6. In so-called catarrhal pneumonia, the phenomena ultimately involve a new growth in the alveolar walls and interlobular spaces, affecting the vascular supply of those tissues.

7. A further necrosis of the alveolar walls, and of the new growth surrounding the vessels and involving the neighbouring parts, may lead to cavity in the lung.

8. A cretification may occur, the products being imbedded in the lung.

9. Or a new development of fibrous tissue may take place, deficient in vascularity, and of low vitality, but contractile and capable of extension, involving all tissues of the lung and also the pleura.

10. A resulting contraction of the lung and of the whole side may take place, followed by displacement of viscera.

11. These fibrous alterations in the lung-tissue are an inevitable feature of all chronic lung-affections, and influence their progress and termination more than any other factors in such diseases. As a leading feature in any case, their influence is conservative, and tends to chronicity and prolongation, retarding and counteracting the more serious events of hæmorrhage and secondary septic infections.

There are one or two points which suggest themselves from the considerations I have brought before you.

If chronic phthisis arise out of inflammatory products in the lung, and not from a special and peculiar deposit—the result of a diseased constitution, or a previously existing condition, antecedent in point of time, to all local disorder—is it to be considered a local or a constitutional affection? If local, it belongs to the class of inflammations; or, at least, it is a specific inflammation.

Another and most practical question is, whether catarrh in its ordinary form leads to phthisis? As it has been ascertained that catarrhal pneumonia, which seems, indeed, undistinguishable from phthisis, originates in a catarrh of the minutest bronchi, which has become localised. If this question be answered in the affirmative, we should find innumerable cases of ulcerative disease of the lung arising out of that capillary bronchitis which affects the minutest bronchioles. But I believe it may be clinically asserted that such sequence is a very rare event—so rare, indeed, as to be exceptional. While most cases of phthisis arise out of a gradual, almost unperceived, disorder of health, in which the patient can scarcely say whether the weakness or the cough was the earlier symptom. It is quite certain, as Louis has observed, and every other authority has confirmed, that it is most rare that any patient can refer the first beginnings of his cough to a cold-catching or exposure well within his notice.

Again, such catarrhal colds affect large tracts of both lungs when they become bronchitis; and the essential character of phthisis is localisation—one apex—one limited tract of lung.

This opens the way to much deeper considerations, which I shall take leave to bring before you at my next lecture.

WOLVERHAMPTON.—The report for this borough is for the twelve months, ended September last. This is to be regretted, as the statistics of Wolverhampton cannot be properly compared with those of other large towns. The death-rate during the period reported on, was 21 per 1,000, or, deducting deaths not belonging to the borough, 20 per 1,000. Of the 1,640 deaths, no less than 726 were of children under five years of age, and 491 of infants under one year. Mr. Love seems to think that the sanitary authority can do nothing to reduce this terrible proportion, though the uninhabitable nature of the dwellings in some parts of the borough, would seem to point to the adoption of the Artizan's Dwellings Act, as a partial remedy for the evil. He, Mr. Love, whilst admitting that errors of diet and delicacy of infants, have their place in causing infantile mortality, feels "constrained to add, that it may in the main be traced to the scourge of this country, drunkenness; for where do we find premature birth, marasmus, inanition, atrophy, diarrhoea, and convulsions most prevalent, but in the wretched squalid hovels of the drunkard, the dissipated, and the indolent?" The number of deaths from "preventable" disease is given as 46, though we find 196 deaths referred to the zymotic class, including 101 from diarrhoea. Scarlatina was fatal in 31 cases; the agency of schools in the propagation of the disease having been especially noticed. The mortality from measles has largely diminished, and typhoid fever was fatal in only two cases. Phthisis and chest affections again contributed the largest quota of deaths, 491, and were especially fatal to young children and old persons. The sanitary work of the borough seems to be pushed rapidly forward, and if we may judge from this prefatory report, there is an unusually enlightened sanitary committee in the town.

