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THE PREVENTION OF CONSUMPTION.

IN modern times much has been accomplished in the field of preventive medicine. The ravages formerly committed by small-pox, cholera, etc., are now matters of history. The spread of such diseases is now fortunately checked and held within narrow bounds. Before we can hope to curtail the spread of any particular disease we must first know its nature, and especially its mode of extension. We may reasonably expect to limit the extension of those diseases of which we can definitely say their spread is favoured by such and such conditions and retarded by others. We know that small-pox, for example, is communicated by one individual to another, and that this communication is more liable to occur if the individuals exposed to the disease are placed in unsanitary surroundings; we know that an individual whose vitality is impaired by lack of proper air, food or clothing, is more likely to contract such a disease if exposed to it than is one whose general health is good, and whose hygienic surroundings are in accordance with the requirements of nature. Knowing that a certain disease is communicable from one individual to another, and that that communication is facilitated by unsanitary conditions, we may hope to prevent the spread of such a disease by isolating those already affected, and by placing them and others who may be exposed to the infection in good sanitary surroundings. In all civilized countries the truth of this is recognized and laws have been enacted requiring the isolation of patients affected with such diseases as cholera, small-pox, scarlet fever, etc. Of late years the number of diseases which are recognized as infectious has been increased, as by the aid of bacteriological investigations the true nature of

certain diseases has been determined and the mode of this communication from one to another rendered intelligible. Cholera, small-pox, etc., have carried off millions of the human race in days gone by. Now that their infectious nature is understood; now that we know the means whereby their spread is favoured; now that we know that isolation of infected patients, together with the necessary disinfecting measures and improved sanitary conditions for those likely to be exposed to the infection, confines the ravages of these dread diseases within narrow limits, we are able to cope with them and save mankind from untold suffering and death. Great, however, as has been the havoc which those and other infectious diseases have in the past inflicted upon the human race, the number of deaths attributable to any of them is insignificant when we compare it with the deaths due to tuberculosis. At least one-fifth of the human race die of tuberculosis. Can nothing be done to check the ravages of this fell destroyer of the human family? Before answering this question it will be necessary to determine whether this disease is infectious or not, and clearly to understand what circumstances favour its spread if it be infectious.

Is tuberculosis infectious? Until very recently we could not have answered this question in the affirmative. In 1882 Koch demonstrated the presence of a micro-parasite in all tuberculous lesions. Many investigators have followed up the work of which he then laid the foundations, and verified his statements. But it might be objected that the finding of this parasite in tuberculous lesions does not prove that tuberculosis is caused by it. True. For this reason investigators have pushed the study of this question experimentally, and their conclusions are thus summed up in Allbutt's "System of Medicine:"

"(a) The bacillus is found in tubercular lesions, both in man and animals. . . .

(b) The bacillus has been separated from tubercular lesions in man and cows, and from the sputum of man, and obtained in pure cultivation.

(c) Inoculation into susceptible animals of the tubercle bacillus, obtained in pure cultivation, produces exactly the same disease, both anatomically and in the mode of distribution of the lesions, as in man or animals which suffer naturally from tuberculosis.

(d) From the lesions in experimental cases in animals the bacillus can be obtained in pure cultivation, living and virulent."

These facts do not rest upon the authority of a single individual, or upon a single series of experiments, but they are continually being confirmed by different investigators all the world over. The conclusion to be drawn from these statements of fact is that tuberculosis is a specific disease, due to the presence in the human organism of the bacillus tuberculosis.

The bacillus tuberculosis, then, being the essential and necessary factor in the production of a case of tuberculosis, our next enquiry would naturally be, how are the bacilli produced, how are they propagated, and how are they communicated to an individual who previously was proof against their invasion? Being a micro-organism, it can be produced only by preceding generations of bacilli. Bacillus produces bacillus as human produces human—just as human beings require certain conditions for their existence and the performance of their various functions, so do bacilli. We find that naturally these bacilli will only grow and increase where the conditions are favourable—heat, moisture, and a low vitality of the tissues upon which they are deposited. They will not grow outside the bodies of diseased human beings or of animals susceptible to their action. It is true that they may be cultivated artificially, and it is thus that experiments have been carried on; but naturally they require the conditions mentioned above for their growth and propagation. How, then, do they pass from the body of an infected animal to the body of another previously unaffected? In several ways, but the two main modes of infection are by food containing the bacilli, and by the inspiration of air contaminated by these germs. Of these two the infection by means of diseased food is the less frequent, and in adults, at least, the less important. It is a subject, however, which requires the closest and most careful consideration of the health authorities, and especially should all dairies be thoroughly inspected and the cattle tested by competent inspectors for the presence of this dread disease. This test may be readily made now by the inoculation of the cattle with tuberculin. In our opinion no one should be allowed to sell milk unless he holds a certificate from the proper authorities that his cows are free from tuberculosis. More important, because more

general, is the infection through the inspired air. As we have said, the bacilli will not grow outside human beings or animals, but they pass from the body of an infected human being or animal in various ways—in the discharges from tuberculous sores, in the EXPECTORATION, in the fœces, in the urine. These excreta becoming dried float in the atmosphere, and the bacilli are carried about in the dust thus formed. In this condition they are not capable of propagation, but they retain their virulence, and being deposited upon a suitable soil they at once begin their work of destruction. We may safely assert that we all, under our present careless method of treating tuberculous patients, inhale bacillus-laden air. Those of us who are in vigorous health do not afford a suitable lodging place for those germs, and they are thrown off before they can establish themselves. Others in whom the vitality of the tissues has been weakened by inheritance, disease or unsanitary conditions, are unable to cast off these bacilli, which thus finding a suitable soil gain a lodgement, grow and propagate and thus establish in a new individual the disease which we call tuberculosis, and which is commonly spoken of as consumption. That such is the mode of infection in many cases can be demonstrated. A spray containing bacilli being thrown upon the faces of susceptible animals previously unaffected by the disease, these animals become tuberculous—or if susceptible animals are compelled to breathe air impregnated with bacilli they become tuberculous. In such manner without doubt the infection is carried from one human victim to another. At present tuberculous patients are allowed freely to mix with the general public. As they go about they expectorate in our streets, our public buildings, our street cars, our way-carriages. This expectoration, laden with bacilli, dries and in the form of microscopically fine dust is inhaled by us all. Those of us whose physical health is robust, and the vitality of whose tissues is up to the standard, are able to resist the invasion of those enemies of mankind. Others whose vital forces have been reduced by heredity, disease or unsanitary conditions are unable to defend themselves from the attacks of these insidious foes, and they, therefore, become new victims of this dread destroyer of human life. We are pleased to see that public sentiment is now aroused against this indiscriminate

mingling of the infected with the uninfected—that health authorities are now recognizing the fact that tuberculosis is an infectious disease, and therefore preventible. Spitting around in our public buildings and in our public carriages of conveyance is now in many places being prohibited. The city of New York through its Public Health Department has taken the most enlightened action in this matter of any city of which we have any knowledge. Every case of tuberculosis occurring within the city limits must be reported to the Department just as diphtheria or small-pox would be. More than that, many hospitals there are now refusing to admit tuberculous patients to their general wards, believing, and this belief is founded upon well-known scientific facts, that tuberculosis is an infectious disease, and therefore that all who are in poor health are liable to contract it if brought within range of a patient suffering therefrom. The Health Department there are now agitating for a hospital in which tuberculous patients may be completely isolated, as it is believed that such patients can be thus better cared for and the dangers to others thus minimized. Dr. H. M. Biggs, Pathologist and Director of the Bacteriological Laboratories, New York City Health Department, in his address before the British Medical Association last September, said :—

“The best medical opinion forbids that persons suffering from pulmonary tuberculosis be treated in association with other classes of cases in the general medical wards of general hospitals. This opinion is based on the daily observation of the dangers incident thereto, and it has very properly resulted in the exclusion to a great extent of persons suffering from this disease from many of the general hospitals to which they were formerly admitted.

A large experience has also shown that in institutions devoted solely to the care of consumptives the general welfare of the patients is more easily fostered, the risks of fresh infection more certainly diminished, and the chances for recovery more surely enhanced than in general hospitals, in which all classes of cases are received.”

In large centres of population like New York separate institutions for the care and treatment of consumptives are a possibility. In smaller centres it is, perhaps, too much to expect a separate institution, but surely it is not too much to ask that in our general hospitals provision be made for the isolation of such

cases. When we know that such cases can be better cared for when isolated; when we know that their cure under such circumstances is more likely to be effected; when we know that by placing them in the general wards we are exposing the other patients to the risk of infection and death, we are, we feel, only making a just and humane request when we ask that all hospitals provide rooms for the isolation of tuberculous patients. When a new hospital is being built, or an old one remodelled, is a most favorable time for making this essential provision for every thoroughly equipped, up-to-date general hospital. We are more than pleased to learn that the governors of the Kingston General Hospital have determined to provide two rooms for such patients, one for males and one for females. We congratulate the governors, and we can assure them that their action will be appreciated by the general public, and that their hospital will thus become more popular, not only with tuberculous patients, but with others who will now feel that by going to it they will not be exposed to the risk of being infected with tuberculosis.

