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NOTE ON CASES OF PHLEBOTOMUS FEVER AT AN ISLAND IN THE EASTERN MEDITERRANEAN.

By J. T. D. S. HIGGINS, M.B., B.A.,
SURGEON, R.N.

EIGHT cases of phlebotomus fever occurred amongst the officers and men attached to the garrison under my charge. These were due to infection by *Phlebotomus papatasi*. Seven cases occurred between July 21st and August 1st, 1915, and one other case on August 9th.

Six of these cases occurred in one locality and in one house. The patients were either mess-servants, sentries, or officers (1) who were on duty at and slept in this house. One case was an officer's servant (Private R.M.L.I.). He came in from another camp, and slept only one night at the house. On the morning of the fourth day afterwards he became ill with the fever. All the other patients had numerous marks of bites. They resembled mosquito bites; but the sandfly bites silently; it does not give warning of its presence by any peculiar musical note, as does the mosquito. A very faint note may sometimes be heard if the fly passes close to one's ear. The sudden sharp sting, when the phlebotomus bites, is sufficient to wake one from sound sleep.

After the first case, on account of the type, sandfly infection was suspected; the suspicion became greater when the localized incidence at the house became marked. A search was made for phlebotomi in the house, *Culex* larvae (? dengue) being searched for at the same time in the wells, etc., as the marks on patients' wrists and ankles closely resembled mosquito bites. No *Culex* larvae were found, but phlebotomi were found in the house, and later inside the mosquito net of an officer, who had been severely bitten and developed the fever. These were caught and proved to be *Phlebotomus papatasi*. Although specimens had been seen at the Royal Naval College, Greenwich, during the tropical course, after entry, I was not certain that this was the genuine sandfly, but the diagnosis was confirmed by Colonel Garnier, R.A.M.C., Egyptian Medical Service, and they were later examined in company with Dr. A. De Lisle, attached to the French Army Medical Service.

The following prophylactic measures were taken:

1. The sleeping place of mess-servants and sentries was changed from the hall on the ground floor to the lobby on the next floor higher up.

2. A space of ground alongside the house, but not part of the premises, contained old rubble, refuse, and fallen masonry, and was thought to be the probable breeding place and habitat of the fly. This was cleared and covered with lime; quicklime was applied for in order to spray or wash down all these old walls and crevices, but was not immediately available.

After these measures were taken no fresh case occurred, but this was probably in part due to the fact that a slight change in the weather followed, and the temperature dropped below 70° in the evenings, which is unfavourable to the continued presence of phlebotomi. The weather during June and early July was probably too hot and dry for the larvae to hatch out.

As was gathered subsequently from articles published in the *BRITISH MEDICAL JOURNAL*, and seen by me in September, prophylactic measure No. 1 above was probably more effective in the circumstances than was hoped for at the time. In the place where the men previously slept they were exposed to the flies from the

rubble, etc., which was only a few yards away across a narrow by-way, and level with the open windows of the hall, so that the flies entered each evening, probably attracted first by the light inside. As the phlebotomus does not tend to ascend much in flight these flies probably did not reach the second lobby, where the men afterwards slept. Although they remained in some of the rooms during the day this lobby was too bright to suit them, and there was always a free draught there.

The case which occurred on August 9th, 1915, was that of a ship's steward (pensioner, aged 43). This case occurred at another building, an old castle. His office and store were in a part of the castle suitable for the fly, that is, inside one of the old stone turrets. This building was not used by the men.

The flies were of a dull pale yellow or sand colour. Two dots of black pigment at the eyes were conspicuous when the fly was caught. The body was curved on itself in hump-backed fashion. The wings were long and narrow, and with a magnifying glass were seen to have long fine hairs along their edges. The wings (at rest) were always carried pointed backwards, upwards, and outwards from the body, diverging from each other. When an attempt was made to capture a fly it did not fly forward, but eluded capture by seeming to jump off at a right angle, alighting again about six or eight inches away in a straight line to right or left.

GENERAL DESCRIPTION OF THE CASES.

Incubation.

From the case of the private (R.M.L.I.), and from consideration of the time of onset after first noticing the bites, this appears to have been about three days.

Symptoms.

