and filtered. This mordant will keep for a considerable period of time. The cover glasses are prepared by washing them in a strong solution of hydrochloric acid. They are taken from the acid, wiped with a clean cloth, and thoroughly heated over a bunsen flame. A convenient way of doing this is to place them on a slide upon a tripod, and apply the flame. On a cover glass which has been sufficiently heated, the film spreads with perfect evenness. The traces of acid which are left on the glass make it easier to avoid subsequent precipitation of mordant or stain. The bacilli are placed on the cover slip and fixed. The mordant is then filtered, poured on the preparation, and heated till steam is given off. Boiling should be avoided, as it leads to precipitation. The preparation should be kept at this temperature for three minutes. It is then well washed in distilled water, and the stain is added, and heated in the same way for three or four minutes.

The stain is made by adding 1 c.cm. of a saturated alcoholic solution of gentian violet to 10 c.cm. of a saturated solution of ammonia alum. This is filtered and poured on the preparation.

This method can be applied generally. I have found it particularly applicable to bacilli of the typhoid and *B. coli* group. It has been used in the laboratory also for the staining of the flagella of *B. cholerae asiaticae*, *B. tetani*, *V. aquatilis*, etc. The flagella are clearly defined and of moderate thickness. The advantage of the method is the certainty and rapidity with which results are obtained. Anyone who carries out the instructions given above will after a very little experience obtain without fail successful preparations.

THE PROPHYLACTIC AND CURATIVE TREATMENT OF PLAGUE.

BY

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AMONG the numerous articles dealing with plague which were published in the Plague Number of the BRITISH MEDICAL JOURNAL, there was one by C. Balfour Stewart, which has induced us to make some observations as to the curative serum and the prophylactic prepared by our method. At the same time we would take the opportunity of describing some of the most recent results, which, although published in the writings of Dr. Choksey, Dr. Polverini, and Dr. Mayr, seem not to be well known by some of those who take an interest in the questions concerning the plague.

The observations have reference to the theoretical side of the question, while some rectifications are necessary as regards to the statements concerning the different results obtained, which Balfour Stewart does not seem to be well acquainted with.

THE PREPARATION OF THE PROPHYLACTIC.

According to our method this is based on the following principle: to inoculate, as a preventive medium, the substance which is alone able to cause in the organism treated an active immunity produced by the action of a specific bactericidal power. This we obtained by isolating from the microbes the nucleo-proteid of which they are partly composed, for it is to this that immunity is due, although it can be also produced by injecting entire cultures of plague microbes.

HAFFKINE'S METHOD.

This method, however, has numerous drawbacks, as to which we would refer to a previous paper of ours in this JOURNAL. Haffkine's prophylactic certainly cannot, as Balfour Stewart suggests, be called the greatest success as a scientific preparation, because it is not possible to establish any qualitative and quantitative relation between the substances contained in that prophylactic and the degree of immunity which is derived from it; while its practical results are still far from those which are looked for in a thorough immunisation, as, for example, had been obtained for small-pox.

THE PREPARATION OF THE CURATIVE SERUM.

As the above-mentioned nucleo-proteid is the only substance capable of determining a specific bactericidal power in animals treated, we use the serum of such animals (after a sufficient treatment) as a curative medium. The question of the existence of specific extracellular toxins produced by the plague microbes is still very much debated. The question of the antitoxic capacity of the serum is even more uncertain, as nobody has yet succeeded in obtaining an antitoxic serum by

means of the injection of filtered cultures deprived also of those toxic elements which constitute the protoplasm of the bacterial cells.

Through the injection of this nucleo-proteid, which is an intracellular specific poison, we confer on the serum of the animals treated with it a bactericidal power, and very likely an antitoxic one against the same. Balfour's assertion that "a horse treated with a nucleo-proteid extracted from the dead microbes would be immunised with even less efficiency than one treated with the killed microbes together with their metabolic products" is theoretically unfounded, and as it does not spring from any principle of experience and practically is not true, for the results obtained from our serum are far better than those given by other serums experimented in India.

