

in the serum under trial. If too weak an emulsion be used, there is the possibility that the leucocytes will not meet with as many sensitized bacilli as they can englobe, and the phagocytic index will accordingly work out too low.

For the films I have found that fixation in absolute alcohol, colouration in Loeffler's blue and prolonged washing in water gives clearer pictures and more easily counted bacilli than Leishman's mixture. In counting films it must be conceded that, if average numbers are to be arrived at, a certain amount of discretion is necessary. Leucocytes which, as they say in America, "have obviously gotten into clumps" of bacilli should be omitted; in other words, only those polymorphonuclears may be counted which are lying singly, touching no other leucocyte and surrounded by no clump of bacilli. Leucocytes vary greatly in their avidity. In the same film some will have englobed 20 bacilli, others only 1. Such a leucocyte containing 20 bacilli should be counted provided that it is lying free. Without doubt it may have run into a clump in the pipette and have been scraped free in the subsequent processes, but every contingency cannot be allowed for.

Serums have a considerable solvent power on *B. coli* which varies in individuals and in the same person from time to time. Hence, if the estimation of an opsonic index be based only on counts made in the presence of the undiluted serums, it may be widely erroneous, for not only are non-phagocytosed bacilli acted on, but also those which the leucocytes have taken up, and the staining reactions are so interfered with that it often becomes impossible to make a satisfactory count.

For this reason it is desirable to dilute the serums before putting up the pipettes. The effect of dilution is generally that higher phagocytic indices are obtained than with undiluted serum, since dilution appears to reduce the bacteriolytic power of a serum in a higher degree than the opsonic power.

The degree of dilution suitable for *B. coli* seems to be anything between 1 in 3 and 1 in 15. Less than 1 in 3 does not overcome the bacteriolytic action sufficiently, and more than 1 in 15 often reduces the number of organisms taken up too much, though with care a reliable index can be obtained with as high dilutions as 1 in 40 and 1 in 50, as long as control counts are made with serumless preparations to estimate the amount of spontaneous phagocytosis which varies slightly according to circumstances.

The best procedure seems to me to make counts with preparations in which several dilutions of serum have been used, say, 1/1, 1/3, 1/5, 1/10, 1/15, 1/20. It involves much time and arduous toil, but a trustworthy conclusion cannot be reached without this expenditure. The indices thus obtained may or may not agree fairly closely, but experimental errors may be further eliminated by calculating the "summa-

tion index" of the figures arrived at and by taking this as the nearest approximation to the true opsonic index than by taking the mean of counts with several preparations in which equivalent dilutions were used. There does not seem to be any obvious relation between the phagocytic index and the dilution employed.

By "summation index" I do not signify the mean of the several calculated opsonic indices, for this might lead to a considerable arithmetical fallacy, but all the original numerators must be totalled and divided by the original denominators, and the index is calculated from the resulting fractions.

Simon, working with staphylococcus, states in the *Journal of Experimental Medicine* for September and previous numbers that he has secured results strictly comparable with Wright's opsonic (bacillary index) by counting the leucocytes which have failed to take up any organisms at all, and working out what he calls a "percentage index." But to perform this it is necessary to use such a thin emulsion that at least 50 per cent. of the leucocytes do not contain any organisms. This scheme renders the counting much less laborious, but it is open to the objection that the serum having the higher value in opsonin does not meet with a sufficient number of bacilli to enable it to display its real superiority and that an experimental error is thereby introduced. It may be, however, that this is corrected by the law of mass actions.

Though the "percentage index" may work out satisfactorily with staphylococcus, there were noticeable variations between it and the bacillary "summation index" when I employed *B. coli*; for all that the ups and downs of the two curves agreed in the main (*vide* Chart 1).

To illustrate the possibilities of experimental error, I append two charts (Nos. 2 & 3) showing the indices obtained with some of the different dilutions of serum employed.

The curve denoted by the unbroken line in Chart 1, is the summation opsonic index and exhibits the probable true variations in the opsonic content of the patient's blood.

