moreover, I venture to state that on active service of such a nature in tropical countries, it is to be preferred to other germicidal preparations.

THE BIONOMICS OF THE RAT-FLEA.

BY

C. STRICKLAND, M.A., B.C.,

TRAVELLING MEDICAL ENTOMOLOGIST IN THE FEDERATED
MALAY STATES.

(From the Office of the P.M.O., Kuala Lumpur.)

HAVING been in the "backwoods" for some time past, I have only lately had my attention drawn to a paper by Nicoll in the BRITISH MEDICAL JOURNAL for October 26th on the life-history of the rat-flea (*Ceratophyllus fasciatus*, Bosc).

The work which Nicoll describes and the facts which he has elucidated are essentially similar to my own in 1910-11, which are the object of a report to the Local Government Board now in course of publication. But I disagree with certain of Nicoll's hypotheses put forward to substantiate these facts, and I would like here to give the reasons for my disagreement.

The facts are these. Fleas are found to live in a certain medium of rubbish for apparently a great length of time without food—Nicoll found for fourteen months, while mine were alive after eighteen months, when they were accidentally thrown away. This fact is of great practical importance, of course, in itself, particularly if the fleas are able to remain disease-infective for the same length of time, and the explanation of the fact may be equally important to the fact itself. Nicoll's hypothesis is that the rubbish contains a large number of larvae, which do not all undergo metamorphosis at once. Some of them pupate and imagnate after one month, some after ten months, and so on, remaining in a resting state meanwhile. In this way a constant succession of new adults is produced which take the place of the old ones, which die off in about a month's time if kept without food, the net result being that the original fleas apparently live for a great length of time.

Now, I disagree with this hypothesis for the following reasons:

1. I have taken specimens of the rubbish from time to time and looked carefully in it for larvae, or pupa-cases which should contain either resting larvae or pupae, and I have never succeeded in finding a single one. Active larvae certainly could not escape detection. Pupa-cases are more difficult to find, but not so difficult that they cannot be seen on a careful search. I have therefore concluded that the rubbish does not contain either active larvae or any resting stages of the metamorphosis. (I admit, however, that for the first month or two resting larvae could probably be found.)

2. I have carefully taken away from a quantity of rubbish all the adult fleas present (a live bait is an efficient mode of procedure for this purpose), and I have then watched the material carefully from day to day for three to four months to see if more adult fleas would appear, but with negative result. Now, if resting stages of the larvae were living in the rubbish and constantly producing a batch of new imagines, it is difficult to see why during the time observed adult fleas did not appear.

3. It is postulated that metamorphosis is most active in summer, yet our actual experience was that the adult fleas to be found in the rubbish greatly decreased during the hot months. This is hard to explain, if the resting larvae imagnate more quickly than in winter.

The conclusion which my experiments led me to was that it was the adult fleas, and not any stages in the metamorphosis, which survived for such a great length of time as eighteen months. I imagined this was possible to the adult flea, because the rubbish in which it lived was hygroscopic and non-conductive to heat, so that heat and dryness inimical to the flea's life was escaped from in its depths.

The facts which I elucidated could only (on Nicoll's hypothesis) be explained on the assumption (1) that the pupa cases which I searched for and failed to find were actually there; (2) that although for some reason or other the resting stages failed to imagnate after three to four months, they might have done so later on; (3) that the resting stages are more prolonged in summer than in winter—a conjunction of events improbable enough to make me believe that the adult flea really survives for great lengths of time without food.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

A CASE OF DERMATITIS ARTEFACTA.

In December, 1911, the patient, a domestic servant, aged 42, was admitted to a cottage hospital for convalescence from some skin trouble. The lesions on admission were merely several reddened patches fast clearing up.

In July, 1912, she returned for treatment in the initial stages of an attack. The lesions, which were distributed fairly generally all over the body, would start with painful erythematous patches followed shortly afterwards by the formation of little blebs. On several occasions there was vomiting and distaste for food, so that I wondered whether an intestinal toxin was the causal factor. This attack lasted one month.

In January, 1913, I received a letter from the patient, saying the trouble had recurred and asking to be re-admitted. The lesions then were much larger and coarser, chiefly on the right side of the neck near the angle of the jaw and on the right upper arm (flexor surface). The patch on the neck was some four to five square inches in extent. Furthermore, reddened patches would occur, which were not always followed by blebs. I very soon doubted my original diagnosis, but there was nothing obviously artefact about the shape of the lesions. One day I remarked to her that it was curious how on this occasion all the patches occurred on the right side. Two days later a patch occurred on the left elbow with bleb formation. At the end of a month the lesions were healed, leaving a little pigmentation, and the patient looked out for and obtained a situation. As it was near London, I advised her to see Dr. Sequeira at the London Hospital if there should be any return of the trouble.

A fortnight later I had a letter from Dr. Sequeira saying that the patient had been to see him, and that "the eruption as then seen was undoubtedly artefact." One spot had such a curious shape that he felt at once it was self-produced. "Its boundaries were all straight lines and sharp angles." There was a faintly acid reaction to litmus. The patient then wrote to me that she had been compelled to give up her situation owing to recurrence of the trouble, and asked me to sign a sick-pay certificate. I refused to sign without seeing her, and she returned to the cottage hospital. A glance at the lesions was sufficient to make me confident that the patches were artefact. I tested one of them with litmus and got a faintly acid reaction, but when, as a control, I tested normal skin I got a much more acid reaction. This proved absence of caustic as an agent, and probably acid too. I accused the patient point-blank of practising deception. She was obviously taken aback, but soon met the suggestion with repeated denials and later with tears. In the pocket of her other dress a screw of paper containing yellow powder was found, but as I had told the searcher to look out for some fluid no notice had been taken of it and no sample obtained.

Next day I asked the patient privately to turn out her pockets, telling her that she had every right to refuse. She was then wearing the dress in the pocket of which the screw of paper with the yellow powder was found. She had no objection, and the pockets contained a few postage stamps and an empty purse. I rather expected this; it did not enable me to know what the powder was, but I felt tolerably certain that it was mustard. She told me most emphatically that there had been nothing in the pocket the previous day which was not in it at the moment of turning it out, and this confirmed me in the belief that I was on the right track. Even when I confronted her with the finder of the yellow powder she still denied it. I called her attention to the penalty under Section 69 of the Insurance Act, and she eventually confessed to having used mustard. In three days the skin trouble had cleared up.

The cottage hospital is partly supported by a small fee charged to the patients (5s. to 10s.). The patient was entitled to sick pay.