ON CERTAIN POINTS IN THE PATHOLOGY AND TREATMENT OF INDIGESTION.*

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THE subject of indigestion is so very wide, that I cannot take up more than one or two points connected with it in the present paper. There are few subjects in medicine of greater practical importance; for there are few that come more frequently under the notice of the medical man, that cause greater annoyance to the patient, or are more satisfactory to treat—at all events, in the earlier stages. I have no doubt that many things which I may say in this paper will be quite familiar to you all; and what I hope to do is not so much to give you new observations on the symptoms of indigestion, or new methods of treatment, as to discuss the causes of the symptoms and the results of the treatment in such a way as, perhaps, to render the treatment more systematic.

By digestion we mean the solution and absorption of the food, and the rejection of the excreta, in such a way as properly to nourish the body; and by indigestion we understand the non-solution or mal-assimilation of the food, and the imperfect removal of its waste products. Digestion begins in the mouth; and, if we retain farinaceous food in the mouth for a sufficiently long time, the starch will be converted into soluble sugar, and will be dissolved. But it is rare for us to allow the food to remain in our mouths long enough for any solution to take place, excepting in the cases of such very soluble substances as salt or sugar. The saliva, which is secreted by the mouth, performs most of its solvent action in the stomach, after it has been swallowed. We might, therefore, look upon the stomach, and not the mouth, as the first part of the intestinal canal where digestion takes place. But, if digestion begins in the stomach, indigestion very often begins in the mouth; for it is in the latter that one of the most important parts of the solvent process takes place—namely, that of mastication. The digestive juices act but very slowly upon large masses either of starch or of albuminous food, though they will attack those substances readily if they are completely broken up. Most of us, I dare say, remember from our boyish days how long a bull's eye of sugar takes to dissolve in the mouth, so long as it remains whole; and how quickly it disappeared after we had once yielded to the temptation to crush it between our teeth. And what is true of sugar is also true of bread and of meat.

Why should bread fresh from the oven be indigestible, and the same bread, after it has become stale, perfectly wholesome? I think you will readily see the reason by crushing a piece of each between your fingers. You will find that the new bread simply forms a toughish mass, while the stale crumbles into a fine powder. Dip a piece of each into water, and the new bread will only take up a little, while the stale sucks it up like a sponge. These two properties of the stale bread—its ready pulverisation and its sponge-like absorptive power—render it easily broken up and easily saturated by the digestive juices, so that it is quickly and conveniently digested; while the new bread is liable to form, in the stomach and intestines, pieces which are not readily permeated by these juices, and are, therefore, dissolved with comparative slowness. The same thing is the case with meat. When it is taken into the stomach in large lumps, the gastric juice can attack it only on the outside; but, when it is thoroughly broken up by the process of mastication, it is dissolved with great facility.

We see the advantage of a fine subdivision of food in the case of milk, which in the stomach is curdled into small flakes, which are digested with great rapidity. These fine flakes are seen in healthy infants, who regurgitate some of their food after having taken too much. But, in children whose stomachs are out of order, the milk curdles in a different way, is thrown down in large indigestible lumps, which are either vomited up, or pass into the bowels, causing diarrhoea. In such cases, we mix the milk with lime-water, which causes the casein to be again thrown down in small flakes, and thus prevents a repetition of the mischief.

Now, imperfect mastication is a very common condition, and is the source of a great deal of the dyspepsia with which we meet. It may have several causes. Decayed teeth are one cause. Even when, on cursory examination, the teeth appear to be fairly sound, a small spot of caries on one of them will make it tender, and its possessor uses the other side of the mouth almost entirely for mastication. If there be tender teeth on both sides, he is tempted to bolt his food after masticating it very imperfectly. Want of teeth is another cause. We sometimes see patients whose teeth, so far as they possess them, are either

* Read before the Lancashire and Cheshire Branch of the British Medical Association.

