RELAPSING AND MIANEH FEVERS IN EAST PERSIA.

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My introduction to the lines of communication East Persia took place at Juzzak in Baluchistan, from which place marching with camels on the camel track Birjand was reached after covering a distance of 375 miles. During the march water was usually brackish, very often saline and at times extremely scarce. The little time there was to spare wearied after the march and the difficulties of obtaining water were not conducive to the cleanliness of the Indian follower and the major portion of the one day's halt after seven on trek during the cold weather was frequently spent by him in sleeping and keeping warm and not in performing ablutions.

When I arrived at Birjand, I was not surprised to find that special attention had to be focused upon vermin-borne diseases such as typhus and relapsing fevers. Troops were at that time living in Persian billets and were verminous. Instructions were issued ordering compulsory bathing, the issue of N.C.I. powder, regular regimental inspections and delousing of clothing, etc., by steamed disinfection.

These arrangements had the desired effect and although accounts of outbreaks of typhus fever in Persian villages reached us from time to time, the troops except for odd cases kept wonderfully free from these diseases in spite of the unavoidable contact with the Persian.

At a later date I toured the upper sections of the line to Ashkabad and here heard tales of Amrani fever, of a disease called "strangers' disease," and that if travellers slept in certain Sarais and were bitten by not less than five bug-like creatures they usually died after very painful convulsions and much suffering. I could not get a clear account of the differences between Amrani fever and "strangers' disease," and therefore concluded they were probably the same and possibly relapsing or typhus fevers. In all of these tales I was very much interested and deeply regretted that the lines of communication of East Persia was not provided with a travelling laboratory.

On my return to headquarters at Birjand the weather was warmer, and I noted in my billet and in several others also that Argus persicus was present. A circular was issued to all senior medical officers ordering them to carry out special inspections of all cases of relapsing fever for the presence of lice, and if these could not be found to inspect billets from which the patients had come for the presence of A. persicus or the common bug. In all cases the presence of lice or possible contact with infected persons was proved, and the relapsing fever was of the ordinary type with which we from India were all well acquainted.
On March 18, 1919, a babu of the survey department was admitted to hospital under Captain Fry, I.M.S., at Birjand, with a history of a low irregular fever of some weeks' duration. He was lousy but had been living miles away from Indians in Persian villages. This low irregular fever continued for twenty-three days and he became anæmic, debilitated and much wasted. After several blood examinations a single spirochæte was found on March 12, 1919, in blood films taken from him. This type of chronic fever with a very few parasites was not at all like the relapsing fever of India and would appear to resemble the low chronic form of African tick fever. This fever was undoubtedly contracted in a Persian village and not from an Indian carrier.

On May 10, 1919, Captain ———, 1/98th Infantry, was admitted to 9 B.S.S. at Birjand under Captain Walker, R.A.M.C., suffering from the usual type of relapsing fever, and he was found to be free from lice. On investigation it was found that he had a charpoy or Indian bed which had been left about in his compound and possibly used by servants, Persians, etc. A little over a week before he had taken this bed into use and had been very badly bitten by bugs. On examining a crack in the bed the woodwork was found to be full of bed bugs. The bed was burnt and eight days afterwards he developed relapsing fever. It is of interest to note the connection between "bed bugs" and relapsing fever.

With the outbreak of the hostilities with Afghanistan our line occupied a very exposed position running as it does for hundreds of miles parallel with the Afghan border; and this made it necessary for all camel convoys to be escorted by troops and led to an increase in the movement of troops on the lines of communication. The troops were also more frequently passing through villages and away from their posts which were now on a fairly good sanitary basis, special attention having been paid to the elimination of the Persian villager, whose body is a fruitful nidus for most diseases, venereal included.

On June 2, 1919, I was on a tour extending north as far as Meshed. When passing through Kain I was informed that out of a guard of thirty-four men of the 1/98th Infantry fourteen had been admitted to hospital with a fever of two or three days' duration. I visited the patients, amongst whom I found their company officer Captain Moore, an Indian jemadar, and a sub-assistant surgeon. They all seemed extremely comfortable, had normal temperatures but looked anæmic. They stated that they had suffered from fever with intense headache and pains in the limbs. I informed the officer commanding A/175 I.F.A., Captain Venugopal, I.M.S., that sandfly fever was prevalent down the line but impressed upon him the necessity for looking out for relapses in these cases. I wired to Birjand for stains and slides, etc., which were sent up by motor.

