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THE WAR IN SOUTH AFRICA.

A NOTE ON THE SO-CALLED "POISONED BULLET."

By G. H. MAKINS, F.R.C.S.,

Consulting Surgeon with the Field Force in South Africa.

Pretoria, July 5th, 1900.

FOR some months past the wax-coated bullets employed by the Boers and discovered amongst captured ammunition have been a source of both interest and anxiety, particularly to the lay mind, in South Africa. To the evil action of these suspected missiles many a case of suppuration and cellulitis has been ascribed. By this time the appearance of the cartridges may be familiar to many of your readers, but to such as are not a short description may be of interest. It has apparently been the custom both by the Boers and some ammunition manufacturers to coat the bullet with a layer of wax, I believe on the theory that the missile in consequence takes the rifling more readily, while at the same time the lubrication preserves the grooving of the barrel from wear by friction. How rapidly the latter takes place is patent to those who were familiar with the deep grooves seen on extracted Mauser bullets at the commencement of this campaign, and can contrast them with the many almost smooth bullets met with at the present time; and when the hardness of the casing of the bullet is considered one would not expect it to be otherwise. Beyond this, the Boer seldom cleans his rifle, and the wax left may act as a preservative against erosion.

The wax coating of the various bullets I have seen differs in tint. In the older large leaden bullets a white wax has been employed, and the wax remains uncoloured except where fouled by contact with dust. Many cartridges I have seen have had a coating of white wax applied which apparently from age, and perhaps the conditions under which they have been stored in hiding, has acquired a brownish tinge.

Of the green-coloured bullets I have seen two varieties; in the first and less common, white wax of some kind has been applied both to the bullet and brass case of the cartridges, and probably from exposure to damp the latter has acquired an incomplete coating of verdigris, which has become irregularly diffused into the wax coating; in the second and more common variety a green-tinted wax is employed in the original coating; cases of cartridges treated in this way are numerous. As to the composition of this wax, I am unable to furnish any information, but in support of the innocuousness of the process I may only first repeat the opinion I expressed on a former occasion, that the surface of the bullet clearing its passage through the grooves of the rifle is almost completely renewed, only the extreme tip and base being untouched, while the velocity with which the missile is started is such as to make it probable that the tip itself would be cleansed by the flight through the atmosphere. This view as to the cleanliness of the surface of the bullet has been most thoroughly confirmed in the case of the coated ones by an experiment performed by Captain Mitchell Wood, at Capetown, as long ago as last March.

A green-coated bullet fired by the Mauser rifle was made to traverse a book of white paper, and then bury itself in a bank of sand. As a result, when the book was examined no trace of the green wax was found on the margins of the perforation in the paper, and the casing of the bullet itself, although somewhat split, was perfectly clean and white. The complete disappearance of the wax is no doubt partly to be explained by the heat generated during the passage of the bullet through the rifle, which, although insufficient to cauterise the tissues, is yet great enough to fuse the wax, and in part to the actual scraping of the surface by the rifling of the barrel.

THE WOUNDED AT PRETORIA.

Only the wounded from the Diamond Hill engagement have been in hospital in Pretoria, hence I can give little surgical information of interest. The service hospitals here are located in the Model School, the Girls' School, the Volk's Hospital, and a building known as the Burke Hospital, while the Irish Hospital has found a home in the splendid new Palace of Justice. Enteric fever is still the most prominent disease, but its incidence is now happily on the wane.

THE LATE MISS KINGSLEY.

