degrees of pressure varying from that obtained by the gentle use of a breast pump to that resulting from vigorous digital expression. The greater the pressure the higher the percentage of fat. With a maximal amount of fluid in the milk and a minimal pressure on the areola, the content of fat might be 8 per cent. below that obtained when the fluid was small in amount and the pressure vigorous. When, however, the pressure was maximal at the outset of a feed and minimal at the end, the percentages of fat could be equalized or even inverted. She was convinced, therefore, that no two infants would get the same percentage of fat from the same mother, even under identical conditions. It might be that the so-called overfed infant to which Dr. Cameron had referred was really the vigorously sucking infant, who obtained not necessarily an excessive quantity of milk, but a milk with a very high percentage of fat.

Dr. HELEN MACKAY, (London) emphasized the point that it was not only necessary to have some knowledge of calorie values, but also to be able to instruct the mother as to the conversion of weights of given foodstuffs into the domestic measures available. She instanced the great variations that existed in this respect in different foodstuffs in common use.

MESENTERIC LYMPHADENITIS AND ITS CLINICAL MANIFESTATIONS:

WITH SPECIAL REFERENCE TO ITS DIFFERENTIAL DIAGNOSIS FROM APPENDICITIS.

BY

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MESENTERIC lymphadenitis was well known to physicians in the past under the name of the "strumous abdomen." During life it was guessed at on general symptoms, or from the *post-mortem* table an accurate scientific fact was recorded. It is only since abdominal section has become common that the protean aspects of the condition have been realized. Whether the glands are acutely or sub-acutely inflamed or have resisted their invaders, symptoms may arise at each step. An acutely inflamed appendix, a stone passing down the ureter, a carcinomatous obstruction, a duodenal or gastric ulcer, can be most accurately mimicked; in fact, there is hardly an abdominal condition for which laparotomy is commonly performed that may not be simulated by diseased mesenteric glands.

That these glands are frequently infected is common knowledge. The tubercle bacillus has been stated to be the causative organism. Still found enlarged mesenteric glands in 59 per cent. of all *post-mortem* examinations in children. Dingwall Fordyce in fifty autopsies could trace tubercle bacilli in 20 per cent. McFadyean and MacConkey found 25 per cent. of clinically non-tuberculous patients to harbour active tubercle bacilli in their mesenteric glands. No child is too young to be infected. De la Alberca reported three cases on which he performed *post-mortem* examinations and found no lesion excepting caseating mesenteric glands. One child was 5 years of age, one 4 weeks, and one had been born only 7 days before. At the Ulster Children's Hospital twenty-five cases of acute appendicitis were treated during 1925 and 1926. So that if one considers the numbers that do not reach hospital these cases must be almost as common as cases of acute appendicitis.

Accurate diagnosis in the case of a patient who is suffering from a pathological condition of the mesenteric glands rests to a great extent on a knowledge of their physiological properties and of their anatomical distributions. The lymph channels follow closely the blood vessels of the same region. The glands are situated in relation to these blood vessels. There are as a rule three sets. The glands affected in mesenteric lymphadenitis are the ileo-caecal, the mesenteric, the inferior mesenteric root gland, the middle glands in the transverse mesocolon, the

root glands at the origin of the superior mesenteric arteries, and the lateral sacral glands.

The flow of the lymph through these glands is as a rule direct from one to the proximal one. The lymph may jump from one set of glands to reach a more distant group. This occurs in intestinal infections where the juxta-intestinal group seems to be passed over and the middle mesenteric group infected. It occurs where the area drained has suffered a developmental change in position. The lymph may take a circuitous route to reach its termination if the glands in its direct route are destroyed by accident or disease. It is in this way that a diseased appendix may infect the subpyloric group of glands. Sometimes the lymph flows backwards; this occurs when its onward way is blocked. This has been cited as a frequent cause of phthisis, where the bacilli in the mediastinal glands have their efferent paths blocked and the backwash of lymph carries the bacilli into the lungs. Ravdin reports a case where a mesenteric lymph abscess was opened and drained. The surroundings appeared healthy. Four months later the caecum and ileum were the seat of hypertrophic tubercle. This was in all probability a case of infection of the intestine from a backwash of infected lymph.