Next day after inspecting the post I continued my journey towards Meshed, inspecting the posts en route. On my return journey through Kain on June 25, I was shown the same cases by Captain Venugopal with
their temperature charts, etc., who stated that he could not arrive at a diagnosis in regard to them. He had treated them for malaria as they had rigors and sweats, but it produced no effect. He had examined the blood of all the cases during the rises of temperature for the presence of malarial parasites and spirochetes. He had been assisted in his examinations by Captain Bose and Assistant Surgeon Dolphin, but in spite of their combined efforts nothing had been discovered. On looking at the cases and case sheets I found that all patients had the same symptoms. They had recurring attacks of fever at irregular intervals, accompanied by severe frontal headache, pains in the limbs, etc., and followed by profuse sweats. The majority of cases had enlarged spleen, all looked anemic, one had jaundice, and two bronchitis which became worse during the febrile attacks. I requested the Senior Medical Officer to transfer Captain Moore to No. 9, B.S.S. Birjand. I gave my opinion that the cases were relapsing fever of an unusual type and ordered repeated blood examinations to be carried out in spite of past failures; and at the same time requested that duplicate blood films taken from the cases should be sent to me at Birjand.

On my arrival at Birjand I saw Captain Walker, R.A.M.C., officer commanding No. 9, B.S.S., and pointed out the importance of Captain Moore's case and requested him to take blood films if he developed a rise of temperature. Two days after my arrival at Birjand a wire was received from Kain saying that a spirochæte had been discovered in a blood film taken from one of the cases. The same evening Captain Moore had a rise of temperature and blood films were prepared. The next morning a spirochæte was found in a film by Captain Walker, R.A.M.C. I visited the hospital and verified the presence of a spirochæte and made certain observations in regard to morphological differences between it and the Indian variety. Duplicate blood films taken from cases at Kain had arrived and were stained and examined. Prolonged searches carried out by Captains Fry, Nambyar, I.M.S., and myself only resulted in finding spirochetes in two of the films. In Captain Moore’s films after prolonged searches made by four observers one spirochæte only could be found in the first film and four in the second. The diagnosis was therefore confirmed and I made arrangements to tour north again in order to investigate the outbreak.

INVESTIGATION OF OUTBREAK.

On July 15, I arrived at Kain and found that five new cases of the same disease had been admitted into hospital from different convoys. Proceeding with my inquiries in regard to the outbreak affecting Captain Moore’s platoon, I found that the inspection of all these cases on their admission to hospitals had not revealed the presence of any lice. That they had escorted the up camel convoy for Turbat as far as Jainuk, changed over next day and brought the down connecting convoy to Kain. The only time that
Captain Moore, the Indian officer, sub-assistant surgeon and the men had been together was at the old Sarai at Jainuk on the night of May 20, and that between 27th evening and 28th morning all fourteen cases had developed fever. Taking it for granted that the incubation period of this disease was approximately the same in all cases, the fact that they all developed fever within twenty-four hours of each other pointed to an infection being acquired at one particular time and place and that the majority of the men of this small guard had been exposed to infection. At all other marching stages but Jainuk this platoon had occupied tents in camp, and therefore it may be presumed that under canvas it would be difficult for such a large proportion of men to be exposed to infection at the same time. I was informed that two platoons of the same regiment under an Indian officer had marched up with Captain Moore and his platoon to Jainuk and had marched on to Turbat next day. The men of these platoons did not enter the Sarai and no cases of fever occurred amongst them. On questioning the sick all thought that they might have been bitten by something at Jainuk, but the post-war Indian sepoy is not very bright and that is as far as I got until I spoke to No. 4867 sepoy Degram, No. 1331 sepoy Bhoora, and No. 4390 sepoy Ganga Ram. These men interviewed independently stated that they had been bitten at Jainuk by jayya (ticks). One of these men described the tick and drew it life size on the wall. They all described its slow movements and stated that it came out of the dust and slowly crawled upon them and that it did not appear for some time after their arrival in the Sarai and only towards evening when it scented human beings. They described the method of its removal from their limbs by plucking it out, as its head was buried beneath the skin, and stated that a swelling remained after removal. Bhoora stated that he had removed fourteen to seventeen ticks from different parts of his body. The evidence of these men was very convincing. The first fourteen cases were now convalescent and owing to their progressive anaemia and debility, Captain Venugopal after failing to find spirochetes in blood films taken from them had found it necessary to give them injections of neosalvarsan. All cases had reacted to treatment and were well.

