

6. Dung and urine and sodden earth in cattle sheds.

7. Decaying leaves and branches of trees.

8. Droppings of fowls.

9. Decaying leaves of bananas.

The nets were spread and left for two to three days when they were examined for the presence of any insect which had bred out. If a fly was present it was captured for identification. On no occasion was it found possible to leave the nets spread out for long as they were disturbed by children, cattle, jackals and sometimes by elderly people. Holes made by beetles in the curtains were common. Only dung and urine and sodden earth in cattle sheds yielded the flies and then on four occasions, the numbers which bred out being 5, 4, 3, and 1.

*Habits.*—A brief description of the habits of these flies is as follows:—They are very active on a hot sunny day, but none can be found when the air is cool or the sky cloudy. They rest on thatch, strings, and small strips of cane hanging down from the roof. Within two to three days the portions of the straw where they have rested may be found to have turned black and are covered over with a web inside in which some of the flies will be seen hiding. On a sunny day in the morning and in the afternoon many will be noticed resting on the grass. They feed on warm human excretions, on the exudates of ulcers of man and of animals, putrid sloughs of ulcers, the discharge from the nostrils or eyes and from the rectum of cattle, and cow and horse dung, fresh and decomposed. These flies are always found in large numbers in cow-sheds, much more so than in other rooms of the same house. There are as a rule very few in the open fields. I observed a striking fact about their distribution in Srimangal, where very few could be noticed; this is a place about two miles from the tea garden in which I was working, where I saw large numbers of the flies.

Unlike house-flies they seldom sit on ulcers but usually settle on the healthy skin surface at the margin and feed there. This no doubt protects their feet and wings from getting wet which would make their flight difficult, and may have an important bearing on the propagation of diseases through their feet and wings.

Their mouth parts are adapted for sucking and not for piercing, but the statement that "they doubtless can act as scarifying organs, enabling the fly to remove dried scab to reach serous exudation below" as mentioned by Senior-White, cannot be supported from my observations. What they have been found to do is to forcibly try to push their proboscis through a rent in the scab and thus get at the exudation below.

They could not be kept alive in the laboratory under any circumstances for more than six days.

The accompanying chart showing the seasonal coincidence of Naga sore and epidemic conjunctivitis has kindly been provided by Dr. R.

Murphy, Medical Officer, Luskerpore Tea Estates, South Sylhet, to whom my thanks are due.

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### OBSERVATIONS ON THE ANTIMONY (UREA-STIBAMINE) TEST FOR KALA-AZAR.

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IN the *Indian Medical Gazette* for June 1927, Chopra, Gupta, and David described a new serum test for kala-azar. These workers observed that when certain organic compounds of antimony were brought in contact with the serum from kala-azar patients in a miniature test-tube, a thick flocculent precipitate was formed at the junction of the two; whereas with non-kala-azar sera no such precipitation occurred. This reaction of the kala-azar blood was so characteristic that these observers developed it into a test for the diagnosis of kala-azar. They tried a number of organic compounds of antimony, but showed a preference for urea-stibamine for carrying out this test. Napier (1927) extended these observations to a large number of cases and corroborated the findings of Chopra and his collaborators, but preferred weaker solutions of antimony compounds. As kala-azar cases are frequently seen in Patna, we tried this test, but at first found it somewhat confusing. During the meeting of the Far Eastern Association for Tropical Medicine held in Calcutta during December last, Col. Chopra was good enough to demonstrate this reaction to the senior author and we decided to apply it to a number of cases, both kala-azar and non-kala-azar, which came under our observation in the Hospital of the Prince of Wales' Medical College, Patna, in order to test its diagnostic value. In their original paper the authors used undiluted serum and a 4 per cent. solution of urea-stibamine, but as it was found to be giving positive results in some non-kala-azar cases, in a paper read before the Far Eastern Congress, Col. Chopra pointed out that doubtful cases could be eliminated by using a 1 in 10 dilution of serum. In his experience if the serum was diluted ten times and the test performed with this dilution precipitation occurred only with kala-azar sera and never with non-kala-azar sera. In our series of cases we used (a) undiluted serum, (b) 1 in 5 dilution of serum, (c) 1 in 10 dilution of serum; we also employed 4 per cent., 2 per cent. and 1 per cent. solutions of urea-stibamine. The tubes used were 55 mm. long and 3 mm. in diameter, and the serum was diluted with normal saline instead of

TABLE I.