ACCOUNT OF THE OCCURRENCE OF EPIDEMIC DROPSY IN COMILLA JAIL.

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THOUGH cases of dropsy now and then occur in Indian Jails, yet it is seldom there occurs a series of cases with characters of a type which can only be called epidemic.

During the period from 15th June to the 30th August 1907, there were in all some 32 cases; one of these proved fatal.

On the morning of the 15th June a prisoner named Adhar Jaloo, a fisherman by occupation,

was admitted to hospital with the following symptoms:—general anasarca with puffiness of the eyelids, breathing was difficult owing to œdema of the lungs, heart dilated, more especially the left ventricle and the pulse was regular and of normal tension. The skin was harsh and dry, the tongue coated, anorexia, constipation, the temperature was normal and the patellar reflexes were normal. The urine was of low specific gravity, *viz.*, 1,010, neutral in reaction, albumen present, phosphates and sugar absent.

The disease was diagnosed acute Bright's, and he was treated accordingly with a gradual and marked improvement of the condition of the patient.

This prisoner worked in the coconut fibre-pounding gang and slept at night in the upper storey of the main barrack; the position of his bed is marked 1 in the plan.

The first case of œdema occurred on the 15th June 1907; the diet at this time consisted of Rangoon rice at both meals which rice had been carefully sunned; vegetables mainly consisted of kutchu stems and leaves, pumpkins of sorts and sâgs. The pulses issued were masoor, muttur, gram and kalai, in this order on alternate days.

On the 16th July an outbreak of dysentery began, and from that date till the 26th July, some 17 cases of dysentery were admitted. In consequence of this dysentery the vegetables were well cleaned and boiled and the pulses were well husked.

On the subsidence of the dysentery, the cases of dropsy came into hospital in large numbers. In consequence of this, the diet was changed on the 18th August, the Rangoon rice was stopped and country rice was issued; potatoes and kutchu were obtained from the bazaar for issue to prisoners and the kalai dal was stopped. Meat was issued four times a week. The last case of epidemic dropsy occurred on the 30th August.

After the occurrence of these cases and comparing their characteristic symptoms with those described in Col. Kenneth Macleod's article on "Epidemic Dropsy" in Allbutt's System of Medicine, it was recognised that one had to deal with an epidemic of this disease.

Most of the prisoners attacked were between the ages of 20 and 55, and were apparently in good health, being robust and well nourished. In almost all the onset was fairly sudden and symptoms calling for treatment were evident to the patient. On admission, patients complained of headache, constipation and scanty urine; some complained of vertigo, whilst others had an indefinite pain over the stomach, which might be accounted for in some cases by the œdematous condition of the abdominal wall. The motions in all were well formed but quickly became loose under saline treatment. The first 3 cases had some dilatation of the heart, especially of the left side, and in one there was a reduplication of the second sound;

in all the pulse was regular and of normal tension. The lungs were implicated in 4 cases, mainly due to an œdematous condition which resulted in harsh and hurried respirations.

In almost all the cases œdema of the lower extremities was the most prominent symptom, and in some there was œdema of the upper extremities also. In all the cases but one the pupils were regular and equal, and this patient had dilatation of one pupil only during the height of the disease.

The urine of 6 cases was examined daily, and was usually of pale straw colour, of low specific gravity, of neutral reaction, and in only 2 out of the 32 cases was albumen found, whilst the quantity passed daily varied from 25 to 40 ozs.

Pyrexia, when present, was of a mild type and remittent in character, rarely reaching over 100° F., and coming down a degree or so each morning. Examination of the blood revealed a diminution in number of the red blood corpuscles, with an increase of the leucocytes, but anæmia was not a prominent feature of the cases.

In only one case there was a paralysis implicating the lower extremities, and this occurred on the subsidence of the dropsical symptoms. This patient gradually improved and in two months' time was able to walk about. I had only one opportunity of seeing this case and cannot state if he had anæsthesia of the skin, or hyperæsthesia of the muscles or not. Nineteen of the 32 cases showed absence or diminution of the deep reflexes, as indicated by the patellar reflex.

