms, such as distress, flatulent distention, and borborygmi beginning from one to two hours after eating, constipation and the loss of weight and

of strength, because absorption and nutrition must suffer along with digestion.

There yet remains one important feature of these cases to be included in this explanation, namely, the disturbances in the nervous system.

It is well known that microorganisms exist in great numbers in the normal intestine; they are derived from food or water. Their multiplication is attended by the decomposition in the intestine and by the development of toxic products which, in health, do no harm, as they are eliminated in the stools and the urine, or are all destroyed in the liver (Bouchard). The putrefactive processes that develop toxic substances are quite distinct from the digestive processes caused by the action of the ferments of the gastric and intestinal juices.

So soon as the peptones pass from the stomach into the intestines they undergo changes that result in the development of ptomaines and leucomaines. Gastric juice outside of the body brought in contact with fibrin and then subjected to the action of amylic and butylic alcohol, produces an amorphous alkaloid that kills frogs in doses of from five to ten centigrams, and hares in the dose of one gram.

Indol may be taken as a type of a poisonous alkaloid formed by putrefaction, and constantly found in the intestine. It is formed by the decomposition of tyrosin, which is produced by the action of the trypsin of the pancreatic secretion on peptone. Thus the intimate result of normal digestion is fermentative decomposition, with the development of a poison. Phenol and skatol are also due to intestinal putrefaction, and stercorin and excretin result

from bile decomposition. In health, as I said, poisons are eliminated before they can do harm, but if any changes occur that delay digestive activity, fermentative processes are increased and the intestine becomes filled with a greatly increased number of microorganisms and a correspondingly greater amount of toxic material. Under these circumstances elimination does not free the intestines sufficiently, absorption takes place, and the system becomes infected by the alkaloids of decomposition. Constipation, by delaying the chief means of escape, undoubtedly favors decomposition and absorption, and is a potent factor in disease.

Brunton has shown that the liver stands at the gateway, receives these absorbed poisons into its substance, destroys some of them (as nicotine), removes others from the blood in the manufacture of bile, and forces them back with the bile into the intestinal canal. Here, if they are not expelled, they are reabsorbed, to pass again into the blood through the liver, and to reënter the intestines, and thus the round is continued without the entrance of the poison into the general circulation. If this last should occur, from excess of poison-production or from the failure of the liver to perform its work, general infection would result. Ludwig and Schmidt-Mulheim have found that the blood ceases to coagulate and the circulation is greatly depressed by injecting peptones directly into the general circulation.

Now the point to which I wish to bring these remarks just made is that, given this intestinal decomposition and absorption of toxins, there is a rea-

sonable probability that the resulting infection of the organisms will lead to reactions everywhere, but particularly in the nervous system, and that the hypochondriasis, mental inertia, irritability, and unrest that characterize these cases are the direct results of this infection.

Acute indigestion is sometimes attended with alarming symptoms, resembling those of acute poisoning. The faintness, intermittent pulse, and languor, of which, after eating, dyspeptics complain, may all be due to the action of these poisons on the nerve-centers. Few men have not suffered at some time in their lives from that loss of energy and drowsiness that follow their hurried meals, and we have all many times seen this symptom occur in connection with well-defined intestinal indigestion. The ordinary explanation of mechanical distention and local pressure will not explain these symptoms. The fact that they follow a small meal as well as a large one, and that they entirely disappear when the digestion improves, is a sufficient proof of their dependence upon fermentative indigestion in the intestines. Headache, giddiness, sleeplessness, sudden loss of consciousness, convulsions in children, have always been thought to be reflex in nature when accompanying indigestion; but it seems in the light of our present knowledge, that they are much more probably due to the presence in the blood of absorbed and non-eliminated poisons that immediately affect the nerve-centers. These symptoms resemble very much the effects of well-known poisons, as curare, for example, and from the suddenness of their onset and quick relief, their relationship to

the time of eating, and absence at other times, it seems as if during digestion poisons were sometimes generated in overwhelming doses.

