On Admission.—The temperature was 102° F., and pulse 130. She looked very ill. The abdomen was rigid and tender, very much distended and tympanitic. Liver dullness was absent.

Previous History.—Pain and vomiting after food for some considerable time.

Operation twenty-seven hours after perforation. On opening the abdomen above the umbilicus, gas and free fluid escaped. On the anterior wall of the stomach, near the pylorus, a perforation was found in the centre of a sloughy area of considerable extent. The stomach was markedly enlarged. The perforation and slough were infolded with layers of Lambert sutures, and on account of the narrowing of the pyloric aperture I performed a posterior gastro-enterostomy at the same time. Drainage tubes were inserted locally, as well as above the pubes and in the right flank.

Recovery. Dismissed June 13th.

CASE VI.

W. J., a man aged 45, was admitted on September 10th, 1908. This patient was seen by Dr. Halkett, and sent in within a few hours of perforation.

On Admission.—His temperature was 96.4° F., pulse 64, respirations 28. He complained of dull aching pain in the left hypochondrium. There was absolute rigidity of both sides of the abdomen, with great tenderness in the epigastrium. No vomiting.

Previous History.—Heaviness in the stomach, and slight pain two hours after food, for the past week.

Operation four hours after perforation. On opening the abdomen both gas and fluid escaped. The pyloric end of the stomach was bound down by adhesions, and could not be raised up. A small perforation was found in the anterior wall of the duodenum, quite close to the pylorus. This was closed with a double layer of catgut sutures. Drainage tubes were inserted above the pubes and in both flanks, and a small gauze drain in the upper wound.

Recovery.

CASE VII.

P. W., a man aged 29, was admitted on September 15th, 1908, as a case of peritonitis of four days' duration. On September 10th, after a meal of cornflour, he was seized with sudden severe pain in the epigastrium, which doubled him up. The pain gradually got easier, but recurred on September 12th, and extended to the lower abdomen. Since September 13th pain had been constant under the right costal margin. He has not been sick nor vomited.

On Admission.—Temperature 101.4° F., pulse 100, respirations 22. He felt fairly comfortable but for the epigastric pain. The upper part of the right rectus is rigid, and here there is marked tenderness, and dullness to percussion.

Previous History.—For five years he has had discomfort and pain two hours after food, and three years ago had an attack similar to the present, but not so severe.

Operation.—I had no doubt that in this case there had been a rupture of a duodenal ulcer. Considering, however, that four days had elapsed, and the resulting mischief being quite localized, either because of previously formed adhesions or because the leakage was slight, immediate operation was not indicated. Anticipating the formation of a localized abscess, the patient was simply kept under observation. At the end of a week the abscess, which had increased much in size, was opened by a vertical incision and drained, a counter opening being made in the right flank.

Recovery slow but uneventful.

CASE VIII.

A. S., a woman aged 48, was admitted on September 21st, 1908. This, which proved to be a case of malignant tumour of the pylorus, is included in the series, because perforation took place with the usual acute symptoms, after being three days in the ward.

On Admission.—Temperature 98.4° F., pulse 120, respirations 24. The patient was very thin and pale and emaciated. She complained of soreness in the stomach region, but with no marked tenderness. The stomach was dilated, extending 1½ in. below the umbilicus, and exhibiting marked peristalsis and splashing. No tumour could be felt. She was put to bed for observation.

Three days after admission she cried out with sudden severe pain in the epigastrium, and became quite collapsed. She lay with her legs drawn up, the abdomen being very rigid and tender.

Previous History.—Indigestion for two years. Pain coming on half an hour after food for the past three months. Vomiting for the last month, sometimes the vomit being black. Stools at times black.

Operation three hours after rupture. A large quantity of dark brown bile-stained fluid escaped when the abdomen was opened. The stomach was much enlarged and hypertrophied. At the pylorus there was a hard cartilaginous mass as big as a Tangerine orange, having a large ragged opening the size of a florin in its centre. The tissue was so friable that the opening could not be satisfactorily closed. A posterior gastro-jejunostomy was performed, and drains inserted locally as well as suprapubically and in both flanks. Died a few hours later.

Pathological report: "A large fibrous mass with an adenocarcinoma invading it. Pancreatic tissue is included in the fibrous tissue."

CASE IX.

