in medicine and surgery, but also in the various special departments will be forthcoming. A professional staff, with numerous assistants, will be appointed from the R.A.M.C., while the Staff College will afford opportunities for the training of lieutenant probationers and also of officers, for periods of study and practical work during their term of service. As this hospital will be in London, it will be under the eye of the Director-General, and a very much more correct judgement of the professional capabilities of officers can be obtained during their periods of service at this hospital than can possibly be done by any system of examination or reports of individual superior officers. I believe all fair-minded people will admit that the work done by this Committee, at the instigation of Mr. Brodrick, is an honest and broad-minded endeavour to place the R.A.M.C. in the position which we all wish to see it occupy. What are the prospects likely to attract young graduates into the service? Men likely to get appointments on the staff of general and special hospitals other than the post of house-surgeon are not likely to seek the army as a career; but, as contrasted with country private practice, except in favoured districts, it appears to present many solid advantages, more particularly so when compared with the miserably hard and underpaid lives which so many dispensary doctors in Ireland lead. The officer of the Royal Army Medical Corps commences with a fair salary; he sees the world, and if, after a few years, he desires to settle down into private practice, he can retire upon a gratuity probably considerably in excess of any sum he could have saved if he were engaged in civil practice for the same period; while after twenty years he can retire on a pension of £1 per day, and, if he so desires, start in any branch of the profession he may wish. The distinguished position which Mr. R. F. Tobin holds as a hospital surgeon and clinical teacher shows what can be done by a man determined to work, even after he has spent twenty years in the service. To those to whom distinctions and decorations are an attraction, it may be interesting to know that six officers of the R.A.M.C. hold the much coveted honour of the Victoria Cross, three hold the K.C.M.G., sixteen the C.B., twenty-five the C.M.G., and twenty-nine the D.S.O.

THE DRAWBACKS OF THE SERVICE.

There are many men who are fond of their work, but who hesitate to enter the army, as it affords—in time of peace, at any rate—so little scope for practical work. That this is to some extent true is an undoubted fact, and it is one of the great difficulties that the service has to contend with—a difficulty which, to some slight extent at any rate, will be diminished by the establishment of the large hospital in London. But even if the opportunities of practical medicine and surgery may be small, there are always opportunities of doing good work in hygiene, bacteriology, and, on foreign service, tropical disease, or other similar subjects in which a really sound scientific reputation may be made. It is only necessary to mention the names of Lieutenant-Colonel Bruce, F.R.S., of the Royal Army Medical Corps, the discoverer of the cause of Malta fever, and of horse sickness in South Africa; or of Major Ross, late of the Indian Medical Service, whose work on the relation of mosquitos to malaria is notorious, to show that medical officers in the army have opportunities of scientific research in some directions far greater than can be enjoyed by their civilian brethren, and that amongst the officers are to be found men capable of utilizing those opportunities to the utmost, and of gaining, not only for themselves but for the service to which they belong, a well-merited scientific reputation.

A LONG HOSPITAL RECORD.—It is seldom that so long a period as seventy-five years of service on a hospital staff can be recorded in one family. On January 29th, 1902, Mr. Andrew Boutflower, M.R.C.S., completed thirty-one years service as Honorary Surgeon to the Salford Royal Hospital, immediately following a period of forty-four years service performed in the same capacity by his father, the late Mr. John Boutflower, F.R.C.S. As a memento of this occasion, Mr. Boutflower's colleagues at the Salford Royal Hospital presented him on January 29th with an Early English silver salver, engraved with the family crest and suitably inscribed.

THE TREATMENT OF CHRONIC MALARIAL FEVER BY SUBCUTANEOUS INJECTIONS OF QUININE BIHYDROBROMATE.

By G. B. FERGUSON, M.D.,

Senior Surgeon, Cheltenham Hospital: President of the British Medical Association.

LIEUTENANT H. P. W. BARROW, R.A.M.C., having recently¹ mentioned my name in connexion with the subject of malarial fevers, it may perhaps be well for me to detail my own experience of their treatment.

Several years ago I was asked to see a military officer suffering from chronic fever of tertian type, thought by him to have been contracted at Malta. He was much emaciated and was getting steadily weaker. Quinine, of which he had taken much by the mouth, moderated, but did not remove, the fever, whilst it induced much sickness, which added to his debility. I tried quinine by the rectum and by inunction, but without success, and iodine and arsenic were equally unavailing. His condition having become very serious, I injected 2 grs. of quinine sulphate, dissolved by the aid of a minimum of tartaric acid, under the skin of his forearm. Decided improvement followed, and accordingly the injection was repeated. It was distinctly painful, however, and the arm swelled and became tender. Accordingly I began a series of experiments on different salts of quinine, till at last I hit on the bi or acid hydrobromate, which dissolves readily in six parts of pure warm water. After six injections altogether my patient made a rapid and perfect recovery, and not very long afterwards took part and obtained distinction in the Chitral and Soudan campaigns. He has not since suffered from any but trivial and temporary attacks of fever.