In lithemia there is a close association of nervous symptoms with the presence of urates in the urine. Mental depression can be expected if the urate deposit is large, while with a clear and abundant urine the mind is bright and hopeful. While we do not know what is the precise cause of this excess, we do know that it is always aggravated by an excess of nitrogenous food, the result of overtaxing an enfeebled duodenal digestion.

It is thought that the liver is more closely connected with the formation of urea than any other organ, and that disturbed function in this organ will lead to excess of uric acid and urates in the blood; and it may be that it is this same disturbed hepatic function that prevents the destruction of absorbed intestinal poisons. There is certainly a very close relationship between nervous symptoms in the cases described, and the excess of bile, urates, and uric acid in the urine.¹

A recent writer² attributes some cases of insanity to absorption of toxic agents developed in the course

¹ In the latest communication on the subject of urea-formation by the liver, the authors do not dispute the idea that the liver produces urea or that there is more urea in the hepatic than in the portal vein; but they do not believe that the liver is the sole or the principal urea-producing organ. They admit that in states of excitation or hyperemia of the liver the production of urea is exaggerated, but think the urea may arise in a process of disassimilation of all the tissues of the body.—*Boston Medical and Surgical Journal*.

² Ayres: *THE MEDICAL NEWS*, July 4, 1891, p. 1.

of gastro-intestinal and hepatic disorders, especially gastro-intestinal catarrh. He refers to his asylum experience as showing that he has averted an impending aggravation of symptoms in mild cases of insanity by a brisk mercurial, followed by a few doses of compound jalap powder, and he refers to a suggestive case reported by Willoughby,¹ "in which acute maniacal symptoms, occurring in a man about fifty years of age, were promptly controlled and his reason restored within twelve hours by copious diaphoresis from a hypodermatic injection of pilocarpine." It was assumed that the elimination of a poison by sweating averted danger.

The question of the continuous production of toxic substances in the intestinal canal in health, and the protection of the organism by physiologic elimination, as well as the auto-intoxication of the organism by the absorption of poisons in alterations of the functions of the gastro-intestinal tract, was developed in detail by Professors Albertoni and Silvia at the meeting of the fourth Italian Congress of Internal Medicine held in Rome. Prof. Silvia enumerates the following substances as probable poisons: peptoxine, organic bases (ptomaines and leucomaines), indol, phenol, lactic acid, ammonia, sulphuretted hydrogen, acetone, etc.

The direct proof of the fact that the nervous phenomena in such cases are due to the absorption of toxic matters from the intestine is not yet found, but the argument in favor of the theory is a forcible one. The existence of indigestion is known by the symptoms; the presence of toxic matters in the in-

¹ London Lancet, No. 21, vol. i, 1889, p. 1030.

testines in health is proved; fermentation and decomposition constitute the source of this class of substances, and the greater the decomposition (as in indigestion), the greater is their number and amount. In disease, this excess is shown by finding in the urine sulphuric acid, phenol, indican (resulting from transformation of indol), acetone, ammonia, diamine, the alkaloids, and peptones. The relationship of acute indigestion and nervous disturbances, and the association of fermentative dyspepsia with nervous symptoms and an excess of these products in the urine and feces, give sufficient grounds for adopting this theory as reasonable.

The second theory, which is a plausible one, is that the original cause is in a fatigued or overstrained nervous system; that a disordered nervous apparatus does not regulate the functions of the body, and that through the disturbed vasomotor and sympathetic functions the digestive secretions are deficient or altered in quality; hence result indigestion, intestinal catarrh, and all the symptoms of innutrition.

It is primarily, then, according to this view, a neurasthenia—that is, there is an atonic, enfeebled nervous system that does not control and coördinate the functions under its control; with this starting-point we can predict any functional derangement anywhere. The many symptoms connected with the nervous system, their very early development and prominence, go far to support this view, and it is this explanation that is most frequently accepted in these cases. But the difference between the two theories is more apparent than real, and both may

be true. I can understand how at one time the overstrained nervous system is the more readily disturbed by the toxic influence, due to indigestion, which exhaustion of the nervous system has helped to bring about, and, again, how nervous symptoms may be due to general infection by absorbed poisons alone; or it may be that there is a double origin, and that the total is not complete until the digestion and nerve-supply and associated functions are involved.