I must not close this note without paying a modest tribute to the memory of Miss Kingsley, of whose sad death I have only yesterday become aware. Early in the year Miss Kingsley came to me with an introduction from Sir Lauder Brunton, although I had had the privilege of her acquaintance in England. My wife, at that time nursing at Wynberg, took Miss Kingsley to the Surgeon-General, who offered her the post of nursing the sick Boer prisoners at that time at Simon's Town. Miss Kingsley undertook this difficult work with characteristic energy, she donned a Boer hat, provided herself with a stock of cigarettes of special composition, and battled with one of the most severe epidemics of enteric fever that has occurred out here. The difficulties to be overcome were great, but she overcame them all, working with untiring cheerfulness and success, infusing her own spirit and thoroughness into those working with her, and gaining the hearts of the patients depressed and unhappy in their captivity and suspicious and fearful as to their disease. The most arduous part of her work may be said to have been over when she was struck down with the same disease herself. She bore her illness with the greatest fortitude, and when the fatal perforation took place she courageously grasped her last chance and underwent an operation by Mrs. Snowden. Much as the surgeon dreads one of these operations, and confident as I am that she was in the best of hands, I cannot but feel a personal regret that I was too far distant to be able to fulfil her wish that I should undertake this for her. It was perhaps characteristic of Miss Kingsley that all she asked was that if she had to die that "she should be allowed to die alone, and that she should be buried at sea." To so great a traveller and so ardent a lover of Nature these desires seem both fitting and natural, and she has found her last resting-place in the sea that she loved and among its denizens who formed her chief interest in the realm of Nature. I think we as a profession may all be proud that the daughter of one of our brethren did such noble and disinterested work out here and met her death as a real heroine. Miss Kingsley's remains were accorded the rare if not unique honour for a woman of both a military and naval funeral. The military service having been performed on shore the coffin was placed on board H.M.S. *Thrush* and committed to the deep with naval honours some 20 miles from the shore.

SOUTH AFRICAN HOSPITALS.

[FROM OUR CAPE TOWN CORRESPONDENT.]

THE WOODSTOCK HOSPITAL.

July 18th, 1900.

As the No. 5 General Hospital at Woodstock is the one at which the principal work at the base is being carried on, and as it has probably reached something like its final stage of development a somewhat detailed description of it may be of interest, if only from the fact that it constitutes now the nearest South African approach to a general hospital at home. Moreover, as a reference to some of my previous articles will show, it has grown from very small beginnings in the course of the present war, a fact that goes some way to prove that the army medical officials can bring constructive ability to bear upon occasion. The position, as I have pointed out before, is not a good one, either from the sanitary or the æsthetic point of view, and perhaps its only recommendation is that it is in close proximity to the railway station. Situated on a low-lying piece of shore, on which nothing will grow, it is dusty and wind-swept in summer, a swamp in winter, and noisy at all times. But for the ordinary work of a garrison station hospital it was handy to the castle and the main barracks, and no one foresaw that it would ever have to be turned into a general hospital. The best had to be done with the only available site, and apparently the best has been done.

The hospital now consists of the permanent building, that is the original station hospital, an old and somewhat ramshackle double storeyed brick building, large huts, smaller ditto, and marquees, with a few bell tents. The old building consists of two wings, each containing four eleven-bed wards, two on each floor, with a large central block used as quarters for medical officers and nurses, with small wards for prisoners, isolation, and ophthalmic cases, and a number of stores and offices. Some of the latter are housed in a recently erected iron building in one of the quadrangles. The wards are roomy and airy enough, and their bareness has been much relieved

by a number of little accessories and decorations, some supplied by authority, others by the outside public. No reasonable objection can be made to them on the score of cleanliness, for the most scrupulous care is evident in regard to this point, but from the age of the building the floors are necessarily worn and dingy, and superficial observers might rashly assume them to be dirty, forgetting that no amount of scrubbing can make old floors look white. The wards on each upper floor are approached by roomy landings, used normally as lounges for the more or less convalescent patients, who in the rainy weather now prevalent in the Cape peninsula cannot spend much time in the open air. On occasions of exceptional pressure caused by the sudden arrival of large drafts of convalescents from up country, beds are occasionally made up on the floors of these landings, but this never lasts more than a few days pending departures to England, and certainly no discomfort to speak of has been endured.