E. M., a woman aged 43, was admitted on December 11th, 1908. In the morning, while engaged in housework, she was suddenly seized with violent pain in the epigastrium, and

became very collapsed. No vomiting. When I saw her with Dr. King of Yoker, at 8 p.m., she had considerably improved; her temperature was 100° F. and pulse 106. There was marked abdominal rigidity, not much distension, and no diminution of liver dullness.

On admission to the infirmary two hours later, temperature was 102° F., pulse 124. Rigidity and tenderness were present all over the right side of the abdomen and in the left iliac region. Liver dullness had diminished.

Previous History.—Occasional sickness and pain after food for some years.

Operation thirteen hours after rupture. The abdomen contained a large amount of turbid fluid. A small perforation was found in the centre of a very hard ulcer, near the cardiac end of the lesser curvature of the stomach, and near the pylorus another doubtful area of stomach wall covered with adherent omentum. The perforation was closed in the usual way. The part near the pylorus was also infolded, and drains inserted above the pubes and in the left flank. The patient died two days later, during which time she was constantly troubled with hiccough, and vomited dark brown fluid.

CASE X.

J. B., a man aged 65, was admitted on August 14th, 1909. He had not been feeling well for ten days, but continued to work. Coming from work the previous night he felt a severe pain under the right ribs, accompanied by sickness and vomiting. He went to work again in the morning, but had to desist on account of a severe attack of pain, which made him fall down. Dr. Allan, who saw him then, sent him in for operation at once.

On Admission.—Temperature 98.2° F., pulse 64, respirations 16. The abdomen was rigid and tender, especially under the right costal margin, with pain also in the right shoulder.

Operation six hours after onset. On opening the abdomen air and fluid escaped. Just beyond the pylorus, on the anterior wall of the duodenum, was a well-defined perforation a quarter of an inch in diameter. Behind the bowel could be felt a hard mass, which I took to be a gland. The perforation was closed by Lambert sutures in the usual way, and drainage provided for above the pubes and in the right kidney pouch.

Recovery.

CASE XI.

A. T., a man aged 34, was admitted on September 18th, 1909. In the morning he complained of pain in the epigastric region. After his mid-day meal the pain became very severe, and Dr. Allan, who saw him, diagnosed a perforated ulcer.

On Admission.—Temperature 98.8° F., pulse 104, respirations 24. He looked and felt fairly well. The abdomen was rigid and slightly tender, and did not move with respiration. Both flanks were dull to percussion, and liver dullness had disappeared.

Previous History.—This patient had a gastro-jejunostomy performed for ulcer three and a half months ago by Dr. Dalziel. Since then he has been very well, and has gained 4 st. in weight.

Operation six hours after perforation. The abdomen contained a large amount of fluid. A perforation about a quarter of an inch in diameter was found in the anterior suture line of the gastro-jejunal junction, evidently a "peptic" ulcer. The perforation was closed by a double row of catgut stitches and the abdominal wound closed. A drainage tube was inserted above the pubes.

Recovery.

P.S.—This patient was readmitted to hospital on January 3rd, 1910, with a fresh perforation in the same situation, and is again making a good recovery.

THE DIAGNOSIS AND TREATMENT OF A COMMON FORM OF DYSPEPSIA AND OF EARLY TUBERCULOUS INFECTION IN CHILDREN.

By A. DINGWALL-FORDYCE, M.D., F.R.C.P. Ed.,
EXTRA-PHYSICIAN, ROYAL HOSPITAL FOR SICK CHILDREN, EDINBURGH.

IN many cases of chronic dyspepsia in childhood the symptoms are sufficiently definite to settle the diagnosis, and the probability of a tuberculous infection lying at the root of the evil is not to be entertained.

There is, however, a type of case in which it is extremely difficult to say this is tuberculosis or this is dyspepsia, and an exact diagnosis in these cases is of great importance as leading up to a definite line of treatment. The subject is doubtless hackneyed, the theme a wide one, and the difficulties besetting it great; but owing to recent developments in the methods of diagnosis and treatment I am emboldened to record the impressions I have gained, the conclusions I have formed, and the results I have attained by adopting them in practice.

Chronic dyspepsia is a territory of medicine the boundaries of which are wide, the characteristics protean, the limits vague, and the etiology and pathology too often obscure; but with more precise methods of diagnosis at

our disposal our certainty of knowledge of the incidence of microbial infection increases and our powers of delimitation are enhanced.

One boundary is tubercle infection, another may be rheumatism, another something else; it is with the tubercle boundary in its clinical aspects that I propose to deal.