In the present state of our knowledge, I do not see how any more definite view can be reached. We have advanced to the point of understanding the danger of indigestion and constipation, the existence and probable absorption of toxic matters in the intestine, the close connection of the liver with these conditions and with the urinary changes, and from this knowledge we gain important indications as to treatment; but beyond this it does not seem possible to go at the present time.

TREATMENT.—No treatment can be successful in cases like these which does not result from a survey of the whole field of disorder. It is a case in which comprehensiveness of vision rather than minuteness of observation is necessary—the sort of visual power that comes from a knowledge of the physiology of all the functions and their individual and combined variations.

Exactly the opposite mental state is developed in specialism, as seems to me needed for studying and treating these cases. Here the organ studied—larynx, eye, uterus, or nerve-center—is made the starting-point of observation and comparison,

and all associated phenomena revolve round a central axis, but the interdependence of organs and functions, and the relative influence of each in bringing about the result, is not easily grasped by any one person, but still less by the too special student.

In this case, whatever may be the starting-point, whichever is the pathogenic theory most worthy of adoption, the plan of treatment involves a restoration of the altered functions of the digestive and nervous systems to their normal state by improved blood-supply, and a higher and better nutrition of all the tissues.

Digestion is not perfect from defective and deficient secretion of digestive juices that are insufficient and defective from altered blood-supply. Again, the blood is altered in quantity and quality from imperfect digestion, intestinal decomposition, and deficient or altered blood pabulum. In this vicious circle it makes no difference where the coil begins. "All roads lead to Rome," and treatment must travel simultaneously over all roads and by-paths toward cure. A combined and harmonious plan directed to attaining the one object—cure—is almost sure in the end to be successful, while any method that, while benefiting one organ and function, overlooks the condition of other correlated disturbances, is unwise and useless. The patient's confidence must first be won, and a close relation must be established between him and his physician. Next, the surroundings must be made as congenial as possible, and anything that can make him hopeful and happy must be supplied.

The prophylactic treatment, of course, includes the avoidance of all causes that overstrain or disturb the functions of digestion and the nervous system. I need not detail in what way the brain and nerves should be kept in the highest state of efficiency by avoiding overwork, and by being spared over-anxiety and worry, and by diversity and diversion in travel. These rules are clear enough; the only difficulty is in carrying them out.

In regard to diet, the lesson must be taught that "what is one man's meat is another man's poison," and that a well man should be fed according to his needs and capacity. Although science is employed in the feeding of other animals, and the law is recognized that for the thoroughbred, the hackney, and the draught-horse the diet should be different, in order to develop and retain the highest capacities of each in speed, endurance, and strength, yet in the case of man, except in athletic training, no law is taught or obeyed. The judge, the clerk, the tailor, the laborer, each requires a different regimen suited to his special needs and habits; in eating, each man should be guided by his hereditary peculiarities, and by his congenital or acquired defects in digestion, and at certain periods in a man's life the food-list should be altered. If we wish to get the highest efficiency from a man in his intellectual or physical life, and to avoid that inevitable breakdown that comes sooner or later to every man who does not regulate his diet according to his age, habits as to exercise, mental work, and digestive activities, we must adapt his food to these conditions.

How many men with a gouty tendency live on a gout-inducing diet? How many who need nitrogenous food live on starch and sugar? Medical science and authority should speak on this subject, and instruct a very ignorant and careless world.

The curative treatment must be based upon the fact that intestinal digestion is relatively less perfect than gastric digestion; that the liver must not be overcharged with the results of nitrogenous excess; that fermentation in the intestines must be avoided or relieved, and that prolonged retention of waste matters does harm. Hence the diet should consist of the lighter and more digestible forms of albuminoid food. The temptation is to the reverse of this, and to meet weakness by increasing meat diet and giving raw beef, beef-tea, etc. But beef, mutton, and eggs should be avoided as far as possible, and fresh or salt fish (which recent observation has shown to be more digestible than fresh fish), oysters, sweet-breads, the white meat of chicken, turkey, and game are to be advised. In regard to vegetables, those that contain the least amount of starch are the best. Lettuce, celery, spinach, onions, raw tomatoes are to be preferred to potatoes, rice, or macaroni. Bread is to be limited in quantity. All farinaceous foods, as oatmeal, grits, granum, tapioca, corn-starch, are bad because they are chiefly digested in the intestine. Fruits, orange juice, grapes, baked apples are agreeable, and not harmful. Gelatin preparations can be given for the same reason.

