that they are chemical in nature, and must produce their effects by the chemical processes into which they can enter and by the chemical force which they can evolve under certain peculiar conditions. The latest result of therapeutic science is thus at one with her earliest efforts—an action through a chemical agent by the mechanism of chemical energy.

The last point to which I would allude is one of a more personal nature, based upon personal experience. My own observations have given me, as regards certain classes of diseases, strong and increasing confirmation of the practice of our predecessors. The affections to which I refer are those which consist in, and depend upon, primary alterations in the molecular nutrition of the nerve elements, manifested by disturbance of their function, either transient or so persistent as to imply alterations of structure. These diseases include the maladies that we can most surely trace, in many cases, to the influence of chemical agents. They also include others of similar features, in which such causation is not traceable, but in which we may reasonably assume that a similar molecular process is manifested by them, although due to a different cause. These are the extensive class of affections that we term "functional," while the others include the equally extensive class of "nutritional" diseases. In both of these the beneficial influence of drugs appears to me to be beyond question. They need to be chosen with judgment, changed with discrimination, and employed with perseverance—perseverance alike on the part of the patient and the practitioner. Given these conditions, I have been surprised at the amount of good that has been done in affections commonly looked upon as intractable—relief, arrest, and restoration. With each successive year's experience, it seems to me to be greater and more distinct, and to elicit more gratitude from the patients to whom it is applied. I regret that lack of time precludes any attempt to illustrate the statement; but my object is attained if I can succeed in bringing home to your minds the reasonableness of the experience, and in encouraging you to keep your grasp of the old when you seize the new.

A SERIES OF CASES OF RELAPSING TYPHLITIS TREATED BY OPERATION.¹

By FREDERICK TREVES, F.R.C.S.,

Surgeon to the London Hospital; Member of the Court of Examiners of the Royal College of Surgeons.

THE limits of this paper render it impossible to attempt any complete consideration of the pathology of the disease still known by the inaccurate name typhlitis. In the place of such attempt, I would venture to draw attention to certain points in this pathology, which bear more directly upon treatment. The term typhlitis has the merits of brevity and ancient usage, and its unsuitability has been so frequently dwelt upon that it is no longer likely to be misleading. It is here considered to apply to a form of localised peritonitis occurring in the cæcal region. In its general features and potentialities this variety of localised peritonitis differs in no essential from other like-named conditions within the abdomen. The inflammation may spread to the general surface of the peritoneum. It may lead to suppuration or it may not. If the peritonitis remain simple in character, it may leave scarcely a trace of its existence; or it may, on the other hand, produce adhesions of almost any grade. If it end in suppuration, the pus will with few exceptions be encysted, and the resulting abscess may either burst through the skin or open into the abdominal cavity, or find its way into some neighbouring hollow viscus or into the connective tissue of the vicinity. Typhlitis may take origin in the cæcum or in the appendix. Cases belong to the latter category are infinitely the more common.

A. WHEN COMMENCING IN THE CÆCUM.

The trouble in these instances appears to be due to some ulcer of the mucous membrane which has so far extended in depth as to induce peritonitis. It is probable that any ulcer met with in this intestine may under certain conditions induce the symptoms of typhlitis. The fact has at least been

demonstrated in connection with the tuberculous and epitheliomatous ulcers. By far the commonest form of ulcer, however, which is found associated with this particular variety of typhlitis is the stercoral ulcer. This lesion is produced by the mechanical and chemical irritation of long-retained faeces, or of masses of undigested food. That the symptoms of a severe form of typhlitis may depend upon such morbid changes as these, I have demonstrated by operation in cases in which the appendix was found to be perfectly normal and free from disease.

Perforation of the cæcum as a primary condition is very rare. When a typhlitic abscess is found to communicate with the cavity of the cæcum, there is in nearly every instance evidence to show that the abscess had commenced outside the cæcum (in the appendix), and had made its way into the caput coli, just as it might have burst into the bladder or ileum, or have entered the connective tissue behind the ascending colon.

I might here add that fæcal fistulæ resulting from such perforations tend to close spontaneously after a lapse of time.