Now pathological changes in these glands are a great worry to the surgeon when it comes to a question of diagnosis. In 6,000 to 7,000 cases admitted to various hospitals only 45 were correctly diagnosed. Even the time-honoured aphorism of appendicitis—pain starting at the umbilicus, followed by vomiting, followed by the pain settling down in the right iliac fossa—may attend the beginning of an attack of inflamed mesenteric glands.

At operation three main types of glandular conditions are found: (1) Discrete enlarged inflamed succulent glands. This type is found in children who have exhibited the symptoms of acute appendicitis. (2) A mass of glands grouped around a caseous gland or a small abscess. There is an acute inflammation of the whole mass, and often there is free fluid in the peritoneal cavity. These cases simulate acute appendicitis with abscess formation; occasionally they get intestinal obstruction. (3) The terminal or healed stage of lymphadenitis—a single gland or several calcified glands lying in the mesentery. It is this type that is usually found in adults. The symptoms simulate those of a duodenal ulcer, a renal calculus, or a chronic appendix.

It is noted that children suffering from mesenteric lymphadenitis have a long history of stomach trouble. This history may only be obtained after long and judicious questioning. The history of the complaint may date from babyhood, or from a distant severe illness, such as scarlet fever or measles. Other points to notice are the numbers of cases that suffer periodically from headaches, drowsiness, and loss of appetite for breakfast; these symptoms are probably the sequel of acidosis, a condition common among these patients. Unfortunately the urine of all children was not examined systematically in hospital, and it was after their acute attack—in some cases two years after—that my examination of the urine was made. In my series of cases acetone was present in 63 per cent. During an attack the percentage would certainly be higher. Nausea and vomiting are frequent in their history—some 71 per cent. of cases. I am inclined to think that the acute abdomen due solely to acidosis of the older clinicians does not exist, but that the real condition in these cases is an associated inflammation of mesenteric glands. Distaste for fats is a common symptom. Constipation is not more frequent amongst these cases than amongst the rest of hospital patients.

Pain.

The pain may be severe. A number of patients are awakened out of their sleep by the pain. Carson has drawn attention to the sudden onset and the sudden cessation of the pain. Although this is frequent, it is not so frequent as to be a good diagnostic point. The duration of the pain varies from five minutes to about two hours. It frequently starts at the umbilicus and settles in the right iliac region; it often starts in the right or left iliac region, sometimes in both; it may be epigastric, usually to the left side of the epigastrium; in certain cases,

to be mentioned later, the pain may have the sudden severity of a perforation, or be more chronic and simulate that of a duodenal or gastric ulcer.

When the cases in children that simulate acute appendicitis are considered it is well to remember that the conditions are equally common, at least in the province of Ulster. In England the group most commonly affected is the mediastinal group; in Ulster the glands in the neck and in the abdomen are most commonly affected. In England the human type of bacillus is relatively more common than in this province, where the bovine bacillus is the commoner. The social status of the patient seems to have no bearing; the condition occurs as frequently in the well-to-do as in the poorer classes.

Most surgeons who have written on this subject have stated that it is a localized inflammation of the ileo-caecal group. Undoubtedly it is the group most seriously affected, but thorough examination rarely fails to detect other glands enlarged, though, maybe, to a slight extent. The glands of the neck are nearly always palpable in these cases. Lymphatic glands are more easily palpable in normal children than in adults, but in children with mesenteric lymphadenitis shotty glands larger than in healthy children can usually be found. In quiescent and subacute cases the gland lying at the root of the inferior mesenteric artery can be palpated as frequently as the glands in the right iliac fossa. Enlargement of the lateral sacral gland has often given me the clue to the correct diagnosis in a doubtful case.

The points of special significance in the history are the long period that symptoms have existed, the weak stomach or so-called bilious attacks, periodically recurring pain dating from an original mild attack and becoming more frequent and more severe. (It is this peculiarity in the history that is the reason of the long duration of symptoms before the patient is seen by the surgeon.) The pain may begin at the umbilicus and settle in the right fossa. The attacks of pain are usually preceded by headaches and drowsiness. Vomiting is a frequent symptom before or after the pain, and it does not as a rule affect the pain.

The common age for the patient to be seen by the surgeon is between 7 and 11 years; it is rare to meet a case under 3 years of age.

Period over which Symptoms have existed before seen by the Surgeon.

	Cases.
Since babyhood	4
Under 1 year (average 6 months)	8
Over 1 year and less than 5 years (average 2½ years)	13
No previous history noted	2
Total	27

Age of Patients (Children under 12 Years).
Average age 9 years 8 months.