In regard to milk, there is no definite rule to be laid down; with some it is a typical food; with others it never agrees. But if milk is taken, it

should not be used at the regular meals. Being liquid, it is swallowed without appetite, and either its agreeable taste or the idea that it is very nutritious and strengthening induces patients to drink it in considerable quantity. Thus, a supplemental liquid food that is not needed, and that requires digestion, is put into the stomach, increasing its work. Besides, if the digestion is not quickly done, milk easily undergoes fermentation, and this, our most dreaded enemy, enters into action. As a substitute for other foods, as a between-meal food, when only small quantities can be taken at the regular meals, milk, either plain or peptonized, is a valuable addition. Fats are to be cut off when the intestine performs its work imperfectly.

Alcohol in any shape or form is injurious. Sir William Roberts has shown that sherry, claret, port, and hock, in the small proportions of 1 per cent., have been found to paralyze saliva almost completely. While brandy or whiskey do not retard gastric digestion, wines do, and to an extent out of proportion to the small amount of alcohol contained in them. The same is true of malt liquors. But what has a more important bearing on the subject of this paper is the effect of alcohol on pancreatic (intestinal) digestion. In regard to the effect of wines and beer on the digestion of starch, it is found that their retarding influence is entirely due to their acidity, and that as this is neutralized by the bile entering the duodenum, wines are without injurious influence on starch-digestion. Tryptic digestion is only delayed by alcohol in high dosage; in the quantities and proportions in which alcohol

is usually taken at meal-time, the absorption of alcohol by the stomach is so rapid that but a small quantity would reach the duodenum, and hence but little injury would follow its use.

There are two serious objections, however, to the use of alcohol in any form and in any quantity in intestinal indigestion; one is that with alcoholic local and general stimulation, more food, especially proteid food, is taken than there is need for; the second objection is that alcohol stimulates cardiac action, induces rapid portal circulation and hepatic congestion, diminishes the resistance of liver parenchyma, and brings about the serious results of interstitial change.

According to Roberts, coffee has less inhibitory effect on salivary digestion than tea, which is a powerful retarder of salivary digestion, on account of the large proportion of tannin that it contains. Both tea and coffee delay stomach digestion, but they have no effect whatever on pancreatic digestion. Hence, it may be concluded that the morning cup of coffee, not too strongly infused, may be permitted to one who is accustomed to it, or that weak tea is not hurtful, and is to be preferred as a drink to hot water, both on account of its pleasanter taste and slightly stimulating effect.

The effervescent table-waters rather aid than delay digestion, and if wines are taken the waters neutralize some of the injurious effects of wines, especially as regard their effect on the digestion of starch.

While the various aids to digestion often fail to secure positive results, yet they should be given. As our object is principally to aid pancreatic digestion,

we are concerned more with the methods that bring this about. The objections to giving pancreatin after a meal are so obvious that few have much faith in its efficacy; even a short stay in the stomach on its way to the duodenum will expose it to the action of the acid of the gastric juice, and its activity as a ferment be destroyed. Roberts has suggested a plan for giving it that obviates these objections; his method is to add pancreatic extract to food fifteen or twenty minutes before it is eaten. "Certain dishes, as farinaceous gruels, milk, bread and milk, milk flavored with tea or coffee, or cocoa and soups strengthened with farinaceous matters or with milk, are suitable for this mode of treatment. A teaspoonful or two of the liquor pancreaticus should be stirred up with the warm food as soon as it comes to the table; and such is the activity of the preparation that even as the invalid is engaged in eating, . . . a change comes over the contents of the cup or basin, the gruel becomes thinner, the milk alters a shade in color, or perhaps curdles softly, and the pieces of bread soften. The transformation thus begun goes on for a time in the stomach, and we may believe that before the gastric acid puts a stop to the process, the work of digestion is already far advanced."¹ This method, if successful, would remove, in part, the objections that I have urged to the use of farinaceous foods. In feeble or delayed gastric digestion, pepsin and dilute hydrochloric acid, given after food, must always constitute one of our resources.

