states that in 475 cases treated a recovery-percentage of 39 was obtained. From the comparatively small number of trials of serum inoculations hitherto reported, neither serum seems to come up to what might be expected from a specific treatment. Lustig's serum does not appear to be so efficacious as that of Yersin. This is possibly accounted for in a way similar to Metchnikoff's explanation of the difference in Yersin's serums referred to above. A horse treated with a nucleoproteid extracted from the dead microbes would be immunised with even less efficiency than one treated with the killed microbes together with their metabolic products, and a horse immunised in this way was shown to give a less powerful serum than one immunised with the living microbes. Compared in this way with Haffkine's prophylactic, the latter is the greater success as a scientific preparation.

REFERENCES.

- ¹ BRITISH MEDICAL JOURNAL, February 11th, 1893. ² *Ibid.*, March 3rd, 1900. ³ *Bubonic Plague*. By Dr. José Verdes, Montenegro. Translated by W. Munro, p. 72. ⁴ BRITISH MEDICAL JOURNAL, September 23rd, 1899, p. 803. ⁵ *Annales de l'Institut Pasteur*, T. xiii, 1899, p. 903. ⁶ *Ibid.*, T. xi, 1897, p. 747. ⁷ *Ibid.*, T. ix, 1895, p. 591. ⁸ *Ibid.*, T. xi, 1897, p. 742. ⁹ *Ibid.*, T. xi, 1897, p. 746. ¹⁰ *Ibid.*, T. xiii, 1899, p. 893. ¹¹ *Steroterapia e Vaccinazioni preventive contro la Peste Bubonica*, Dott. Alessandro Lustig, Torino, p. 5. ¹² BRITISH MEDICAL JOURNAL, February 10th, 1900, p. 311.

A NOTE ON THE METHOD OF USING HAFFKINE'S PROPHYLACTIC.

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A SHORT description of the method of inoculating with Haffkine's prophylactic, and of the immediate clinical effect, may be of use at the present time. While I was in Calcutta in 1898 Dr. Nield Cook (the Medical Officer of Health) and I inoculated some 2,490 cases between April and July, none of whom died of plague during that year's epidemic. A stock of Haffkine's prophylactic was obtained from the Bombay Research Laboratory in January, 1898, and when the first fatal case of plague occurred at the European General Hospital, 10 members of the staff were inoculated at the request of Colonel Ranking, the Senior Medical Officer.

Roux's syringes, with a capacity of 10 c.cm., were employed. At different times the fluid varied in strength; some bottles were marked "double strength," in which case only half the dose was given. The dose has varied from 5 c.cm. to 20 c.cm. The ordinary dose for an adult male of the fluid then provided was 5 c.cm.; I used to give a woman 4 c.cm., girls aged from 10 to 14 years 3 c.cm., and children from 2 to 10 years from 1½ to 3 c.cm. according to age. To save time the whole of the syringe was filled, and used to inoculate several people, the graduations on the cylinder making it possible to gauge the dose accurately for each person; the needle was well rubbed with a cotton wool sponge dipped in 1 in 20 carbolic in the interval between two inoculations. Strict aseptic precautions were observed throughout. Carbolic was used, as it has been proved to have no action on the prophylactic. The neck of the sealed bottle of prophylactic was sterilised in the flame of a spirit lamp. The cork was then extracted with sterilised dissecting forceps. The bottle was covered with a pad of absorbent cotton just squeezed out of carbolic lotion until the syringe was quite ready, and in filling the syringe the bottle was held on the slant. The syringe was carefully taken to pieces each day after it had been used, washed with boiling water, then with carbolic 1 in 20, and carefully dried. Just before using the needle it was boiled in a test tube and inserted into the syringe with sterilised forceps.

