Thus spa treatment produces two definite effects upon the bacterial growth that is the cause of most of our diseases: it prevents the growth of a large class of bacteria in the intestinal canal, and it causes the elimination of those toxins already circulating in the blood. All the accessory modes of treatment, the various baths and forms of massage, are designed to the same end; they all in some way help the circulation through the cell spaces and increase elimination through the various organs of the body when applied generally; locally applied they cause an increased flow of serum through the tissues treated, which is again a factor in antibacterial treatment, though the increased resisting power given to the tissues by a flooding out of serum should also be taken into account.

COTTAGE NURSES FOR RURAL DISTRICTS.*

BY

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We have heard a good deal lately of the trouble there is with district nurses thrust on the profession and the community by what I would call the "Lady of Improvidence," who pays the piper and wants to call the tune.

The subject of cottage nursing is one which must be of deep interest to any one practising in rural districts. I should be inclined to say among the poor anywhere, but it is so long since I was engaged in town practice that I prefer to speak only of those conditions of which I have had recent experience.

Nursing of the poor, as of the better classes, is a necessity, but in considering the subject, several matters must be borne in mind. While the nursing is the main need, there are other things little less important.

When the wife and mother is in bed, it is little use having even a first-class nurse to attend to her if she is worrying all the time as to what is happening to her husband and children. What is wanted is a nurse who, in addition to attending the patient, will see to these matters. A cottager cannot afford, out of a wage of some 15s. to 18s. a week, to pay for a nurse and a housekeeper too.

The nurse must be competent within her limit; she must be able to do without waiting on; she must be able to keep house, see to the comfort of the husband and children, get them their food, send the children properly dressed to school, and generally take the mother's place, and so relieve her of all anxiety.

Her attendance must be so constant as to prevent friends and neighbours interfering with the treatment, removing dressings to see how a wound is getting on, or to show it to any interested visitor. Above all, she must be cheap, or she will not be available for the class of persons I have in mind.

The nurse must not be provided by charity, or the poor will be pauperized, to their own and every one's disadvantage. The ordinary trained nurse is quite beyond the means of these people, and the district nurse does not meet other requirements in the case. She will not cook for the family, nor get the children ready for school. A district nurse could not work in a sparsely populated district—the distances are too great for her to attend more than one or two patients a day.

The cottager should be able to pay for the services of the nurse when well, for when ill he has more to do to meet the extra cost of living than he can well manage.

The nurse should be provided by the community, not by any "Lady of Improvidence," under whose guidance she would work—an arrangement which generally appears to lead to trouble with the medical men. In my opinion, it is essential that any nursing association which is to be a success, and work smoothly, should be on provident lines, apart from the unquestionable benefit to the people from this method of working. As soon as charity is introduced the door is opened for the interference of the larger subscribers, who, sooner or later, will want to run the scheme on their own lines, without any regard to the interests of the patients or the doctors.

* Read at a meeting of the Ashford Division.

These needs are met by the Holt Ockley system, which was founded at Ockley by Miss Broadwood in 1883. It is a provident system, each member paying his share of the estimated cost of the nurse. In my experience, the figure at which the subscriptions are fixed will, I am sorry to say, hardly cover this cost. Miss Broadwood says she had at Ockley great difficulty in fighting the idea that the poor should have everything found for them, instead of being encouraged to provide for themselves. We have found that, with encouragement, they are quite willing and able to do this.

The central office told us, in the first instance, that one nurse would nurse the sick of a population of 1,100, but when the maternity nursing is added, we find that the number of nurses needed is much larger. Acting on the figures supplied by the central office, we fixed our subscription at 4s. a year as a minimum for the labouring class, rising gradually to 21s. for gentry; and the hire of the nurse rises proportionally, the labourer paying 2s. a week and the gentry 15s. when the nurse is employed. These fees are doubled after the nurse has been at a case for three weeks, unless a certificate from the doctor saying that a longer attendance is necessary, is shown.

The nurses are taught to make a bed, cook, wash and dress a patient, do ordinary dressings, take temperatures, pass a female catheter, and note symptoms; to nurse a midwifery case, and, most important of all, to do as they are told. Some of them have a midwifery certificate, but most of them hold certificates for monthly nursing. No nurse is allowed to attend without a medical man, and we have not had any trouble with nurses wanting to practise medicine or midwifery.

