dently of our efforts to eradicate the disease in man. Kitasato points out that so far as the chronicles of Japan extend back through the centuries they tell of the existence of human tuberculosis, and yet, although the disease has been present all these centuries, the cattle of the present day are not infected. If the human strain of bacilli easily adapt themselves to existence in the bovine organism this could not be possible. This is another link in the chain of evidence which led me to urge in 1899, before the Canadian Medical Association, and repeatedly since, that we in Canada should lead the world in completely banishing the disease from among our cattle. The disease is altogether too prevalent in European countries, for example, for this to be possible—the cost there would be too great.

We are remarkably free from the disease, freer than any other Western country; still it exists, and its eradication is obviously a national and not a provincial concern. We are told that the Federal Government hesitates to interfere in the prevention of human tuberculosis, not because they do not recognize that this is a work of national import, but because, doing this, they would be trespassing upon provincial rights, and the law is above the people and their welfare. But the health of animals has been from confederation onwards a matter both of national concern and of federal legislation. I would once again urge that it is for the Government to select some one well-defined section of our country and there to root out completely the disease from among the cattle. Let them take Prince Edward Island, for example; appoint inspectors, and be prepared to superintend the health of the animals on the island for, say, five years; let those inspectors make a census of all the cattle on the island, let them apply the tuberculin test, and take over and compensate all reacting cattle; disinfect the byres, and forbid any fresh animals to be landed without rigorous determination that those animals are free from the disease.

I am convinced, first, that by the end of two years, if from the start they thoroughly entered into their work, the inspectors would find not a single case of the disease cropping up anew on the island. That disease, I say, only passes from animal to animal, and not from man to animal, under natural conditions, and if there are no infected animals to convey the disease no new case can show itself. In the second place, the farmers would be benefited materially; no longer would they be subject to loss from the disease decimating their herds, and, what is more, the certainty that their stock was free from the disease would enhance the value of that stock and afford a market for it for breeding purposes, not merely at home but in distant countries which despair of obtaining uninfected animals, their own stock being so riddled with tuberculosis.

Lastly, the experience gained in eradicating the disease in one locality, would show how it can be accomplished most economically and surely in other parts and eventually throughout the whole of the Dominion, so that Canada, our Canada, should stand before the world as the first country to solve the great problem and to possess stock wholly free from this devastating disease, so ruinous to agricultural communities throughout the world.

This is no chimerical plan: it is a perfectly feasible experiment, assured of success from the first, causing little disturbance and capable of being carried out at no great cost. If the Government has not merely the fear of the provincial politician before its eyes but possesses a statesman-like foresight; if it has the welfare of the community at heart, the well-being of this Canada of ours, then I urge that it takes up this work; that it makes a forward move fraught with advantage to what is by far the greatest industrial interest of the country, even if it does not immediately see its way to take up measures for the benefit of the greatest national interest of all—the health and well-being of the people.

NOTES ON 600 CASES OF TYPHUS FEVER.

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THE interest aroused in London a short time ago by the occurrence of a few cases of typhus fever in Stepney, and in Aberdeen by the recent outbreak in that city, emphasizes the rarity of this disease at the present day in the British Isles as a whole.

INCIDENCE.

In London the notified cases have averaged only sixteen per annum during the fourteen years 1890-1903, and the smallness of the number of cases makes it probable that the accuracy of the diagnosis is frequently doubtful. Under such circumstances the knowledge of a disease becomes traditional, handed down from textbook to textbook, without regard to such change of type as may have occurred in the few foci where it still lingers. The writers have had a joint experience extending back to 1896 in the City Hospital North, Liverpool, where a number of cases of typhus is admitted each year, trifling compared with what was once the case, but still sufficient to supply a practical knowledge of the disease. They propose to record those features which they consider specially prominent rather than to enter into a detailed account of the 600 cases which have come under their observation, and upon which alone their conclusions are based.

Without dwelling on the public health aspect, it may be said that practically all the cases are drawn from the poorest and most ignorant classes, often hawkers or dock labourers, and that there are very frequently several cases admitted from the same family. This bears out the received ideas as to the environment and infectivity of typhus. The admission of several cases from the same family, adults as well as children, is a very marked feature of typhus, and in this respect reminds one of small-pox. The two families given illustrate this well, and many more might be added.

	Age.	Admitted.
<i>Family 1.</i>		
W. C.	10	November 4th
E. C. (mother)	40	November 28th
E. C. (daughter)	10	
M. C. "	20	
M. C. "	17	December 24th
J. C. "	6	
<i>Family 2.</i>		
C. F.	60	December 5th
M.	6	
E.	5	
B.	3	
J.	31	December 7th
C.	3	December 8th
J.	10	December 9th
J. } (cousins of above)	16	January 5th
J. }	10	

A similar experience is reported by Dr. Matthew Hay from Aberdeen, where, out of 100 cases, 75 were admitted from 15 families. Dr. Hay remarks that "typhus is not nearly so infectious as the public suppose," or the spread in Aberdeen would have been much more rapid, and there is much to be said in support of this view in the wider sense. At the same time its intense infectivity at close quarters is demonstrated amply by the family records such as we have alluded to, where the conditions exclude dilution of the poison by fresh air. Matters are very different where ventilation is free, as will be pointed out later when referring to the experience of the hospital staff.