Each set of wards has an annexe for cleansing purposes, and another as a sister's room. On the ground floor of each wing of the permanent building is a dispensary, serving the left and right divisions respectively. The total capacity of the permanent building is somewhat under 100 beds. There are six principal huts, substantially built of iron lined with wood, floored, and lighted, as is the old building, with electric light. These are most comfortable, and in fact preferable in many respects to the main building. Each of these huts has 36 beds.

There are four huts of iron of a more or less temporary nature, less substantially built than those just named, but comfortable enough for the class of patients, mostly convalescents, sent into them. Their capacity is also 36 each. There are also 7 portable huts, built in sections of 25 beds. These could easily be taken down and re-erected in a very short time. There are 2 infectious huts of 10 beds each, well built and floored with wood. Some infectious cases are occasionally put into bell tents. An observation hut for 10 patients, and a number of marquees and bell tents, all wooden-floored, complete the accommodation for patients, which totals up to 804.

Two of the large huts are specially set apart for enteric cases, and a fair proportion of the beds in the permanent building are also allocated to the same disease. Generally speaking, one of the ground-floor wards in the main building is reserved for surgical cases, and the other seven wards are as far as possible devoted to serious medical cases. Of course classification is most difficult to carry out, with the sudden influxes of patients from up country, but it is enforced as far as possible.

The dining hall is an iron structure, capable of seating more than 200 patients. The convalescents take their meals there, and it is also used for Divine service and for recreation purposes, including concerts, which by the praiseworthy efforts of the outside public are frequently given.

There are eight or ten Boers at Woodstock at present, accommodated in a separate hut. All are absolutely convalescent, and being fed up on luxuries galore. Indeed, the dietary throughout the hospital is liberal to a fault, extras being absolutely unrestricted, and practically every man gets everything he asks for unless precluded by actual medical reasons.

A commodious operating room of iron is now being erected. There are libraries attached to each set of wards. There is a post-office in the old building.

The staff now consists of Lieutenant-Colonel Williamson, in command; Major Russell, secretary and registrar; Majors Gibson and Saunders in charge of divisions; one Militia Surgeon-Lieutenant, who acts as company officer; one Volunteer Surgeon-Lieutenant, holding a temporary commission in the R.A.M.C.; and 10 civil surgeons, besides a quartermaster.

The nursing staff consists of the superintendent (who has also sole charge of all gifts contributed from outside) and 13 Sisters. Part of these are accommodated in the hospital, and part in a hired house near by.

The detachment consists of 1 R.A.M.C. warrant officer, 3 staff-sergeants R.A.M.C., 2 staff-sergeants V.M.S.C., and 1 St. John Ambulance, 6 sergeants V.M.S.C., and 3 St. John sergeants, 48 corporals and privates R.A.M.C., 11 Militia M.S.C. corporals and privates, 75 V.M.S.C. corporals and privates, and 33 St. John men. Four of the Militia privates

are specially enlisted compounders, and, of course, a large number of the company are employed in the kitchen, stores, and offices. The R.A.M.C. warrant officer is assisted by an acting sergeant-major who takes his duties at night, and two sergeants are engaged as wardmasters during the day, and one at night. Two nursing sisters and about 20 men are permanently engaged on night duty, supplemented by special orderlies as occasion requires. An orderly medical officer is constantly on duty; all the officers below the divisional officers, except the senior civil surgeon, taking turns on this roster. The orderly medical officer likewise visits the castle cells. A medical officer detailed for outside duties at the barracks and amongst the castle staff, is attached to the No. 5 unit, but does no hospital duty, and is not included in the list of the staff given above.

The professional staff is amply sufficient to ensure the most careful attention being given to every case, and they are a very well qualified set of gentlemen, one being a M.R.C.P. of London. The subordinate staff is pretty heavily worked, and a good many—an average, I believe, of about 20—are constantly non-effective through sickness, mostly enteric. Three orderlies have died from this disease already. Regimental orderlies are now and then drafted in to fill the gap temporarily caused by illness. No nurses have contracted enteric, and only one medical officer, and his case is clearly traceable to *post-mortem* work.