B. WHEN COMMENCING IN THE APPENDIX.

The anatomical conditions found in the great majority of the cases of typhlitis may be ranged under the following headings:

1. *There has been a moderate torsion of the appendix.* The mesentery of the appendix is unduly scanty, and as a result of this, the little process is nearly always found to be twisted or contorted. Inasmuch as the main blood supply of the appendix is derived through its mesentery it can be understood that torsion or bending of the process to an immoderate degree may disturb its blood vessels and produce engorgement, or may cause undue pressure to fall upon some one part of the wall of the tube. As a result of this may follow catarrh of the mucous membrane, or occlusion of the tube at the point of twisting or bending with very probable ulceration at that spot. If the catarrh be copious and long continued, and if the discharge can find a vent, a condition favourable for the production of an intestinal calculus is present. It is probable that the small concretions often found in the appendix have the same mode of origin as like calculi in the nasal passages. If, however, the tube become occluded, the distal segment is soon found to be distended with mucus, and to be greatly increased in size. This condition of hydrops is very common. The distended section may feel almost as hard as a stone. The fluid may escape on untwisting or unfolding the tube, or the lumen may be found to be occluded by fibrous tissue, the result of long-continued ulceration. Within the distended portion of the tube may be found mucus or mucopus or pure pus, and more or less ulceration of the lining membrane.

2. *There has been extreme torsion of the appendix.* In this condition, the blood supply to the vermiform process having been more or less completely cut off, a gangrene of the organ follows. This gangrene may be very acute, and may involve the entire process, or it may be found limited to the point or points of greatest torsion, and thus the appendix may be found cut into two, or even into three parts, the continuity of the tube being only maintained by sloughing segments. In connection with these forms of the trouble which depend upon torsion, it may be pointed out that distension of the cæcum (by causing a dragging upon the mesentery of the appendix) may encourage twisting of the process, or may aggravate a distortion which already exists. In this way may be explained the part that constipation and an engorgement of the cæcum may play in the etiology of inflammatory processes in the appendix.

3. *A foreign body has lodged in the appendix.* This condition is not common. In 146 examples of trouble in the appendix Matterstock found a foreign body in 9 instances only.

4. *A primary ulceration of the appendix exists.* In this connection may be mentioned the ulcer of tuberculosis, and the destructive process associated with actinomycosis.

CLINICAL MANIFESTATIONS.

It will be impossible to do more than draw attention to certain isolated phenomena, many of which are illustrated by the subjoined cases.

(a.) In the first place it is difficult and often impossible to

¹ Read before the Harveian Society.

distinguish from one another the different anatomical varieties of typhlitis. There is, moreover, no constant ratio between the severity of the symptoms and the gravity of the local changes as demonstrated by an operation (see Case I). The symptoms in two cases may be very nearly alike, and yet the local conditions discovered may differ widely (this is illustrated by Cases III and IV). Adhesions may be dense after three attacks of typhlitis (Case I), or absent after nineteen (Cases II and III).

(b.) Perforation of the appendix is spoken of by some writers as if it were the principal morbid change underlying typhlitis. The cases quoted below (and especially Cases II and III) will show that perforation is by no means so common as has been supposed. A sudden and acute onset of symptoms is no conclusive evidence of perforation of the vermiform process. Acute attacks of abrupt origin are very commonly due to sudden torsion of the appendix, to a strangulation of it, a condition which may soon pass on to gangrene.

(c.) The majority of the cases of typhlitis get well without any operative interference. Fitz places the mortality of cases treated medically at 11 per cent.

(d.) It must not be assumed that because an attack of typhlitis is apparently brought about by constipation or errors in diet, it is due to disturbances in the cæcum as distinguished from the appendix. In many instances in which the appendix is found to be solely at fault, the attacks of typhlitis appear to have been in each example definitely due to neglect of the bowels or faults in dieting (see Cases III and IX).

While on the subject of differentiating symptoms, I might mention two isolated facts which have some bearing upon diagnosis. The most severe example of tenesmus I have ever met with was in a boy with gangrene of the whole of the vermiform process. In two cases (Cases XI and XII) in which at the operation the ileum was discovered to be involved, diarrhoea had been a conspicuous symptom.