decayed, or, more generally, carefully stopped, but who have large blanks in either jaw, whence the molars which formerly filled them have been removed. Those molars which remain are sometimes rendered almost useless from the want of opposing molars in the other jaw, and thus the food is very imperfectly broken up. Another cause, and perhaps a still more frequent one, is the habit of eating hastily, without taking time to masticate. This is not unfrequently induced, in the present day, by the necessity of catching a train shortly after a meal, or by swallowing the food during too brief an interval from business. Another cause is the habit of reading about, or thinking of, during meals, such subjects as relate to one's daily actions. So long as a man reads about something which has no direct reference to his own activity, I do not think it does him much harm; but, if his thoughts be directed towards anything which concerns his active life, the case is very different. I have observed that, in such circumstances, the mere thought of an exertion which he must make at some future time seems to lead to hurry in the present; and so the man bolts his food, finishes his meal in double-quick time, and hastily rises from the table. All this causes imperfect mastication of the food, and consequently leads to its imperfect solution in the stomach and intestines, or, in other words, to indigestion. So long as the man is young, the effects of imperfect mastication may not be noticed, because almost all the organs of his body are capable of doing more work than they are usually called upon to perform, just as he himself is rarely worked up to his full powers. A young man, even if pretty hardly worked, is almost always ready for a spurt when called upon; and so are his stomach, heart, or lungs. But, as life advances, he becomes less and less ready for a spurt. He is living more and more up to the limit of his powers; and the same is the case with his stomach and intestines. The young man's stomach will digest his food even when imperfectly masticated; but, as middle age approaches, this becomes more impracticable; and, unless the food be previously broken up, the gastric juice is powerless to dissolve it. The symptoms which then occur are much the same as those which would be produced by deficient secretion of gastric juice in the stomach; and, in all cases of indigestion, the first thing we should do is to examine the teeth, and make inquiry as to the length of time devoted to meals; and it is well, if possible, to get some information on this point from others than the patient, as he may be unconscious of his habit. If we find that the patient is in the habit of bolting his food, we must insist on more time being taken, and advise him to give his thoughts to his food, and not to his business, while he is taking his meals.

Where we find the teeth imperfect, of course the patient should be sent to a dentist, either to have the decayed teeth properly stopped, when that is practicable; or extracted, when stopping is impossible, and to have the blank spaces left by removal filled up by artificial teeth—so that mastication may be rendered easy. But, even when mastication is thoroughly performed, we find that indigestion may occur from various conditions of the stomach itself. One of the most common of these is catarrh, whether acute or chronic. The symptoms to which this condition gives rise are usually loss of appetite, with an occasional tendency to nausea. Sometimes, however, there is increased appetite, or a gnawing sensation before meals, disappearing as soon as food has been placed on the table, or the first mouthful has been swallowed, and giving place to anorexia. There is a feeling of weight at the epigastrium, and very often pain after meals there, shooting through between the scapulæ. There is much flatulent distension, and sometimes eructation. It is interesting to trace the symptoms to these causes in functional or structural changes in the condition of the viscera, though sometimes our attempts are very imperfect, and occasionally entirely unsuccessful. The loss of appetite in these cases may, however, be connected with a certain amount of congestion—as may also the increased appetite: for, although the cause of appetite has not been precisely made out, it appears, to some extent at least, to be associated with a full condition of the vessels in the stomach. Thus it is that so many different drugs have the power of increasing appetite. Bitters, such as quassia and quinine; stimulants, such as brandy and whisky; irritants, such as red capsicum and arsenic, all have this power. Perhaps the one point in which they agree is, that they all tend to cause congestion of the sensitive mucous membrane. But, when the irritation passes beyond a certain point, a change takes place; and, instead of appetite being felt, there is a sensation of nausea. All the drugs that I have mentioned have this effect, when given in too large quantities. Though in small doses they cause appetite, in large ones they excite nausea or vomiting. We might expect, then, that a moderate degree of congestion, due to a catarrhal condition, would excite in the stomach a feeling of appetite akin to that produced by irritant drugs; and that, when the congestion was still more increased by the stimulating effect of the first few morsels of food, the feeling of appetite would be replaced by one of satiety or nausea. The