The general conclusion one draws from a look over No. 5 is that the patients are comfortable and exceptionally well fed—far better, indeed, than the average rich civilian—and that here, at least, no foundation exists for the strictures passed upon the medical administration.

A CAMPAIGN OF CRITICISM.

A new development of the campaign of criticism has come out in the publication of a letter accusing the medical officers at Wynberg and elsewhere of partiality in their selection of cases for invaliding, but, on the whole, there is a general disposition not to anticipate the investigations of the Commission.

Personally, I do not think that Commission will find much evidence of preventable discomfort to patients, although it may be able to suggest some modifications in Army Medical organisation, whilst the testimony of the large number of civil surgeons at present employed may throw some light on the etiology of the paucity of candidates for commissions in the R.A.M.C.

As an instance of the loose way in which statements are circulated to the detriment of the Department, I may mention that some weeks ago it was announced in the *Cape Times* that the secretary of the Soldiers' Christian Association had received a request from the principal medical officer of one of the military hospitals for shirts, socks, and warm clothing, "badly" required for the patients, and inviting the public to send to the said secretary any such articles. This, of course, gave the impression that the principal medical officer in question could not get these necessities from official sources, and had to appeal to outside. Now, as a matter of fact, there is an ample supply of all these articles at the hospital in question, but the secretary voluntarily offered some pyjamas and other things, which were, naturally, gratefully accepted, and on his offering to supply more, he was told that they would be thankfully received, but nothing in any way approaching an appeal was made, or was necessary.

NOTES FROM THE SEAT OF WAR.

[FROM A CORRESPONDENT].

THE COMMISSION OF INQUIRY FROM A SOUTH AFRICAN STAND-POINT.

On the whole medical officers in South Africa manifest but slight interest in the forthcoming Committee of Inquiry. This is no doubt due to the fact that one and all feel convinced that the inquiry will result in a complete vindication of the R.A.M.C. It may, perhaps, also lead to the introduction of a few much-needed reforms—reforms which have already been advocated by many of the officers. If these are conceded in a liberal spirit they will undoubtedly tend to strengthen and consolidate the corps, and will prove beneficial in every way. There can be little doubt that the inquiry will still further

bring home to the nation the sterling quality of the medical and surgical work which has been done during the campaign, and will in this way also tend to strengthen the position of the corps.

From telegrams published here it would seem that Mr. Burdett-Coutts has now qualified his original statement by announcing that it was not meant as an attack on the *personnel* of the R.A.M.C., but applied only to the system. This, however, is rather a lame explanation, for the system is the *personnel* in the sense that without the system the *personnel* could not exist as it exists to-day. Without the system the *personnel*, if it existed at all, would be an untrained and more or less useless body.

Mr. Burdett-Coutts doubtless meant that his attack was directed against the corps as at present constituted and not against its individual members. It is presumed, therefore, that the attack was started with the object of weakening and discrediting the corps, thus causing its overthrow and erecting on its ashes a renovated regimental system, which is still the chimera of the "combatant" officer. Think what it would mean if Mr. Burdett-Coutts were to accomplish his object—always presuming that his object is as above stated. A corps of highly trained officers and men, who are always ready to proceed to any place where their services may be required, would be split up into its individual atoms (if I may use such a term) and distributed in twos and threes amongst the regiments which now form our army. They would become isolated units, incapable of collective action; tied to their regiments however urgently their services might be required in another direction. In other words we should have returned to the medical organisation which existed in the days of the Crimea. Where, then, would be the general, the stationary, and the field hospitals, whose work during the campaign will probably survive as a record in military surgery which will be pointed at with envy by Continental armies. For criticise the administration of individual hospitals as we may, the fact remains that the collective surgical results of the campaign have been successful in an eminent degree.

A TYPICAL FIELD HOSPITAL.