In regard to the five new cases one was a havildar of the 1/51st Sikhs, who had undoubtedly contracted his disease above Turbat. Three were Government camel sarwans from two different convoys who had contracted the disease below Turbat. The fifth was a dooly bearer of the hospital who had acquired this infection whilst in attendance upon Sub-assistant Surgeon Ghosh. The sub-assistant surgeon is included in Captain Moore's party. On admission to hospital no lice could be found on these men. The havildar admitted staying in Sarais at Kafir Kaleh, Asadabad and Khaimi, and I discovered later in Meshed that two of these places, Kafir Kaleh and Khaimi, had evil reputations. It is worthy of note that this havildar stated that he had contracted the same disease in Africa in 1917.
occasion the first attack of fever lasted for four days. Succeeding this he had an apyrexial period of five days and then a relapse. His blood was then examined and he was given an intramuscular injection into the buttock which cured him. If this is so it would seem that this Persian disease, although tick borne, may not be identical with African tick fever. The sarwans denied visiting Sarais, but as they were cognisant of the stringent orders that had been issued this was only natural. To men marching late at night and early in the morning and resting during the heat of the day, buildings are bound to be attractive when the temperature in the tents becomes high. On examining the blood films taken from the three sarwans and dooly bearer, I found that the spirochaetes in them were similar in appearance to the ones observed in films taken from Captain Moore. Spirochaetes were seen in the films taken from dooly bearer Kharkes in relatively large numbers, but this is the only case in which fairly numerous spirochaetes have been observed. This man had a very severe infection, was extremely ill, semi-delirious, and severe epistaxis necessitated the plugging of his anterior and posterior nares, as blood literally poured from his nostrils.

From Kain I toured to Jumin and found there the non-infected portion of Captain Moore's platoon. These men were paraded and questioned. They stated that they had entered the Sarai at Jainuk with the rest of the platoon, had thrown down their kits on the floor of the Sarai, opened their blankets, and laid down to sleep. After a time, towards evening, they noticed ticks crawling on to their blankets. They then went outside and picked the ticks off their blankets and slept in the open. They stated that they saw Bhoora remove sixteen ticks from his body and that as other men were being bitten they did not like the idea of sleeping inside. It did not occur to them to tell Captain Moore or the others who were asleep, in addition to which the Captain Sahib was sleeping in a tent inside the big dome and on a bed.

At Jumin I also saw Sub-assistant Surgeon Ghosh, who had received a neosalvarsan injection at Kain, was quite well and had returned to duty. He stated that he too had been bitten on the wrists by something at Jainuk and that Captain Moore had shown him two large swollen places on his leg with red punctured lumps in the centre, but that somebody had suggested that these were ringworm. Captain Moore at a later date informed me that he had noticed three red swollen elevated lumps on his body the day after leaving Jainuk. He had two on his leg and one on his neck, which were about \( \frac{1}{4} \) inch in diameter. The centres of the lumps were red with a puncture mark in the middle. The periphery of the lumps was blue and they faded away like a bruise. These must have undoubtedly been tick bites.

I next visited Jainuk and found an old decayed Sarai with bricks all eroded and full of holes and the ground covered with very ancient litter. It had a dome like a mosque and it was under this that Captain Moore
pitched his tent surrounded by his men. Unfortunately, I could not stay here for the night but placed a towel on the ground. After two hours, although I changed the position of the towel to different parts of the Sarai, nothing appeared upon the towel, it being midday and these ticks nocturnal in their habits. On searching amongst the litter and bricks the shell of a dead *Argus persicus* with typical markings was seen suspended in a cobweb. I was now compelled to continue my journey to Turbat. A British orderly is, however, being sent down from Turbat to Jainuk, and it is hoped that he will be able to collect specimens with a view to attempting some experiments.

On arriving at Meshed I approached the British Consul-General, Colonel Grey, who very kindly placed his staff at my disposal. I learnt that these ticks were well known and feared and that their bites caused fever with haemorrhages and frequently death. I was informed that the two most notorious Sarais were Kafir Kalah and Khaimi just north of Turbat. At one of these, nine years ago, three subordinates of the British Consular Staff had been bitten by these ticks. All developed fever, two died and one recovered. The man who recovered had haemorrhages from the bowel and was ill for several weeks with irregular fever.