PROGRESSIVE BULBAR PARALYSIS, WITH PRESENTATION OF A CASE.*

GOWERS describes a typical case of Progressive Bulbar Paralysis, the symptoms of which were:

1. But little power of moving the lips and lower part of the face.
2. Almost complete paralysis of the tongue.
3. Feebleness of palatine muscles.
4. Complete paralysis of the abductor of left vocal cord and partial paralysis of abductor of right cord.

Thus the parts mainly involved are the lips, tongue and larynx, suggesting to Duchenne the name "glossò-labio-laryngeal paralysis."

*Read before the Medical Library Association, Utica, N. Y.

It is interesting to note the correlation of anatomical parts involved and functional use. Those parts are paralysed which are concerned in articulate speech.

The laryngeal muscles are supplied by the spinal-accessory through the accessory portion, whose nucleus is the lowest group in the medulla.

The palate is supplied by the same nerve, but by fibres that that arise from its highest cells (formerly from facial via sphenopalatine).

The hypoglossal nucleus lies parallel to that of the inner part of the spinal accessory.

The chief nucleus of the facial nerve is only a little above the upper extremity of the hypoglossal. The nuclei of the nerves controlling articulate speech, therefore, are almost in contact with one another.

A simple experiment illustrates the close connection between the fibres or cells which have to do with the muscles about the mouth, and with those for the tongue. Try to narrow the tongue, you cannot do so without at the same time narrowing the opening of the mouth.

The paralysis corresponds to function in its distribution and is gradual in development—two features which evidence the degenerative nature on which the paralysis depends.

There are two forms of chronic bulbar paralysis—the one dependent on the degeneration of the cells of the nuclei in the bulb and associated with conspicuous wasting of the parts paralysed; the other dependent on a slow degeneration of the fibres which conduct the voluntary impulse from the brain to the cells of the bulbar nuclei, and here we have no wasting, but an excess of the muscle reflex action.

But in either form of bulbar paralysis the degree of correspondence with function varies.

The nuclei affected are those of the lower cranial nerves, thence the name "inferior nuclear paralysis." Above this group is another in the bulb, the nuclei of which innervate the eye muscles and are sometimes similarly affected, called "superior nuclear paralysis." In rare cases both sets of nuclei suffer. Gowers cites a case of this kind following diphtheria, and another in which deglutition was affected. Dr. J. Taylor re-

ports a case of tabes, in which not only the eyeball muscles, but the muscles of mastication, are weakened, while the face, palate and larynx are also more or less paralysed.

The pathological changes then consist in an atrophy of the ganglion cells in the nuclei, in connection with an excessive deposit of connective tissue cells—a true sclerosis.

The cause is obscure. The disease is most frequent in the old, but occurs in the middle-aged, and even in the young. It has been known to follow syphilis, diphtheria, lead poisoning and exposure to cold.

The prognosis is grave. Bosworth states that death occurs in from one to five years after first symptoms appear, any amelioration of symptoms being rare. Gowers claims that there is a marked tendency to arrest of the progress of the disease.

Death occurs either from inanition, dyspepsia, heart failure or inhalation pneumonia. This case was referred to me by Dr. Kilbourn.

September 10, 1897, Andrew A, truck driver.—History: Served in the army three years, during which time he had a severe attack of chills and fever and later of typhoid fever. Was wounded in the left groin. Family history good; also personal. Denies any specific infection. Typhoid fever left him with an irritable cough, which disappeared with onset of present trouble.

Three years ago had difficulty in swallowing and speaking which lasted for six weeks. Last fall had complete ptosis of left eyelid for ten or twelve days. Three months ago the present attack came on with difficulty in swallowing and articulating. Eyes are weak in the light and he sees double at times. Bloats after eating and occasionally has abdominal pains lasting for an hour or more. Has been treated for catarrh, of which at present there are no symptoms.

PRESENT CONDITION.

Eyes: vision is imperfect owing to dust-like opacities in the vitreous. Pupils are small, equal, round and react to light and accommodation. Optic papillæ are pale, surrounded by a scleral ring and marked by deep physiological cupping, at first sight suggestive of glaucoma. On fixing an object which is gradually brought close to his eyes, the left eye swings out, indicating paresis of left internal rectus. Cannot close his eyes tightly.

Face and lips: He has little power over the lower part of the face; the lower lip and corners of the mouth tend to droop; and the food collects in his cheeks.

The tongue is very feeble; he cannot protrude it to any extent, nor can he touch the roof of his mouth with it.

His palate can be raised slightly but if he tries to swallow, liquids come back through his nose; semi-solid food is swallowed though with difficulty, more easily in the morning—at times deglutition is impossible, especially in the evening, showing that his pharynx is also involved.

The nasal twang that you notice is further evidence of the feebleness of the palatine muscles.

The masticatory muscles are so affected that he cannot bite hard enough to hurt your fingers.

The larynx has apparently escaped, to judge from his voice and easy respiration. The paralysis, however, is shown by the laryngoscope. He can bring the cords together, and so phonates all right. On easy respiration the cords are fairly well separated, but on forced inspiration, instead of a wide separation, the cords approximate one another, reducing the rima glottidis to a narrow chink, due to a paresis of abductors of the cords.

The grip of his hands is fairly good; he can stand with his toes together and eyes shut; co-ordination is perfect; patellar reflex is accentuated.

Diagnosis—Progressive bulbar paralysis.

Treatment.—Put him on mixed treatment.

Sept. 21.—Stop mercury and continue the iodide of potash, sixty grains.

Sept. 30.—Patient reports some abdominal pain with tympanites last night. Reduced the iodide to thirty grains t.i.d.

Oct. 7.—Swallows and talks with greater ease; complains of cold hands and feet. Stop iodide and put him on arsenic and strychnine.

Oct. 13.—Has been in the country the past week; unable to swallow anything except his breakfast during that time. Has had considerable frontal pain and dizziness; cannot touch his lips with his tongue; tongue and lips less sensitive than before; two pins have to be two and one half inches apart on his cheek before recognized as two; on attempting to close his eyes there

is a palpable opening one-eighth of an inch wide; left eye diverges down and out; feet and hands warm again. Put him back on iodide of potash.

Oct. 18.—Much improved in ability to swallow and talk; moves his tongue fairly well; can close his eyes.

Nov. 2.—For several days has been unable to swallow in the evening.

It may be of interest to consider the cause of this particular case. We can exclude diphtheria and lead poisoning, as his single dose of lead passed quickly through him; exposure to cold, and also syphilis, so far as can be ascertained.

It has been suggested that a toxic influence, producing acute trouble but with no action on the nerve elements, may leave behind it some effect, possibly some chemical product, which fixes itself on the nerve elements, in consequence of which these nerve elements at some future time undergo degeneration.

Thus in syphilis we have an early toxic blood state, followed by tabes, a late degenerative process. So also superior nuclear paralysis, the degeneration of the nuclei for the motor nerves for the eyeball, is a late sequel of syphilis apart from tabes. This relation has not been traced for bulbar paralysis. Here is a patient who suffers from the double affection (certainly the condition of the eyes is strongly suggestive of syphilis), but may not his whole trouble be due to the early toxic influence of either malaria or typhoid fever, or possibly both combined.

T. H. FARRELL, Utica, N.Y.

CHRONIC STOMACH AFFECTIONS.*

WITH, perhaps, the exception of diseases of the respiratory organs, no class of ailments causes so much annoyance to patients and taxes the physician's skill and tact more than do chronic affections of the stomach. The subjective manifestations of these disorders are many and varied. Headache, lassitude, a sense of fulness after eating, a feeling of tenderness or

*Read before Kingston Medical and Surgical Society

even pain in the region of the stomach, anorexia, a ravenous appetite, nausea or even vomiting, flatulence with gaseous eructations, water-brash, constipation, perhaps alternating with diarrhoea, heart-burn, shortness of breath, palpitation, are among the most common symptoms of which a patient will complain when suffering from some chronic gastric affection. From this train of symptoms the physician is unable to learn much, except that the seat of trouble is probably in the stomach, but whether primary or secondary it would be impossible to say without further evidence. Any or all of those symptoms may be complained of in any of the chronic gastric affections. Whether in such a case one has to deal with cancer, ulcer or inflammation, can only be determined by a careful enquiry into these symptoms, the time of their appearing, the duration of the diseased condition, the character of the tenderness and pain, and a careful physical examination of the patient and a chemical and bacteriological examination of the stomach contents. As to whether the disease is primary or secondary in the stomach will in each case be determined only by a careful examination of the condition of other organs.