Several detailed descriptions of general and stationary hospitals have been published from time to time, from which it will have been seen that these units are equipped on a scale corresponding to station hospitals in England, and that they are, as a rule, models of neatness and comfort. Hitherto field hospitals have been more or less overlooked by your correspondents. I am therefore induced to send the following brief notes on an inspection of one of these hospitals, as doubtless they will prove interesting to your readers, especially as there is reason to believe that recent adverse comments have been mainly levelled at these units. What follows, however, will tend to show how little justification there is for such adverse criticisms. In this case the unit selected was No. 15 Field Hospital, it being the only representative of its class then stationed in Bloemfontein.

Before entering on its description, I may premise that a field hospital is equipped for 100 patients. It is attached to a brigade, and moves with it wherever it goes. It is essential, therefore, that the equipment should be as light and portable as possible. This consists of field medical and surgical panniers, an operating and thirty-nine circular tents, etc. To insure lightness and portability, the medicines are in tabloid form. All told, the equipment weighs roughly 8 tons, and can easily be carried on four ox or five mule waggons. A field hospital receives the sick from its brigade, and all wounded that may be brought to it by the bearer companies. The serious cases are transferred to the base as soon as possible, only slight cases, which are expected to be fit for duty in a few days, being retained in the hospital. This rule, however, has been frequently modified during the present campaign, as in the following instance:

Before leaving England No. 15 Field Hospital was detailed for duty with the Fifth (Irish) Brigade. It landed at Durban on December 1st, 1899, the officers with the unit being Major G. H. Younge (in command), Major F. T. Wilkinson, Captain E. M. Pilcher, Lieutenant R. H. S. Fuhr, Lieutenant and Quartermaster J. Hirst. Having drawn its transport at Pietermaritzburg, the hospital joined its brigade at Frere on

December 8th, 1899, and was present with it at the battles of Colenso, Spion Kop, Val Krantz, Pieter's Hill, and the relief of Ladysmith. The hospital was subsequently ordered to Bloemfontein. Since arriving here it has been attached to the Third Division, and has been detailed to treat the sick from the various rest camps and from the drafts which are continually passing through the station. It rapidly became filled with enteric fever cases, and to accommodate these additional tents and equipments had to be drawn. The hospital now consists of 65 tents, 18 of these being marquees.

The camp is pitched on a level plain west of the town. It is rectangular in shape, and covers an area of 140 by 250 yards. The bell tents are pitched in six rows with an interval of 16 yards between each row, the marquees in two separate rows on the south side of the camp. On the south side also corrugated iron latrines and a large washstand and on the east a pretty corrugated iron cookhouse have been erected. From whatever point the camp is viewed the tents are in perfect alignment with a broad avenue between each row. As the tents are snow white and the site smooth and well kept the whole forms a neat and pleasing picture. In rear of the camp are the mortuary tent, a marquee for hospital stores, the horse lines, etc. The marquee is kept well stocked with large reserves of medical comforts and warm under-clothing, which are issued liberally to the patients whenever necessary. The sanitary arrangements receive especial attention. The camp is scrupulously clean, not even the tiniest scrap of paper being visible. All refuse is at once burnt; all waste water being emptied into a deep pit filled with broken stones, through which it rapidly percolates. Chloride of lime is freely used for disinfecting the waste water.

For excretions and clothing izal is almost exclusively employed. Large supplies of both are on hand. The hospital is now almost entirely occupied by enteric fever cases, and the marquees are reserved for these. Three nursing sisters are doing duty in the enteric fever wards.

Each marquee is 14 by 30 feet. They are provided with double roofs and walls, and comfortably accommodate 7 beds. Those in use in the hospital are wire-wove spring beds, which are found light, portable, and very comfortable. The beds are placed round the marquees at right angles to the walls. This leaves a large space in the centre, in which stands a long table. In the centre of this is an elevated tray, on which are placed feeding-bottles, medicine bottles, etc. The remainder of the table is covered with books and illustrated papers. Beside each bed stands a bedside table. The marquees are bright and neat, and every article in them is spotlessly clean. The floor of each marquee is covered with a double layer of tarpaulin, which is found safer, more comfortable, and much more convenient than wood.