No.	Clinical Diagnosis.	W. R.	UREA-STIBAMINE SOLUTIONS.										
			4%			2%			1%				
			0	5	10	0	5	10	0	5	10		
1	Eczematous rash on face ..	+++	-	-	-	-	-	-	-	-	-	-	-
2	Papular eruptions all over body	+++	-	-	-	-	-	-	-	-	-	-	-
3	Serpiginous ulcers on legs; perforated palate.	+++	-	-	-	-	-	-	-	-	-	-	-
4	Eczema on face ..	-	-	-	-	-	-	-	-	-	-	-	-
5	Dermatitis of legs ..	-	-	-	-	-	-	-	-	-	-	-	-
6 & 7	Ulcers ..	-	-	-	-	-	-	-	-	-	-	-	-
8	Dermatitis ..	-	-	-	-	-	-	-	-	-	-	-	-
9	Folliculitis ..	-	-	-	-	-	-	-	-	-	-	-	-
10	Condylomata ..	+++	±	±	-	±	-	-	-	-	-	-	-
11	" ..	-	-	-	-	-	-	-	-	-	-	-	-
12	Chaucre ..	+++	-	-	-	-	-	-	-	-	-	-	-
13	Secondary syphilis ..	+++	-	-	-	-	-	-	-	-	-	-	-
14	Syphilis suspected ..	+++	-	-	-	-	-	-	-	-	-	-	-
15	" ..	+++	-	-	-	-	-	-	-	-	-	-	-
16 & 17	" ..	+++	-	-	-	-	-	-	-	-	-	-	-
18	" ..	+++	±	-	-	-	-	-	-	-	-	-	-
19	" ..	+++	-	-	-	-	-	-	-	-	-	-	-
20	" ..	+++	±	-	-	±	-	-	-	-	-	-	-
21	" cerebral ..	+++	-	-	-	-	-	-	-	-	-	-	-
22	" W. R. +++; had a course of anti-syphilitic treatment.	+	-	-	-	-	-	-	-	-	-	-	-
23	W. R. ++- before; had a course of anti-syphilitic treatment.	+	-	-	-	-	-	-	-	-	-	-	-
24	Painful joints; suspected syphilis	+++	-	-	-	-	-	-	-	-	-	-	-
25	Gonorrhœa ..	+++	±	-	-	-	-	-	-	-	-	-	-
26	Arthritis ..	+++	-	-	-	-	-	-	-	-	-	-	-
27	Paralysis agitans ..	+++	-	-	-	-	-	-	-	-	-	-	-
28	Spastic paraplegia ..	+++	-	-	-	-	-	-	-	-	-	-	-
29	Hemiplegia ..	+++	-	-	-	-	-	-	-	-	-	-	-
30	Myelitis ..	+++	-	-	-	-	-	-	-	-	-	-	-
31	Facial paralysis ..	+++	-	-	-	-	-	-	-	-	-	-	-
32	Encephalitis ..	+++	-	-	-	-	-	-	-	-	-	-	-
33	Retinitis ..	+++	-	-	-	-	-	-	-	-	-	-	-
34	Keratitis ..	+++	-	-	-	-	-	-	-	-	-	-	-
35	" ..	+++	-	-	-	-	-	-	-	-	-	-	-
36 & 37	Mitral regurgitation ..	+++	-	-	-	-	-	-	-	-	-	-	-
38	Malignant endocarditis ..	+++	-	-	-	-	-	-	-	-	-	-	-
39	Dilated heart ..	+++	-	-	-	-	-	-	-	-	-	-	-
40	" ..	+++	-	-	-	-	-	-	-	-	-	-	-
41	Asthma ..	+++	-	-	-	-	-	-	-	-	-	-	-
42 & 43	" ..	+++	-	-	-	-	-	-	-	-	-	-	-
44	Fibrosis of lung ..	+++	+	±	-	-	-	-	-	-	-	-	-
45 & 46	Repeated abortions ..	+++	-	-	-	-	-	-	-	-	-	-	-
47 & 48	" ..	+++	-	-	-	-	-	-	-	-	-	-	-
49	Delivery of a still-born foetus ..	+++	-	-	-	-	-	-	-	-	-	-	-
50	Alternating diarrhœa ..	+++	-	-	-	-	-	-	-	-	-	-	-
51	Tumour of abdomen ..	+++	-	-	-	-	-	-	-	-	-	-	-
52	Pneumothorax ..	+++	+	±	-	±	-	-	-	-	-	-	-
53	Dilatation of stomach ..	+++	+	±	-	-	-	-	-	-	-	-	-
54	Diabetes ..	+++	-	-	-	-	-	-	-	-	-	-	-
55 & 56	Emaciation ..	+++	-	-	-	-	-	-	-	-	-	-	-
57	Debility ..	+++	-	-	-	-	-	-	-	-	-	-	-
58	Clavicle Fracture ..	+++	-	-	-	-	-	-	-	-	-	-	-
59	K. A., enlarged spleen; aldehyde test +++; 3 injections of urea-stibamine.	+++	+++	+++	+++	+++	++	++	+	±	±	±	±
60	K. A., enlarged spleen; aldehyde test +++.	+++	+++	+++	+++	+++	++	++	++	+	±	±	±
61	K. A., enlarged spleen; aldehyde test +++.	+++	+++	+++	+++	+++	++	++	++	+	+	+	+
62, 63, 64, 65 & 66	Healthy persons ..	-	-	-	-	-	-	-	-	-	-	-	-

N. B. - W. R. = Wassermann Reaction; +++ = Strongly positive; ++ = Moderately positive; + = Slightly positive; - = Negative; 0 = Undiluted serum; 5 = Diluted serum 1 in 5; 10 = Diluted serum 1 in 10.

distilled water. The age of the serum, which was always kept in an ice chest, varied from a few hours to 3 or 4 days.