HISTORY OF THE EXPERIMENTS WITH THE CURATIVE SERUM.

The first serum was obtained in the year 1897 from an immunised horse in the Laboratory of Pathology in Florence, and was tried in India on 6 patients at the Arthur Road Hospital, 5 of whom recovered. Besides 29 patients were treated with it in the Poona Plague Hospital, and 21 of them got well. In the year 1898 the Municipal Corporation asked us to prepare a certain quantity of serum which was chiefly used at the Arthur Road Hospital. The clinical observations concerning the effects of this serum have been collected with the assistance of Dr. Choksey, in charge of the above-mentioned hospital, in the most careful way. We injected the serum into every individual infected with plague, without distinction of age or period of illness, making no account of the complications present, and it was even injected into some dying persons. It is besides worthy of remark that Arthur Road Hospital receives all patients, belonging to the lowest class of people, poor, ill-fed, and in consequence little able to resist the infection which in these conditions appears in the most dangerous form.

The number of patients treated with our serum on June 10th was 175. We made the injections under the skin of the arm or the thigh, using Roux's syringe. The results were altogether very satisfactory, but we noted a great difference in the serums coming from different horses. Thus, the serum obtained from the horse marked No. 1 in the following table has always given the same effects, in spite of its being extracted at different times and used for different patients. The results obtained with this horse were not very good, and lowered the proportion of our recoveries; while the serum obtained from horse No. 4 has been most efficacious in all cases.

Results obtained with Different Serums.

No. of Horse.	No. of Times Bled.	No. of Patients Treated.	No. of Deaths.	No. of Recoveries.	Percentage of Recovery.
I	1	24	18	6	
	2	41	30	11	
	3	6	5	1	
		71	53	18	25.35
II	1	—	—	—	
	2	13	—	—	
	3	17	—	—	
		30	14	16	53.33
III	1	19	10	9	
	2	24	12	12	
	3	11	3	8	
		54	25	29	53.70
IV	1	8	3	5	
	2	12	5	7	
		20	8	12	60.00
		175	100	75	42.70

Of the 175 patients treated with the serum, 18 were in a most dangerous state when they were put under treatment. These patients had received only one or two injections before they died.

Thus, as Dr. Choksey has rightly considered, these 18 cases

should not be included in estimating the definitive valuation of the serum.

The mortality, therefore, among the patients treated with the serum may be placed at about 53 per cent., while the general mortality for plague at the same period—namely, from March 10th till the end of June, was, according to the official statistics, about 94 per cent.

RESULTS WITH OTHER SERUMS.

These were obtained during the same period of time, in the same hospitals, on analogous patients:

1. In 1897 the results obtained by the curative serum prepared by Haffkine's method were so little satisfactory that Haffkine himself thought it advisable to discontinue such treatment.

2. In 1897 the serum prepared by Yersin was tried in 3 very early cases which only Dr. Yersin considers amenable to his serum. The mildest of them recovered after a very long and protracted convalescence; the other 2 died within twenty-four hours of the injection.¹

3. In 1897 the Russian serum "prepared according to Dr. Yersin's method, which was tried by Professor Lewin, of the Royal Military Academy of St. Petersburg, did not give good results even in a single case, as all the cases injected died."²

4. In 1898 another supply of Russian serum was tried by Dr. Janeinski, Dr. Kaskadamoff, and Dr. Wigoura. This also showed no efficiency in lowering the mortality.

5. In 1898-99 the serum of Professor Roux was brought by the Indian Plague Commission. Its administration was carried on under the control of Dr. A. Turkud,³ Chief Medical Officer in charge at Modikhana Hospital. From his report (page 371) we extract the following:

"The treatment was carried out by Lieutenants Walton and Douglas, of the Indian Medical Service, who were assisting the Plague Commission in their laboratory work, and the cases were watched from time to time by Professor Wright and Dr. Ruffer.