cause of the feeling of weight at the epigastrium, we cannot precisely determine; but I should be inclined to think it due to the continued pressure of the weight of food upon one part. In the healthy stomach, the peristaltic movements of its walls keep the food in constant motion, and thus its weight is distributed through the entire viscus, and not allowed to press long upon any one part of it. We all know that a slight weight, when allowed constantly to press upon one part, becomes painful, or almost unbearable—though, if moved about over different parts of the body, it would produce a sensation rather agreeable than otherwise. The feeling of weight and dragging at the epigastrium, then, I am inclined to associate with impaired movements of the stomach, allowing the food to accumulate in the greater curvature; and, by its constant pressure upon that part of the organ, and continued dragging upon the pyloric and cardiac extremities, producing the feeling of weight as well as the shooting pain between the scapulæ already spoken of. The flatulent distension is probably partly owing to the generation of gas during the slow and imperfect digestion of the food in the stomach; and partly also to its slower absorption by the blood: for there can, I think, be little doubt that an interchange of gas takes place between the gases in the stomach and the blood in the gastric vessels, just as an interchange occurs between the air in the lungs and the blood in the pulmonary vessels. It is, no doubt, much slower in the stomach, even under healthy conditions; because the layer of tissue lying between the vessels and the gas is much thicker in the stomach than in the lungs. In a catarrhal condition, the difficulty of absorption would be increased in two ways; because not only will the layer of mucus lying in the stomach oppose a considerable impediment to the absorption of gas, and thus take up the gas more imperfectly, but the blood in the congested vessels will circulate more slowly. In cases of heart-disease, we very often find that the patient is a good deal troubled by flatulence, which may, no doubt, partly depend on catarrhal changes in the stomach itself, due to the impeded circulation; but is, in my opinion, also in part due to the slow circulation itself. For one can notice that flatulence is very apt to come on in a healthy person, when the circulation is embarrassed after running to a train. Nor is the heart the only organ which leads to congestion of the stomach. In mitral-disease, no doubt, the backward pressure of the blood upon the stomach through the portal veins, which are destitute of valves, causes congestion; but the gastric circulation may also be impeded by the alterations in the liver itself. We all know that, in cirrhosis, venous congestion is induced in the stomach, and may lead to hæmorrhage from the gastric vessels; but, perhaps, we do not so often consider that vaso-motor changes occurring in the normal liver may also lead to gastric congestion. When the liver is removed from the body, and blood is allowed to flow through the portal vein, from a bottle containing it, by means of a cannula and India-rubber tubing, we notice that the liver is almost like a sponge—swelling out enormously when the pressure is increased by raising the bottle, and diminishing greatly when the pressure is lowered. We also notice that the flow through it may vary to an enormous extent. Sometimes the blood seems to stream through the organ, as though it presented no obstruction whatever; while, at other times, it will only pass through in a fine stream, or even drop by drop, notwithstanding the tolerably high pressure behind. These observations show that the vessels of the liver, so long as it retains some vitality, even after its removal from the body, are capable of great dilatation and contraction, and have very considerable contractile power. This power, if exercised during life, cannot but influence very greatly the circulation in the stomach and intestines; and, if the hepatic vessels contract very much, they may lead to congestion of the stomach. In the condition of so-called biliousness, we find that there is, in some cases, the craving appetite which I have already mentioned, something passing into anorexia, or we may have the anorexia without any craving. It is possible, indeed probable, that these symptoms may be partly produced by the entrance of bile into the stomach itself, where it will interfere with the gastric digestion. But we sometimes find, in cases of biliousness, these symptoms, without having any evidence that the bile has actually entered the stomach; and, therefore, it seems probable that the alterations in the appetite may, to a great extent, be due to alterations in the gastric circulation, caused through vaso-motor changes in the liver. Another factor in the production of flatulent distension is, no doubt, the imperfect movements of the stomach; or, their imperfect co-ordination interfering with the expulsion of gas through the cardiac or pyloric orifices.

From the causation of the weight, pain, and flatulent distension in cases of dyspepsia we may deduce rules for treatment. And first as to diet: we must have regard to the rules already given for complete mastication, not merely because the food is more readily dissolved when it is thoroughly broken up, but because prolonged mastication induces a freer flow of saliva. This alkaline fluid, when it reaches the stomach,