Chronic gastritis may be secondary to organic lesions in the liver, the heart, the lungs or the kidneys. The determination of this secondary nature of the gastritis is of the utmost importance so far as treatment and prognosis is concerned. Again, it must be remembered that we may have, and frequently do have, a combination of chronic gastric affections. Cancer and ulcer of the stomach, by interfering with the movements of the stomach, by retarding the onward flow of the stomach contents, and by lessening the amount or impairing the character of the gastric secretions, may impede the act of digestion and thus favour putrefaction and fermentation and set up a chronic inflammatory condition of the gastric mucosa. It will thus be readily seen that the diagnosis of the particular nature of chronic gastric lesions is not a simple question, but is a very complex problem. We have first to determine that the stomach is the seat of disease; secondly, whether that disease is primary or secondary to some lesion in some other organ. These points having been settled, we have next to differentiate between cancer, ulcer, gastritis, and here, as already pointed out, we may have a com-

bination of lesions—gastritis accompanying and being caused by either of the others, and cancer, perhaps, supervening upon ulcer. These problems in diagnosis will, perhaps, best be exemplified by a brief outline of a few cases which have come under my observation and care.

Case I.—A. F., æt. 23, barber, single. Came under my care Oct. 6th last. Family history good. Personal history good till about five years ago. General appearance and condition—Muscles soft—wasted; complexion, however, ruddy; no appearance of anæmia; heart, lungs, liver and kidneys sound. Disease, therefore, not secondary. Subjective symptoms: Pain after eating; water-brash, vomiting about half an hour after eating—vomit is bitter, never contains blood—eructations of gas, also bitter; some difficulty in swallowing food, but none in vomiting; symptoms aggravated by smallest amount of alcoholic beverage; patient, however, has always been temperate; has lost 25 lbs. in five months; trouble dates back five years, gradually getting worse. Physical examination: Other organs of body sound; emaciation; stomach distended and tender on pressure; no nodule evident, even on deep palpation.

By examination of stomach contents three hours after a breakfast of milk and lime water—nothing solid given as it would not be retained—starch granules visible under microscope; reaction acid; no free hydrochloric acid. small amount of lactic acid. Pepsin or milk ferment not tested for, as contents were too dilute.

Diagnosis—Chronic or sclerotic gastritis.

Upon what was this diagnosis based? The age of the patient while not excluding cancer rendered that diagnosis highly improbable. The character of the pain—a feeling of uneasiness increased on taking food—had not the sharp lancinating character of the pain of cancer nor the burning or boring sensation of ulcer. The duration of the trouble—5 years—would absolutely exclude the possibility of cancer from the beginning. The character of the vomit—particles of food mucus and gastric secretions—in the vomit of either cancer or ulcer blood is almost invariably found at some time or other during the progress of the disease. The absence of any appreciable tumour or induration which, if felt, would be so suggestive of

cancer, but the absence of which would not exclude that diagnosis. The patients' general appearance which while it showed the effects of emaciation, did not give any evidence of anaemia so frequently observed in ulcer, nor of the cachectic appearance of cancer. While those subjective symptoms and physical signs point to gastritis rather than to cancer or ulcer, they are not pathognomonic. Taken in connection with the chemical examination of the stomach contents their evidence is verified and corroborated. The most important fact elicited by this means is the absence of free hydrochloric acid. As the duration of the disease practically excludes cancer so the absence of free hydrochloric acid renders the evidence against ulcer almost conclusive. By exclusion, therefore, we arrive at the diagnosis of gastritis, and as by examination we find the other organs of the body in a healthy condition, we conclude that the gastritis is in this case primary. What, then, was the cause? The patient has never been addicted to the use of alcoholic stimulants. He has not used tobacco extensively. He has not carious teeth. These not uncommon causes are, therefore, excluded. He has, however, been in the habit of taking his meals very rapidly and has lived on strong and coarse food. His food has been imperfectly masticated, passed down into the stomach in lumps and not thoroughly mixed with the saliva. Extra work was thus thrown upon the stomach, the food was retained in that viscus for too long a time, putrefaction and fermentation were set up. These processes in turn set up an irritation which led to a hyperaemic condition of the gastric mucosa, and thus undue secretion of mucus took place. This mucus further interfered with the act of digestion and thus further aggravated the trouble.

Treatment—Lavage, hydrochloric acid and a bitter; the bowels regulated. Result—in about one month marked improvement; patient able to take solid food without discomfort; bowels acting better; general tone of muscular system improving. Patient passed out of my observation in four weeks.

Case II.—C. N., æt. 43, unmarried. Came under my care Oct. 18th last. Family history good. Personal history: Almost totally blind and hearing very dull. General appearance indicates general depression. Muscles soft and flabby; anæmic; rather cachectic. Has never used alcohol, but for years has used

tobacco to relieve heart-burn. Present attack came on Oct. 13th last, with vomiting, dizziness and general weakness. Could learn nothing of character of vomit at this time. After coming under observation he vomited at first about one and one-quarter hours after taking any food. Tenderness on pressure over stomach, though no tumour can be felt through his very much emaciated abdominal walls. Marked constipation. Heart, lungs, etc., healthy. Examination of stomach contents: Reaction acid; no free hydrochloric acid; lactic acid present in fairly large amounts; pepsinogen much diminished in quantity; starch reaction absent, but no starch had been taken with food; milk curdling ferment present. After being under my care for a week he vomited dark brown matter, "coffee ground" in appearance. At the same time motions of bowels were almost black. Whenever he lay on his left side he vomited. Could take no food by mouth without vomiting. For three weeks fed by rectal enemata. Is now up and about and taking ordinary diet, apparently without inconvenience. No vomiting.

What is the diagnosis? His age is such that either cancer, ulcer or inflammation might be suspected. His general appearance might indicate simply the emaciation which would naturally be brought about by non-assimilation of food as would occur in a gastritis, but seemed to me rather to suggest that peculiar but hard to describe appearance called cancerous cachexia. The vomiting continuously would suggest an irritable condition of the gastric mucous membrane, which might be due to any one of the three conditions already referred to. The "coffee ground" vomit again is very suggestive of cancer. The amount of blood vomited was small—a few mouthfuls, and might, perhaps, have been produced by ulcer. On the other hand, the absence of free hydrochloric acid rather excludes ulcer. Free hydrochloric acid is not found in cancer of the stomach as a rule, nor in chronic gastritis. Its absence in cancer is, no doubt, not due to any direct influence of the cancerous growth, but is caused by the accompanying gastric catarrh or inflammation with which gastric cancer is usually complicated. Taking all the symptoms, the physical signs and the chemical examination of the stomach contents into consideration, I am inclined to the opinion that this patient is suffering from gastric cancer, and

that there is considerable inflammation of the stomach mucous membrane.

Treatment.—As the patient was so depressed and the stomach so irritable, lavage was not attempted. No medicine administered by the mouth could be retained. Rectal feeding was, therefore, resorted to and persisted in for three weeks. This gave the stomach absolute rest. Feeding by the mouth was then gradually and cautiously attempted, and the character of the food varied as he was able to bear it.

Taken all in all this case reminds me of one reported in the *MEDICAL QUARTERLY* January, 1897, in which during life there was absolutely nothing except the patient's appearance to suggest cancer, and yet the post mortem examination demonstrated a small cancerous growth at the cardiac end of the stomach, the whole of the gastric mucosa being in a catarrhal condition, and the stomach enlarged to double its ordinary size. Such cases make one hesitate as to a positive diagnosis and exemplify the difficulty there often is in excluding cancer, even when we are confident that gastritis is present. They may, and frequently do, co-exist.

Case III.—Mrs. A., æt 61, for years has been troubled with "indigestion" and constipation. Very stout. Ruddy complexion. Picture of health when attacked in October, 1896, with a more than usually severe fit of indigestion. Complained of headache; pain in epigastrium, flatulence. On physical examination stomach was found to be enlarged and tender on palpation. The liver not enlarged, but tender on percussion. Vomiting was severe, the vomited matter being sour and bilious. Tongue thick, flabby, indented and furred with a dirty white fur. Temperature rose, the highest point attained being $103\frac{1}{2}^{\circ}$ F. In a few days patient became profoundly jaundiced from head to foot.

Examination of stomach contents, made two hours after breakfast of porridge, bread and tea, showed the following:—Reaction acid; odour sour; contained mucus and particles of undigested bread; no free hydrochloric acid; lactic and acetic acids present; starch reaction readily obtained. Microscopically were discovered bread fragments, practically untouched by digestive fluid; many free starch granules, debris, oil globules,

squamous and cylindrical epithelium and moderate numbers of a small bacillus, but no sarcinae.

