Then she developed a persistent nasal catarrh, from which I isolated the bacillus of Friedländer, and prepared a vaccine which did temporarily stop the rhinorrhoea, but did more harm than good. A nasal polypus was then removed, and was followed by infection of the maxillary antrum. This was drained and washed, but the other sinuses became infected one after the other. All the sinuses have now been operated upon except the sphenoidals, and now, by wearing a tiny style to drain the frontal sinus, the poor girl seems to have been given relief from this trouble. However, after each operation urethral catheterization became necessary, and at the last one a cystitis due to *B. coli* infection was acquired in spite of every precaution. It spread up to the kidneys, causing a critical illness (February 6th, 1910).

The chart commences two weeks after this had passed its acute stage, while there was still pain and tenderness in the kidneys, and much pus in the urine. Though the temperature was normal, the antitryptic index was high (7th delay). I did not dare risk the possibly injurious effect of a *coli* vaccine at this stage, though if one could have foreseen how obstinate the case would prove, a vaccine would have been worth the risk. As she had previously reacted very well to tuberculin (it always acted like a strong tonic) I gave her a small dose of T.R. (0.005 mg.).

This and three other doses had an unmistakably good effect on all her symptoms, and also on the antitryptic index. A relapse, however, occurred, due partly to the necessity of her having another nasal polypus removed. This probably caused the big rise in the index about April 4th. The dose of *coli* vaccine she then had was probably slightly too large (20 million), as it produced a preliminary rise in the index and a fall delayed too long. The dose on April 20th was probably correct, as it caused a prompt and decisive fall in the index (4th), but of course one cannot generalize on such slender evidence. A vaccine appears to cause no fall of a normal index, but too large a dose would no doubt produce a rise, so that in either case the index may afford valuable guidance.

Those who are accustomed to opsonic curves must bear in mind that our object is to coax the curve down to the normal instead of trying to force the curve up, as in opsonic work.

Dry cupping I found of great benefit in this and similar cases, but I could not disentangle any effect on the antitryptic index attributable to it.

Urotropin, as usual in my experience of a *coli* urinary infection, did no good, but helmitol, as usual, proved distinctly helpful.

Methylene blue did no good in this case, and possibly harm.

The index varied independently of the temperature, proving much more sensitive to the vagaries of the kidneys and to the influence of vaccines.

CONCLUSIONS.

1. It is possible by this method to measure the antitryptic index with only $\frac{1}{2}$ c.cm. of serum, which is easily obtainable from a finger-prick.¹
2. It appears probable that repeated observations of this index may give valuable guidance in the amount and frequency of doses of vaccines.
3. A suitable dose apparently lowers a raised index sharply without a preliminary rise (vide chart, March 8th and April 21st).
4. A dose which is unduly large seems to cause a preliminary rise and a delayed fall (vide chart, April 5th to 10th).
5. Tuberculin (T.R.) markedly improved the symptoms and an index raised by a *coli* infection, showing that the effect is not entirely a specific one. Although the patient was tuberculous there were no tubercle bacilli in the urine.
6. The present patient seems defective and abnormal as regards her immunization machinery, and the index in other cases may react differently.
7. The curve of the antitryptic index is perhaps more staid and moves in straighter lines than a chart of the opsonic index, probably because it is so much more accurately measurable. This consistent behaviour of the curve is, to my mind, strong evidence of the reliability of this technique.
8. In this chart the index displays a quality which simulates inertia, for whenever it falls suddenly it is apt to overshoot the normal line and to become a *negative index*, like a heavy, quickly-moving lever.
9. This throws some light on negative indices, which as isolated observations were less intelligible.
10. This method becomes a possible competitor with the opsonic index as another means of measuring immunization response.

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ON THE VALUE OF TEST MEALS AS A GUIDE TO INFANT FEEDING.

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THREE years ago I started "infant consultations" in North Kensington (Notting Dale), with the help of the Kensington Health Society.

The mothers brought their infants once a week for advice because they were not progressing favourably. The majority were breast-fed, and, as is usual in these cases, friends told the mothers to wean the child. It seemed to me it would be a help in the elucidation of this problem to follow Professor Budin's plan and weigh the infant before and after a breast feed, and so discover at any rate the quantity of milk it obtained, and I have found this method to be of great practical importance. The number of breast-fed infants that "go wrong" is really amazing, and I feel quite certain that a large proportion of the deaths from gastro-enteritis attributed to bottle feeding are in reality breast-fed infants who have been artificially fed as a last resort. I have watched several of these cases, and I can positively say that the initial disturbance in nutrition started whilst the infant was breast-fed, and that artificial feeding was only resorted to when the degree of wasting had become noticeable to friends and relations.