(e.) With regard to the relapsing form of typhlitis, I have nothing especial to add. It may depend upon trouble in the cæcum subsequent to the lodgment there of faecal masses or of a bolus of undigested food. But in the very great majority of instances (possibly in 90 or 95 per cent.) it is due to mischief in the appendix. Statistics show that the trouble is more common in males than in females, and is usually met with in adults under 40. In the majority of cases dealt with by operation pus will be found. In the fourteen examples given below, pus was discovered in nine instances, and was absent in five. When local symptoms (such as discomfort in the groin and tenderness) persist between the attacks, there is a probability that pus is present. This is illustrated by Cases I and II, V and VIII. The attacks vary greatly in severity and in frequency, and often grave attacks will alternate with others of comparatively trifling character (see Case III).

THE QUESTION OF OPERATION IN CASES OF RELAPSING TYPHLITIS.

The circumstances which would justify an operation in these cases must be precisely defined, and it cannot be too emphatically stated that, in a fair proportion of instances in which the trouble has relapsed, no surgical interference is called for.

I am aware of many cases in which a patient has had three or more attacks of typhlitis, and has then ceased to be troubled with any further outbreaks. In some examples of the relapsing form much can be done by medical means, by diet, by attention to the bowels, and by placing the patient under conditions more favourable to a state of peace within the abdomen.

The operation alluded to consists, it is needless to say, in the removal of the offending organ—the appendix. I first proposed this operation, which should be carried out during a quiescent period, in 1877, in a paper read before the Royal Medical and Chirurgical Society. Since that date the procedure has been performed in a great number of cases, and not always, I would venture to think, with proper discrimination.

The following are the more important circumstances which would justify an operation, and in all the cases with which I

have dealt one or other of the subjoined conditions has been present.

1. The attacks have been very numerous, as in Case II, in which there had been nineteen relapses.

2. The attacks are increasing in frequency and severity, as in Case XII.

3. The last attack has been so severe as to place the patient's life in considerable danger. (See Case I.)

4. The constant relapses have reduced the patient to the condition of a chronic invalid, and have rendered him unfit to follow any occupation.

5. Owing to the persistence of certain local symptoms during the quiescent period there is a probability that a collection of pus exists in or about the appendix.

I have never operated in any case in which I have not been able to make out the enlarged appendix still in evidence after the acute symptoms have passed away.

It may be safe to argue that the pain and distress involved by the operation will be less than that attending any but a slight attack, and that the risk of the procedure is less than that associated with an outbreak of typhlitis considered generally. In none of the cases in which I have removed the appendix during a quiescent period for relapsing typhlitis has the patient done other than make a sound recovery.

THE DETAILS OF THE OPERATION.

The procedure is carried out during a quiescent period, and after all the acute symptoms have subsided. The position of the appendix must be made out, and upon its site the place of the incision will, to a great extent, depend. In the larger proportion of cases an incision similar to that advised by Mr. Harrison Cripps upon the left side for inguinal colotomy answers well. An imaginary line is drawn from the anterior superior iliac spine to the umbilicus. The incision is about two inches in length, is placed at right angles to this line, and at a point about two inches from the spinous process. The centre of the incision corresponds to the line. The abdominal cavity is opened, and the appendix is exposed. Adhesions are dealt with in the usual way. If the little process be found to be very closely adherent to such a viscus as the ileum or bladder it is better to cut it off close to its attachment, and then to pare away the fragment still left adhering. (See Cases XI and XII.)

In dealing with the appendix it is well, whenever possible, to make a circular cut through the peritoneum just on the distal side of the spot at which it is intended to sever the process. The peritoneum thus freed is turned back, as is the skin in a circular amputation. The appendix is cut across at the line of the reflected peritoneum. The mucous membrane which presents is scraped away with a sharp spoon. The muscular wall of the appendix is then brought together by means of a continuous suture of No. 1 silk braid. Over the stump thus formed the reflected peritoneum is drawn and secured in place by means of a few points of Lembert's suture. It is needless to say that this procedure is not always possible. The tube may have to be occluded by means of a single ligature, but an attempt should always be made to give to the stump a covering of peritoneum. If the appendix be cut off close to the cæcum, it is sometimes possible to cover the divided end with a flap of peritoneum drawn from the cæcum. In other instances the serous covering required may be derived from that lying over the iliac fossa. In only one instance have I ever found a drainage tube necessary (see Case VI). In two cases, both of which have been already published, I failed to remove the process. The wound in the parietal peritoneum is finally brought together by means of a continuous suture of No. 1 silk braid passed with a milliner's needle. The rest of the wound in the parietes is closed by silkworm gut sutures. The patient should remain in bed for a full period of twenty-one days.