The next patient was an officer from Burmah. His attacks were extraordinarily severe. People in the adjoining house declared that they could feel the shaking of his rigors. At first they thought it was an earthquake. His final sweats soaked sometimes through the bed and wet the floor. Six injections cured him also, which much quinine by the mouth had not done. He has since had no more fever though he is now again in Burmah.

The next case was an Austrian colonel, the husband of an English wife. His fever was contracted during the manœuvres in Bohemia. The same story—failure of quinine by the mouth, but quick cure after six injections and no fever since.

Then followed cases from India, South Africa, the Ionian Islands, Gibraltar, and elsewhere, and all with the same tale of rapid and permanent cure. I have not hitherto published any account of my treatment of malarial fever, as I have not considered it in any way peculiarly mine, though it has certainly been spoken about, for I have answered inquiries on the subject from many medical men. There is nothing new or individual about it. The Italians have long practised subcutaneous injection of quinine, and Baccelli in "malaria comatosa" even injects as much as 15 grs. at one time into a vein. Surgeon-Colonel Benson,² reported 614 successful cases, and no untoward results such as tetanus, abscess, or sloughing. Surgeon-Colonel Benson used 5 grs. of the ordinary sulphate, dissolved with the aid of hydrochloric acid in 20 minims of water. My own cases and those in which I have advised the treatment amount to nearly 100, and among these likewise have occurred no tetanus or ulceration.

The treatment is of remarkable efficacy, and it will often cure malarial joints and malarial rheumatism. It is not very painful if the bihydrobromate salt is used. In fact, the subcutaneous use of this salt and antiseptics are my only special points. The bihydrobromate is perfectly stable, and makes a solution (1 in 6) that is only faintly acid. It is not approached in solubility by any salt of quinine except the acid hydrochloride. I feel sure that this last would be equally efficacious, though I have my doubts as to its being equally unirritating. It is the fear of tetanus alone that restrains the more extensive employment of quinine subcutaneously. Several of my patients postponed their cure owing to their fear of tetanus. This fear is echoed by Dr. P. T. Manson in the *Guy's Hospital Gazette* of December 7th, 1901. The danger of tetanus is undoubtedly much greater in the tropics, but it can hardly be

very serious, as Surgeon-Colonel Benson's experience shows. I cannot believe that with a careful and antiseptic operator there is any danger at all of tetanus. I have by me a letter telling of 800 cases of malarial fever cured by a native Indian doctor, nearly all of them by one subcutaneous injection each. No ill consequences followed any of these injections. The native doctor used each time $2\frac{1}{2}$ grs. of quinine sulphate dissolved, with the aid of tartaric acid, in 20 minims of water. I have also another letter, in which an old patient of my own writes of having cured about 50 Indian natives in the same way, many of them after months of fever. One abscess but no tetanus followed in this set of cases. The method followed by me—I must not call it my method—is to inject subcutaneously 3 grs. of quinine bihydrobromate dissolved in 20 minims of pure warm water. I first inject it under the skin of the upper arm, then under that of the thighs, then under the skin of the abdomen, or at the top of the chest or between the scapulae. Six injections on alternate days are usually required in a serious case, and 3 grs. under the skin will prove much less distressing and more curative than 30 by the mouth. I keep a syringe for the purpose, and use it for nothing else. I disinfect the syringe and the patient's skin with strong carbolic lotion, and carefully disinfect my own hands. I always sterilize the needle in the flame of a spirit lamp. The solution of quinine is sterilized when first made, but I have not myself boiled it each time before using, though, following Lieutenant Barrow in this respect, I will beg that it be always done. With such precautions I am convinced there need be no fear of tetanus, and I am further convinced that there are few or no cases of malarial fever that will resist six subcutaneous doses of 3 grs. each of quinine bihydrobromate. This dose may, of course, be exceeded on special occasions, or it may be given several times a day, but it will usually be sufficient. It may be that intramuscular injection into the glutei (as advised by Dr. Manson) is a still better method, but I have no experience of it, and would expect it to be more crippling and more painful.