All the medical men in the district were invited to join the committee, and I and my colleague did. The central office suggested that in some districts at least one of the nurses should be a certified midwife, but we pointed out that there was no demand in the district for midwives, and, further, that if the association employed midwives, we should expect it to make provision of payment of any medical man called to her assistance by a midwife, and that the Poor Law allowance of two guineas would be the smallest fee we should be prepared to accept. (The model rules now provide for the payment of the doctor by the association.) The committee decided not to employ midwives as such.

The nurses are women of the cottager class, and generally are well content with their position and do good work; the trouble is that the younger ones get married, and the elder ones get ambitious and want to train further.

Each nurse receives four to six months' training at a cost to the association of from £14 to £21. This amount is repaid by the nurse by the acceptance of a smaller salary for the first three years. A small sum is also retained by the association to form a bonus, which is given to the nurse at the end of three and a half or four years' service. As showing somewhat the progress of our association, I may say that the first year's subscriptions amounted to £31 12s. 5d., and the fees for actual nursing done, £6 10s. 6d. Last year the subscriptions were £58 9s., and the fees £71 5s. To put it in another way—in the first year 9 cases were nursed out of 105 subscribers; in the second year 26 cases out of 110, the nurses being engaged for seventy-two weeks' nursing. In the third year 28 cases were nursed for ninety-two weeks out of 124 subscribers; the fourth year 48 for 127 weeks out of 127 subscribers, and last year 57 for 156 weeks out of 221 subscribers. These figures will serve to show how the nurses increase in favour as they are known.

Each association covers a number of parishes, and supports one or more nurses, who are not allotted to separate parishes, or districts. Any nurse may be sent to any part of the district where she is required, so that if there is no work in one part of the district, the nurse is not wasting her time, but is working where she is needed. The work of the association is controlled by a committee consisting of president, secretary, treasurer, and one or more committee ladies from each parish. The duties of the committee ladies are to collect subscriptions and fees in their parishes, to forward applications for nurses to the secretary, and to pay occasional visits to the house where a nurse is employed, in order to see that both patient and nurse receive fair treatment. All fees are paid through

the committee lady to the treasurer, and nothing to the nurse herself—she receives a regular wage.

Under the auspices of the central association there have been established a number of lending groups for the interchange of nurses. The more this can be extended in the county, the better for the associations working in the county.

We have borrowed nurses from all over the country, and the travelling expenses become heavy where the borrowed nurse has to be brought from a distance.

There are five associations in the county affiliated to the Holt Oakley Association, and I am satisfied that the more we get established the sooner we shall cease to hear of the necessity of midwives, and of the everlasting difficulty with the "Lady of Improvidence."

THE TRANSMISSION OF TRYPANOSOMA LEWISI BY THE RAT-FLEA (*CERATOPHYLLUS FASCIATUS*).

BY
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(From the Protozoological Laboratory, Lister Institute.)

In a recent number of this JOURNAL¹ Mr. Strickland has communicated the results of some experiments carried out by him on the question of the mechanism of transmission of *Trypanosoma lewisi* from rat to rat by the rat-flea. Mr. Strickland succeeded in infecting clean rats by contaminating their food with infected fleas, and arrives at the following conclusions, amongst others:

1. Infection of rats with *T. lewisi* is caused by the rat's act of eating infective fleas.
2. It is not caused by contamination of the rats during a short time, nor by their being bitten by the fleas.

We have been making experiments on the same subject for over a year, and hope soon to publish a full account of our results with regard to the transmission of the trypanosome by, and its development in, the rat-flea. Since, however, Mr. Strickland has forestalled us with regard to one of our results, and has drawn from it conclusions with which we cannot agree, we wish to state (1) that we have also found that rats can be infected by devouring infected fleas, (2) that we do not consider this to be the sole nor even the usual method by which the transmission of the trypanosome from rat to rat is effected by the flea.

I.