acts as a stimulant to the mucous membrane, and induces a more copious secretion of gastric juice, so that the complete mastication of food in the mouth has the double action of aiding and accelerating gastric digestion; but if we are to get this stimulating effect of the saliva, the stomach must not be full of fluid when the saliva reaches it. It is a good rule, therefore, for persons suffering from flatulence to begin their meals with solid food, and not to take any fluid until the meal is pretty far advanced. We find that patients not unfrequently begin their meals with a draught of some fluid, such as tea or coffee, and then proceed to the solids. After a meal taken in this way, they suffer from flatulence, but are free from it if they begin with the solids instead. Soup appears to be less objectionable, and the patient may sometimes be allowed to take soup at the beginning of dinner; but he should never be permitted to commence his breakfast with tea or coffee. Occasionally it will be of advantage, even at dinner-time, to begin with solids. Where the stimulant action of the food is insufficient, even when taken in this way, we must add to such action by the use of weak alkaline solutions, to be taken before meals, as, for example, ten grains of bicarbonate of soda, with a little bitter infusion. The time for administering this will vary, but it will probably be found best about twenty minutes before meals, though sometimes twenty-five minutes or half an hour. Sometimes we find that a little alcohol with the meal is beneficial, stimulating the stomach, and increasing the circulation, but in other cases we find that it is decidedly injurious; and that, although its local action on the stomach may be unobjectionable, and its immediate effect agreeable enough, yet after its absorption it seems to derange the liver, causing dulness and heaviness to come on a few hours after the meal. One cause, and not an unfrequent one, of indigestion from atony of the stomach, is simply that the stomach, like the rest of the organism, is tired. A man will sometimes work the whole day, until he is nearly exhausted, and then, hurrying home, will at once eat a heavy meal. His whole nervous system is exhausted, and his stomach shares in the general fatigue. It is unable to meet the sudden call thus made upon it; digestion goes on slowly, and thus the individual suffers from weight, distension, and flatulence. Most of these cases occur in men who work their brains more than their muscles; and it is generally utterly useless for the medical man to tell the patient not to work so hard. He *will* work, and then he calls upon the doctor to shield him from the consequences of his indiscretion. The best thing to do, in these cases, is to insist that the patient shall lie down and rest for ten or fifteen minutes before dinner. If he be above middle age, a little wine just at the commencement of dinner may considerably aid his digestion. There is a physiological reason for the glass of sherry so often taken with the soup at dinner; it stimulates the stomach before the food has been ingested, and thus its subsequent digestion. But it is chiefly in men above middle age that this is required, as was, I think, well shown in the experiences of the Ashantee campaign, as recorded by Parkes. It was found that, when the ration of rum was served out to the troops on halting at night, the younger men did not seem to care for it, but the elder ones wanted their own and that of their comrades too. This might, doubtless, be partly due to the different character of the old and young soldiers, but I think probably not entirely so. It probably indicated, to some extent at least, the physiological want of a gastric stimulant, felt by the elder men, for whom the short rest after the march, during the time the evening meal was being prepared, was not sufficient to remove the fatigue which would have impaired their digestion, though the rest without the stimulant was quite sufficient for the younger soldiers. Exposure to cold, as a cause of gastro-intestinal catarrh, and consequent indigestion is sometimes, I think, too little considered. The intestines are but very thinly covered by nature, and the slight abdominal walls are insufficient to protect them from great changes in atmospheric temperature. We can readily see this in the attitude which persons assume when they go to sleep with an insufficient quantity of blankets. They curl themselves up so that the thighs lie against the abdomen, forming a sufficient covering to the intestines. The intestinal vessels are able to contain a great quantity of the blood in the body, and, as they contract when exposed to cold, so much blood goes to the brain, that the person cannot get to sleep. When we get warm, however, they dilate, allow the blood to leave the brain, and we fall asleep. The thighs thus form an efficient covering in bed, keeping the intestines warm, and allowing their vessels to distend, and the person to fall asleep; but during the day the intestines are not unfrequently exposed to chills. In hot countries, this is well recognised, and all through the East we find that the people wear a shawl or bandage around the abdomen. Some time ago, when visiting Pompeii, I was struck by observing the same thing in the bodies of those who had perished during the eruption of Vesuvius, which overwhelmed the city. The necessity for protecting the abdomen, is, perhaps, more readily noticed by the natives of hot climates, who wear

little other clothing, than by us, who are better clad all over; but, even here, the necessity for it exists; and in thin persons, who are liable to indigestion, the abdomen should be well covered by a flannel bandage, although there may be no necessity for this in those whose intestines are already protected with a thick layer of omental fat. The best form of bandage is a double strip of flannel, about seven and a half to eight inches broad, and long enough to go once and a half round the body. The overlapping part should be in front, and should be simply fastened with a couple of safety-pins. These I find to be more easily adjusted, and less troublesome than straps, tapes, or buttons.

