

Case 10.—This case was treated in the Sassoon Hospital at Poona, under the care of Lieutenant-Colonel W. H. Henderson, I.M.S.

V. A., Medical Student, Brahmin, aged 23. Patient was admitted into hospital on the 25th September 1900, suffering from continued fever, said to be of about six days' duration. On admission, the temperature was 101° F. He complained of severe headache and constipation. The tongue was furred and coated in the centre, and red at the lip and edges.

For temperature, *vide* Chart No. 10.

During the first week of residence, constipation continued. This gave way to a mild diarrhoea, the stools being then described as typical of typhoid fever.

The abdomen became tympanitic during the latter part of the fever.

The nervous symptoms in the third week became marked; they consisted of great exhaustion and prostration and later on severe collapse, when stimulants had to be freely used.

Convalescence was uneventful, and patient was discharged on the 6th November. The serum sedimentation reaction with bacillus typhosus was tested on two occasions with the following result:—

DILUTIONS.

Date.	10	20	50	100
3rd November.	Complete.	Complete.	Complete.	Trace.
6th November.	Do.	Do.	Do.	Do.

Case 11.—This case was also treated in the Sassoon Hospital, Poona, under the care of Lieutenant-Colonel W. H. Henderson, I.M.S. For the following notes I am indebted to the kindness of Assistant-Surgeon Barucha:—

N. T., aged 12 years, Hindoo Maratha. Patient was admitted into hospital on the 18th September 1900, suffering from fever said to have been of about twenty days' duration. On admission he was semi-conscious, and in a state of restlessness and delirium. There were no prominent abdominal symptoms.

For temperature, *vide* Chart 11. Patient was semi-comatose and delirious while the fever remained high. He was never quite unconscious, but could only be roused with difficulty. With the defervescence of fever, the brain symptoms subsided considerably.

At no time was there either any tympanites or marked diarrhoea. The tongue remained clean throughout. There were in short, never any abdominal symptoms. Convalescence was slow, the temperature showing a slight evening rise for some time. During convalescence he suffered from pain in both knee-joints, and also along the course of sciatic nerve.

The serum sedimentation reaction with both bacillus typhosus and micrococcus melitensis was tested on the 26th November, with the following result:—

1. Bacillus Typhosus.

DILUTIONS.

Date.	10	20	50	100	Remarks.
26th November 1900.	Complete.	Complete.	Complete.	Very well marked.	No higher dilutions.

2. Micrococcus Melitensis.

DILUTIONS.

Date.	10	20	50	100
26th November 1900.	Marked.	Trace.	Nil.	Nil.

The diagnosis of this case was a puzzle throughout. It was only the sedimentation reaction which the serum gave with bacillus typhosus that cleared it up.

EXPERIMENTAL INOCULATION OF
MALARIAL FEVER IN NAGPUR.

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In the article which appeared in the February number of the *Indian Medical Gazette*, I promised to send an account of the results of the experiments which had been made with a view to ascertaining whether the mosquito (anopheles) conveys the malarial germ.

Experiments have been made with different kinds of malarial fever, but at present only the results in cases of Benign Tertian will be given.

We see then that out of seven cases who volunteered to be bitten by the mosquitoes four were attacked by fever, but in only two of these did we find the Benign Tertian parasite. In case (1) a parasite was found but it was a young form and there was no proof that it was a Benign Tertian.

Taking the two cases in which parasites that were undoubtedly those of Benign Tertian were found, we see that the fever came on in one case 22 days after the first bite, and in the other about 15 days after the first bite. It may be said by those who are opposed to the mosquito theory that the fact that the attacks of fever came after the mosquito bites was entirely accidental. This was the objection raised against the cases which were experimented on in Italy. We have carefully examined the blood in every case that has been admitted for fever while these experiments were being carried on, and out of a population of 1,200 (odd) there were only two other cases admitted for Benign Tertian. If the fever in these two cases were not the result of the mosquito bite would it not be curious that out of seven individuals who were bitten by mosquitoes two should get Benign Tertian fever, while only two other cases occurred among about 1,200 men? and would it not be still more curious that the time when the fever should come on, was about a fortnight or three weeks after they had been bitten by the mosquitoes.