All these rules are intended to prevent decompo-

¹ Roberts: Digestion and Diet, 1891, p. 217.

sition and the development of toxic agents in the intestines, but for some time, at least, the evil will continue, and means must be used to render those products harmless, and to eliminate them. The first object is reached by disinfection of the gastrointestinal canal by means of thymol, salol, naphthol, salicylate of bismuth, etc., the drug to be given before eating, but not within one hour and a half after. Theoretically this is the right treatment, but how far we succeed in carrying it out is a matter of doubt, as the drug has to pass unaltered through the stomach and pylorus into the duodenum.

Elimination is practised by avoiding delay in the intestine and favoring the daily evacuation of the colon. The practice is certainly an old one, and the guide to it has been the reiterated statements of patients that without the daily evacuation bad feelings were inevitable; and they continued to believe this notwithstanding our assertion that moderate constipation did no harm, and that purgatives did a good deal. Now it looks as if they were right, and we were wrong. Delay anywhere in the large intestines means the opportunity for continuing decomposition and absorption of matters unfit for nutrition or injurious to the system. Means, therefore, that favor a rapid transit from cecum to rectum, and that cause the rectum to be emptied daily, must be employed. Cathartics are the last remedies to be advised if the result can be brought about in any other way; a proper diet, change in the habits of life, exercise, and colon massage may accomplish this. If they do not, a small enema of cool water containing some antiseptic, or a mild laxative pill

will have to be given. In the choice of a laxative, it does not make much difference what one is selected. Hydragogue cathartics, as Hunyadi and other mineral waters, and drastics, are wrong in every way. A "peristaltic persuader" is best, and the minimum dose that will produce the effect is the one to be prescribed. Electricity has been employed, and is highly recommended; it is used as an excitant to muscular action, and, if properly given, in accordance with the laws of electrical action, it may render great service.

When the toxic products have entered the system, their elimination is favored by diaphoresis, diuresis, and by the inhalation of compressed air or oxygen. Hence arise the benefits of exercise or bathing, friction and general massage, the free drinking of pure water, as Poland water, or some harmless mineral water, as the Lithia waters, the virtues of which depend, in very small part, upon the mineral matters that they contain. In case of muddy skin, with acne, sluggish circulation, cold hands and feet, when there is constipation and a urine dense and loaded with urates and with increased urea, oxygen inhalations would promise a great deal of benefit.

In regard to other drugs, tonics are bad; iron is the worst, and only in those forms in which anemia does not disappear with the improvement in digestion should the more assimilable and least irritating forms be given, as the lactate and pyrophosphate. Bitter tonics are inadvisable; the most they can do is to stimulate the gastric mucous membrane, increase secretion, and it is questionable whether more harm than good is not done by trying to bring this

about. Cod-liver oil is objectionable, for the reasons given, and yet in just such cases it is frequently given on "general principles."

The attempt has been made in this paper to discuss the nature and cause of symptoms that we are constantly meeting in our daily practice, and that when we attempt to cure them prove so troublesome to us. There may be many different opinions formed when such a case presents itself for examination, but a comprehensive study of *all* of the symptoms, and an effort to look upon them as closely related and as together forming *one* disease, will help one to arrive at a rational view as to the treatment that should be pursued.

Intestinal chemistry points out to us a probable cause of most of the symptoms, and gives indications for treatment that are of the highest value. But I do not believe that there is any name hitherto applied to this diseased state that expresses the nature, or that is comprehensive enough to include in its meaning its essential features; for while toxemia, lithemia, intestinal indigestion, constipation, functional diseases of the liver, neurasthenia, hypochondriasis, may all be present in any one case, there is not one of these terms that is satisfactory or acceptable.

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