In this case the jaundice suggested the liver as the seat of trouble, the stomach disorder being secondary thereto. The impaction of gall-stones in the bile ducts was also a possibility not to be overlooked. This latter condition, however, was fairly excluded by the absence of the characteristic pain which usually accompanies this condition, and by the fact that while there was tenderness over the liver, there was not noticeable any enlargement of the gall bladder. The jaundice in this case, I was rather inclined to believe, came from an extension of the inflammatory condition from the stomach to the duodenum and thence to the common bile duct. This duct becoming more and more occluded by the inflammatory swelling and the collection of mucus, the outflow of the bile was partially or wholly arrested, absorption took place and jaundice resulted. This condition, too, would explain the tenderness over the liver and the rise of temperature which latter would be occasioned by the inflammatory condition, and by the absorption of the constituents of the bile, which would act as a poison. That there was gastritis, the examination of the stomach contents made certain. This excluded ulcer also. Cancer, I think, may now be safely excluded. If cancer had been present instead of improvement in the condition there would have been a gradual downward tendency in the patient's vitality, cachexia would by this time be quite manifest. The patient, however, has gradually improved. She is able to take ordinary diet; attends to her household duties; goes out and about, and her general appearance and health have improved. Considering, then, the condition of the patient 21 months ago, the chemical examination of her stomach contents and her subsequent history I am confident that I had to deal with a case of chronic gastritis.

Treatment—Lavage, hydrochloric acid and a bitter, peptonized food until her stomach would bear milk and broth without being peptonized; then her diet gradually increased.

Case IV.—Mrs. G., widow, æt. 65. Has for years suffered from bronchial asthma, and has from time to time attacks of indigestion. These attacks were always overcome by regulating the diet. In June last was called to see her. She was suffering from pain in stomach, eructations of foul smelling gas, vomiting

of a mucous, bilious character. She became jaundiced. On examination found the stomach distended and tender on palpation. The liver was not enlarged. No heart or kidney trouble. Examination of the stomach contents gave practically the same results as in last case. From the history, the physical examination and the examination of the contents of the stomach, the same diagnosis was made as in case III., viz., chronic gastritis. The treatment adopted was lavage of stomach, hydrochloric acid, and a bitter, peptonized food for a time. As the patient improved milk and broths without being peptonized were administered. Patient became fairly well; went about the house, and even took outdoor exercise; resumed her ordinary diet.

In November last was again called to see her. Found her in much the same condition. Now, however, although she was able to take plenty of liquid food, she did not appear to assimilate it. Her diet was milk, broth, koumys, albumen water, of which in 24 hours she would take at least three pints. Her muscles wasted; she became much emaciated. This continued until December 28th last, when she appeared to gain in strength. Since then she has steadily improved, and now she is able to sit up about two hours every day. Her pulse has become stronger, and she, herself, feels her strength returning. For weeks she lay in bed listless, taking no interest in what was going on. Now she is bright and cheerful, and wishes to know about everything that is going on.

In this case, as I have said, we had to deal with a chronic gastritis, primary in its nature. I am of opinion, however, that the inflammatory condition has now extended beyond the stomach, and has involved the intestinal tract. This, it appears to me, would account for the non-assimilation of the easily digested food which alone she was allowed. Digestion is a complex act. The mouth, the stomach and the bowels are the parts in which the act is carried on. When the stomach fails to perform its duty the food is passed on into the bowels in a condition unfit for the action of the intestinal juices. As a consequence fermentation takes place, gases are formed, the bowels are distended; they in time, owing to the irritation thus set up, become inflamed and unable to perform their functions properly.

Such, undoubtedly, has been the result in this case. The prognosis must, therefore, in this case be grave—a protracted illness, gaining strength for a time, then a relapse, and finally non-absorption of nutriment, death.

Case V.—T. G., æt. 51, a tailor by trade. Has suffered from indigestion for years. Called to see him in June, 1896. Found him vomiting large quantities of blood. Blood afterwards passed from his bowels. Became very anæmic and weak; almost collapsed. After hæmaturia was controlled, made an examination and found stomach distended; pain on palpation, especially towards the pyloric end. Examination of stomach showed free hydrochloric acid. Here we had to deal with a case of ulceration of the stomach. This was manifest from the symptoms of which the patient complained—the distension of the stomach and the pain on palpation localized at the pylorus, and the examination of the stomach contents. He had another attack in August, 1897. The treatment adopted was absolute rest in bed, chopped ice, ergot, opium and stimulant hypodermically. His food was of the lightest—milk and lime water; then broths and raw oysters, fresh fish, broiled beef-steak in the order named, as his stomach was able to bear the changes.

This synopsis of a few cases will, perhaps, serve to exemplify the points which I wish to emphasize in the diagnosis of chronic gastric affections. The most important points to consider are as follows:

- I. Does there exist any lesion in any other organ which would act as a cause of the gastric trouble?
- II. The duration of the trouble.
- III. Has the trouble been continuous, or has it been intermittent?
- IV. Is the stomach distended?
- V. Is the stomach painful on palpation, and is the pain localized?
- VI. Can a tumour or an induration be made out?
- VII. The chemical examination of the stomach.
 1. Is blood present?
 2. Is free hydrochloric acid present or absent?
 3. The presence or absence of lactic, acetic and butyric acids.
 4. The presence or absence of pepsinogen.
 5. The presence or absence of the milk curdling ferment.

Without a careful consideration of all these points, a definite diagnosis cannot be confidently made. Unless a definite diagnosis is made, the prognosis must be made comparatively in the dark, and the treatment must necessarily be symptomatic. A definite diagnosis based upon a careful consideration of all the evidence furnished by the methods above referred to enables us to adopt scientific methods of treatment and to give our patient and his friends a fairly sure forecast of what the result will be. Let this be my excuse for the presentation of this article.

JOHN HERALD.

ABORTION.*

THIS subject, though well worn already from repeated discussion, is still one of the most important in the whole range of obstetrics. I do not know that there is a subdivision in the practice of the art which causes more anxiety, or has so many dangers and difficulties in its pathway as abortion. There is probably no one present who has not at some time, possibly very often, stood aghast at the alarming symptoms which have suddenly arisen in a case which, but a short time before, seemed simple enough. I do not think there are many obstetricians who, though considering themselves equipped with the most recent technique, and backed by that feeling of confidence which lengthened experience brings, have not felt that their methods of treatment did not bring about the happy results expected, but, on the contrary, that they signally failed. I have in my mind the woman who habitually aborts, appealing to us for aid that she may experience the pleasures of motherhood and the delights which offspring brings. I have in my mind those cases of threatened abortion where we have to decide whether an effort shall be made to save the life of the foetus, while risking the health and perhaps the life of the mother in the attempt. I have in my

*Read before the Kingston Medical and Surgical Society.

mind those cases, hopeless from the beginning as far as the foetus is concerned, but where the mother's life is in imminent danger, too, from hemorrhage alarming from the beginning, and which, unless speedily controlled, will leave our patient hopelessly exsanguinated, or in such a condition that her return to health can be looked for only after a lengthened period of convalescence.

I offer, therefore, no apology for introducing for discussion this common-place subject, feeling confident that the results cannot be otherwise than advantageous to each of us, and that it will add in some measure at least to our storehouse of knowledge.

In a general sense by the term "abortion" is meant the interruption and termination of pregnancy by the expulsion of the ovum before the end of the twenty-eighth week, or the seventh lunar month of gestation, but in the more restricted sense the term is used to denote the expulsion of the ovum prior to the complete formation of the placenta, that is before the end of the twelfth week. It is to such a restricted sense that I intend to confine my remarks this evening, for it is during that period abortions most frequently occur, and when they do occur are apt to be surrounded with the greatest dangers. Owing to feeble contractile powers of the uterus there may be considerable delay before the remnants are entirely expelled, the process of unaided expulsion requiring days, weeks, and even months for completion, and so long as any portion of the ovum with its coverings remains in the uterus, just so long will the patient be subjected to the risk of hemorrhage and sepsis. The disposition to abort gradually diminishes after the third month, according as the placenta becomes more fully developed and the connection between the ovum and the uterus becomes stronger, and the uterus adjusts itself to the new order of things. The farther the period of abortion is removed from the third month, the greater the expulsive power of the uterus, and its subsequent power of contractility, consequently there will be less danger from hemorrhage, or sepsis from retention of any portion of its contents.