Some of the cases of which I speak might be called mucous disease, some chronic gastro-enteritis, some lithaemia, some other things, but the point in common in all is that in history, appearance, symptoms—in one or all—grave doubt as to the presence of tubercle infection exists. The chief characteristic of all the cases—tuberculous and non-tuberculous—is their vagueness in personal history and in symptoms; all have very chronic symptoms, mostly gastro-intestinal, and there are no physical signs on which to found a diagnosis.

The cases are those of children of from about 5 to 10 years of age who are not confined to bed but who are going about, are comparatively well, and have approximately normal temperatures. The diagnosis in these cases lies, I take it, between the two following conditions:

On the one hand, a form of chronic dyspepsia which is broadly characterized as follows: The child is thin, has dark rings round the eyes, and looks anaemic but is not actually markedly so. He is nervous, probably smart, and may be subject to bad habits, suffers from constipation and occasional attacks of sickness, at which times he is cold and shivery, and passes a large amount of urine. His gastric digestion is apparently good but he cannot eat fat; he is always relieved temporarily by calomel, and he suffers from no obvious organic condition. During a passing slight acute attack of illness (non-gastro-intestinal) his condition is improved.

On the other hand are cases of early tubercle infection. Here we have a child in many respects very similar in appearance to the foregoing—thin, pale, and not infrequently with a distinct anaemia; with or without a history of tubercle among near relatives—phthisis in an occupant of the home, particularly for some time during the period of infancy, being, however, practically always sufficient for a definite diagnosis; in chronic ill-health, with no definite abnormal physical signs but with assimilative incompetence, gastro-intestinal irritation, lassitude, and weakness. These cases are, I think, practically always glandular—it may be the bronchial, it may be the abdominal glands which are infected, or it may be glands elsewhere, but it not infrequently is the abdominal glands.

Further, while differentiating strictly between the two conditions, I am at the same time sure that this form of chronic dyspepsia, closely simulated as it is by the initial stage of tuberculous infection, not infrequently merges itself in tuberculosis.

The points upon which a definite diagnosis rests are:

1. The capacity of digesting fat.
2. The reaction to tuberculin tests.
3. The condition of the urine.
4. The opsonic index.

Of these tests I shall merely touch upon the two last named; they are complicated and tedious, and, consequently, in many instances are not of practical application.

As regards the urine, I allude more particularly to the quantitative and qualitative tests for sulphates—the determination of the relative amount of ethereal and preformed sulphates. Given its fullest value, this test is obviously no criterion by which one can exclude tubercle infection. I think, however, that absence of excess of ethereal sulphates—as indicating absence of abnormal intestinal putrefaction—along with the other signs and symptoms of this type of case is definitely in favour of tuberculous infection.

As regards the opsonic index, elaborate technique and constant practice, associated, perhaps, with incommensurate results, also place this test, to a certain extent, outside the realm of practical medicine. So far, however, as my experience goes, the opsonic index to tubercle in early cases of glandular infection is consistently low, and I am certainly prepared to deny that this test, efficiently carried out, is valueless.

For the majority of patients, however, the chief criteria of the condition are the powers of fat digestion and von Pirquet's cutaneous tuberculin test.

In early childhood the power of digesting and assimilating quantities of fat is very considerable, and in the early stage of tuberculous infection this power is, as a rule, not markedly affected. The diet of both types of these children of whom I speak varies enormously, and in many cases but little is taken; but in tuberculous cases this small amount not infrequently consists of milk, eggs, and other fatty food. Again, cod-liver oil emulsion is usually readily taken in early tuberculous infection, and does good even in cases where previously it could not be borne, and this is seen very strikingly in cases which merge into tuberculosis from this form of chronic dyspepsia.

Want of power to deal with fat is, on the other hand, one of the outstanding characteristics of this form of dyspepsia. It may be that, owing to conditions in the gastro-enteric tract, fat is only imperfectly digested and is not absorbed, or it may be that fat assimilation is imperfect, and, according as one or other condition predominates, the course of the condition may tend towards mucous disease, acidosis, etc., but in all there is inability to utilize fat, the original exciting cause of the condition varying very widely.

As regards the tests with tuberculin, the evidence of many observers, and more particularly the results of Holtseem to show that the cutaneous test of von Pirquet is as reliable as any, while unattended by the constitutional and local disabilities of respectively the tests by injection and by Calmette's method.