The onset is sudden; the patient's face is flushed and eyes puffy and injected as if he had been drinking heavily. He complains of dizziness, severe headache, and pains, generally in the back and region of the hip-joints. He is "tired" and feels very ill. In two of the cases there was nausea and slight vomiting at the onset. The temperature was generally about 101° at the onset, but usually reached 103° or more within ten hours. On the second day it was usually about 101°. In three of the cases it eased to normal on the evening of the second day. In the others it did not reach normal until the evening of the third day or later. After becoming normal, in several cases a rise next day to 99° or 99.4° was noted, the temperature afterwards steadying at normal.

During the night of the first day and subsequently, pain in the back, sacral region, and joints was marked, and also pain across the eyes; the eyeballs are rather tender to pressure. The patient slept little and did not sweat. By the second day the tongue was covered with a white fur, except at the tip, and the patient had no appetite. One patient had slight diarrhoea, but the others were constipated. The pulse-rate was never more than 80 in any of the cases, even when fever was high. In one case there was slight sore throat, and in another slight stupor and delirium on the third night.

After Effects.

A general feeling of fatigue and lack of energy, mental and bodily, lasted for some time. All cases showed this to some extent, but in three it was much less than in the others; these three cases were "two-day" cases. The others remained unfit for duty for a week or longer. The pains and feeling of stiffness sometimes remained. Although the patients said they felt well, they walked about shakily, and as if shrunken inside their uniforms. Their voices were noticed to be weak and rather higher pitched than normally.

Treatment.

During the attack acetyl-salicylic acid was freely given. Quinine was given to the first two cases, but discontinued when it was seen that they were not due to malaria and that quinine did not appear very effective. During the after-period mist. Fowleri was given for about a week.

In his article on phlebotomus fever at Peshawar, published in the *BRITISH MEDICAL JOURNAL* of July 31st, 1915, Captain Houston, M.B., R.A.M.C., remarks on the tendency of the infection to "cling more particularly to certain bungalows." It is interesting to note that the infection met with above was almost exclusively experienced at one particular house. Also, the detailed corre-

spondence of the symptoms noted above, with accounts published in the BRITISH MEDICAL JOURNAL for Indian phlebotomus, is at once striking and interesting for one without previous experience of this widely-distributed infection.

THE TEMPERATURE NECESSARY FOR THE DESTRUCTION OF LICE AND THEIR EGGS.

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THE points concerning temperature dealt with by Dr. Kinloch in his valuable contribution on lice, published in your issue of June 19th, 1915, were so at variance with my experience regarding the heat necessary to kill other insects that I felt impelled to test the matter for myself.

Bugs (*Cimex lectularius*) have been shown by Blacklock (1912) to die at 45° C. (113° F.); subsequent experiments by myself (1914) confirm this, and also show that fleas (*Xenopsylla cheopis*) and cockroaches (*Periplaneta americana*) are destroyed at this temperature, or a few degrees higher. Reports of experiments with mosquitos (*Stegomyia fasciata*), performed under the auspices of the Yellow Fever Commission (West Africa), now in course of publication, show that about the same degree of heat is also critical for these insects.

Living specimens of lice—*Pediculus humanis (vestimenti)*—were obtained from two separate sources and treated as a single stock, from which the active insects and nits required for the following experiments were drawn. The breeding method adopted was to line an entomological glass-bottomed box with a slip of dark-coloured cloth and cover the top with chiffon,* through which the insects were fed. This box was nested in one of a larger size for safety and carried in a pocket where the insects had the advantage of the natural heat and humidity of the body.

The method used in the tests was as follows: Pieces of cloth with eggs and active lice on them, or with one or the other only, were taken from the stock box and divided, one portion being kept as a control, the other used for the test. If active lice were present, the piece of cloth was placed in a similar box, covered with chiffon, but if the nits only were tested the cover was not used.

It was found that both the eggs and lice (in their second instar) survived a thirty minutes' trial in an incubator (dry air) at 49° C. (120.2° F.), the lice being apparently unaffected, as they subsequently completed their development. Living lice, however, were killed by thirty minutes' submersion in water at 50.2° C. (122.3° F.); at the same temperature in dry air they were paralysed and rendered incapable of other movements than a feeble motion of the legs; 28 out of 32 specimens in all stages of growth died within a few hours, but 4 (two in the second and two in the third instars) survived.