Habitual abortion.—In most of the text-books, of recent origin at least, we find the causes of abortion classified as: Those produced by causes existing in the father; second, by

causes due to the general health and habits of the mother; third, from causes due to the state of the womb and its appendages; and fourth, from causes due to diseases of the ovum. Under these headings an almost innumerable list of causes are produced by various writers, yet notwithstanding all this I am firmly of the opinion that there exists in some women a disposition, so to speak, to abort upon the slightest provocation. In many cases of habitual abortion, that there is undoubtedly some anatomical or physiological cause upon which the phenomenon depends, is more than probable, and in all instances in which there exists a mechanical impediment of any kind it may follow impregnation periodically almost as a matter of course, but putting such aside there are other and by no means rare instances in which we can only account for the repeated abortions by supposing that the uterus has contracted an inveterate habit. It is, perhaps, one of the most familiar observations in obstetrical practice that a woman who has previously aborted is much more liable to miscarry, and that in the face of no cause. In such it is generally observed that the tendency to separation of the ovum is greatest at a certain period of pregnancy, and every accoucheur of any experience can recall cases in which successive ova were thrown off at exactly the same age, as calculated from the presumed period of conception. The cause of such cases, however, is accounted for by the rather indefinite and non-tangible explanation—a perverted condition of the uterine fibres and hypersensibility of their contractile powers.

The prophylaxis of habitual abortion is one which concerns us greatly, for notwithstanding the amount of literature on the subject, and the number of drugs recommended, without counting the very early ones, more than twenty per cent. of all pregnancies terminate in abortion. That advice so generally given in all diseases, *remove the cause*, is equally applicable here, and of course should be resorted to whenever such can be discovered. Attention to the general health before and after conception, and the avoidance after pregnancy has begun of all those exciting causes which are more or less given to precipitate an abortion; the removal of local causes such as displacements, subinvolution, endometritis, and other local inflammations, and the treatment of pathological conditions such as syphilis, anæmia and tubercu-

losis, are methods so well known to you all that more than reference to them need not be made here. It is in cases of habitual abortion in which the predisposing or exciting causes are not apparent that we need advice and counsel. My own ideas are that where there is a good constitution and the general state of the health is good, the uterus is the organ chiefly at fault, and that physiological rest, both local and general, is what is most required. As an example of what I mean I quote the following aggravated case: Mrs. —, five years married, family history good, personal history good on both sides as far as could be made out, the mother of one child, puerperal period normal, aborted at the third month four times inside of three years. Physical examination revealed no appreciable cause. Separation from the husband was advised for six months; the uterus was curetted three times in the interval—once at the commencement of treatment, once towards the middle of the period, and once towards the end. Small doses of iodide of potassium combined with viburnum prunifolium were administered four times a day, together with such instruction as to enforced rest, regulation of the diet, and attention to the bowels as it was believed would give the best results. Pregnancy occurred shortly after cohabitation was resumed, as she did not menstruate again. As soon as pregnancy was established, coitus was prohibited, the medicinal treatment was kept up, all the previous regulations were more fully enforced, rest in bed was one-third the day's duty, and rest continuously in bed for eight days corresponding to the menstrual period fully enjoined. This treatment was continued for six months, the medicinal treatment being dropped for a few days from time to time, after which the patient was gradually relieved from the enforced restraint, and she went on to full term. Since then she has had a second child without any co-existing treatment.

Threatened and inevitable abortion.—Text-books tell us that if we are called to a case of suspected abortion and we find the os undilated, the cervical canal unexpanded, hemorrhage not profuse, and pain absent or moderate, the case should be considered as one of threatened abortion, and as such preventible and treated accordingly, our aim being to prevent, if possible, any further separation of the ovum from the uterus, and allow of the

healing of the already injured surfaces. To this end we are to endeavor to control hemorrhage and uterine contractions. Along this line you are all well acquainted with the routine practice;—absolute rest and quiet, a cool room, light clothing; the use of nerve sedatives such as chloral, the bromides, phenacetine; uterine sedatives such as cannabis indica, viburnum prunifolium, hydrastis and hamamelis; small doses of ergot, are all recommended and, doubtless, have given excellent results in some cases. My own experience leads me to believe that if a large dose of opium—and when I say opium I do not mean its extracts or alkaloids—sufficient to make a decided effect on the patient, and the effect kept up for some time, does not suffice, nothing else will. Local treatment and manipulation is to be severely avoided, particularly the introduction of a tampon with the idea of quieting hemorrhage. The use of a tampon is, in my mind, fatal to successful results. It stimulates uterine contraction, while the retained blood tears up the placental attachments still farther. This in its turn increases the hemorrhage and stimulates further uterine contraction, so that our threatened abortion becomes one that is inevitable.

Whether through my fault or my misfortune, I see but few cases of threatened abortion, and when I say *threatened* I use the word as synonymous with *preventible*. A very large percentage of them, even though they when first seen have but the symptoms laid down in our text books as those of preventible abortion, do not react to treatment. Even though the case looks hopeful at first, a visit a few hours later, if one has not earlier been hastily summoned because of violent hemorrhage, reveals a condition which at once makes it evident that the case is now one of inevitable abortion and must be treated accordingly.

In a great many cases abortion seems inevitable from the beginning, yet there are some cases which prove to be inevitable when seen that might have been avoided had the case been seen earlier. Those peculiar premonitory symptoms—a slight chill, a little uneasiness, a feeling of not being quite well, a sensation of discomfort or possibly of a dull pain in the back, are all too likely to be overlooked or to be attributed to something else, and not until a sanious discharge from the vagina makes the patient surmise that is not quite right are we summoned to interfere.

In cases of inevitable abortion the indications are to control hemorrhage and to secure complete evacuation of the uterus. These indications are best met by the use of the vaginal tampon. Properly applied the tampon will surely control hemorrhage; further it hastens the complete separation of the ovum by causing an accumulation of blood between the uterus and the membranes, and, as said before, it is a powerful excitor of uterine contractions. Moderate doses of ergot are recommended, but I cannot countenance its use in any way. The tampon, if well applied, will arrest the hemorrhage until the uterus is emptied, and after that hemorrhage will cease spontaneously. Ergot retards the progress of the case by contracting the circular fibres of the inner or what subsequently becomes the retraction ring of the uterus, and should the fœtus come away without the membranes, as is frequently the case when the abortion is at the third month or a little later, it is almost certain to prevent their subsequent extrusion, and we find ourselves with an incomplete abortion on our hands.

I do not hold with those who teach or practise the immediate and complete evacuation of the uterus the moment it is decided that the fœtus cannot be saved; a physiological process has been set in motion, and with a little assistance it may be left to physiological laws with safety. Of course there are cases or circumstances which may arise, and which may demand immediate action, but they are the exceptions and as such are to be so considered. Relying on a rigid aseptic technique on the part of the genital tract, on the part of the obstetrician and on the part of the methods employed by him, the case will come to a favourable termination without surgical interference, a form of interference which always brings consternation to the patient and her friends, and is in itself not without danger. It occasionally happens that after the fœtus has come away, and with it possibly some of the membranes, uterine contractions cease, and the os becomes partially contracted, leaving on our hands for management an incomplete abortion. At this time if a pair of placenta forceps can be introduced with ease within the uterine cavity, the membranes may be grasped within its jaws and extracted, but even after the insertion of the forceps it is often no easy task to remove even a considerable portion of them. Here, too, I

am still in favour of conservative measures. When the case is of the usual type and one in which there is as yet no infection of the retained portion, and where the case can be kept under observation and the treatment properly carried out, the uterus can be persuaded to rid itself of its contents with safety by the further use of the vaginal tampon and by keeping the vulva and vagina in a strictly aseptic condition.

However, should the line of conservative treatment not be successful after some thirty-six hours, or in those neglected cases which we see for the first time several days or, perhaps, several weeks after a partial abortion, the indications are clearly to empty the uterus completely at once. Dilating the cervix by forcible dilation if necessary, the uterine contents should be removed by means of the finger, the placenta forceps, or the curette, or all three combined. After their successful removal the uterus should be carefully irrigated, and if there is any suspicion of sepsis, the cavity drained by the insertion of a strip or two of iodoform gauze.

There is no valid reason why the woman who has aborted should not require as much time for the repair of uterine lesions and for the proper involution of her enlarged uterus as does the woman who has been delivered at term. Owing to the imperfect development of the enlarged uterus after abortion the process of involution is even slower than the same process after labor at term. If women were educated to realize the fact, and were treated after aborting more nearly as they are after a normal labor, there would be a marked decrease in the number who habitually abort.

R. W. GARRETT.

ANTITOXIN.

THE use of antitoxin in the treatment of Diphtheria is now almost universal. It is essential that the article used should be pure and up to the required strength. We notice that Mr. John Mackenzie, Official Bacteriologist of the Ontario Board of Health, has recently made a test of the antitoxin prepared by Parke, Davis & Co. The samples tested were purchased in the open market, and were found to be pure and above the strength stated upon the label—the bottles were marked as containing 1000 units, but in reality contained between 1200 and 1500 units. As a result of this test, and in consequence of personal experience, we believe that the antitoxin prepared by Parke, Davis & Co. is a reliable article.