"There were altogether 28 cases of acute plague treated with Roux's serum. These cases were not specially selected for treatment, but every alternate case as it was admitted into the acute plague ward was taken for serum treatment, the remaining cases forming the 'controls.' This arrangement was thought to be better adapted for comparing the results of the serum treatment with that of the routine treatment as carried on in the hospital.

"Of the 28 cases treated 5 recovered and the remaining 23 died, thus giving a mortality of 82.1 per cent. Out of an equal number of 'controls' there were 3 recoveries and 25 deaths, mortality percentage being 89.9. Thus the percentage of recoveries from the serum treatment does not show any striking results as compared with those obtained from the ordinary treatment.

"The result, therefore, was unsatisfactory and disappointing, especially as in laboratory experiments Roux's serum had shown a decided antagonising action to the toxins of plague."

RECENT RESULTS.

More recent results of the treatment of plague with our serum have been published in Dr. Polverini's report,⁴ from which we take what follows:

—	No. of Patients Treated.	Recoveries.	Deaths.	Percentage of Recovery.
Arthur Road Hospital ...	403	154	249	38.21
Maratha Hospital ...	28	11	17	39.28
Government House, Parel	12	3	9	25.00
Private ...	32	19	13	59.37
Total ...	475	187	288	39.36

"The rate of recovery was therefore 39.36 per cent. These results appear in themselves satisfactory if we compare them with the following figures. At the Arthur Road Hospital 1,190 patients were treated without serum during the same period, 233 of whom recovered, equal to a recovery rate of

19.57 per cent. At the Maratha Hospital 3,378 patients were similarly treated, of whom 646 recovered, equal to a recovery rate of 19.12 per cent. At the Modikhana Hospital 1,384 patients were treated, of whom 295 recovered, equal to a recovery rate of 21.31 per cent. It is interesting to note that for the whole city of Bombay 24,752 attacks of plague have been recorded, with 21,193 deaths, equal to a recovery rate of 14.37 per cent." Therefore, taking into consideration only what was observed in the hospitals, the comparison of these results shows that the average rate of recoveries of the non-treated cases was 20.6 per cent., while of the serum cases 39.36 per cent. were cured—namely, that out of 100 patients treated with the serum 19.3 recovered only in consequence of this curative medium, and without this treatment they would have almost certainly proved fatal. "Considered numerically, it may be said that about 30 per cent. of the patients at the large plague hospitals die within the first twenty-four hours after admission, and that recovery in them will be exceptional, even with the best serum. Within the next twenty-four hours another 20 per cent. die; that many of these may be saved is open to doubt. About 20 per cent. recover under the ordinary treatment. Thus there remain 30 per cent. in which there is the possibility and probability of the serum influencing recovery" (Dr. Polverini's Report).

Out of these 30 per cent. our serum has determined the recovery of 19, that is, of about two-thirds. In other words, the serum cured two-thirds of the treated patients in which the recovery was possible, but was not due to natural resources. Finally, in accordance with a paper by Dr. Mayr,⁵ we desire to state: "The crucial test for its efficacy is given by the higher total recovery-rate of the Arthur Road Hospital when compared with that of the two other hospitals. The Maratha and Modikhana Hospitals had a heavy recovery-rate of 19.76 per cent. in 4,762 patients, and the Arthur Road Hospital a rate of 24.29 per cent. in a total of 1,593 patients. The increase is 4.5 per cent. in favour of the latter, although only one-fourth of all the patients received specific treatment."

THE ALTERNATE SYSTEM.

Later on, the English Plague Commission paid a visit to the City of Bombay, and suggested as a more severe test for the serum what is known as the alternate system. Such a method was put into action in the Arthur Road Hospital, and thus 480 cases were treated with the serum, while 480 others were kept, as control cases, under ordinary treatment. Excluding the moribund cases and the convalescents from both sides the results are as follows:

—	Percentage of Mortality.	Percentage of Recovery.
Serum cases ...	60.08	39.92
Non-serum cases ...	79.79	20.21

These results therefore show, as before, 19.41 per cent. of recovery in favour of the serum, and such higher rate is due to the serum only (*vide* Dr. Choksey's Report,⁶ p. 963).