The statement on the annexed table shows the incidence of the disease as it occurred, and of the 32 cases, 27 were admitted from the upper storey of the main barrack (as shown on the annexed plan), and the 5 other cases were admitted from other dormitories.

There was one fatal case, *viz.*, Kulu Chandra, who was admitted to hospital on the 28th July; at first he had œdema of the lower extremities which increased in amount, so that general anasarca resulted and ultimately œdema of the lungs carried the patient off on the 1st August. The *post-mortem* examination revealed marked œdema of both lungs; the heart was dilated, especially the left ventricle; the pericardium was full of serum and there was otherwise nothing remarkable beyond some enlargement and congestion of the kidneys the capsules of which stripped off easily.

On admission all were placed on light diet, milk, soup, etc., and internally were given a saline purgative followed by a mixture containing strychnine, digitalis and spirits of nitrous ether; under this treatment the epidemic dropsy gradually disappeared.

All the affected prisoners were under the same regime as regards their diet, clothing and other hygienic conditions, and after careful

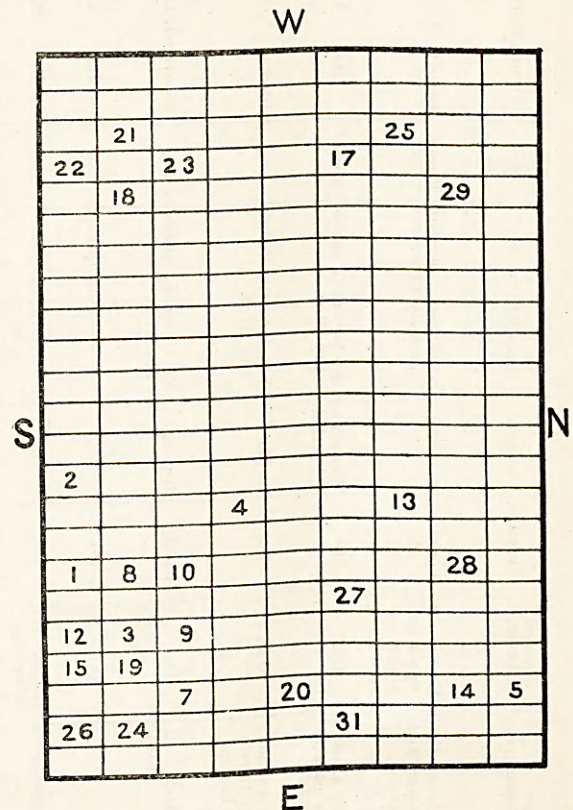
segregation of these prisoners the change in diet effected on the 18th August together with the measures of segregation adopted caused complete abatement of the disease. The epidemic does not appear to have any causative relation with employment, since the occupation of the affected prisoners, as noted in the annexed table, was very various. A perusal of the annexed plan would also lead one to suppose that the disease was more or less communicable, and the fact remains that the disease almost totally disappeared from the Jail one week after strict segregation measures had been adopted.

From the description noted it is evident that the dropsy is throughout the prominent symptom and that neurotic symptoms and anæsthesia were subordinate; in addition, the dropsy quickly disappeared under treatment, and since I have seen a good many cases of "wet beriberi," the present epidemic is not of that type and does not present the clinical picture of that interesting complaint.

The plan annexed shows the remarkable grouping of the cases, lending colour to the view that the disease is spread by human agency. The west end of the upper storey of the main barrack, which had previously been used as a dormitory was prepared as a hospital for these cases only and was completely partitioned off from the general ward; the advantage of having the hospital here was that the stairway leads to the cook-house, latrine, etc., in the yard below and the yard itself being walled in; communication was prevented with the other prisoners. About one-tenth of the jail population exposed to the disease contracted it.