THE LAW OF SECRECY.

A MORE judicious reserve than is now practised by many medical men is necessary to protect the interests of the patient and the profession. There is nothing more common than for a doctor to be asked, "How is Mr. Blank," or "what is the matter with Mrs. So-and so?" If a patient is a well-known person, a reporter is likely to request an interview and to demand the nature and seat of the disease, the symptoms, the details of the sick room, the prognosis and treatment. It is, of course, impossible to take the ground that nothing whatever is to be communicated to friends or the public. The condition of a patient in respect to danger, and, perhaps, the probable duration of the disease, may be communicated to the friends. Sometimes it is proper and sometimes not to state the nature of the disease. The physician must exercise his judgement and sense of propriety to determine how much should be told.

The binding force of secrecy in regard to all information obtained professionally is not properly appreciated by many members of the profession, and still less by the public. Many ailments are of a nature that most persons desire to conceal, and they are not to be deprived of this right. Take, for example, the case of a vessel captain who consults a physician about a slight inflammation of the eye. In course of examination the doctor discovers that the captain is very myopic and does not wear spectacles. The man's employer is a personal friend of the doctor. The temptation is great for the doctor to warn his friend that his property is in danger, but his duty as a physician is to respect the secret of his patient, who would otherwise be deprived of his livelihood. Confidential communications by patients relating to themselves or their families are to be held as a trust. Many things become known to the physician which are unsuspected by others. Physical ailments, vices, weaknesses, serious diseases, domestic troubles, all sorts of moral and physical secrets are known to the doctor, and he cannot help knowing them if he would. One who appreciates this duty of secrecy cannot but feel that it is a reflection upon his professional

character when, as sometimes happens, he is requested by a patient to observe this duty. On the other hand, some patients are not sensitive and may even desire that others should know of their maladies, and under these circumstances the physician is absolved from his duty of secrecy. The clause in the code of Ethics reads as follows:—"Secrecy and delicacy, when required by peculiar circumstances, should be strictly observed: and the familiar and confidential intercourse to which physicians are admitted in their professional visits should be used with discretion, and with the most scrupulous regard to fidelity and honor. The obligation of secrecy extends beyond the period of professional services: none of the privacies of personal and domestic life, no infirmity of disposition or flaw of character observed during professional attendance should ever be divulged by the physician except when he is imperatively required to do so. The force and necessity of this obligation are indeed so great that professional men have, under certain circumstances, been protected in their observance of secrecy by courts of justice."

There is a difference of opinion as to the duty of a physician in reference to knowledge of criminal acts. The code however makes no exception, and, clearly, the doctor is not to act as a detective or informant. Some may consider it an extreme view to hold that a physician is under an ethical bond of secrecy when he knows his patient to be a criminal. No matter what the crime, every wretch has the right to medical services in sickness, and the duty of the doctor relates exclusively to his patient. Some may say that a distinction should be made as to the nature of the crime. But the ethical rule is without exception, and the doctor is not called upon to exercise judicial discretion on the point. Not long ago the body of a new-born infant was discovered on the pier beneath a bridge. The following day a policeman, detailed to investigate the matter, visited the physicians in the neighborhood to learn what confinements they recently attended. It was certainly not the duty of any physician to answer such a question.

Another case: A physician is called to attend a young woman whom he discovers to be a victim of malpractice, and, as he believes, in the cause of justice, demands to know the name of her betrayer and of the one who undertook criminal interference.

A magistrate is summoned and the woman dies. The affair becomes public. The excitement contributed to the death of the patient, she was dishonored, the relatives of both parties were disgraced, and after all the real offenders were not punished. From no point of view can the action of the doctor be justified. Knowledge of malpractice was essential to the proper management of the case, but beyond that he had no right to ask questions, and he took an ungenerous and improper advantage in doing so.

The duty of the physician in regard to testimony as a witness is a matter for careful consideration. It may happen that medical ethics and the laws relating to testimony do not agree: that is, he may be called upon to give testimony on matters which he regards as medical secrets. He must decide in such a case whether he will abide by his convictions of ethical duty and accept the consequences whatever they may be. English law makes the divulging of professional secrets compulsory. The leading case in England which fixes the law is that of the Duchess of Kingston, in which Lord Mansfield said, "If a medical man voluntarily revealed these secrets, to be sure he would be guilty of a breach of honor and of great indiscretion, but to give that information which by the law of the land he is bound to do, will never be imputed to him as any indiscretion whatever." In this case Sir C. Hawkins, who attended the Duchess, was compelled to disclose what knowledge he had gained professionally in confidence. Such a decision considers only the rights of the medical man, and not those of his patients, and, to my mind, debars from the right to medical services. Canadian law probably follows the English, but I have been unable to find any reference to it. American law varies in different states. That of New York State is in harmony with the code of Ethics. The statute reads as follows:—"A person authorized to practise physic or surgery shall not be allowed to disclose any information which he acquired in attending a patient in a professional capacity, and which was necessary for him to act in that capacity." The profession in Canada may very properly ask for similar protection.

J.C.C.

INFANT FEEDING.

IN a former issue of this JOURNAL we referred to the various ways in which infants may be fed—the selection of a proper substitute, when breast milk was not available—and the modifications necessary to render cows' milk fit for infant food.

It is our purpose to discuss, in this paper, the quantity of food to be given—when and how it should be given—and how to supply and adjust the nutritive ingredients in an infant's food after it has outgrown an exclusive milk diet.

We return to this subject because we consider it one of the most important within the whole range of preventive medicine. In medical teaching and in medical literature it has not received the time and space it deserves. Young men go out from our colleges, who talk fluently of the Bacterium Coli Commune and the Bacterium Lactic Aerogenes, and are able to discuss seriatim the whole list of Toxicogenic microbes, but if you asked them the capacity of an infant's stomach at birth, not one in ten could make even a good guess. The same lack of practical knowledge prevails among the laity. Within the past month I have enquired of ten intelligent mothers and nurses, who had the care of children, how much milk an infant should be given at one feeding when a week old, and the answers have varied from four ounces up to a pint. Imagine an infant with a capacity for *one ounce* struggling to take in, digest, and assimilate a pint—eight ounces—or even four ounces of food, which is, at least, three times as hard to digest as human milk. Do we wonder that the death rate for infants is high, and that seventy per cent. of deaths, from all causes, in infants are due to disease of the digestive organs? Is it not a mercy that death does come to the relief of these poor, little, helpless, suffering victims of ignorance and indiscretion?

In preparing a schedule for feeding the average healthy infant upon cow's milk, the capacity of the stomach, its digestive power, the age and the weight must all be taken into account. During the early months of infant life the stomach plays a small and unimportant part in digestion. At birth it is simply a di-

lated portion of a tube, almost vertical in position, and serves as a receptacle for the milk, until it is passed on into the intestine to be digested. Its average capacity is one and one-fifth ounces at birth—two ounces at end of first month—four and one-half ounces at third month—six ounces at sixth month—and nine ounces at the end of first year.

In infants the process of digestion is rapid, and during the first month the stomach will be found empty one hour, or at most, one and a half hours after feeding, so that the interval between meals must not exceed two hours. As the child grows the fundus of the stomach enlarges rapidly—the position changes from vertical to horizontal—the food is retained longer in the stomach—hydrochloric acid and pepsin are secreted more freely—the digestive function is increased, so that from the second to the sixth month gastric digestion requires two hours for human milk and two and one-half hours for cow's milk, hence the interval of feeding must be two and one-half to three hours.

The following table exhibits the ingredients, their proportions, the quantity for each meal according to age, and the intervals for feeding a healthy infant during the first eight months:

Age.	Milk.	Water.	Cream.	Sugar.	Size of each meal.	Interval of feeding.	Night feeding. 11 p.m. to 5 a.m.
1st week.	1 dr.	4 drs.	2 drs.	20 grs.	1 oz.	2 hrs.	Twice.
1st month.	3 drs.	1 oz.	2 drs.	20 grs.	1½ oz.	2 hrs.	Twice.
2nd month.	1 oz.	1½ oz.	3 drs.	½ dr.	3 oz.	2 hrs.	Twice.
3rd month.	1½ oz.	2 oz.	4 drs.	½ dr.	4 oz.	2½ hrs.	Once.
4th month.	2 oz.	3 oz.	4 drs.	½ dr.	5½ oz.	2½ hrs.	Once.
6th month.	2½ oz.	2½ oz.	4 drs.	1 dr.	6 oz.	3 hrs.	Once.
8th month.	3 oz.	3 oz.	5 drs.	1 dr.	7 oz.	4 hrs.	