Another cause of indigestion is disordered relation between the stomach and the liver. Usually, the bile does not enter the stomach, but remains in the duodenum and intestines, but, when indigestible and irritating substances enter the stomach, the bile may flow into it, producing very unpleasant symptoms; not merely does it interfere with digestion, by precipitating pepsine, but the local irritation which it produces in the stomach itself, as well as its general effect upon the nerve centres after being absorbed into the blood, causes the patient to suffer from dullness and headache. In Dr. Beaumont's interesting experiments upon Alexis St. Martin, he notes, that where he introduced several muslin bags, containing various articles of diet, into the stomach, St. Martin, shortly after their introduction, began to complain of a sense of weight and distress at the scrobiculus cordis, slight vertigo, and dimness of vision. This continued to increase, and became quite severe, accompanied, at the latter part of the time, by slight pain in the forehead and through the eyes, and a sense of tightness or stiffness across the breast. His countenance had changed from a florid and healthy, to a sallow, sickly appearance during the experiment, and a soreness at the pit of the stomach continued, after the extraction of the bags, for eight or ten hours; and had not entirely subsided next morning. Morbid action of the inner (?) membranes was evident next day, with considerable erythema and aphthous appearance. Some of the bags were covered with a thick, mucous coat, tinged with yellow bile; and to the entrance of the bile into the stomach, Dr. Beaumont ascribes the symptoms observed in St. Martin, as he had noticed them also in similar experiments. Here, it was apparently, the irritation of the indigestible muslin bags which caused this bilious attack in St. Martin; but other indigestible substances will produce the like effect.

Nor is this the only disturbance in the relation between the liver and the alimentary canal, which is of importance in the production of indigestion. I have mentioned the probable effect of vaso-motor alterations in the liver upon the vascularity of the stomach and intestines, and upon the solution and digestion of food within them. But there remains still another condition of great importance. The digestion of food is not entirely accomplished in the alimentary canal. In addition to what used to be called the primary digestion in the stomach and intestines, there is the secondary digestion, which appears to be of no less importance. Farinaceous foods are converted, in the intestinal canal, into grape-sugar, but apparently only a small amount of this sugar reaches the general circulation unchanged. It first undergoes conversion into glycogen in the liver, and is thence passed out, as it is wanted, into the general circulation. The albuminous constituents of the food are converted, in the alimentary canal, into soluble peptones, but, like the sugar, these also do not reach the general circulation unchanged. Excess of sugar in the systemic circulation is injurious, as we see in cases of diabetes, but excess of peptones appears to be still more injurious. The action of these bodies has been recently investigated by Professor Albertoni of Genoa, and by Professor Ludwig and Dr. Schmidt-Mühlheim in Leipsic. Albertoni has found that peptones, when injected into the circulation, deprive the blood of its power of coagulation, at least in dogs and cats, and probably in all carnivorous animals. It has not the same power in sheep or rabbits, and probably has not the same action in herbivora as in carnivora. Ludwig and Schmidt-Mühlheim also observed the effect of peptones on the coagulability of the blood, and they have investigated their action upon the blood-pressure. They found that when the peptones are injected into the veins the blood-pressure sinks considerably; and, if the quantity introduced be great, a soporose condition, convulsions, and death are produced. It is therefore evident that, unless there were some provision for the alteration of peptones before they enter the general circulation, we should be poisoned by the products of our own digestion. Ludwig and Schmidt-Mühlheim were unable to settle precisely where the peptones underwent transformation, most of them having apparently already disappeared from the portal blood before it reached the liver. Two other observers, Plosz and Görgyal, were led by their experiments to fix upon the liver as the place where peptones undergo transformation, and it seems not improbable that to some extent they are right. The liver, like the stomach, may be overworked, and both organs are liable to great functional disturb-

ance from emotional causes. It is extraordinary how frequently one is able to trace diabetes, or grave functional disorder of the stomach to grief or worry; and although it is impossible to protect patients from these injurious causes, just as it is impossible to protect them from overwork, yet we must do our best to lessen their injurious effects. Probably the best way of doing this is, to remove from the patient's mind during the hours when digestion is going on, so far as is possible, the source of grief, worry, or anxiety which disturbs him. It is, therefore, well to insist, that he shall give orders that no letters or telegrams be given to him, or any commercial intelligence in the papers be looked at, until at least an hour after dinner.