	Cases.
Below 4 years	1
Between 4 and 7 years	9
Between 7 and 11 years	23
Over 11 years	4
Total	37

Percentage of Figures.

	Cases.
Males	37
Females	63
Laparotomy performed	33
Acetone present	63
Headache	73
Vomiting	71
Lassitude and drowsiness	78

Site of Onset of Pain.

	Cases.
Epigastric	3
Umbilicus	33
Left iliac fossa	25
Right iliac fossa	39

Renal Symptoms.

Two cases had pain on passing water.
One case had haematuria.

As regards physical examination, the patient is often pale with bright red lips; the tongue is moist but often has a whitish fur; acetone may be detected by the odour of the breath. The tongue of an acute appendix case is drier, redder, the papillae are more prominent, and the fur inclines to be brown in colour. A child suffering from mesenteric lymphadenitis has never a tongue of this type.

Shotty glands can be felt in the neck, especially in the posterior triangle. The abdomen moves freely with respiration. There may be some muscle spasm in the right lower quadrant of the abdomen, but no true involuntary rigidity except in those cases of Group 2 where there is much peritonitis and the glands are massed together. The muscles in the flank or the lower fibres of the external oblique are never rigid. Rectal examination will reveal nothing, or an enlarged lateral sacral gland may be palpated. Nearly all authors state that there is tenderness at McBurney's point. Now a glance at the lie of the glands in the ileo-caecal angle will convince you that this is an improbability. The maximum point of tenderness in acute appendicitis is most frequently McBurney's point; in an appendix lateral to the caecum, or lying retroperitoneally, tenderness may best be elicited in the flank, above the crest of the ilium. Glandular affections never involve the oblique muscles here. In mesenteric lymphadenitis the site of maximum tenderness is not McBurney's point, but higher up and more medial, as might be expected; the tender area extends upwards in a vertical manner under the right rectus muscle to the transpyloric plane (Fig. 1). This is the position of the inflamed mesenteric glands. I have never found this area of tenderness to betray me, given other suggestive signs. Careful palpation of the left iliac fossa may show local tenderness or an enlarged lymphatic gland. Rectal examination is especially useful. If the finger is inserted to its fullest extent, and, starting in the middle line posteriorly, is swept round the side wall of the pelvis, an enlarged gland, the lateral sacral or the gland of the promontory, can frequently be felt. This lateral sacral gland is felt like a pea. Hyperaesthesia of the skin, simulating the hyperaesthesia of an acute appendix, is sometimes present.

FIG. 1.—Showing the area of tenderness in cases of lymphadenitis of the ileo-caecal angle, as compared with the position of McBurney's point. The area of tenderness may extend over the whole of the shaded area or be limited to the darker area. 1, Umbilicus. 2, Maximum point of tenderness in lymphadenitis of the ileo-caecal angle. 3, McBurney's point. 4, Anterior superior iliac spine.

The temperature varies. It is frequently elevated, depending upon the type of glands found. In Group 2 it is frequently high; it may reach 104° F.

Taking the above points into consideration, the diagnosis of the condition can be made with confidence in practically every case.

Group 2.

Here the glands have become caseous and are the seat of acute inflammation; they are usually massed together, with adherent intestines. There are more general disturbances. It is these cases that give the high temperatures. High temperatures in these cases were also noted by Dingwall Fordyce. The mass may be adherent to the anterior abdominal wall, giving rise to a true localized rigidity. The case has then the objective signs of an appendical abscess. These cases are admittedly difficult to diagnose. If the condition is suspected then the expectant treatment is best. The treatment of the appendical abscess and of the mass of glands will coincide, if it is possible to keep the patient under observation. The position and type of the mass when the acute symptoms abate, with the other clinical signs of lymphadenitis, will decide the question. If the patient worries one it is best to operate. The laparotomy is rarely harmful. A blood count is of no help in the diagnosis. There is usually a lymphocytosis of from 14,000 to 17,000, with 80 per cent. polymorphonuclear leucocytes. These cases of inflamed glands may go on to abscess formation. The abscess may behave like an appendical abscess and burst into the peritoneal cavity, bringing about an abdominal catastrophe.

Group 3.