Each bell tent accommodates three beds, arranged so as to form three sides of a square. The patients are provided with mattresses, blankets, sheets, and pyjamas. Most of them are now convalescent, and those who are allowed up wear the regulation blue hospital clothing, in which they look neat and smart. One and all speak in the highest terms of the treatment they have received, and express indignation at the charges which have been brought against the hospitals in South Africa.

I append a few figures which have been jotted down from the hospital returns. They will show that, although field hospitals are only equipped for 100 patients, they are capable of doing much good work.

Since its arrival in South Africa the following are the numbers which have passed through the hospital:

	Admitted.	Died.
Gunshot wounds	1,012	33
Simple continued fever	609	N/A
Enteric fever	338	38
Dysentery	539	9
Other diseases	990	1
Total	3,488	81

These figures represent a very large amount of work. The death-rate works out to a fraction under 2.33 per cent. Of the cases which have passed through the hospital 732 have been discharged to duty, 120 are still under treatment, whilst the remainder have at different times been transferred to the base. Altogether, No. 15 Field Hospital may well be proud of both its equipment and record.

RELIEVED MAFEKING.

Writing from Deelfontein on July 16th Mr. A. D. Fripp says: There is not a single seriously sick or wounded man now left in Mafeking. Fuel is still very scarce up here, the locomotives having to depend on wood, of which they draw a huge truck after them. Of food there is plenty, and of danger there is none. But in all other respects very little change has as yet come over Mafeking since it was relieved.

Trophies and mementos of the siege of all sorts are in great demand both at Mafeking itself and also down country. Siege stamps, paper money, shells and bullets, occupy the most prominent place in most people's minds, and realise most extraordinarily high prices, but Professor Chiene, who was visiting us not long ago, is the possessor of one of the most interesting mementos in the shape of a concertina, whereby, in conjunction with the noise made by a native dancing on a sheet of corrugated iron, the Boers were tempted to put up their heads when only separated from our sharpshooters by about 60 yards. Many Boers paid for their curiosity with their lives, for the moment anything showed above the sandbags it got a bullet through it; even a cartridge case, which is only 2½ inches by less than half an inch, left by chance on the top of the sandbags, got two bullets put through it. There are some field glasses made on such an arrangement of angles and prisms that by their aid a man in a trench can spy over the top without exposing his head. I saw one such glass which had had a Mauser bullet bang through its lens, and also through the hat of the person who was using it.

Throughout the siege they seem to have been remarkably free from sickness, despite the fact that Mafeking is as innocent as any other town in South Africa of any attempt at sanitation. I am glad to say that sickness among the staff here has materially diminished of late. Only twenty-one of our orderlies are in hospital, and they are all doing well, and so are the two doctors who are convalescent from enteric, and a couple of sisters who are off duty for slight ailments. This most satisfactory statement seems to be general throughout the country. The epidemic of enteric continues to rapidly decrease. Sloggett, who is just back from Pretoria, whither he had to go to make arrangements for the new advanced branch of the Yeomanry Hospital, the first instalment of which is due at Capetown to-morrow, says that there are only 400 sick and wounded in that city, and only 1,600 in Bloemfontein, instead of the 5,000 that there were when I was there six weeks ago. He says that there are two whole general hospitals now in Kroonstad besides the Glasgow Hospital of 300 beds, but there, as at Kimberley, where I visited the hospitals on my way to Mafeking, and everywhere else that the hospital trains ply to, the report is extremely favourable, and there are vacant beds everywhere now. The difficulty of transport, however, continues. Between Kroonstad and Johannesburg it is even greater than it was, owing, of course, to the depredations of Christian de Wet.