I invariably selected the back and outer side of the arm midway between shoulder and elbow as the site of inoculation: in men I believe the flank was sometimes used. The skin was well rubbed with a sponge dipped in 1 in 20 carbolic; if any dirty patient presented herself I made her wash the arm herself first with water and, when procurable, soap; but the numbers were so large that as a rule the rubbing with carbolic was the only measure employed, and I never had an abscess or other untoward result. The needle was run into the superficial fascia for quite half or three-quarters of an inch,

and the fluid slowly injected; the needle was quickly withdrawn, the skin being pinched up as it emerged. If the needle be run in towards the elbow it quite prevents any of the fluid emerging with it. The pain was of course trifling. I let the patient press a small sponge squeezed out of carbolic over the spot to stop any bleeding. I only remember one case where more than one or two drops of blood flowed, and usually there was none at all. In view of the subsequent inflammation and itching, I avoided the application of collodion or strapping. It is not necessary to apply any dressing at all.

The reaction in many cases began at once with pricking at the site of inoculation and the gradual formation of a hard tender red swelling for a few inches round. The temperature rose, in the cases in which I was able to take it, within six hours of the inoculation: it was highest on the night of inoculation. The height of the fever varied a great deal. In a few cases it only reached 99.6° or 100° F. In most it rose to 102° or 103°. It was rarely possible to reinoculate immediately any who manifested no reaction, though I believe Mr. Haffkine considers it more satisfactory to reinoculate in all cases which do not present a rise of temperature to 103°. The fever rarely lasted more than two days, though the arm remained more or less painful and tender for a week or ten days, and a small hard nodule often remained for a few weeks.

I was not able to make a practice of seeing all inoculated persons the next day. Those I did see presented a red, hot, hard swelling of the skin and subcutaneous tissue of the arm rarely spreading above the shoulder, but often extending to the elbow or even to the wrist. The margin was as defined in many cases as in erysipelas; the pseudo-erysipelatous condition was not, I am told, noticed when the flank was chosen. There seemed to be no relation between the degree of fever and the amount of local reaction. The axillary and cervical glands were sometimes swollen and tender, and this occurred at times when the arm itself was only slightly inflamed. Many patients complained of shooting "rheumatic" pains in the shoulder and elbow-joints. One said she felt as if the arm were so heavy that it was dragging itself out of the socket. The general symptoms varied with the individual. Some people vomited or had diarrhoea, others suffered from nausea, syncope, or shivering. Two cases had only slight fever and local reaction but were intensely sleepy, for twenty-four hours in one case and thirty-six hours in another. I never saw a case of delirium but have heard of one or two. Some patients felt slightly out of health for a week or two after inoculation.

Neither Dr. Cook nor myself had any untoward results. There should be no suppuration if cocci are excluded by aseptic proceedings. We used to advise the patients to keep quiet for a few days, to drink chiefly milk, to take a simple aperient the next morning, and to apply cold water or lead lotion to the arm and keep it in a sling. It was our practice to refuse to inoculate any who were already ill (especially if they had any increase of temperature), aged and feeble persons, nursing mothers, pregnant women, and children under two years. I never saw any ill-effects in those cases in which old women urged me to inoculate them, or mothers insisted on my inoculating babies under two; I never injected any under a year. We had to take special care to refuse any cases that were at all likely to be ill from causes apart from inoculation, as any serious or fatal illness would have been at once attributed to the inoculation.

During the first two months, reports were constantly spread that inoculated persons had died within a few hours or days; one newspaper was only induced to withdraw such statements by a letter from the health officer's solicitors threatening legal action. As it was, a young Austrian, who from the fact that he carried a handbag, was supposed to be an inoculator, was beaten to death; and an attack, intended for Dr. Nield Cook and myself as inoculators, was made on Dr. Laing in a quarter where we really had been inoculating the day before, but where he was only inspecting a house suitable for a hospital.

Certificates were granted to every inoculated person, and particulars inserted in the register; these certificates were highly valued in Calcutta, as segregation of contacts was not enforced where the whole household had been inoculated.