In the library of the British Consulate at Meshed is a book written by Eastwicke called “A Diplomat’s Residence in Persia” by the late H. M. Chargé d’Affairs at the Court of Tehran, published in London 1864. In vol. ii, Appendix iv, is a very excellent description of the effects of bites and habits, etc., of *Argus persicus*, and a good illustration of this tick by Mr. W. H. Ince is portrayed. Eastwicke, in his description drawn from travellers’ tales, quotes that M. le Baron Walchenaer described the fever due to the bites of *Argus persicus* in Paris in 1844, and that M. Fischer de Waldheim prepared a paper on this subject for the Academy of Moscow in 1823.

Dupré, quoted by Fischer, stated that a man who is bitten by these ticks falls into a consumption and dies. Treatment consisted of abstaining from fermented liquors, and sugar was a specific and preventive. This is interesting in the light of present-day treatment of some of the other types of spirochaetosis.

Maurice Kotzebue described the dangerous bug of Mianeh, a village on the Tehran Tabriz road. He gave a good description of the tick and stated that it lived in old buildings, in which it could be found in very large numbers, and in these its bites were more dangerous. It was known to have infested Mianeh from time immemorial. He described its nocturnal habits, viz., that it feared the light and lived in holes in walls. In the winter it lay dormant but became active during the hot weather. He pointed out that it did not bite the local inhabitants, or at least if it did its bite had no worse effect on them than a bite of an English bug. Immunity as in African tick fever.
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Chart 1.—Typical Indian type relapsing fever.

Chart 2.—Indian type relapsing fever—two relapses only.
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revenge these creatures waged a cruel war against strangers who had the misfortune to spend the night at Mianeh, and these unfortunates often died during the night. The English at Tauris (Tabriz) had unanimously stated that they had lost a servant after being bitten by these terrible insects; the bites in this case being followed by high fever, delirium, convulsions and death. These observations are stated to be confirmed by a no less reliable authority than Colonel Baron Wrède, whose Cossack orderly contracted this disease and died in agony. Treatment quoted in this article was to wrap the patient up in a still warm ox, hide, and this usually effected a cure. The patient, however, should only drink sugar or honey and water for forty days. The paper went on to state that the local inhabitants could handle these creatures with impunity, and that it was extremely fortunate that they were not conveyed from place to place in their clothing or it would soon be disseminated throughout Persia. From this information there is no doubt that the Argus persicus has an extremely evil reputation.

These old records and the information given me by the Consular Staff at Meshed seem to indicate that the incubation period of this disease in some cases might be as short as one day. However, in the case of the fourteen men of Captain Moore’s platoon the incubation period was seven to eight days and the dooly bearer who acted as sick attendant upon Ghosh developed the disease twelve days after the date of last exposure to infection.

**Description of the Disease.**

Incubation period one to twelve days. The attack commences with the same symptoms as Indian relapsing fever, viz., rigor accompanied frequently by vomiting, intense headache and pains in the limbs. The headache is frontal and often causes photophobia and this is very characteristic of the disease. In the case of the Indian variety of relapsing fever the temperature of the patient during the first attack usually remains at a fairly steady high level for five to six days with possibly one slight fall about the third day. After this initial rise of temperature there is almost invariably an apyrexial period of eight to nine days before the first relapse occurs.

In this Persian type of relapsing fever the first attack of fever may last anything from one to five days, usually three days, and the temperature of the patient is rarely as steady as in the Indian variety, the chart showing a very swinging type of fever with remissions which may touch the normal line. Profuse sweating accompanies the fall of temperature. The first apyrexial period may be anything from one to five days and is usually two days. The subsequent relapses rarely exceed forty-eight hours in duration and may last twelve hours only. They take place at fairly frequent but irregular intervals, the periods of apyrexia getting longer as the disease progresses. The largest number of relapses noted by us were seven and

1  "Strangers’ disease" of Eastern Persia.
these occurred within a period of forty-two days. In all probability many more would have been recorded if the disease in all cases had not been cut short by the administration of neosalvarsan.

During the course of the disease the patient becomes progressively weaker, anaemic, debilitated and wasted. Splenic and hepatic enlargement is usual. Between the relapses the patient feels well and is cheerful. Bronchitis and epistaxis were observed in two of the cases and jaundice in one case only.

The swinging irregular type of fever with short and irregular apyrexial periods and numerous relapses is diagnostic of the Persian variety and in this it is comparable to African relapsing fever, which is also tick borne.