I have here given a series of fourteen examples of this operation which have not been hitherto published, and which serve to illustrate, I believe, the chief complications which may be encountered during the performance of the operation:

SERIES OF CASES.

CASE I. *Operation in a Young Subject.*—A little girl, aged 7 years, the daughter of robust parents, had an attack of typhlitis in May 1891. The symptoms lasted for seventeen days. A second attack of much greater severity occurred in the following month of June; this involved a con-

finement in bed of nearly six weeks. In May, 1892, a third attack—far more intense than the previous one—made its appearance. Symptoms of general peritonitis ensued and the child's life was despaired of. It was not until July that the little patient was sufficiently recovered for an operation to be discussed. Between the second and third attacks there had never been a complete disappearance of local symptoms, and after the third attack there remained some tenderness and sense of discomfort in the iliac fossa. The appendix was removed in July, 1892. It was very adherent, and its apex was fixed to the peritoneum behind the centre of Poupert's ligament. Here was found a small encysted abscess. The appendix was so extensively ulcerated that it was torn across as soon as traction was made upon it. A proper stump was fashioned and closed in by sutures. The abscess cavity was scraped out and the abdominal wound closed. There was no rise of temperature; the bowels acted normally on the fifth day and the patient made an uninterrupted recovery.

CASE II. Operation after 19 Attacks.—The patient, a woman of 26, came under my care in April, 1892 (London Hospital). Her first attack of typhilitis took place six years ago. Since then she had had 19 attacks, which had occurred at about the rate of three a year. The attacks had at first been slight, but they had gradually increased in severity and duration, and those of later appearance had laid her up for three weeks at a time. There was so much pain and discomfort in the iliac fossa between the acuter outbreaks that the patient was loth to leave the sofa, and had become a chronic invalid. The appendix was removed in April, 1892. There were but very few adhesions. The lumen of the organ was occluded near the cæcum, and the part beyond was greatly distended by muco-pus. The surface of the appendix was smooth and showed no evidence of perforation. In this connection it is worthy of note that the later attacks had commenced with sudden and acute symptoms. The abdominal wound was closed and the patient made a complete recovery.

CASE III. In which the Attacks Varied Greatly in Severity.—A gentleman, aged 30, was operated upon in January, 1892. He had had fourteen attacks of typhilitis; the first occurred in February, 1888, and laid him up eleven days. The second, third, and fourth attacks took place in October, 1888, November, 1889, and May, 1890, respectively, and were all of a comparatively slight character. The fifth outbreak, in July, 1890, was exceedingly severe, and the patient was not allowed to take solid food until the end of the following September. During the whole of this time he was laid up. The sixth, seventh, and eighth attacks (October, 1890, January, 1891, June, 1891) were mild. The ninth (July, 1891) was quite severe. The tenth, eleventh, and twelfth outbreaks (July, 1891, August, 1891, October, 1891) were again slight. The thirteenth attack (November, 1891) was very sharp; and the last outbreak before the operation (December, 1891) was but trifling. The appendix was much contorted, was free from adhesions, and was greatly distended with muco-pus. A rapid recovery followed. The patient considered that constipation and errors in diet were the causes of the various attacks. Constipation ceased to be a symptom after the operation.

CASE IV. To be Compared with the Above.—A gentleman aged 25 had his first attack of typhilitis in May, 1888. Eleven attacks followed, making twelve in all. As in the previous case, they varied greatly in severity. The last attack was in the beginning of October, 1891. I removed the appendix on October 30th, 1891. Although this case was clinically a close counterpart of that just cited, the appendix was found to be buried in dense adhesions, to be distended with mucus, and to exhibit some ulceration of the lining membrane. Recovery without complication.

