

certain selected jails in Bengal and Madras Presidencies, not because these jails were particularly bad places for dysentery but because the observations could be properly controlled in such places, and strictly comparable results would be available after some time, as both the treated subjects and untreated controls would be exposed to similar conditions in a common environment.

Two preparations were used for this purpose, viz., (1) Bilivaccin-Shiga consisting mainly of compressed tablets of desiccated bacterial bodies prepared by La Biotherapie of France according to the special formula of Prof. Besredka. (2) A mixed and sterilised emulsion of dysentery bacilli—of both Shiga and Flexner strains—prepared in the laboratory of the School of Tropical Medicine and Hygiene, Calcutta, from strains of organisms isolated locally. The dosage of the emulsion was the same as that used by Nicolle and Conseil (2), in their experiments in Tunis; that is to say 100 milliards of dysentery bacilli for an adult on an empty stomach for 3 consecutive days, no food being allowed by the mouth within 2 hours of ingestion of the vaccine.

The bacillary emulsion was exclusively used in two jails, Bilivaccin tablets in a third, while both emulsion and tablets were tried in a fourth jail. Altogether 1,136 prisoners were treated orally and no unpleasant effects, immediate or remote, were reported in any case and there was no objection on the part of the prisoners to this method of vaccination. Results of the trial are given below:—

(1) Those treated with the mixed bacillary emulsion.

Total number vaccinated	..	627.
Number of cases of dysentery among the vaccinated	..	18.
Percentage of incidence	..	2.88
Total number unvaccinated	..	4,516.
Number of cases of dysentery among the unvaccinated	..	237.
Percentage of incidence	..	5.2

(2) Those treated with "Bilivaccin-dysentery."

Total number vaccinated	..	509.
Number of cases of dysentery among the vaccinated	..	11.
Percentage of incidence	..	2.16
Total number of unvaccinated	..	1,053.
Number of cases of dysentery among the unvaccinated	..	47.
Percentage of incidence	..	4.46

From a consideration of results obtained under (1) and (2) it would appear that the percentage-incidence of dysentery among the vaccinated was appreciably reduced in both cases, but the reduction was more marked when Bilivaccin tablets were used for immunisation. Owing to the high cost of production of dysentery vaccine locally as well as of purchasing Bilivaccin for an extensive and prolonged trial, the investigation has not been continued any further. The results

already obtained, although small for a statistical enquiry of this sort, are highly instructive and call for a wide application of the same principle in fighting cholera which is a much more fatal disease and causes many times more havoc in India than do the dysenteries of bacillary origin.

We are much indebted to the superintendents of the jails concerned, especially to Captain B. G. Mallya, I.M.S., and Dr. Duckworth of the Jail Department, Bengal, for allowing facilities for research work in their respective jails and for keeping careful records of observations in this connection.

REFERENCES.

1. Besredka, 1919. *Annals de l'Institut Pasteur* XXXIII, No. 5.
2. Nicolle and E. Conseil, 1922. "Vaccination preventive per voi digestive chez l'homme dans la dysenterie baccillaire et la fièvre Méditerranéenne." *Annales de l'Institut Pasteur*, XXXVI, No. 8.

A NOTE ON AN EPIDEMIC OF FOOD POISONING IN MULTAN CITY (PUNJAB).

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ON the morning of the 12th May, 1926, I was informed by a sanitary inspector that on the previous day in one *mohalla* of the town about twenty-five persons had shown simultaneously symptoms of cholera, i.e., vomiting, purging and collapse.

I at once visited the *mohalla* and found that all these persons had taken "lassi" (butter-milk), sold by a milk vendor. This milk vendor had hawked his "lassi" in the *mohalla* on the 11th instant. On inquiry I found that some cases had occurred in another *mohalla* also, where this vendor had plied his trade. Altogether thirty-two cases came to my notice.

Incubation period.—The symptoms occurred 1½ to 4 hours after taking the "lassi". The length of this period depended upon the amount of "lassi" ingested. Those who took one glass of it fell ill within two hours, and those who ingested less did not show any symptoms till the lapse of four hours.

Quantity ingested to produce symptoms.—Some persons, especially the children, who took only a few drops, also fell ill. This fact shows that the poison, whatever it was, was virulent. As far as I could ascertain, there were only eight persons who had taken the "lassi" and escaped.

Symptoms.—Headache. Half of the cases had headache before the vomiting began.

Vomiting. Vomiting began from 1½ to 4 hours after taking the "lassi". It was very violent and lasted for about eight hours practically in all the cases.