Our serum was not used in Europe, where the mortality has been, in every one of the infected places, a very low one. The plague in Oporto and in Glasgow was of a mild type. As it appears from the statistics, the mortality in Oporto amongst the plague patients treated with ordinary cures was lower than 40 per cent.,* and therefore it is easy to understand how the French serum, tried in such conditions, has given results which are apparently better than those we have obtained in India. This low mortality of 40 per cent. not only reveals that out of 100 patients there were 60 who recovered spontaneously, but also that in the other 40 cases the disease had a milder type.

If Yersin's serum,⁷ which in India did not reduce the plague mortality when it was about 80 per cent., gave on the contrary good results in Oporto, where the mortality scarcely reached the average of 40 per cent., it can be admitted that our serum, which proved itself a good curative means even in India, would have had an even greater efficiency in Europe.

* The cases occurred at Oporto (from August, 1900) amount to 282, of which 104 were fatal, giving, therefore, a mortality-rate of 36.9 per cent. (*vide* BRITISH MEDICAL JOURNAL, October 27th, 1900, p. 1253).

Although supplies of our curative serum were requested from several countries of Europe and Australia, we have been obliged to stop the preparation of it on account of obstacles put in our way by the sanitary authorities, who feared the preparation of plague cultures on a large scale. Of course, we cannot but desire to put our serum to another comparative test (particularly in the fairer conditions of milder epidemics like the recent ones in Europe) with Yersin's serum, as such an experiment would have a decisive interest for science and humanity. For the present, as far as our four years' experiments have gone, it must be acknowledged, that our serum was the only one which gave satisfactory results, as it is practically demonstrated by the fact that the sanitary authorities of Bombay recommended its use so strongly that it is the only serum manufactured in a specially-arranged laboratory in Bombay and largely used in the hospitals, whilst the other serums were soon put aside.

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DYSENTERY IN SOUTH AFRICA.

By JAMES JOHN DAY, M.R.C.S., L.R.C.P.LOND.,
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MUCH of the "dysentery" which the private soldier in South Africa believes he suffers from is not dysentery. It usually resolves itself on questioning the patient into diarrhoea accompanied by griping pain. Men really suffering from dysentery describe the motions as consisting of "blood and slime," "white of egg," "jelly," and once I heard of "phlegm" being passed.

At Wynberg, where the cases were usually of some duration when admitted, the various methods of treatment met with about equal success. The *post-mortem* appearance varied greatly. I saw two cases in which the lower part of the ileum was involved. As a rule the upper part of the colon was more affected than the lower part and the rectum.

In the advance through the Free State one saw many cases of acute diarrhoea, in a large percentage of which blood and mucus were passed. Very few of these ended as acute dysentery. They yielded readily to treatment by *ol. ricini* c. tr. *opii*, followed by pil. plumbi c. *opio*. The few cases of real dysentery occurring in the Division (Colville's) to which I was attached all improved rapidly under treatment with magnesium sulphate given in hourly doses of 1 drachm and dieting. But I noticed in cases sent for treatment from other bodies of troops that the longer the duration of the case the less readily it yielded to this treatment. Out of some hundreds of cases of acute diarrhoea and dysentery treated I only saw one death occur actually in the field, and that was in a case of long duration brought from another division.

At Johannesburg, in the Victoria Hotel Hospital, there were not many cases of acute dysentery, and such as there were yielded more or less readily, according to the duration of the attack, to the treatment. One patient recovered from a primary attack, but relapsed, developed enteric, and rapidly succumbed.

At Welverdiend such acute cases as occurred recovered under sulphate of magnesia, but of 5 chronic cases I have notes of only 1 recovered under a combined course of this salt with quinine. The others were transferred for treatment to standing hospitals, and in no way improved.