None of my cases have required more than six injections, and some have got well after only three. Considering that quinine is almost completely excreted within twelve hours, it is not easy to understand why so many convalescents remain malarial proof, unless it be the case that, like other febrile convalescents, they have manufactured a special antitoxin. The excretion of quinine through the kidneys begins a few minutes after a dose has been given, and it is this fact that explains the superior results from its subcutaneous use. Slowly absorbed through disordered stomach and intestinal membranes, it is excreted nearly as fast as it is absorbed, and never reaches in the blood the strength sufficient to destroy the malarial plasmodia. Subcutaneously used its maximum and effective strength is probably reached within half an hour. In a case of malarial fever contracted in Holland treated by me many years ago it required 30 grs. daily of quinine by the mouth for nearly a week to subdue the fever; smaller doses had failed, and, though cured, this patient suffered much in head and stomach during his treatment. It is difficult to explain why quinine subcutaneously used affects the head less, but the fact is so. It has probable reference to the sympathy between the head and the stomach, and the latter is of course not irritated at all by the subcutaneous treatment. I would advise the injections to be given two or three hours before the expected paroxysm, so as to catch and destroy the spores; though in chronic cases, like all I have had to deal with, it does not seem to matter much when you inject, provided that you do it often enough.

In the hope that the simple and effective treatment described may soon become the rule instead of the exception, and at the suggestion of the Editor I have contributed this short paper.

REFERENCES.

- ¹ BRITISH MEDICAL JOURNAL, 1902, i, p. 302. ² Trans. Indian Med. Congress, 1895.

ANTIRABIC INOCULATION IN MEXICO.—The Mexican National Board of Health reports in its last bulletin that since 1888, when the Pasteur treatment of hydrophobia was introduced, 4,000 persons have been treated, with a total mortality of only 3 per 1,000.

SHOULD MILK BE BOILED?*

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SOURCES OF CONTAMINATION OF MILK.

THE slightest acquaintance with the methods of the farmer, the dairyman, and the milkman shows that pure milk is an unknown substance on our tables. Secreted perchance in a healthy mammary gland, the fluid is drawn through unwashed rustic hands into a pail placed under the dung-spattered udder and belly of a cow who spends at least half her time in a dark and noisome byre, carpeted with a slush of decomposing urine and faeces and papered with the splashings of the same, while the air is thick with the bacterial flora of these admirable culture media and of the bovine alimentary canal. What wonder that the bottom of a milk-can nearly always exhibits a rich sludge, and thus serves the purpose of a cesspool or septic tank? It has been calculated that the inhabitants of Berlin consume in their milk 3 cwt. of excrement per diem. Even in the milk of one of the most model dairies of this district, where hand-washing and teat-washing are supposed to be *de rigueur*, have I seen this sludge, which the milkman said he could not understand, because he always strained the milk through a cloth before sending it out! And on arrival in the city do we not daily see a row of milk-carts in the bright and perfumed air of Station Street, where milk is being poured from big cans into smaller ones through dirty cloths which between their services lie about anywhere?

When in addition to the chances of pollution we recall the contaminated water with which in country places the milk cans are often washed, the contaminated atmospheres of shops and cellars in which the milk retailed to the poor is usually stored, we no longer wonder that milk, even from a healthy cow, occasionally makes people ill.

But in the present state of the law we have no guarantee that our milk does come from a healthy cow, and in most English towns milk is sold coming direct from udders which are affected by tuberculous or other inflammatory disease, and from which in milking a considerable quantity of pus is squeezed into the milk can.

PATHOGENIC PROPERTIES OF CONTAMINATED MILK.

Thus, as matters now stand, we are liable to drink milk which may come from a diseased cow and which is almost invariably exposed to contamination by subsequent dirt. The milk on which our children mainly live may be primarily or secondarily a pathogenic fluid. Thus epidemics of scarlet fever and diphtheria have been traced to the milk from diseased cows, while the virus of these diseases and of typhoid fever has been introduced by infection from the *personnel* of the dairy or milk seller. Tuberculosis I will not dwell on, though I think that cases of milk infection in that disease have been made out. But undoubtedly the main disease caused by milk is the summer diarrhoea or gastro-enteritis of hand-fed infants, the mortality from which is appalling. Thus the deaths in Nottingham among children under 1 year of age were in 1900 equal to 196 per 1,000 born, and in 1899 to 210 per 1,000, and the total of deaths from diarrhoea in 1899 being 600.

During the summer of 1899 the epidemic of infantile diarrhoea spread all over England, and the death-rate everywhere rose; for example, in 67 large towns from 156 to 179 (or *plus* 23) per 1,000. To this increase, however, there was one notable exception—St. Helens—where it fell from 176 to 157 (or *minus* 19). In this town Dr. Drew Harris, the energetic M.O.H., in August started the public distribution, in closed bottles, of milk which had been exposed for three-quarters of an hour to a temperature of 102° C. Although the distribution only began in August, the effect was to cause the infantile death-rate of the whole town to fall from 176 to 157, while among the consumers of the sterilized milk it fell to 103. This system was introduced in 1894 at Fécamp, in Normandy, by Dr. Leon Dufour, with the result that in 1898-99 but 1.3 per cent. of the infants drinking the sterilized milk of the *goutte*

* Abstract of a paper read before the Nottingham Medico-Chirurgical Society.