It is therefore evident that the disease had characters of the nature of an exanthem; this was exemplified in its manner of incidence, the premonitory symptoms, its course, the absence of marked neurotic symptoms, the presence of

mild fever, the peculiar stomachic discomfort, the mildness of the complaint, its disappearance



PLAN OF THE UPPER STOREY OF MAIN BARRACK IN COMILLA JAIL, SHOWING THE GROUPING OF CASES OF "EPIDEMIC DROPSY" AS THEY OCCURRED.

under treatment and its small mortality, all point to the disease being "epidemic dropsy." This is further confirmed by the fact that the outbreak was epidemic and not endemic, and that no cases occurred previous to it, nor have any occurred since, either amongst the prisoners nor amongst the civil population.

THE competitive examination for Commissions in the Indian Medical Service was held on January 27, 28, 29, 30, and 31, and February 1. The subjects of examination were Medicine and Therapeutics, Surgery and Eye Diseases, Pathology and Bacteriology, Surgical Anatomy, Physiology, Midwifery and Diseases of Women and Children, Pharmacology, and Toxicology. Fifty candidates presented themselves for sixteen vacancies. The following is a list of the successful candidates, with the marks obtained by them out of an aggregate of 5,100 marks :-

- Brierley, Wilfrid Edward, F.R.C.S., Eng., L.R.C.P., M.R.C.S., M.B. Vict., M.B., Ch.B., Leeds University and London Hospital ... 3,988
- Knowles, Robert, B.A., Cantab., L.R.C.P., M.R.C.S., Cambridge University and St. Mary's Hospital ... 3,962
- Lapsley, James Burne, M.B., B.Ch., B.A.O., Royal University of Ireland, Queen's College, Cork ... 3,796
- Shorten, James Alfred, B.A., M.B., B.Ch., Royal University of Ireland, Queen's College, Cork ... 3,722
- Sewell, Robert Beresford Seymour, L.R.C.P., M.R.C.S., St. Bartholomew's Hospital ... 3,680
- Watson, William Linton, L.R.C.P., and S., Edinburgh, L.F.P. and S., Glasgow, L.D.S., Edinburgh, of Edinburgh ... 3,65

- Fielding, Charles Henry, M.B., B.S., London, St. Bartholomew's Hospital ... 3,627
- Simpson, Wilfrid James, M.B., Ch.B., Edinburgh, Edinburgh University and University College Hospital ... 3,621
- Coppinger, Francis Romney, M.B., B.Ch., B.A.O., Dublin, Trinity College, Dublin ... 3,610
- Charles, Arthur de Courcey Cranston, B.A. Cantab., L.R.C.P., M.R.C.S., Cambridge University and St. Thomas's Hospital ... 3,571
- Barnett, James William, M.B., Ch.B. Aberdeen, Aberdeen University ... 3,574
- Stevenson, Frederick, M.B., B.Ch., B.A.O., L.M., B.A., Dublin, Dublin University ... 3,554
- West, Stephen Harold, M.B., B.Ch. Victoria, L.R.C.P., M.R.C.S., Victoria University, Manchester ... 3,534
- Madan Lal Puri, L.M. and S., Punjab, L.R.C.P. and S. Edinburgh, London Hospital ... 3,506
- Satya Charan Pal, L.R.C.P. and S., Edinburgh, Royal College of Physicians and Surgeons, Edinburgh ... 3,501
- Townsend, Reginald Stephen, M.B., B.S., London, L.R.C.P., M.R.C.S., St. Bartholomew's Hospital ... 3,483