We have taken in nearly 250 patients this week, including one train from Winburg, half sick and half wounded, and one train load of convalescents from Pretoria, and about fifty Yeomanry, including a batch of the Warwicks and a batch from Kimberley.

THE STANDARDISING OF DRUGS BY EXPERIMENTS ON ANIMALS:

THE Home Secretary recently asked the Royal College of Physicians and of Surgeons to advise him in reference to an application from a firm of manufacturing chemists for a licence for the performance at their laboratories of experiments on living animals for the purpose of standardising drugs. The views of the Royal Colleges were specially requested on the following three questions:

1. "Is the standardising of drugs by means of experiments on animals indispensable in the public interest?"
2. "If so, is it probable that, in proper cases, duly-qualified experimenters working in the premises of manufacturing chemists should be empowered to perform the necessary experiments on animals for this purpose?"
3. "If it is not thought desirable that manufacturing chemists should be entrusted with this power, what other provision is it advisable and practicable to make for the purpose?"

The letter was referred to the Laboratories Committee (consisting of Dr. Pye-Smith, Chairman, Drs. Halliburton and S. Martin, Mr. Howse, Sir William MacCormac, and Mr. H. Morris) for consideration and report.

In a report dated July 3rd the Committee replied to the first question that with certain remedies containing active agents which cannot be estimated by any known chemical process, experiments on animals (usually rabbits, guinea-pigs, or mice) are absolutely necessary, in order that their therapeutical strength may be estimated. This applies more particularly to the group of remedial agents, anti-serums (antitoxins, etc.), which have been introduced for the treatment of infective diseases. In the case, for example, of the diphtheria antitoxin, which is the only preparation of this kind at present in general use, the antitoxin strength of each sample of serum as it is obtained from the horse has to be estimated, since individual horses, even if treated in the same manner, yield serum of different strengths. The antitoxic strength must be ascertained by determining what amount of the serum will exactly counteract a known amount of the toxin or poison of the diphtheria bacillus, when both substances are injected into the same animal (usually a guinea-pig). The strength of both toxin and antitoxin cannot be estimated by chemical means, so that a physiological test becomes necessary. An unstandardised antitoxin is a source of danger, for the practitioner might be relying on a remedy which would not produce the effect required, and life would be endangered, or might be lost, from using a more or less inert preparation.

To the second question the Committee replied that they would regard the authorisation of the necessary experiments in the premises of manufacturing chemists as highly undesirable. They pointed out that even in the event of such firms being able to obtain the services of experimenters of such acknowledged skill and experience as to guarantee the accuracy of the work, the standardisation of antitoxic serum by experiment is still a matter of investigation and improvement. A competent worker on the subject must be conversant with others working at the same and kindred subjects in the various research laboratories at home and abroad. Moreover, it is difficult to foresee to what extent the grant of licences to manufacturing chemists would be carried, if any are issued, for it would be a matter of difficulty to determine which firms would be permitted to perform experiments and which should not, the more so because the possession of such a licence would be of value from a commercial point of view. Again, experiments made for the purposes of trade have not the same independent character as the purely scientific and humane experiments in pathology, physiology, or therapeutics which are carried on under the Act 39 and 40 Vict., cap. 77.

In reply to the third question, the Committee said that, while they thought that it is undesirable for a licence to be given to any firm of manufacturing chemists, they are strongly of opinion that it is essential for the public welfare that in the case of the antiserums the antitoxic strength of the remedies should be tested and certified by some responsible authority. This standardisation might be carried out either by the Government directly in a State laboratory, or by some public body or bodies with the sanction of the Government. In Germany the standardisation is carried out in a State laboratory, under the direction of a Minister; in France it is undertaken by the Pasteur Institutes; while in New York the State is responsible for the work. If a State laboratory is not established, there would be no difficulty in finding laboratories in London or elsewhere provided with the necessary appliances, worked by skilled officers, and carried on for purely scientific ends; and such laboratories might be used by authority of the Government for testing these remedies and for issuing certificates at such charges as would cover the expenses in-