In the dissection of fleas performed by us with a view to following out the development of the trypanosome we have frequently found cysticeroids in the body-cavity of the flea, and this fact suggested at once that the rat infected itself with the tapeworm by eating infected fleas, a supposition which was confirmed experimentally by our colleague Dr. W. Nicoll.² From this it was evident that it must be a common habit of rats to eat their fleas, and it naturally occurred to us that they might infect themselves with the trypanosomes by the same method. We therefore carried out last year several feeding experiments, taking fleas from the infected breeding-cage, that is to say, from a breeding-cage for fleas in which a rat infected with *T. lewisi* is always kept in order to feed the fleas. The fleas were killed by crushing their heads with a forceps, and then they were mixed with sop of bread and milk and given to rats. Some of these experiments gave a positive result, some did not. Dr. Nicoll obtained similar results incidentally in the experiments he carried out on the infection of the rat by the cysticeroids of the flea. He made use of fleas from our infected breeding-cage in his experiments, for the reason that the cysticeroids had been found in fleas from that cage. It will suffice for the present to quote the data kindly supplied to us by Dr. Nicoll.

1.

Five rats born November, 1909.
Two fed with fleas from the infected breeding-cage daily from January 26th to February 14th.

On the latter date both had large infection of trypanosomes. Other three control rats showed no trypanosomes.

2.

Four rats 2 months old.
Two fed daily with fleas from the infected breeding-cage, from April 4th to 22nd. Both showed trypanosomes at the end of a fortnight.
The other two rats showed no trypanosomes.

Dr. Nicoll's experiments thus furnished decisive confirmation of our previous experiments, showing that rats could become infected with *T. lewisi* by eating infected fleas. Other experiments, however, which were carried on by us at the same time led us to the conclusion that in Nature infection of the rat by eating fleas is an exceptional and aberrant method of transmission of the trypanosome. It is known that rats can acquire infection with trypanosomes by eating other infected material, such as the blood or organs of other rats containing living trypanosomes, and Manteufel has shown that rats can even be infected with *T. lewisi* by allowing blood containing trypanosomes to dry on the unbroken skin. Rats in their fights often kill and eat each other, and doubtless may sometimes acquire an infection as a result of cannibalism of this kind, but no one has suggested that this is a normal method of transmitting trypanosomes. We should not, therefore, have thought it worth while to publish separately the experiments cited above, were it not for Mr. Strickland's second conclusion that we have quoted.

II.

Decisive proof that "the rat's act of eating infective fleas" is not the usual method by which it becomes infected is furnished, in our opinion, by experiments in which, after putting a single flea from the infected breeding-cage on a clean rat for a short time (usually about three days), we have recovered the flea and dissected it, and the rat has become infected in due course; and by other experiments in which we have succeeded in infecting several rats by means of one and the same flea.

For these experiments we used specially constructed rat-cages, each consisting of a tin cylinder, 6 in. in diameter, 10 in. in height; the bottom is closed in with tin, the top by a tightly fitting tin cover, which has an opening sufficiently wide to admit air for the rat, but barred doubly with both wire gauze and finely meshed cloth gauze, the former to prevent the rat forcing its way out, the latter to make it flea-proof. Into such cages were put, first, a small quantity of sawdust at the bottom; secondly, a rat carefully examined to make sure that it had neither trypanosomes in its blood nor fleas on its skin (if necessary chloroformed to rid it of fleas); thirdly, a single flea which had been taken from the infected breeding-cage two or three days previously, and kept isolated before being put on the rat, with the double object of avoiding any possibility of direct transmission of the trypanosomes, and of making the flea hungry. In these cages we never had the slightest difficulty in recovering the flea. Generally, as soon as the rat was lifted up, the flea was seen at once in the sawdust at the bottom; if not there, it was found on the rat, usually on the inner side of the thigh.

In these experiments by no means every flea taken from the infected breeding-cage produced an infection, even though the flea when dissected showed trypanosomes in its digestive tract. We have performed 63 such experiments, which may be divided into two periods: 37 from August 2nd to November 11th, of which 6 gave positive results; 26 from November 12th to December 14th, which were all negative. Of these 26 negative, however, in 6 the flea was left on the rat only for a few hours, and when dissected was not found to contain blood in its stomach and probably had not fed. It is curious, nevertheless, that the experiments in the early winter all had negative results, and this is probably more than a coincidence. In the warmer months the average of positive results is very nearly 1 in 6. In the whole 63 experiments we failed three times to recover the flea, and it may have been eaten by the rat in these cases, but as the result was negative in each case, it makes no difference one way or another. In two experiments the flea was dead when recovered: these also were negative in result.