The above table holds good for the average healthy infant, but must be modified to suit individual cases. For example, many infants are above the average weight, and such require not only more food, but relatively more in proportion to their size.

In the preparation of the food and in the feeding of an infant careful attention to details is necessary to secure the best results. Each meal should be accurately measured and given at the appointed time only. The temperature of the food should be 95° to 100° F., and may be taken from a plain glass bottle, graded for ounces and half ounces, fitted with rubber nipple to slip over the neck. Bottles with perforated corks and long rubber tubes should never be used. Fifteen minutes is ample time

for taking a meal, and nursing an empty bottle should not be allowed. After each meal the bottle and nipple must be carefully cleansed and aired. The bottle should be sterilized by lying in boiling water for a few minutes before being used again. Two bottles should be kept for alternate use.

Thus far a milk diet only has been considered. After the eighth month the infant is able to digest starch, and oatmeal, arrowroot, or some of the farinaceous foods should be added. At the tenth month albumen water and beef juice may be given, and when twelve months old, stale bread and meat broth.

During the first half of the second year feeding should be carried on upon the same general principles. Milk should be the basis of the diet—farinaceous foods, in the form of gruel, albumen water, beef juice, broths, etc., being added, the form and quantity of each being varied from day to day to suit individual tastes. The average healthy infant will require to be fed five times in the 24 hours, and may take six to eight ounces of milk and one to three ounces of other food at each meal.

After eighteen months, solid food and fruits may be added, but only the simple, plain, easily digested forms, such as rare beef and mutton, scraped, stale bread, fresh fish, soft boiled eggs, baked apples, stewed prunes, orange juice, etc. The number of meals may be reduced to four, regular hours for feeding must be observed, and water only is to be allowed in the intervals:

In infants' food, as in adults', the nutritive ingredients are five—proteids, fats, carbohydrates, mineral salts and water—but the form and relative proportions in which these are supplied to infants are not the same as for adults. One reason for this is the immature condition of the infantile digestive organs; another is that provision has to be made for the rapid metabolism and growth of the infant. So long as an exclusive milk diet is used, all these ingredients are supplied in due form and proportion, but when the milk diet has been outgrown, and other foods substituted, it becomes a question of vital importance how these several nutritive ingredients may be furnished in such quantity, quality and form that the infant may digest and assimilate what the system requires to maintain the balance of nutrition, and secure the growth and development of a healthy, robust child. The limit of this paper will not allow a full discussion of

this question, but a few hints may aid in the solution of the problem. Proteids are represented by the casein, or curd, of milk, the white of eggs, lean meat, and the gluten of flour. They are essentially tissue builders, and are the chief agents in carrying on the vital functions of digestion and assimilation of all the other foods. Deficiency of proteids in the food will induce anæmia, impaired digestion and nutrition, general weakness and loss of tone in the tissues and circulation, etc. Excess of proteids is indicated by colic, and by masses of undigested casein or curd in the stools. Fats are best supplied to infants, as cream or cod liver oil. They increase the body weight, produce animal heat, prevent tissue waste, and promote absorption of mineral salts, especially phosphates, from the intestines, and thus favor the growth of bone and nerve tissue. Deficiency of fats in the food is shown by emaciation, defective bone formation, nervous exhaustion, obstinate constipation, etc. Too much fat will cause regurgitation of the food an hour or so after eating, and will increase the action of the bowels.

In the early months carbohydrates are supplied to infants in the form of sugar, later as starch. They are, in part, converted into fat, thus increasing body weight, and in part used up in the generation of heat, thus preventing tissue waste. When deficient the gain in weight is slow, and there may even be emaciation. In excess they cause eructations of gas, pyrosis, colic and green stools. Mineral salts are essential to the upbuilding of the nervous and osseous systems. They enter into all cell formation and are found in the blood and digestive fluids. They facilitate absorption, secretion and excretion. They are incorporated with all other food stuffs, and therefore need no separate consideration.

Water is the medium in which all the proximate principles of life are dissolved, elaborated and distributed. In the infant metabolism goes on rapidly, and water is needed to dissolve, suspend and eliminate the waste. In proportion to its weight an infant requires six times as much water as the adult. The youngest infant should have water several times in the day, and the demand increases as the number of meals is reduced and solid food is added. When water is withheld every function of the body is impaired; it is as essential for growth as any other kind of food; it is as necessary for health as the sunlight.

ISAAC WOOD,

REFLEX ACTIONS.

THE many questions of nerve associations are oftentimes passed over by the busy practitioner, and while, perhaps, the knowledge of the fact of a reflex act is all that is required from a clinical standpoint, yet the recognition of the paths of these acts is of considerable interest.

The nervous system, though complex, is a unity in that it binds together and associates organs of such different actions. Without its control each organ could not work, or if it did, would, so to speak, burn itself out. With its perfect action it renders the human organism a finely balanced machine, and, like a delicate machine, anything disturbing one part will interfere with the action not only of that part, but also with that of another and, perhaps, distant part. There are some associations which puzzle and can only be explained by examining closely the anatomy of these structures, such, for instance, as Why, in paralysis of the facial nerve of central origin, the eyelid is to a great extent unaffected, but in that of peripheral origin from cold, blows, &c., the whole side of the face is paralysed. The explanation of this is that the fibres supplying the Orbicularis with motion are derived from the third nerve root and pass by means of the facial to their distribution in the Orbicularis palpebrarum, and hence in injury to the nucleus of the facial or above it, these fibres are not disturbed, but when the facial is injured, either in the canal or at its exit, then these extraneous fibres being bound up with it are also affected, and the paralysis is complete.

When one branch of a nerve is irritated the paths of reflex acts may be direct, *i.e.*, passing through branches of the same nerve, or indirect—passing through other nerves and so affecting distant points. As examples of the first or direct course we have (1) earache associated with toothache of lower jaw. This is due to the fact that the greater part of the external meatus is supplied by the auriculo-temporal, a branch of the inferior maxillary, and the lower teeth are enervated by the inferior dental, a branch of the same trunk, hence irritation of one branch disturbs the other, and pain in the lower jaw is so often accompanied by earache. (2) The copious flow of tears resulting from a boil on end of nose or the irritation of certain odors. Here the nasal which supplies the skin and anterior portion of the mucous membrane of nose is irritated, and the nasal being a branch of the ophthalmic, the lachrymal a branch of the same

trunk, causes by reflex action increased secretion from the lachrymal gland. (3) Chronic coughing or vomiting from wax in external meatus. In this the pneumogastric is at fault, for though the greater part of the external meatus is supplied by the inferior maxillary, a small portion—the posterior—is controlled by the auricular branch of the pneumogastric, and the pneumogastric supplying the larynx, the irritation is referred from the ear to the terminal fibres of the superior laryngeal, the sensory branch of the pneumogastric to the mucous membrane of the larynx and coughing results, or to the terminal fibres in the stomach and vomiting occurs.

(4) While in appendicitis we have the cardinal symptoms of pain, tenderness and rigidity, the pain may not be in the usual situation of the appendix, but may be felt most intense on the opposite side of the abdomen or at the umbilicus. This is because the appendix is supplied by the superior mesenteric plexus of the sympathetic, and this plexus also supplies the rest of the small intestine, hence the pain may be reflected to the parts occupied by the small intestine.

(5) Contraction of the abdominal muscles. When laying a cold hand on the abdomen one is struck by the almost instantaneous contraction of the abdominal muscles. This contraction is a wise provision of nature to guard against injury to the abdominal contents. In the abdomen nature relies on flexible muscles to protect the easily injured structures, whereas in the cranium, thorax and pelvis the delicate organs are protected by a bony framework. The skin of the abdomen acts as an outlying picket for the muscles. They, skin and muscles, are supplied by the same nerves—the intercostal—the skin by the lateral cutaneous branches and the muscles by the main trunks, and by this arrangement a quicker result occurs than if the reflex act were brought about by a less direct path.

The above are examples of the first variety mentioned, *i.e.*, direct paths. As examples of indirect or the second variety we have the marked rigidity of the abdominal muscles in inflammatory conditions of the viscera. At first glance it seems strange that there should be any nervous connection between these structures, because the viscera are supplied by the epigastric plexus of the sympathetic system at the back of the abdomen and the muscles by the intercostal or spinal system, but it is plain when we consider that the epigastric plexus has the great splanchnic from the sympathetic of the chest as its main derivative and the intercostals have branches running to the root of the splanchnic, hence we can realize how thoroughly nature binds parts together, for here the delicate viscus is in immediate contact with its natural protector, *i.e.*, the abdominal muscles. In this example the path is through

the epigastric plexus, which sends branches along the arteries to the different organs, and so when any viscus is inflamed the irritation is conveyed up these branches to the epigastric plexus, and from this plexus to the splanchnics, thence through the branches joining the splanchnics to the intercostals which supply the abdominal muscles. Possibly pain in the shoulder, that is said to be oftentimes caused by hepatic trouble, may be a reflection through the sympathetic which supplies the liver and communicates in the neck with the cervical plexus or spinal accessory which supplies the shoulder, and being a sensory as well as a motor nerve to the trapezius, may account for the aching felt here in this condition. In the perineal region, however, we are daily brought in contact with these indirect reflex effects, such as vesical tenesmus from piles, fissure ani, &c., and conversely, pain and tenesmus of the rectum from cystitis, stone in the bladder, inflammation of prostate, &c.