In this group the symptoms approach those of renal calculus, duodenal or gastric ulcer, or a chronic appendicitis. On looking over the records of the Royal Victoria Hospital for the last year I found some twenty cases which

had calcified mesenteric glands. They had been operated on for duodenal ulcer or chronic appendicitis. We have seen how the pain may come on after food, and its association with nausea or vomiting. If the glands affected are high up in the mesentery the pain is felt in the epigastrium. The skiagram usually shows good peristalsis of the stomach, or some pylorospasm, with the duodenal cup badly filled, and hypermobility of the colon. The picture could be coincident with that of duodenal ulcer, which is the diagnosis usually suggested. Pylorospasm due to lymphatic spread from the ileo-caecal angle has been demonstrated by Braithwaite. Further resemblance to duodenal ulcer is imperfect. The periods of freedom are not so characteristic, though they may last for over a year. Exercise usually gives these patients acute pain. Screening of the stomach and duodenum by the "whitewash method" under the x rays ought to show an ulcer. A good picture taken from a well prepared subject ought to show the glands, as they are calcified in most cases. The test meal is within the limits of normal.

The two conditions may coexist. A diagnosis of chronic appendicitis is rarely justified without a history of a previous definite attack. Here again the acute attack may be simulated by a previous attack of acute lymphadenitis. Accurate history taking ought, however, to help the diagnosis. The skiagram ought to reveal a shadow if the calcified glands cannot be palpated.

Owing to the site of tenderness, during a rapid examination, being put down as at McBurney's point these patients are often labelled "reflex dyspepsia from chronic appendicitis." In all cases considered the appendix was removed if it had not been previously dealt with. The notes frequently state that there were adhesions on some fibrosis of the appendix. The removal, however, of this organ only cured 42 per cent. of these cases. A good many of the patients were only traced for some six to twelve months, and as a long period (from one to two years) of relief from symptoms is frequent in cases due to calcified glands, it is doubtful if the percentage of cures is ever as high as 42.

Disease of the urinary tract is often copied in these cases. In my series in children, one patient had pain on micturition, one had haematuria. The pain is often brought on by exercise; it is stabbing in character and may radiate down; it may be felt in the right or left side. Rest eases the pain. Sir J. Thomson-Walker in 1922 had met with 42 cases of calcified mesenteric glands simulating renal disease. Blood was present microscopically in 6 cases. There was profuse intermittent haematuria over eight years in one case; this was cured by the removal of a calcified gland. In 11 cases he operated and removed the glands; this operation cured the pain in these 11 cases.

Undoubtedly the diagnosis from renal disease may be very difficult. The pain, its character and site, its association with haematuria, its provocation by exercise and relief by rest, simulates renal pain. If to these symptoms is added a skiagram showing a shadow in the renal area in line with the ureter, the clinical picture of renal calculus with colic appears complete. In these cases there is no retraction of the testicle with the pain. The pain ceases abruptly. Renal colic usually leaves an aching sensation behind it. The cystoscopic examination is negative. There is rarely ureteric obstruction (only 4 cases have been recorded). The x-ray picture is the most valuable evidence if rightly interpreted. Screening and plates taken at different times are usually a necessity. Pyelography and the insertion of an opaque ureteric catheter serve to define the position of a calcified gland.

I have related the common clinical manifestations of the diseased glands; the rarer clinical pictures include the following.

A caseous gland the seat of inflammation will occasionally rupture suddenly into the peritoneal cavity and give rise to the clinical picture of acute perforation of a viscus. In Floderus's series of 100 cases he reported one case of this nature where a young adult athlete when swimming got a perforation. There was no previous history to suggest that such a catastrophe was imminent. Iselin reported 8 cases and Skillman 25 cases of acute perforations. In 2 cases in Skillman's series it was the left gland that perforated.

Occasionally a mass of glands may simulate an abdominal tumour. The most common site for these masses simulating a growth is around the origin of the superior mesenteric artery. It may give rise to a chronic obstruction, and this together with a hard swelling and the wasting common to mesenteric lymphadenitis induces the clinician to decide that it is a case of malignant growth. Without a laparotomy the diagnosis is often difficult, and a microscopical section is sometimes necessary to decide the diagnosis.

Chronic intestinal obstruction is common enough. Four cases of occlusion of the ureter have been reported, and seven cases of obstruction of the common bile duct. Wakely reported a case causing dysphagia and giving rise to a lump in the stomach. Hornuth and Bruning have reported cases of acute ileus. Umbilical fistulae occur, and a cold abscess lying in the retroperitoneal tissues has simulated the psoas abscess of Pott's disease.