CASE V. In which a Large Abscess Occupied the Appendix.—A messenger, aged 31, was operated upon in November, 1891 (London Hospital). His first attack of typhilitis was in August, 1890, when the acute symptoms lasted six days. He was unable to resume work for two months. The second attack was in January, 1891, and was very much more severe. He was away from his work four months. Ever since the second attack he had some tenderness in the right iliac fossa, and now and then some pain there. His expression was that "his groin never felt easy." When exposed by operation the appendix was found to be acutely bent upon itself some three-fourths of an inch beyond the cæcum. The distal portion of the process measured one inch in diameter, and was full of thick creamy pus; there were but scanty adhesions. The patient left the hospital in four weeks with a soundly-healed wound.

CASE VI. In which a Drainage Tube was Used.—A man, aged 44, was admitted into the London Hospital in May, 1890, with a history of repeated attacks of typhilitis during the previous twelve months. He had been unable to work since the trouble began. I removed the appendix shortly after his admission. The process was found to be twisted upon itself, dilated and deformed, and bound down by extensive adhesions of the densest kind. So much oozing of blood and laceration of tissues attended the removal of the diseased organ, that I considered it wise to insert a drainage tube. This was removed in forty-eight hours. The wound healed soundly without rise of temperature, and the patient got up on the sixteenth day. The operation itself was attended by no difficulty, and this is the only case in which I have employed a drainage tube.

CASE VII. In which much Omentum was Excised.—The patient was a man, aged 34, who had had many attacks of typhilitis. The appendix was removed in July, 1891 (London Hospital). It was distended with pus and bound down by many adhesions. To the disturbed district the omentum had become extensively attached, and in order to entirely free it a considerable amount of the omentum had to be excised. Abdominal wound closed. Perfect recovery.

CASE VIII. In which the Appendix was Adherent to the Ureter.—A constable, aged 40, was admitted into the London Hospital in May, 1891. He had had eight attacks of typhilitis; the first occurred one year and nine months previously. The second and fourth attacks were very severe; the others were of slight character. Since the fourth attack there had remained a sense of discomfort in the groin, with tenderness and occasional pain. When the appendix was removed it was found to be distended with pus and to be intimately adherent to the ureter, from which it was separated with difficulty. Uninterrupted recovery.

CASE IX. In which the Appendix was Adherent to the Iliac Artery.—The patient, a baker, aged 22, was operated upon in June, 1891 (London Hospital). He had had many attacks of typhilitis; the first had occurred eighteen months previously. He was quite an invalid. The attacks

appeared to be always induced by constipation and irregularities in diet. The patient stated that the eating of eggs invariably brought on an attack. At the operation the appendix was found to be full of pus and to be closely adherent to the external iliac artery. Uninterrupted recovery.

CASE X. In which the Appendix was Adherent to the Cæcum.—A man, aged 18, was admitted into the London Hospital in November, 1892. He had had six attacks of typhilitis, the first of which occurred in the previous May. He had not been able to do any work since May, and was an invalid. All the attacks were of short duration. The appendix was removed on November 4th, 1892. It was found to measure, when removed, 3 inches. It was discovered to be bent upon itself in the form of an *u*, and the whole of the process, with the exception of the terminal inch, was closely adherent to the cæcum. The removal of the appendix was attended with much difficulty. Three blood vessels were ligatured. The surface of cæcum bared by the separation of the process was covered over by peritoneum, which was fixed in place by No. 1 silk. The abdominal wound was closed. The appendix was found to be distended with muco-pus, and in one place the mucous membrane had sloughed extensively. The patient made an excellent recovery. The bowels acted naturally on the third day.