Another trial was carried out at 54° C. (129.2° F.). Thirty-five minutes after the lice were placed in the incubator they were all dead, and, up to the time of writing—over three weeks after the test—no young have emerged from the eggs submitted to this temperature, though the control box is swarming with lice in all stages of growth.

Eggs on pieces of cloth were dipped into water boiling at 98.4° C. (209.1° F.) for one minute and a half-minute respectively, and, as was to be expected, they turned opaque white, presumably owing to the coagulation of the albumin. They were, however, kept in entomological boxes and carried in the same pocket as the control eggs; these latter duly hatched, but the tested eggs shrivelled up after drying.

A further test was carried out in a water bath to ensure greater accuracy. One batch of eggs was placed in tap water in a tube, stoppered with cotton-wool, and another portion of the same batch of eggs was placed dry in a similar tube; both the tubes were submerged to within an inch of the rim in the water bath, the registered temperature of which was 55° C. (131° F.). After thirty minutes the eggs were removed and placed in separate boxes, the

control portion being placed in a third. All three boxes were kept together in the same pocket. Up to the time of writing (sixteen days after the trial) no eggs have hatched in either of the test boxes, while many active lice in various stages of growth are present in the control box.

While it is, of course, possible that eggs having a long hatching period may survive a temperature which kills those which develop more rapidly, it is so improbable that I have no hesitation in concluding that dry heat or submersion in water at 55° C. (131° F.) kills both active lice and their eggs. It follows as a consequence that considerably lower temperatures than those usually employed may be used to destroy these vermin. For the thorough sterilization of infested garments the question of penetration is all-important. It is probable that considerable economy in fuel might be effected by allowing a longer exposure at a lower temperature, while it should be practicable to use quite lightly built chambers or temporarily adapted rooms to obtain dry air temperatures of, say, 60° C. (140° F.)

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Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

CREOSOTE IN RHEUMATISM AND GOUT.

OWING to the great rise in price of acetyl salicylic acid and sodium salicylate, I made a trial as a substitute of creosote in $\frac{1}{2}$ -minim doses given in the form of a mixture, as follows: Magnesium carbonate (heavy), 3j; creosote, viij min.; peppermint water to viij fl. oz. The dose for an adult is one tablespoonful every four hours, with an equal quantity of water.

If pain is severe, the addition of from five to seven minims of liquid extract of opium to each dose is valuable; and when the pain is due to acute gout, the further addition of from seven to ten grains of potassium bicarbonate is also good. In cases of arthritis, associated with great loss of lime salts, prepared chalk (ten grains), or aromatic chalk powder (ten to fifteen grains), may be added with good results.

I have found that cases of acute gout treated on these lines, combined with suitable local treatment, are rapidly relieved, the patient being able to return to his work in less time than before, whilst the interval between the attacks seems to be lengthened.

In cases of catarrh and influenza, with feverishness, it is a good plan sometimes to substitute for the peppermint water solution of acetanilide (2½ grains to the ounce), made previously with boiling water and cooled—the flavouring being made by essence of peppermint.

Cases of lumbago, sciatica, fibrositis, neuritis and arthritis of various types, seem to do quite as well with the creosote treatment as with the salicylic, and one decided advantage is the absence of severe gastric disturbance associated with the use of acetyl salicylic acid in some cases, as shown by anorexia and nausea. In fact, the creosote mixture (modified if necessary to suit individual cases) is of use in gastric and intestinal disorders, and replaces bismuth salicylate very well in some cases.

For patients unable to tolerate the smell or flavour of creosote, as well as for other cases, the substitution of sodium sulpho-carbolate gives good result.

I send these suggestions in the hope that they may help to cut down expenses in panel and dispensing practice, and to obviate the difficulty in obtaining a sufficient supply of the salicylic compounds.

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Ashby-de-la-Zouch.

DYSTOCIA DUE TO CONSTRICTED OS.

HERMAN, in his valuable work on difficult labour, refers to dystocia due to the very rare condition of smallness of the os externum, and the following case is recorded on this account:

A young woman had suffered from procidentia uteri; the uterus had been ventro-fixed by operation, but the procidentia thereafter completely recurred. She became

* This method is fully explained in A Study of the Bionomics of the Common Rat-flea and other Species associated with Human Habitations, etc., *Journal of Hygiene*, Plague Supplement III, January 14th, 1914, p. 465.