In the case of breast-fed infants there should be some sort of co-ordination between the supply on the part of the mother and the demand on the part of the infant. A strong infant, by reason of its active powers of suction, affords the appropriate stimulus for a parallel activity on the part of the secreting gland, while the feeble nursing, on account of its indifferent powers of stimulation, excites little reaction in the breast. In a considerable proportion of cases there is no co-ordination between the supply and demand; sometimes there is too much milk, and sometimes not enough. Apart from the physiological test—namely, the progress of the infant—there is no way of finding out how much milk an infant receives unless we weigh the infant before and after feeding on very accurate scales; the amount consumed is estimated by noting the difference in the two weighings. This method is known as the "test feed." The following case illustrates its practical application:

A woman came to my consultations with a very wasted infant aged 2 months, and weighing 6 lb. She had fed it entirely on the breast, and assured me that it obtained the milk because it sucked for about ten minutes and then fell asleep. A "test feed" was arranged, and two hours after the last feed the infant was put to the breast. The scales proved that it obtained no milk at all. Milk could, however, be easily squeezed from the nipple, showing that an adequate supply was present. I ordered the mother to give 1 oz. of cow's milk with 1 oz. of barley water alternately with the breast feedings. During the following week the test feed showed that the infant obtained $\frac{1}{2}$ oz. from the breast, and the child had increased 4 oz. in weight. She continued to feed in this manner for another week and the test feed then showed that 1 oz. was obtained from the breast, the child having gained another 5 oz. in weight. At the end of a month's treatment 2 oz. was obtained from the breast, and the child had gained nearly 1 lb. The cow's milk was now discontinued and the child was fed entirely on the breast till it was 8 months old.

Irregular feeding is a frequent cause of vomiting and diarrhoea in breast-fed infants; the scales have often shown what small quantities these infants obtain, and when the mothers are told to feed "by the clock," the result is that the vomiting and diarrhoea cease and the child obtains often double the quantity of nourishment from the breast. When irregular feeding is persisted in, the child begins to waste, the mother then commences bottle feeding, with of course a bad result; should such a case end fatally, the doctor in attendance, if he had not inquired into the previous history, would naturally assume that bottle-feeding was the cause of death.

Another interesting observation that the test feed has disclosed is that among breast-fed infants it is not always those who are inadequately fed according to our accepted scientific data who suffer from wasting, but often those who receive an adequate or even excessive amount. I have notes of at least forty cases in which the infant appeared to thrive and maintain a good weight curve on half the quantity of food that it should normally obtain; for

instance, it is a common experience to find that an infant 3 or 4 months old is fed ten times a day and only obtains 1 to 1½ oz. of milk at a feeding, or about 12 oz. in the twenty-four hours. Evidence from an independent source confirms these observations, for Dr. Eric Pritchard at his consultations at the Marylebone Dispensary has come to exactly the same conclusions.

A starvation diet is hardly likely to promote active nutrition, so that in cases in which the test feed proves that the child is maintaining its weight on such a small amount of milk, I usually supplement the defective supply with additional feeds from the bottle. The following case, however, will show that this is not always necessary.

M., aged 1 month, weighing 8 lb. 5 oz., obtained 2 oz. from the breast. When he was 3 months old he obtained 4 oz. from the breast, and weighed 12 lb. 5 oz. At 4 months, the infant obtained only 2 oz. from the breast, and weighed 12 lb. 14 oz. At 5 months he obtained 2½ oz., and weighed 15 lb. I felt inclined to give some cow's milk as well, but the child was satisfied, vigorous, and had well developed muscles, so I refrained. At 6 months he obtained 3½ oz. from the breast, and weighed 16 lb. At the seventh month he obtained 3 oz. from the breast, and weighed 16 lb. 11 oz.

This child is still attending the consultations, and at present I see no reason why I should supplement this deficient supply of food, because evidently the quality of the milk must be very high. A wasted child, aged 2 months, and only weighing 6 lb. 10 oz., obtained 3 oz. from the breast; this is rather an excessive amount for this age. In a week's time he had lost 4 oz. in weight, and the test feed showed that he still obtained 3 oz. from the breast. In this case the quality of the milk must have been very deficient.

I frequently have infants brought to me who have been artificially fed from the first week of life, owing to the belief that the breast milk had "dried up" on the fourth or fifth day. I regret to say that some of these cases came from maternity institutions. I am sure that no one, however skilled in maternity work, can possibly tell, apart from the test feed, whether the infant obtains a small quantity from the breast or not. To show how mistakes can be made I will quote the case of an infant born in one of our maternity institutions.

The baby was 2 months old when I saw it, very wasted and was having the bottle. The mother told me her milk had disappeared on the fourth or fifth day, and that the nurse said she must feed the baby on the bottle. The financial problem on leaving the institution worried the mother a good deal, so she put the child to the breast now and then "when the nurse was not looking." The test feed showed that the child obtained 2 oz. from the breast. I told the mother to stop the bottle and feed only by the breast. The child did remarkably well, and there was no further trouble.