Another most important factor in the proper regulation of the hepatic function is, the removal of waste products from it. The bile is one of these, and its accumulation in the bile-ducts leads to its re-absorption and circulation in the blood, with all the consequences which the injurious effect of the bile upon the nerve-centres is likely to produce. The bile is secreted under very low pressure, and its expulsion from the liver is effected, to a great extent, by the mechanical pressure exerted upon the liver by the diaphragm during respiration. When the person leads a perfectly sedentary life, so that no calls are made upon the respiratory organs for increased action, the pressure of the diaphragm on the liver is diminished, and consequently there is a tendency to the accumulation of bile in the biliary radicles, and to its absorption into the blood. This shows the physiological necessity for exercise in persons who are liable to bilious attacks; and of all forms of it, exercise on horse-back and rowing are probably the best. Half an hour's brisk ride, will do more good to the liver than two hours' walking. Here I ought perhaps to have said a few words in regard to cholagogues; but as I mentioned at the commencement, this subject of digestion is so wide, that to go into it in detail would extend my paper far beyond any limits that could be allowed to it.

THE IMMEDIATE CURE OF INGUINAL HERNIA BY A NEW INSTRUMENT.

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The operation has been performed in the following cases since the paper published in the JOURNAL of December 11th and 25th was written.

CASE XIV. *Right Oblique Inguinal Hernia*.—Mrs. S., married, aged 27, residing at Hanley, a stout, well-developed, healthy woman, had only one child, ten years previously. She never had any serious illness. She first noticed rupture eight years ago, after falling down some steps. It had gradually increased in size, and latterly became painful. When I saw her on September 23rd, 1879, there was a right oblique inguinal hernia about the size of a duck's egg; and the inguinal ring was quite open. After preliminary preparation, I operated at the patient's house on October 7th, 1879; Dr. Partington administering chloroform. Lister's antiseptic dressings were used, and the operation was performed under carbolic spray. After the operation, some chloroform-sickness ensued, which soon subsided.—October 8th. She slept little, but had no pain. There was frequent retching. Temperature 98.5° Fahr.; pulse 96.—October 9th. She slept well after a dose of morphia. The wound was quiet. Temperature 98.5° Fahr. She had no pain.—October 10th. She was going on well. The wound was dressed under spray. There was slight serous discharge, and some oedema along the inguinal canal, with induration. She was ordered to have a dose of castor-oil. The daily progress was uninterruptedly good, and she suffered no pain.—October 15th. The wound was dressed, and the instrument removed. There was very little discharge; the track of the instrument was indurated throughout.—October 23rd. The antiseptic dressings were removed. The wound was almost healed. Simple dressing and a pad and bandage were applied.—October 26th. The wounds were quite healed. She was allowed to get up. There was no impulse in the inguinal canal on coughing.—November 14th. She had been about ordinary household duties, and felt quite comfortable, and could stoop and move about without any pain or discomfort such as she had previously. She wore a pad truss, and has continued well and strong since.