A perusal of Table I will show that of 66 samples examined, 5 from perfectly healthy and normal individuals gave negative results in all dilutions of the serum and with all 3 solutions of urea-stibamine.

Of the 61 pathological sera, 3 were known to be from kala-azar patients and 58 from patients suffering from other diseases: 3 kala-azar cases gave marked positive reactions in all dilutions with both 4 per cent. and 2 per cent. solutions, while with 1 per cent. solutions the undiluted sera gave a positive reaction and the diluted sera gave varied results. The Wassermann reaction was negative in all 3 cases.

Of 58 sera from patients suffering from other diseases, the 1 per cent. solution gave negative results in all dilutions; the 2 per cent. solution gave similar results, except in 3 cases where undiluted sera only gave a doubtful reaction; the 4 per cent. solution on the other hand gave with (a) undiluted serum, 4 positive and 3 doubtful results; (b) 1 in 5 serum, 5 doubtful results; (c) 1 in 10 serum, all negative reactions.

The Wassermann reaction showed 25 strongly positive, 1 moderately positive, 4 slightly positive, and 28 negative reactions. A positive Wassermann reaction did not appear to influence the reaction in any way. Only 2 samples with a positive Wassermann reaction gave a slightly positive urea-stibamine reaction in undiluted serum, while the same sera gave doubtful reactions in 1 in 5 and negative in 1 in 10 with a 4 per cent. solution: 2 samples with negative Wassermann reaction gave similar results as above. It appears, therefore, that 1 in 10 diluted serum with 4 per cent. solution of urea-stibamine gives better results and minimises the possibilities of error, especially in well-developed cases of kala-azar.

We next took up a series of 24 cases (Table II) to study the comparative serum response to the formol gel and urea-stibamine tests. All 13 cases from the kala-azar ward gave a positive reaction with a 4 per cent. solution in all dilutions, and varied in reaction with 2 per cent. and 1 per cent. solutions. Ten cases showed a positive formol gel reaction; 3 negative formol gel cases had a full course of treatment. Not one of the 11 non-kala-azar cases taken from the general ward gave a marked positive reaction with the formol gel or antimony (urea-stibamine) test. A doubtful reaction was, however, obtained in 2 cases with formol gel and in 5 cases with 4 per cent. urea-stibamine solution; 2 of these 5 cases were negative at 1 in 10 dilution.

#### CONCLUSIONS.

From the series of cases studied by us we feel justified in drawing the following conclusions:—

1. A 1 in 10 dilution of serum gives a negative antimony test in all non-kala-azar cases.

2. A dilution of 1 in 10 of serum gives better results than undiluted serum or a dilution of 1 in 5, in differentiating kala-azar from non-kala-azar cases.

3. A 4 per cent. urea-stibamine solution gives more positive results than weaker solutions.

4. The factors responsible for a positive Wassermann reaction do not appear to influence this test.

5. The reaction appears to be a specific one for kala-azar serum.

6. The reaction lasts longer than the formol gel reaction after a course of treatment.

Our grateful thanks are due to Lt.-Col. H. R. Dutton, I.M.S., Professor of Medicine, Prince of Wales' Medical College, Patna, for permitting us to carry out this investigation in the Patna General Hospital.

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#### ELECTRO-CARDIOLOGY AND SOME OBSERVATIONS ON INDIANS.\*

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THIS evening I shall lay before you the highly technical subject of electro-cardiology. It was by the invention of the string galvanometer by W. Einthoven, a Dutch physiologist in 1901, that the study of the electrical variations associated with the activity of the various chambers of the heart was made possible. In Calcutta this subject has been introduced only lately, as the electro-cardiographic apparatus was obtained for the Medical College Hospital in 1925 by the personal efforts of the recent Principal, Col. Barnardo, who is foremost in maintaining that the electro-cardiograph is essential for the modern diagnosis and treatment.

*Importance of Electro-cardiology.*—During the last thirty years, largely owing to the work of Sir James Mackenzie, Sir Timothy Lewis, Professor Starling and their pupils, the attention of the medical profession has been particularly focused on the study of the cardiac

\* A paper read before the Medical Section of Asiatic Society of Bengal on the 20th February, 1928.