Personally, I am inclined to attach marked value on the von Pirquet reaction in cases of this description. In its employment I have used both human and bovine tuberculin; in some instances the reactions of the two have corresponded, in some they have not. A positive reaction to either I consider a positive result.

Further than being a point of interest in the etiology, and possibly in the prognosis, I do not think it matters which tuberculin gives the reaction; it is no indication as regards the specific form of tuberculin treatment.

The tuberculous focus may be in the cervical, thoracic, or abdominal glands, or elsewhere; a positive reaction is a definite danger signal; in young children of this type it indicates the necessity of active antituberculous treatment.

Owing to the very various routes by which a child may arrive at the condition of chronic dyspepsia, it follows that treatment in different cases must vary considerably. By whatever route the condition is attained, there are, however, certain points in treatment common to all, and certain points of marked difference in this treatment from that of early tubercle infection.

Each case has, of course, to be treated on its own merits, but for all prolonged and careful dieting is necessary. The condition may have originated with irregular meals and excess of carbohydrate food, or a diet rich in protein, or an excessive supply of fat. But now, for all cases, the diet is to be cut down; rest is essential for the digestive apparatus, and to regain their normal power the duties of the various organs must be well within their diminished capacity. Rest in bed is generally desirable, but not always obtainable, and small doses of calomel to begin with, and later of strychnine, are invariably of value. A good drink of water at bed time, a cold bath in the morning, alkalis in some cases, thyroid extract in others, and butter-milk where it can be taken, are among the measures most generally beneficial. Absence from school and change of air are always desirable.

Compared with such a scheme of treatment, that of early tubercle infection is markedly different. The diet should be free; fat and animal protein specially should be given as freely as is found possible. In many cases, an occasional dose of calomel and the daily administration—specially in cases with high amount of ethereal sulphates in the urine—of butter-milk is of marked value; fresh air is, of course, of the utmost importance. Great care must be taken in the prevention of sources of glandular irritation and infection, and the teeth, mouth, throat, ears, etc., must be closely attended to.

Finally, all such children should be treated with tuberculin. My own impressions as regards the administration of tuberculin in obviously glandular infections—mainly abdominal or cervical glands—or in cases which by the previous methods of diagnosis, I have diagnosed as latent tuberculosis—and I think these are chiefly glandular—are:

1. That this treatment is very unsafe when large doses are employed or when the temperature is unsteady.
 2. That it is quite safe in the minute doses hereafter mentioned, when commenced with a practically normal temperature and when the patient is kept under observation.

3. That in many cases tuberculin treatment appears to have no definite effect upon the condition one way or another.

4. That in cases in which treatment by rest, climate, feeding, and careful nursing can be employed, improvement by these means alone is usually so marked that it is impossible to attribute to tuberculin, when given in these cases, its due meed of praise or to judge whether it takes any part whatever in the improvement.

5. That, however, when treatment by rest, climate, feeding, and careful nursing cannot be properly adopted, tuberculin is often of very marked value. These are the cases which otherwise do badly, and tuberculin treatment is with them of the greatest importance.

6. That T.R. is as a rule preferable to P.T.R.

7. That for routine use the method of hypodermic injection is greatly superior to that of oral administration; the effect of giving tuberculin by the mouth varies very much.

These impressions are derived from the treatment of about 100 cases during the past three years. At the commencement I used the opsonic index as a guide, but early found it impossible, and I think unnecessary, to take the index in selected cases such as these. The condition of the temperature is, I think, a sufficient guide for the initial administration and the clinical symptoms thereafter in relation to each injection.

The forms of tuberculin I have used have been Koch's new tuberculin, T.R., and the corresponding bovine tuberculin, P.T.R. The two varieties I originally employed in order to determine their varying results in cases showing different reactions to von Pirquet's test with human and bovine tuberculin. I have come to the conclusion, however, that, no matter to which strain of bacillus von Pirquet's reaction is positive, T.R. is the tuberculin of the greater therapeutic value.

The tuberculin was given hypodermically and by the mouth. By the mouth the doses I gave varied from $\frac{1}{1000}$ of a milligram to $\frac{1}{50}$ of a milligram, and the results I considered very disappointing; only very occasionally was any satisfactory result noticeable. By hypodermic injection the initial dose varied from $\frac{1}{1000}$ of a milligram to an infant 9 months old to $\frac{1}{3000}$ of a milligram to a child of 12 years.

The injections were repeated weekly or fortnightly and the dose increased at long intervals and by very minute amounts, the rapidity and amount of increase desirable being gauged by the clinical condition.