Purging. Vomiting was accompanied by liquid motions, yellowish in colour. Ten was the average number of motions till the relief of symptoms.

Weakness occurred in all the cases just after the beginning of vomiting.

Convulsions and cramps. No case showed these symptoms.

Temperature. No case had any rise of temperature.

Suppression of urine did not occur in any case.

Convalescence.—All the cases, though looking depressed, after twenty-four hours were quite fit otherwise.

Nature of the poison.—I tried to secure a sample of the "lassi" consumed but failed in my efforts. None of the patients had any of it left. The vendor himself, having heard of the cases, disappeared from his shop and could not be found for two days. Meanwhile he had destroyed even his earthen vessel in which this "lassi" was prepared and sold.

Note.—"Lassi" is a sort of buttermilk and is prepared in the following manner:—Some *dahi*, a preparation of milk rich in lactic acid bacilli, is added to the warm milk. The whole of the milk after some hours is converted into *dahi*. This *dahi* is churned and butter extracted from it. The remnant after addition of some water is sold as "lassi." It is supposed to be a cooling drink.

ANTI-MALARIAL OPERATIONS ON THE EASTERN BENGAL RAILWAY—KHULNA BRANCH.

(September 1924 to March 1925.)

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Factors in Malaria Propagation.—In any endeavour to deal successfully with malaria three factors must be considered:—

1. The rapidity of growth and multiplication of the mosquito fostered by insanitary conditions. Whilst the importance of this factor is evident, the cost of putting the railway colonies into such a sanitary state as substantially to reduce mosquito hordes is likely to be very considerable, and unless effective co-operation with outside authorities can be secured much of the benefit which might accrue would be neutralised by the insanitary conditions which exist outside the railway sphere, but still effectively adjacent to railway premises.

The most successful disease prevention campaign (after the Panama Zone control) where the mosquito factor was primarily considered was the campaign instituted by the St. Louis S. W. Railway of the U. S. A., but here not only was a large special staff and adequate funds available but the campaign was designed as a co-operative measure between the railway and the adjacent municipalities.

Since there is evidence that in Bengal some municipalities would be prepared to co-operate in anti-malarial work and the assistance of the

Provincial Department of Public Health could probably be assumed, it is a matter for consideration whether a systematic programme of work on similar lines would not be possible and yield good results.

At the same time there is much that can be done on a small scale to check the growth of the proximate mosquito by attention to conditions in and adjacent to bungalows and compounds, such as searching for and destroying small mosquito breeding places, clearing small patches of undergrowth, removing decaying garbage, etc.

The value of such measures was recognised and special sanitary *jamadars*, trained to discover and deal with such conditions, were engaged and attached to the visiting medical staff—their duties being regarded as both practical and educative.

2. The second factor in malarial propagation is the existence of a large infective focus, viz., the group of persons who harbour one or other varieties of the malarial parasite and "feed" the mosquito carrier.

3. The third factor is the potential infectible group of debilitated and careless persons who, by reason of their habits and conditions of life, render themselves easily liable to infection.

The liability to and disadvantage of partial cure in malaria.—Malaria is peculiarly liable to partial cure and to recurrence (due to non-eradication of the malarial parasite) without reinfection by fresh parasites. Such recurrences follow disturbance of the vital *status quo* such as results from exceptional fatigue, cold or heat, privation, change of residence or diet, etc., whilst other diseases also may induce reactivation of the quiescent parasite and superadd to such affection a recurrent malarial attack. A person who has been partially cured, as has been already pointed out, is a potential transmitter of the disease in addition to being unreliable as regards his ability to perform regular and efficient service.

Distinctive feature of the work.—Since the cost ruled out any attempt at extensive mosquito reduction, the distinctive feature of the work has been to afford thorough eliminative treatment for all cases with the object of lessening the probability of recurrent attacks, and thereby limiting the infective foci to diminish the propagative risk, and, in turn, reduce the number of "primary" cases.

The Campaign, Staff, and Division of Work.—The district in which the "campaign" was conducted is that comprising the 29 stations on the Khulna Branch from Dum-Dum Cantonment on the west to Khulna on the east.

This district was placed in charge of four travelling medical officers, viz., H. K. Banerji, M.B., D. B. Mukerjee, M.B., B. N. Roy, M.B., and K. N. Basu, M.B., who visited each family in railway quarters at least once weekly, made the necessary examinations, and, as far as practicable, assured themselves that the course of treatment laid down was carried out. To assist in the work