The connection here is by means of the 4th sacral nerve. The sides of the prostate and neck of the bladder are supplied by the sympathetic, *i.e.*, inferior hypogastric plexus, and this plexus also receives a branch from the 4th sacral, but the 4th sacral sends branches to the levator ani and sphincter ani, hence the intimate relation between the bladder, prostate and anus. This connection was recently emphasized in a very severe case of prolapsus ani in a child, in which every form of treatment by astringents failed, but which was readily relieved by circumcision. Here retained secretion behind the glans constantly irritated the cavernous nerve, a projection forward of the plexus spoken of above, and the constant irritation weakened the sphincter muscle, allowing the prolapse.

The path in this example being from the cavernous up to the inferior hypogastric plexus, and through the branch of the 4th sacral in connection with that plexus to the other branches of the 4th supplying the levator ani.

Stone in the bladder is frequently accompanied by pain behind the glans penis, due to the connection of the cavernous nerve above referred to with the sympathetic plexus alongside of the neck of the bladder. Irritation of the urethral mucous membrane causes erection of penis and spasmodic stricture, because the mucous membrane is supplied by the int. pudic nerve, which is also distributed to the erector penis and compressor urethral.

Again, the aching pain of the testicle from irritation derived from the kidneys, as in acute nephritis or renal calculus, is due to the fact that the testicle has connected with it the spermatic plexus, a projection of the renal sympathetic system. And this relation also explains the severe shock and vomiting resulting from injury to the testicle because the spermatic is in-

timately associated through the renal with the epigastric or solar plexus, the great abdominal control, hence the testicle has the same nerve connection as the intestine, and we know what shock is produced by an injury to the intestine.

D. E. MUNDELL.

CONVOCATION AT QUEEN'S.

THE GRADUATES IN MEDICINE RECEIVE THEIR DEGREES—THE CHANCELLOR HONORED—DR. PURDY, AN OLD GRADUATE, MADE AN LL.D.—A BRILLIANT CEREMONY—ADDRESSES BY THE REV. PRINCIPAL, CHANCELLOR FLEMING, DR. PURDY, AND DR. MOORE.

KINGSTON, April 7.—(Special.)—The first convocation for the benefit of the medical graduates of Queen's took place in the University hall this evening. It was instituted so that the medicals would not be compelled to remain in the city for two or three weeks longer until general convocation and at considerable expense. There was a much larger attendance than expected, and the interest manifested in the new feature was somewhat of a surprise. On the platform were seated the various professors in academical robes, and among the audience were many strangers from a distance here to witness their sons receive their degrees. Convocation was opened by Rev. Prof. Ross, who acted as chaplain of the day. Principal Grant then installed Chancellor Fleming, the occasion making the seventh time that the Ven. Chancellor has accepted the duties of the office. He was congratulated by Dr. Connell not only on his selection as Chancellor but on the distinction placed on him by Her Majesty Queen Victoria. Dr. Connell then, on behalf of the University Council, presented to the Chancellor an excellent oil painting of himself, the unveiling of which caused great enthusiasm.

The Chancellor made a suitable reply.

CONFERRING THE DEGREES.

Dean Fowler then introduced the medalists, who were handed their palms of victory by the Chancellor. The names of the graduates were next called by Registrar Chown. The graduates were capped in couples, the degree hoods being placed upon them by Dr. Herald, who at the same time handed them their "sheepskins." During this ceremony the graphophone was introduced. It was located in the gallery.

The next item on the programme was the reading of the valedictory by W. Moffatt, M.A.

Dr. Fowler, Dean of the medical faculty, presented Dr. Purdy, of Chicago, to receive the degree of LL.D. In doing so he said he always took a pardonable pride in the success of our graduates, believing that their success in the battle of life is due, in some measure at least, to the training they have received at this University. Dr. Purdy's course since his graduation in medicine, now some twenty-nine years ago, has been ever onward and upward, and he is now known, not only in Chicago but far and near, as an eminent consulting physician. His laboratory attainments are of a high order, his writings on medical subjects being eagerly sought after on account of their literary and scientific value. He retained a warm and kindly feeling towards the University. We confidently hope that many of those now leaving the University to engage in the battle of life may follow in his footsteps and attain like distinction.

SPEECH BY DR. PURDY.

Dr. Purdy was greeted with cheers and applause. In his reply he said: "Principal Grant,—After twenty-nine years' absence from the venerable and venerated halls of my alma mater, it is with feelings of no ordinary pleasure that I find myself privileged again to visit my old class rooms, to meet with those of my old teachers who are here, and to take part in this august ceremonial. If those feelings of pleasure confess that I cannot restrain a fair degree of pride at the thought and faith that my native University has seen fit on this occasion to enrol my name so permanently upon its roll of honor, I feel sure that you, my fellow-alumni, will understand and pardon the feeling, and you, sir, my senior teacher, and your old colleagues, to whose precepts and example all that has come to me professionally in these twenty-nine years that is desirable is directly due. So now, although nominally this special honor comes to me, I by no means lose sight of the fact that in reality what there may appear to be of credit due me is in reality reflected from you. My life-work has been an instrument from your hands; my professional care has been an earnest endeavor to carry out your precepts and example, and it is indeed pleasing to me after so lengthy a span of years' absence—nearly all of which have been spent among foreign people and in a somewhat distant clime—now to be called back by you, sir, for such generous approval of the work entrusted to me by my masters and my alma mater. I must confess that it is with feelings of satisfaction and even pride that I am able to refer to the endorsement and approval of my work by something over fifty of the medical colleges in the land of my adoption, but at the same time I must confess that to me they are of but

secondary importance and value to the mark of appreciation bestowed upon me to-day by my own University in my own native land. While, therefore, I have not been expected to occupy the valuable time assigned for this convocation by any lengthened address, I cannot allow the occasion to pass without expressing to you, honored sirs, and the illustrious Principal of Queen's University personally, the very deep feelings of gratitude and thanks for the honor conferred upon me, and also to renew my allegiance and assure you of my steadfast loyalty to the University which you have always so distinctly and ably graced as its chief representative."

ADVICE TO THE GRADUATES.

The members of the graduating class were then addressed by Dr. Moore, of Brockville, the representative of the University on the Medical Council. He gave them good advice, and urged them to be sure and secure a first-class library as soon as possible. A man was known by the books he read as well as by the company he kept. They must learn to labor and wait, and must have the courage of their convictions. He spoke of the benefits of industry, and strongly recommended his hearers to beware of slander and to be polite and truthful. Every true physician should be a gentleman. "Keep out of debt," he said, and then closed a most interesting address with the words, "Let duty be your watchword."

The medical convocation was such a success it bids fair to become one of the features of University life in Kingston.

—*Toronto Globe*, April 8th.

The following is the list of the graduates in Medicine, Queen's University, April 7th, 1898 :

N. W. Anderson, Kingston; C. C. Armstrong, Kingston; F. W. Birkett, Ottawa; C. H. Burger, Kingston, Jamaica; W. F. Callas, Kingston; G. W. Collison, Brinston's Corners; W. N. Condell, Ventnor; D. J. Corrigan, Kingston; N. A. Davis, Allowfield; J. D. Doyle, Belleville; H. H. Elliott, Frankville; W. S. Fadden, Brockville; J. E. Gage, Riverside, Cal.; Robert Hanley, Kingston; W. H. Hills, Acadia, N.S.; W. A. Jaquith, Sydenham; E. J. Lake, Kingston; H. W. Malone, B.A., Garden Island; J. F. Mather, Plainfield; Wm. Moffatt, M.A., Carlton Place; C. A. Morrison, Kingston; C. J. McCambridge, Kingston; C. E. O'Connor, Kingston; J. J. O'Hara, Camden East; N. J. Pike, Sebewaing, Mich.; R. C. Redmond, B.A., Lansdowne; J. F. Scribner, Ottawa; Rev. A. Grassett Smith, Deseronto; A. E. Stewart, Kingston; A. L. Tinkess, Greenbush; H. M. Waldren, Guelph; Ward Young, B.A., Odessa.