In all cases, diminished vitality or health—apparent in any manner whatever—during the few days following an injection was considered a sign either to diminish the dose or increase the intervals between doses, the conditions aimed at being that after each injection the child should continue steady improvement or show a step in advance. In several instances a child while under tuberculin treatment had apparently attained sound health. The tuberculin treatment was stopped for two or three months; the child relapsed, only again to improve on the renewal of the injections.

DRIED MILK AS A FOOD FOR INFANTS.

By C. KILLICK MILLARD, M.D., D.Sc.,
 MEDICAL OFFICER OF HEALTH, LEICESTER.

Dried milk is the residue left after the natural moisture in milk has been evaporated. The process of manufacture usually adopted is that invented some years ago by Drs. Just and Hatmaker and known by their names. Fresh milk is fed in a continuous stream on to revolving heated cylinders on which it forms a thin film. These cylinders are heated by steam at about 40 lb. pressure; the surface attains a temperature of, say, 250° F., and the moisture in the film of milk is almost instantly dispelled. The dried film is automatically detached from

the cylinders by knife edges, and falls off into receptacles below. The small amount of moisture not evaporated is taken up by the milk sugar as water of crystallization. The dried milk is subsequently passed through a sieve to ensure uniform pulverization, and is obtained as a coarse granular cream-coloured powder, practically sterile, which, in airtight packages, will keep almost indefinitely. I have kept samples in my laboratory for over a year and found them still good.

When again mixed with the equivalent quantity of water about 60 per cent. is found to be soluble, the remainder being readily suspended. The resultant fluid is slightly different in consistency from fresh milk; the flavour is altered, although by no means unpleasant, and the fat tends to separate and to rise to the surface, owing to the cream globules having been ruptured. To what extent the chemical composition is affected is a little uncertain. The relative proportions of the main groups of constituents—proteids, fat, milk sugar, and salts—remain, as we should expect, practically unchanged; but there is, no doubt, some interference with the exact composition of the more complex albuminoids and enzymes, similar to what occurs when fresh milk is boiled. Owing, however, to the extremely short time—only a matter of seconds—during which the heat is applied, which is one of the essential principles of the Just-Hatmaker process, it is possible that the alteration in chemical composition is less than in the ordinary process of boiling milk. The heating process destroys all tubercle bacilli and other pathogenic organisms.

The process of manufacture is not expensive, and, owing to the saving on carriage, dried milk, if manufactured in localities where milk is cheap, can be sold wholesale at a price very little above the price of fresh milk. If retailed in small quantities in tins the price is, of course, increased.

USE OF DRIED MILK IN LEICESTER.

The use of dried milk at the Leicester Corporation Infants' Milk Dépôt was begun about eighteen months ago. I was somewhat prejudiced against it, disliking the idea of abandoning fresh milk with its antiscorbutic properties, and only very limited use was at first made of it. It was very soon discovered, however, that dried milk had one most important advantage—greater digestibility—and that many infants would retain it and at once begin to thrive who previously had been continually subject to vomiting after each feed and in consequence were making little or no progress. This difference in digestibility would seem to be largely accounted for by the character of the curd formed in the stomach; it does not tend to run into hard cheesy masses, as is the case with ordinary cow's milk. The babies certainly like the milk. In my experience they never refuse it when offered it for the first time; and it is quite common to hear that they show a decided preference for it, and after getting used to it they will sometimes refuse ordinary milk.

As a consequence of these good results it gradually became our practice to order dried milk in all cases where infants were not thriving on the humanized bottled milk, but it was found that once a baby had been put on dried milk it was very seldom that the mother wished to go back to the humanized milk. Indeed, with the mother dried milk has been very popular from the first. After a time requests from neighbours began to be received that their babies should also be put on dried milk, and medical practitioners began to specify dried milk when sending cases to the dépôt.

A careful watch has been kept for any bad effects, such as scurvy or rickets, but although I have had experience of some hundreds of infants fed on it for periods ranging up to ten months, or even longer, so far none have been seen. Inquiries have also been made from fifteen medical men practising in the districts whence most of the cases have been drawn, and their replies in all cases were favourable to the use of dried milk, and support the conclusions that no bad effects have followed. Inquiries, too, have been made from the mothers of babies fed on the dried milk to ascertain if the health had continued good after giving up the milk, but nothing pointing to bad after-effects has been discovered.

As for rickets, it was not to be expected, having regard to modern views as to the etiology of this affection, that