Before the satisfactory treatment of these cases can be undertaken it is necessary to unravel the cause of the symptoms and the pathology of the condition. When the glands in the ileo-caecal angle are the main group affected, it at first suggests a diseased focus in the intestine of that drainage area. The appendix is a frequently diseased structure, yet enlarged ileo-caecal glands in cases of acute appendicitis are an unknown occurrence. The appendix when removed in cases of enlarged mesenteric glands is admitted by almost all observers to be within the range of normal. It may show fibrosis or have a few surrounding adhesions—a state common enough in persons who go about free from discomfort. Carson thought that 16 out of his 50 patients had some abnormality of the appendix. Appendectomy does not cure all these patients, which would be the logical conclusion were it the cause. In a follow-up of 20 cases on whom appendectomy was done in the Royal Victoria Hospital 12 were traced six to twelve months after operation; of these, 2 felt improved, and one patient who had had the appendix and the gland removed was cured. As has been stated previously, the time was really too short to determine whether a patient was cured, as periods of freedom of from one to two years are common enough.

On examining a series of sections of these glands I was unable, by the microscopic appearance, to discover whether there was more peripheral or cortical destruction. The latter would have indicated a lymphatic, the former a blood infection. The distribution of the diseased glands can best be explained by Calmette's view. He considered that there is first an infection of the local glands; the infecting organism overcomes these glands and then reaches the blood stream. The lower end of the ileum is the site that favours the entrance of organisms. It is in this area that there is most stagnation of contents, and it is here that the reaction of the intestinal contents changes from an acid to an alkaline medium. The glands in the ileo-caecal angle are then the most likely to be picked out. When the infection has passed this barrier the whole lymphatic system becomes quickly infected.

It is difficult to decide definitely if this infection is due to the tubercle bacillus or to another organism. The pathological changes in the glands are those most typical of tuberculous infections—inflammatory reaction, passing on to fibrosis or caseation or calcification or cold abscess. True suppuration is rare; this would not be the case if the infection was due to a pus-forming organism.

Corner suggested that the seeming proneness of the glands in the ileo-caecal region to acute inflammation was due to the change at this point of the reaction of the intestinal contents from acid to alkaline. Tuberculous ulcers of the intestine occur most frequently in the lower part of the ileum. Struthers considered the cases of acute inflammation of the glands to be due to the superimposition of secondary infection on a pre-existing old or healed tuberculous gland. A calf injected with human bacilli will show no effect, except that, some months later, the glands draining the area will be the seat of a chronic fibrosis or calcification. Might not these fibrosed and calcified glands found in the mesentery of man, with their infrequent generalization of tubercle, have a corollary in an infection with the bovine bacillus, which is the type usually found?

The 6 per cent. of cases that ultimately develop signs of general tuberculosis could be accounted for by an infection with the human type of tubercle bacilli.

The common symptoms of acidosis may be explained by the interference with the supply of fats to the liver. The child's metabolism is easily disturbed. Frew showed that the urine of most children suffering from any acute disease contained acetone. The lower ileum and the appendix are great absorbers of fat; appendical concretions are chiefly fat. A calcification and fibrosis of the glands of the ileo-caecal angle must to a great extent interfere with the supply of fat to the liver, and set up acidosis. It seems to me that this acidosis has some relation to the onset of the acute attack of pain in the right iliac region. A dietetic indiscretion, a period of nervous strain, or muscular exertion often starts an attack. Many organisms lie latent till an acid is presented to them. In children first come the symptoms of acidosis, headache, drowsiness, and then pain.

The pain has been attributed to different causes by different observers. Corner thought it was due to the reflex action on the appendix. Carson attributed the pain to the irritation of the mesenteric nerves causing enterospasm. This, he thinks, explains the colicky nature of the pain, and its sudden onset and cessation. He actually saw an intussusception occurring when he was operating on a case of lymphadenitis. Probably Carson's explanation holds good in many cases. It would explain the colicky pain at the umbilicus at the beginning of an attack. The shifting of the pain to the right must be explained by the local inflammatory lesion.

It is easy to understand how a calcified gland in the mesentery with no recent inflammation can, on exercise, cause acute pain. The site of the pain will depend on the part of the mesentery affected. Its irritating presence will also give rise to pylorospasm or enterospasm by reflex nervous action, or its bony hard spicules may irritate a ureter and give rise to renal colic and haematuria. The movements of the intestine after eating will readily cause the calcified gland to act as an irritant, and bring about pain after food, simulating that due to digestive ulcer. The treatment, then, will resolve itself into preventing the condition by a clean milk supply, and in the established cases according to the type.