The fever in all these cases was milder than in the cases which were admitted to hospital without having been bitten voluntarily by mosquitoes. Perhaps the mosquitoes had not been fed originally at a time when the flagellar bodies were ripe for giving out flagella or perhaps there may be other ways in which the malarial parasite can be introduced into the human body.

fever. Crescents will be found at this time;

Third.—Then comes the secondary or flagellar fever and flagella will be found at this stage if the blood is drawn.

It is generally believed that exflagellation takes place only outside the body after the blood has been drawn. There is no doubt that exflagellation is hastened by the drawing of the

BENIGN TERTIAN.

Serial No.	Name.	*A Case on which mosquitoes were fed.	Date when fed on A. *	No. of bites on A.	Date when fed on B. †	No. of bites.	Date when B was attacked by fever.	Kind of parasites found.	Nature of fever.
1	Tilak Ram	Narayan ...	15, 18 21, 25, 28, 30 December.	83	20, 27, 29, December, 1st January.	108	22, 24, 26 December.	Young form changing shape rapidly.	Distinct Tertian 3 paroxysms, temperature ranging to about 103 each time; on 28th tem. 103.6.
2	Ganshia ...	Shaikmahbob	24th to 27th December.	34	From 27-12-00 till 8-1-01 every night.	78	10th or 12th (Temp. was not taken till 27th January.)	Pure Benign Tertian.	He had had fever before, but temperature had not been taken as he had not reported sick.
3	Pahlad ...	Thibroo ... Yeshwanta ...	3-1-00. 26-1-01.	12 5	9-1-01 till 17-1 every night 30-1-01 31-1-01	22	31-1-01	Typical Benign Tertian.	On 31st January and 1st February temperature went over 101.
4	Phundia ...	Thibroo ...	3-1-01 to 7-1-01.	14	9-1-01 to 20-1-01 daily.	20	20-1-01	Nil.	A very large number of eosinophile cells, 6 in a field and in one field (stained specimen) 32.
5	Bisnoo ...	Thibroo ...	1-1-01 to 4-1-01.	14	9-1-01 to 23-1-01.	44	Nil.	Nil.	Nil.
6	Motiram ...	Thibroo ...	27-12-00 to 30-12-00.	17	31-12-00 to 7-1-01.	16	Nil.	Nil.	Nil.
7	Changia ...	Sadoo ...	3-1-01 to 6-1-01.	22	9-1-01 to 19-1-01.	50	Nil.	Nil.	Nil.

* A = the man on whom mosquitoes were fed primarily.
† B = the man who was bitten by the infected mosquitoes.

We hope to publish later on the results of the investigations which have been made here with the assistance of Colonel Quayle, I.M.S., Dr. Agnes Henderson and Assistant-Surgeon Kane. Five kinds of Malarial fevers are described by Celli and Manson. We have found four here. The great majority are malignant Tertian, of Quartan and Benign Tertian we have had nine, and of Quotidian two. The unpigmented Quotidian described by Celli and Manson has not been found. The crescents of the Quotidian are, we believe, larger and contain pigment which is in longer rods than that which is found in the Malignant Tertian.

In untreated cases of Malignant Tertian, the chart often shows three fairly distinct periods:—

First—A Tertian fever with a gradual slope downwards, that is, the paroxysms get gradually less;

Second.—An interval of four or five days when there is no fever, or only slight

blood, but is it not possible that exflagellation may take place also inside the body? We shall advance arguments which seem to at any rate establish a strong probability that exflagellation may take place inside the human body, and that the secondary or flagellar fever is the accompaniment of this exflagellation. If there is a fairly definite period during which exflagellation occurs, and if the mosquito can only convey the fever if it has bitten the infected individual at the time when the flagellar bodies are ripe, then the recognition of the flagellar period might be of considerable practical importance.*

A few additional observations in regard to mosquitoes may be added here:—

Culex.—A record has been kept to show the number of culex eggs taken from one small

* We have been allowed to see many charts of these cases in which after the interval there is a return of fever with numerous flagella. This question of secondary flagellar fever is one of great interest.—ED., I.M.G.