Mistakes such as this could easily be avoided if the test feed was employed in all doubtful cases.

During the colostrum period the amount of fluid secreted is always extremely limited. The milk is thought to "dry up" on the third or fourth day, because at about this time the breasts, which have been previously hard, often become soft and smaller owing to the resolution of the gland cells into a colostrum-like secretion.

I have seen many cases of dyspepsia and wasting in infants who have never had a chance of passing through the colostrum period (which usually lasts from ten to fourteen days), but have been fed on milk mixtures from the very commencement.

Colostrum is a bland, unirritating, non-coagulable fluid, and at the appointed time Nature adds the casein very gradually. The whole process may be regarded, in Dr. Pritchard's words, as an "educational" one, in which we can imagine the digestive processes being trained to deal with the clot at a later date. It is easy to see that cow's milk cannot be a suitable food at this early age. I have notes of several cases in which vomiting persisted for two or three months after this initial mistake was made. Infant foods were tried one after the other with a like result, and I only succeeded in arresting the vomiting by giving peptonized milk for some time, and gradually weaning the child on to citrated undiluted milk.

When cow's milk is added to the diet, the knowledge we obtain from the test feed is valuable. Take the case of a child 5 months old, who only gets 2 oz. from the breast—if the regular allowance of 4 or 5 oz. of modified milk were given in such a case gastric disturbance would be a likely consequence. I have seen many cases of mixed feeding,

in which the mother has followed the printed instructions supplied to her with regard to the quantity of milk which should be given at a particular age, and where the result has been disastrous. I have in some of these cases proved by the test feed that the mixtures were in these particular instances far in excess of what the child required; and when I made the quantity of cow's milk to correspond to the amount obtained from the breast a more peaceful state of things resulted.

Up to the present time 360 infants have attended my consultations. During the first two years there were 5 deaths due to gastro-intestinal disease; during the last year no deaths from disease of the alimentary canal have occurred. The number of attendances has been 595 during the last year.

OVARIAN GRAFTING AND MENSTRUATION.

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ONE of us has been making a special study during the last few years of the question of ovarian grafting in the female subject. This grafting consists in implanting under the skin of the abdominal wall one of the ovaries which has been removed during a subtotal hysterectomy. The question of grafting an ovary from one woman into the abdominal wall of another subject, and also of grafting an ovary which has been preserved in ice during a period of from one to twenty-five days, has also been studied.

In all these cases the grafting has succeeded. The ovary has retained its original size for a period varying from one month to three years, and has exhibited at different times certain congestive phenomena which have stimulated those which normally take place just prior to menstruation. The results of these inquiries have been published in a thesis by Scheurer.¹

The question of interest at the present moment is to know what actually takes place in a woman in whom both ovaries and tubes have been removed while the uterus has been left in place, and in whose abdominal wall one of the ovaries, apparently in a healthy state, has been implanted. Such a patient, after recovery from the operation, possesses a uterus in a normal position and an ovary in an abnormal position. Is it possible for such a utero-ovarian combination to present the congestive phenomena associated with menstruation?

We have already published two cases with details upon the subject without being able to formulate any definite conclusions. In the case published below normal menstruation occurred, accompanied by enlargement of an ovary which had been implanted four and a half months previously:

E. G., aged 29, was admitted to the Hertford British Hospital on October 28th, 1909, with a history of abdominal pain on the left side of one month's duration. She was unable to assign any cause for the onset of the pain, and there was no history of miscarriage. There was slight leucorrhoea, but no examination was made to demonstrate the gonococcus. The patient had had one child, who was aged 4 years. Menstruation, which had commenced when she was 13 years of age, had been regular. Examination showed that she was suffering from double salpingitis, the disease being most marked on the left side. Treatment by rest in bed, daily douches, and enemata was undertaken and continued up to December 10th, 1909. On that day both tubes and ovaries were removed, and the right ovary, which appeared to be normal, was grafted into the abdominal wall on the right side. For some days following the operation there was complaint of pain on the right side of the wound, and the grafted ovary was tender upon palpation. These symptoms, however, quickly subsided, and she was dismissed well on February 10th, 1910.

On May 4th the patient came back with the complaint that the abdominal pain had returned, and then she gave the history of the following events, which had occurred since her discharge on February 10th. There had been slight yellowish-white vaginal discharge, which at times had had an offensive odour, and had necessitated her taking vaginal douches. Six weeks prior to her return—that is, on February 20th, or ten weeks after the operation—she had acute pain on the right side of the abdomen. This pain had come on suddenly and continued six