16	Meser Shaik, M. M., 30.	4 0	<i>Nil.</i>	Surkhi convict overseer.	Tin shed	16-8-'07	Constipation and headache ...	Do.	Do.	Do.	Do.	Present	Do.	27-8-'07.
17	Nawab Ali, M. M., 28.	7 0	<i>Nil.</i>	Rope making ...	Upstairs main barrack.	16-8-'07	Face puffy; constipation ...	Upper and lower ex- tremities.	Do.	Do.	No albumen, quan- tity 40 oz.	Absent	Do.	31-8-'07.
18	Mani Ram, H. M., 50.	7 0	<i>Nil.</i>	Coir pounding	Do.	17-8-'07	Complains of pain in loins; pain over umbilical region; head- ache and constipation.	Lower ex- tremities.	Do.	Do.	No albumen, quan- tity 30 oz.	Do.	Do.	28-8-'07.
19	Bhagwan, H. M., 35.	5 0	<i>Nil.</i>	Cook	Upstairs main barrack.	17-8-'07	Face puffy; constipation	Lower ex- tremity.	Healthy	Healthy	No albumen, quan- tity 30 oz.	Absent	Recovered, 23-8-'07.	
20	Keramat, M. M., 25.	2 0	<i>Nil.</i>	Door mat making.	No. 10	17-8-'07	Constipation	Do.	Do.	Do.	Do.	Do.	Do.	27-8-'07.
21	Reajuddin, M. M., 60.	0 9	<i>Nil.</i>	Sweeper com- pound.	Upstairs main barrack.	21-8-'07	Face puffy; constipation; anorexia	Do.	Do.	Do.	No albumen, quan- tity 29 oz.	Present	Do.	30-8-'07.
22	Abdul Jabbar, M. M., 45.	1 6	<i>Nil.</i>	Door mat making.	Do.	23-8-'07	Constipation	Do.	Do.	Do.	No albumen, quan- tity 35 oz.	Do.	Do.	31-8-'07.
23	Sabu, M. M., 40	1 6	<i>Nil.</i>	Wall guard	Do.	23-8-'07	Constipation	Do.	Do.	Do.	No albumen, quan- tity 40 oz.	Absent	Do.	31-8-'07.
24	Kangali, H. M., 45.	1 0	<i>Nil.</i>	Thread making	Do.	23-8-'07	Face puffy; constipation	Do.	Do.	Do.	No albumen, quan- tity 25 oz.	Do.	Do.	31-8-'07.
25	Jamir, M. M., 30	0 8	<i>Nil.</i>	Coirpounding...	Do.	23-8-'07	Constipation	Do.	Do.	Do.		Present	Do.	31-8-'07.
26	Sekunder, M. M., 50.	1 6	<i>Nil.</i>	Convalescent gang.	Do.	23-8-'07	Constipation	Do.	Do.	Do.	No albumen, quan- tity 30 oz.	Do.	Do.	31-8-'07.
27	Waheb Ali, M. M., 49.	2 6	<i>Nil.</i>	Wall guard	Do.	23-8-'07	Constipation	Do.	Do.	Do.	Do.	Do.	Do.	30-8-'07.
28	Mahamed Ali, M. M., 35.	1 0	<i>Nil.</i>	Cook	Do.	23-8-'07	Constipation	Do.	Do.	Do.	Do.	Absent	Do.	30-8-'07.
29	Saheb Ali, M. M., 28.	1 6	<i>Nil.</i>	Watchman	Do.	24-8-'07	Constipation	Do.	Do.	Do.	No albumen, quan- tity 35 oz.	Do.	Do.	30-8-'07.
30	Sher Ali, M. M., 25.	10 0	<i>Nil.</i>	Cook	Tin shed	30-8-'07	Bowels constipated; urine scanty.	Do.	Do.	Do.	No albumen, quan- tity 32 oz.	Present	Do.	9-9-'07.
31	Jinnat Ali, M. M., 50.	2 0	<i>Nil.</i>	Sweeper com- pound.	Upstairs main barrack.	30-8-'07	Bowels constipated; complains of weakness and pain in the legs.	Do.	Do.	Do.	No albumen, quan- tity 25 oz.	Do.	Do.	8-9-'07.
32	Abdul Gafour. M. M., 25.	0 6	<i>Nil.</i>	Coirpounding...	Tin shed	30-8-'07	Bowels constipated; complains of pain in the legs.	Edema over left shin.	Do.	Do.	Healthy	Do.	Do.	8-9-'07.