"tanka." The number of egg boats collected from this tanka (which is about 2 feet square) in December was 17,000 odd, and reckoning at the rate of 250 eggs per boat the number of eggs would be over $4\frac{1}{4}$ millions. The largest number of "boats" collected from this tanka in one night was 1,609, which reckoning at the same rate would give over four lakhs of eggs. The number of egg boats collected in January was 2,410. The wet minimum thermometer went down to 45, and two days later and for some time afterwards no eggs were laid. At the end of January the temperature rose (wet minimum 59), and the mosquitoes began laying eggs early in February. On the 13th February the wet minimum again went down to 45 F., and two days later and for some time afterwards the culex stopped laying. Perhaps this may help to elucidate a point on which there was some difference of opinion as shown in articles which appeared in the columns of the *Pioneer* a few months ago. One writer held that mosquitoes are more common in the cold weather and another maintained the contrary. "Cold weather" is an indefinite term, and the temperature in the cold weather of one place may be much higher than the temperature in the cold weather of another place. A few degrees difference in the temperature may make a considerable difference in the activity of the mosquito.

Anopheles.—The small subsoil drain from which we got our supply of anopheles dried up in December, but occasionally some clean water was poured into this drain, and a few small pools were made to attract the anopheles. They came regularly throughout the winter in small numbers, and we were thus able to get a supply for the experiments. We had some difficulty in keeping the anopheles alive when they were kept in glass tumbler with water in the bottom of the tumbler. Since we put a small amount of mud in the glasses so as to give them a resting-place they are doing better. The larvæ feed greedily on the dust (? pollen) which is shaken from grass seed.

Method of biting.—The individual who is to be bitten puts the front of his forearm over the glass which is covered with fine mosquito curtain. The forearm is previously moistened with water. The time they are allowed to bite is from 7 to 10 P.M.

Catching anopheles.—The men who collect the living anopheles say that the anopheles hide in a black coat, but avoid a white coat, so they hang up one or two black coats in the Hospital Ward.

Number of full grown anopheles caught and number of admissions for fever.—In the previous paper the numbers for November and December were given, but for the purposes of ready comparison these numbers will be given again together with the numbers for the months of December, January and February.

Month.	Week.	Weekly Total of admissions for fever.	Weekly total of Anopheles caught.	Lowest record by wet minimum thermometer.
October 1900.	1st	37	...	61
	" 2nd	20	...	58
	" 3rd	32	...	56
	" 4th	18	117	55
Total		105	117	
November 1900.	1st	10	28	53
	" 2nd	6	62	53
	" 3rd	9	19	54
	" 4th	9	20	51
Total		34	139	
December 1900.	1st	28	25	55
	" 2nd	41	62	52
	" 3rd	27	51	52
	" 4th	23	40	54
	" 29-31	6	11	55
Total		125	189	
January 1901.	1st	8	22	45
	" 2nd	14	9	49
	" 3rd	10	12	47
	" 4th	11	0	50
	" 29-31	9	0	52
Total		52	43	
February 1901.	1st	5	5	53
	" 2nd	11	6	45
	" 3rd	8	7	47
	" 4th	2	0	46
Total		26	18	

It should be explained, however, that there are many cases of what have been called "recurrents," that is, cases that have had fever sometime previously, and in which the parasites, not having been killed, resume activity.

THE DISTRIBUTION OF ANOPHELES IN ELLICHPUR CANTONMENT.

(FOR THE I. M. G. COLLECTIVE INVESTIGATION)

BY W. GLEN LISTON, M.B.,

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THERE is no doubt that Ellichpur Station is one in which malarial fever is very prevalent.

Of the total admissions during the year ending 31st December 1900, to the Civil Hospital (out and indoor patients), 20 per cent. were for malarial fevers. Of the total admissions to the Military Hospital 41 per cent. were for malarial fever. Of the total admissions to the Jail Hospital 50 per cent. were for malarial fever.

Ellichpur Cantonment is situated about five miles from the base of the Satpura Mountains on an extensive black cotton plain. Through the midst of the cantonment runs a river which