Group 1.

In the succulent inflamed glands of children operation is not necessary and it is unsatisfactory. Fresh air, sunshine, dietetic treatment, and alkalines are recommended. The diet should consist of large quantities of green vegetables and a liberal amount of protein. Excess of sugars cause fermentations and acid changes in the intestine, and should be forbidden. Highly saturated fats are likely to be incompletely burned and to continue the acid state. I think small quantities of the unsaturated fat in Norwegian cod-liver oil are useful. It is probably absorbed higher up in the intestine than the diseased area. As a medicine small quantities of sodium bicarbonate after meals are useful in preventing the acidosis. When it has occurred large doses of the bicarbonate and glucose are indicated. I have never tried insulin. Fortunately the removal of the appendix does not harm the child if attention is paid to the acidosis.

When a gland abscess is present it may be treated by absolute rest in bed with only glucose and sodium bicarbonate by mouth and by rectum. It will usually subside. If the child appears to be getting worse under this treatment the abscess should be evacuated and wiped out with bipp, with as little disturbance as possible to the surroundings, for the intestines are likely to separate, leaving holes in their lumen. In cases where future obstruction seems to be pretty certain, a side-to-side anastomosis, from above the lesion to below it, will save many a life and hasten convalescence.

In cases of calcified glands I think the evidence is all in favour of their removal. Their close relation to the mesenteric blood vessels should be noted and the blood supply of the adjacent bowel not interfered with. If on account of the close relation of the gland to the blood vessels the surgeon thinks it dangerous to remove the

gland completely a partial removal of the gland will in many cases cause a cessation of symptoms.

Violet rays have proved to be of great use in the treatment of the disease in children and in the fibrosed glands of adults. Deep x-ray therapy is useful, especially in those cases of massed glands simulating tumours. The dosage should be light, as intensive treatment is apt to cause abscess formation.

Summary.

1. Mesenteric lymphadenitis is of frequent occurrence in children. The most common period for the complaint is between 7 and 11 years of age.
2. Symptoms date back over a long period.
3. The history of frequent attacks of lassitude, drowsiness, headaches, and loss of appetite for weeks past is very common in these patients.
4. Attacks simulating acute appendicitis, duodenal ulcer, and other abdominal diseases are common.
5. Other enlarged glands will be detected.
6. The site of tenderness in inflammation of the ileo-caecal group of glands is not McBurney's point, but a situation higher up and more medial than this point.
7. Operation is unnecessary in the case of Group 1.
8. A calcareous gland causing symptoms should be removed.
9. The cause of the condition in children is probably infection by the bovine tubercle bacillus, with a superimposed condition such as acidosis causing an acute attack.
10. The acute abdomen of children due to acidosis is really caused by an underlying mesenteric lymphadenitis.

My best thanks are due to the surgical staffs of the Ulster Hospital for Children, and the Royal Victoria Hospital, for permission to make use of their case records; to Dr. Vint of the Pathological Department, Queen's University, for the supply of sections of the glands; and to the house-surgeons and out-patient sister at the Ulster Children's Hospital for their help in collecting the cases.

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THE TREATMENT OF CERTAIN MENTAL DISEASES BY RINGER-LOCKE SOLUTION.

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ACTING on the suggestion of Ishida, confirmed by Morowoka (*Journal of Mental Science*, April, 1927), a number of patients in the St. Luke's Mental Hospital, Middlesbrough, have been treated by the subcutaneous injection of massive doses of Ringer-Locke solution. The solution used contained, in a thousand parts of distilled water, sodium chloride 9.0, potassium chloride 0.42, calcium chloride 0.24, sodium bicarbonate 0.1, and glucose 0.1. The patients have been somewhat carefully selected; and the debilitated general paralytic and the toxic case have been considered to be most suitable, but a number of the manic-depressive type have received injections over a considerable period, and latterly we found it advantageous to treat the "debility of senility" in this way.

The aim in all the treatment has been to better the physical condition of the patient, but latterly, in view of the results obtained, we have felt that it is quite reasonable to expect a good deal of mental improvement in certain types of mental conditions. A dose of 1,000 c.cm. has been