**Chart 3.**—Babu of Survey Department—(? chronic type Persian relapsing fever.

**Description of Spirochete.**

In the majority of cases the number of spirochetes seen in any one blood film is much smaller than in the Indian variety and this is indicated by the number of examinations that had to be carried out before the discovery of the first spirochete. Out of a total of nineteen cases and after prolonged searches by several observers spirochetes were only detected in eight cases. In fourteen of the cases, however, examinations of the blood did not take place until the first relapse and observations were cut short after the third to fifth relapse by the administration of neosalvarsan which the bad state of the health of the patient necessitated. The diagnosis of the cases in which spirochetes were not found was made on clinical grounds and the reaction of the patients to neosalvarsan confirmed the
diagnosis. The use of the thick drop method, using dilute Loeffler's methylene blue as the stain, which we have now adopted, would have undoubtedly given better results. In one case only were spirochætes found in fairly considerable numbers, and in this respect the disease resembles African tick fever, in which it is stated the spirochætes found are few.
The spirochète may be said to be longer, a little coarser than the Indian variety and its spirals are more regular and deeper, the Indian spirochète being less regular and possessing open flexures.

Its length without showing divisional characters averages eighteen to twenty-two microns and short forms are rarely seen. On one slide a spirochète thirty-five microns in length was seen by me without any attempt at division being visible in the protoplasm. Figure of eight and loop forms are met with.

It might be noted that although in length this spirochète is comparable with the African variety it may be differentiated from it by the fact that it possesses fairly regular and deep spirals, whereas the African type is stated to have open flexures. It does not however the extremely regular spirals which S. novyi is said to possess.

The characters of this spirochète have received the confirmation of Captain Fry, I.M.S., Captain Walker, R.A.M.C., and Captain Venugopal, I.M.S.

Geographical Distribution of Disease.

Accurate information is extremely difficult to obtain in Persia. It is apparently thought that the Mianeh disease is more or less confined to Mianeh and district, but it is undoubtedly more widely spread. There is evidence to prove that it is known on the Tehran Meshed road and on the Eastern side we have the tales of "strangers' disease," tick bite fever, and Amrani fever. Amrani being an extremely filthy village in which Argus persicus is extremely common.
C. T. H. H. Harold
MAY 1919

DATE  27  28  29  30  31  1  2  3  4  5  6  7  8  9  10  11  12  13  14  15
DAY OF DIS  1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16  17  18  19  20

PULSE

MOTIONS

JUNE

DATE  27  28  29  30  31  1  2  3  4  5  6  7  8  9  10  11  12  13  14  15
DAY OF DIS  1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16  17  18  19  20

PULSE

MOTIONS

JULY

DATE  16  17  18  19  20  21  22  23  24  25  26  27  28  29  30  1  2  3  4  5
DAY OF DIS  1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16  17  18  19  20

PULSE

MOTIONS

Chart 7.—Persian type tick fever.
All definite cases of this disease admitted to our hospitals have come from the lines of communication above Kain and always from down-coming convoys. In up-going convoys Indian relapsing fever has only been found. All this points to this disease being endemic in the upper sections of the lines of communication above Kain and we have definite evidence from the Consular authorities at Meshed of infection of Kafir Kalah and Khaimi and the infection of Moore's convoy implicates Jainuk. It is possible that practically all old Sarais built of burnt brick are more or less infected.
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All cases of relapsing fever admitted to hospital below Kain with one possible exception have been of the Indian variety and undoubtedly with exception of one or two cases louse borne.

In Meshed and also in Transcaspia during the winter of 1918-19 cases of Indian relapsing fever occurred amongst the Indian troops. These troops were frequently lousy and the spread of this disease was probably by means of Indian carriers and lice.

It was not until the warmer weather when ticks become more active and convoy duties due to the Afghan war brought our troops more frequently in contact with Sarais that this endemic disease of Mianeh or the relapsing fever of Persia showed itself.

I wish to acknowledge my indebtedness to Captain Fry, I.M.S., Captain Walker, R.A.M.C., and Captain Venugopal, I.M.S., who have kindly assisted me by placing their cases and hospital records at my disposal and also for carrying out numerous blood examinations at my special request.

I also wish to record my thanks to Colonel Boulton, I.M.S., A.D.M.S. Lines of Communication, East Persia, for his assistance by which I was enabled to carry out this investigation.