At Pretoria, where for some weeks I had charge of the majority of the dysentery patients in No. 2 General Hospital under Lieutenant-Colonel Keogh, many of the cases were typical. The method of treatment adopted was as follows:

On admission the patient was immediately given *ol. ricini*, 3j; tr. *opii*, μ xv—xxv; aq. menth. pip., 3j; and a diet of arrowroot, Oj; milk; Oij; soda water, Oij; brandy or port

wine. As soon as the bowels had been thoroughly cleared, mag. sulph., 3j; ac. sulph. dil., μ xv; aq. menth. pip., 3j, was given every hour until the stools became feculent.

I found the concentrated doses of sulphate of magnesia more quickly efficacious than more dilute doses. As the tenesmus was relieved and the evacuation of blood and mucus ceased, the sulphate of magnesia was administered correspondingly less frequently, but was always continued for at least forty-eight hours after the dysenteric symptoms had ceased. I found frequently that it seemed to produce a marked astringent effect, the stools becoming formed during its administration. In cases where the bowels were still relaxed a simple astringent mixture of catechu, tr. *opii*, and ac. sulph. dil., in all cases proved efficient. As the symptoms abated the diet was increased through eggs and chicken to ordinary rations, after four or five days of which a patient was transferred to the convalescent division.

Several cases were encountered presenting complications.

Scurvy.—In this case the dysenteric symptoms persisted for some time. The gums were swollen and spongy, bleeding freely, and his teeth were very loose. He had severe neuralgic pains in the face and head (bilateral). Also on several occasions he had slight epileptiform seizures. Lime juice, fruit, and vegetables, combined with astringent mouth washes, rapidly cured both dysentery and scurvy.

Malaria.—Various cases, in which the temperature was typical of malaria, although the prominent trouble was the dysentery, occurred. These were readily and completely cured by adding quinine v grs. 4 *tis. horis* to the mag. sulph. treatment. I regret that no microscopical examination of the blood was made in these cases.

Synovitis.—I saw two cases of this, in one of which the knee and ankle joints were enlarged, but not painful, and there was but slight exacerbation of temperature. The other was rather peculiar in that the onset of the synovitis was accompanied by a slight relapse of the dysenteric symptoms. The joint first affected was the metatarsophalangeal joint of the great toe. It presented all the features of an attack of acute gout, and was treated as such without any benefit. In rapid succession both ankles and knees were attacked. There was a good deal of pain, and the temperature ranged from 99° to 102.6°. Salicylates pushed to salicysm did not produce any effect, nor did various other treatments. The only benefit obtained was from local anodynes. The attack gradually abated, and the patient was convalescent when I left Pretoria.

There is a great tendency to relapse should the patient be allowed to get about in the sun too soon during convalescence. In No. 2 General Hospital at Pretoria the dysentery cases were placed in wards separate from the enteric cases. This should certainly be done wherever possible. As much care should be taken to either disinfect or destroy the stools as in enteric.

NOTE ON THE LESIONS PRODUCED BY
OXYURIS VERMICULARIS.

By MARC ARMAND RUFFER, M.D.,

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At the *post-mortem* examination of an adult male (an Egyptian workman) aged about 35, who had died from chronic cirrhotic disease of the liver and kidneys, many small worms (*oxyuris vermicularis*) were noticed by Dr. Taha and myself in the contents of the large intestine, more especially in its lower portion. In the rectum, about 6 inches from the anus, a small hard tumour was found, which lay within the walls of the intestine, and was of the size of a small nut. Two other tumours of nearly the same size were discovered $2\frac{1}{2}$ inches from the first, while here and there throughout the length of the large intestine small elevations were also noticed. These varied from the size of a pin's head to that of a small pea. The mucous membrane covering these tumours and the elevations above noticed was quite intact, and there was no sign of congestion, inflammation, or ulceration around the tumours. The peritoneal wall of the intestine showed no special adhesions.

The larger tumours and several of the smaller ones were re-