CASE XI. In which the Appendix was Adherent to the Ileum.—An unhealthy woman, a machinist, aged 33, had had several slight attacks of typhilitis. On June 14th, 1892, she was suddenly seized with pain in the abdomen, followed by vomiting and diarrhoea. These symptoms continued and were attended by fever and much prostration. She was considered to be suffering from typhoid fever, and on July 12th was removed to a fever hospital. It was here recognised that she was not the subject of enteric fever, but that her symptoms were due to an inflammation about the vermiform appendix. Her illness was long continued, and it was not until October 10th that she was admitted into the London Hospital. The enlarged appendix could readily be made out. On exposing it by operation it was found to be distended with pus, to be of unusual size, and to be intimately adherent to a coil of the lower ileum. Its attachment to the bowel extended over three-quarters of an inch, and was upon that border of the gut most remote from the mesentery. As it appeared to be impossible to remove the process without making a serious breach in the wall of the ileum, I cut off the appendix close to the cæcum, and then pared away that part which was fixed to the ileum until I had reduced it to a mere disc. The abdominal wound was closed. No rise of temperature followed; the bowels were opened on the fifth day, and the patient made a complete recovery. In this case it seems probable that the symptoms of enteric fever were to a certain extent imitated by reason of an inflammation of the ileum, which probably involved one of Peyer's patches. The diarrhoea was very severe and lasted many weeks.

CASE XII. In which the Appendix was Adherent to the Bladder.—A woman, aged 30, was admitted into the London Hospital on March 31st, 1892. She had had nine attacks of typhilitis, the first took place in August, 1890. The attacks were never very severe but they were becoming more frequent. At first the intervals were about four months. Latterly they were reduced to nine weeks. On removing the appendix it was found to be two inches in length, to be sharply bent upon itself, and to be adherent to the anterior abdominal parietes, the ileum, and especially to the bladder. There had been no bladder symptoms, but certain of the attacks had been associated with diarrhoea. The surface of the ileum laid bare by the removal of the appendix was covered over by peritoneum drawn into place by three Lembert's sutures. The attachment to the bladder was so intimate that in the place of cutting the appendix away I pared it down as in the previous case. The dilated vermiform process contained mucus only. The abdominal wound was closed, and although a little suppuration followed, the patient made a good recovery within the usual period.

CASE XIII. In which the Appendix was Adherent to the Rectum.—A governess, aged 24, came to the London Hospital on March 24th, 1892. Her first attack of typhilitis occurred two years previously, and laid her up for four weeks. The second attack took place shortly afterwards, and kept her confined for three months. Since then she had never been well; the right iliac fossa had never been free from discomfort. Slight attacks appeared at intervals of from three to six weeks, and she had been confined to bed absolutely for six months preceding her admission. There had been from time to time a copious discharge of mucus from the rectum. On opening the abdomen I discovered the largest appendix I have ever seen. It measured 5 inches in length, and its diameter at its widest part was $\frac{1}{2}$ inch. It descended into the pelvis, and was adherent to the rectum. It was separated without much difficulty, and was found on removal to be filled with thick pus. It had no communication with the rectum. The abdominal wound was closed, a little suppuration about the sutures followed, but the patient made a sound recovery, and has since married.

CASE XIV. In which the Appendix was Lodged in the Inguinal Canal.—The patient was a gentleman, aged 28. He was athletic, and had enjoyed vigorous health. In 1890 he became the subject of a peculiar inguinal "rupture" on the right side. He could feel something "like an egg" in his inguinal canal. It was round and hard, and about the size of the little finger. When pressed upon it always slipped back but immediately came down again. It was evidently the appendix. He had a truss applied in September, 1890 and wore it for some time, when the inconvenience disappeared. In June, 1892, he had his first attack of typhilitis; the symptoms lasted nine days. Like outbreaks occurred in August and September. The fourth attack was in October, when he was kept in bed three weeks. These attacks caused him so much inconvenience that he was anxious to have the appendix removed. The operation was carried out in November, 1892. The appendix was found to be 4 inches in length, and its extremity occupied a little hernial sac in the inguinal canal. Here it was adherent, and attached to it on the abdominal side of the ring was a considerable quantity of omentum. The end of the appendix was bulbous, was distended with muco-pus, and exhibited extensive ulceration of the mucous membrane. The operation presented no difficulties, and the patient recovered without any untoward symptom.

DONATION.—Mr. George Herbert Strutt has sent a contribution of £4,000 to the funds of the Derbyshire Royal Infirmary.