CASE XV. *Right Inguinal Congenital Hernia*.—Frederick J., aged 4, was admitted into Children's Ward, North Staffordshire Infirmary, under Mr. Spanton, on August 23rd, 1879. He was a healthy unmanageable child, with a large scrotal hernia of the size of a man's closed fist. The inguinal rings were very wide, and the finger could be passed easily within the abdomen. No truss was of any avail to

keep up the rupture. On August 23rd, after the usual preliminary treatment, I performed the operation with the screw instrument under chloroform. Owing to the great width of the pillars of the hernial ring, I could not satisfactorily secure a hold upon the internal pillar, which was, indeed, so far obliterated that it was formed chiefly by the border of the rectus-sheath. I had some misgiving at the time that the hold I had obtained was not sufficiently secure; and the sequel shows that this was well founded.—August 24th. The patient had, during the night, removed the lint pad, and also the ball from the point of the screw. The latter was not replaced; but the bandage was firmly reapplied.—August 28th. The patient was very restless, although he said he had no pain. The instrument had become twisted somewhat, owing to his constant movement. He took food well.—August 30th. A slight attack of diarrhoea came on.—August 31st. The instrument was removed (eight days after operation); there being a moderate amount of irritation in its track, and slight purulent discharge. The temperature had never risen above 98° Fahr.—September 5th. The hernia had descended again, and the inguinal ring was almost as patent as before operation. The child appeared quite well.—September 30th. He was allowed to get up. It was found impossible, even with a firm pad, to keep up the rupture. Feeling convinced that the failure was due to an imperfect hold having been obtained on the internal pillar of the hernial canal, quite as much as to the unruly behaviour of the patient, I decided to operate again; and on October 10th, under chloroform, I performed the operation a second time, taking especial care to obtain as firm a hold as possible of both sides of the inguinal canal. This involved taking up the sheath of the rectus; and I found that the adhesion of the subcutaneous tissues to the skin of the scrotum rendered the separation of them more troublesome than usual. But the operation was satisfactorily completed in the ordinary manner.—October 12th. He slept well; had no pain. He was much less restless than after the former operation. Temperature 98.6° Fahr.—October 13th. There was some oedema of the scrotum; no discharge.—October 21st. He progressed well. The highest temperature had been 99.6° Fahr. (on 13th); since then, normal. There was a considerable amount of local irritation along the course of the instrument, and a moderate purulent discharge. The instrument was removed under chloroform.—October 24th. The wounds were healing rapidly; the discharge had ceased. This morning, while dressing, the child cried lustily; but there was no tendency to any descent of the bowel. The canal was occupied by a firm fibrous mass, and completely occluded.—December 8th. He was allowed to get up, wearing a pad-truss; and on the 19th he was discharged well.

CASE XVI. *Right Oblique Inguinal Hernia*.—Thomas P., aged 20, glass-cutter, single, was admitted into the North Staffordshire Infirmary on August 29th, 1879. The rupture was about the size of a hen's egg, of three months' standing, caused by jumping. On August 30th, the operation was performed in the usual manner, under chloroform.—September 3rd. There was slight discharge from the lower wound. The general condition was good.—September 6th. The instrument was removed; the ball being embedded under the skin, owing to the screw being rather too short.—September 10th. The discharge had ceased; the wounds were nearly healed. There was a firm cord along the inguinal canal, which gave no impulse on coughing.—September 15th. He was allowed to get up. The wounds were quite healed; the plug firm.—September 22nd. He was discharged well.—September 29th. He called to report himself as feeling quite sound, and not needing a truss.

CASE XVII. *Right Congenital Inguinal Hernia*.—Albert C., aged 6, was admitted into the Infirmary on September 11th, 1879, under Mr. Alcock. Before admission, the hernia was strangulated, and great difficulty was experienced in its reduction. On admission, a rupture of the size of a small egg was present, quite reducible. On September 13th, the operation was performed under chloroform, after the usual preparation.—September 14th. He suffered but little pain, slept well, and seemed comfortable.—September 20th. The instrument was removed under chloroform.—September 24th. The wounds were nearly healed; the discharge was slight. There was some swelling of the scrotum. No impulse was produced on coughing.—October 9th. He was allowed to be up. The hernial canal was obliterated, and there was no impulse on coughing. He was discharged cured. The highest temperature in this case was 99° Fahr.

CASE XVIII. *Right Inguinal Congenital Hernia*.—William C., aged 5, was admitted into the Infirmary on September 30th, 1879. The child, on admission, did not appear strong. He had a right congenital hernia of the size of a large hen-egg. The pillars of both rings could be clearly defined, and the openings easily admitted one's finger. Cod-liver oil and iodide of iron were ordered for a few days; and on October 11th, after the usual preparation, the operation was performed by Mr.