As practically all known cases of typhus are isolated in hospital, the following figures may be taken as being, in the main, fairly indicative of the age incidence and mortality:

Age Periods.

	0-5	5-10	10-20	20-30	30-40	40 and upwards.	Total.
Number of cases	22	78	235	92	98	75	600
Percentage of total cases	3.6	13	39.1	15.3	16.3	12.5	100
Number of deaths	1	—	9	12	28	35	85
Deaths per cent. of cases in each age period	4.5	—	3.8	13	28.5	46.6	14.1
Number of cases	335			265			
Percentage of total cases	55.8			44.2			
Number of deaths	10			75			
Deaths per cent. of cases in each age period	2.9			28.3			

The chief points to which we would draw attention in this table are the greater proportion of cases during the first twenty years of life, the slight mortality during that period, and the rapidly increasing fatality later in life. The number of cases during the 0 to 5 years period is small, but the 10 to 20 years period comprises close on two-fifths of the total attacks. The

tendency to death is, however, seen to be only one-tenth as great as that which prevails during the period subsequent to twenty years. It is not improbable that this disproportion should be further increased by the addition of some unrecognized fatal cases among adults, for as we shall show later errors in diagnosis are by no means infrequent in connexion with this disease.

SYMPTOMS AND TREATMENT.

Onset.

As regards the alleged suddenness of onset of typhus, we have not found that a definite date is often given as having impressed itself on the friends of the patient, or, in those cases where the latter is in a condition to give information, on the patient himself. The number of cases in which the illness proved to be more advanced than was described has exceeded those in which an accurate account was given. Partly this may be due, of course, to lack of intelligent observation in the class attacked, but probably still more to the diminution in the severity of type of the disease as compared with several decades ago. The late Dr. R. Robertson, formerly Visiting Physician, who had had an unusually wide experience of typhus during the serious outbreak in Liverpool some thirty years ago, frequently described a prevalent severe type with haemorrhage from the mucous surfaces such as has not come within our experience.

In children, whose average attack is by no means severe, the onset would appear to be frequently almost unnoticed, and the rash the first matter to attract serious attention. As this sign may be scanty in mild cases, it is evident that unrecognized cases among children may be an important factor in the spread of the disease. Professor Matthew Hay, endeavouring to trace the source of the recent outbreak at Aberdeen, has pointed out that a large number of cases seem to have started from a particular school. This is interesting in view of Sir J. W. Moore's opinion, expressed in Clifford Allbutt's *System of Medicine*, that children are comparatively immune. Of course, their close proximity in school would tend to overcome such immunity, but would hardly account for 13 per cent. of our admissions being within the 5 to 10 years age period.

Of the early symptoms, the severe headache is the one which appears to make an impression on the patient, from whom it is easily elicited. It is usually frontal, and deserves some attention as leading to early insomnia and delirium. The typhus face, too, is of great assistance in diagnosis, and is very significant to the accustomed eye. Congestion is the prominent feature, both as regards skin and conjunctiva. The marked conjunctival suffusion, frequently-contracted pupil, and the dull expression generally, form a decided contrast to the clear conjunctiva, dilated pupil, and anxious expression of the enteric-fever patient. It would seem likely that the severe headache and delirium of the earlier stages are due to a similar intracranial circulatory disturbance rather than to the toxæmia which is an important factor later in the attack. For the treatment of this condition no remedy appears to be so satisfactory as the application of leeches to the temples, supplemented by the administration of chloral hydrate and potassium bromide. The hair should also be removed. The relief following these measures is often speedy and the effects lasting.

The deafness which is present early in the attack may be recorded at this point.

In the early stages the tongue often presents a raw, "beefy" appearance, which gives way later to the usual effects of high temperature, though without the fissuring so frequent in the more prolonged pyrexia of enteric. Constipation is an early symptom, and there is a decided tendency for it to persist throughout the attack.

Respiratory System.

It is commonly thought that true pneumonia often ushers in an attack of typhus, and a number of cases of inaccurate diagnosis, especially in alcoholics, are probably due to this idea. We have seldom, if ever, seen pneumonia in the early stages, or indeed throughout the course of the attack. On the other hand, a certain amount of pulmonary disturbance is so frequent that it may be considered an essential feature of the disease. It takes the form of bronchitis of varying extent, which appears early, and is followed by hypostatic congestion, pulmonary oedema supervening in the severer cases, and constituting a tendency to death of great importance.

Myalgia.

Myalgia may here be alluded to. The commonest sites for

this symptom are the calves, upper part of the chest, and the arms. It is frequently very acute; on squeezing the calves of the patient he cries out and resents the investigation violently. It is often transient in type, one being able to elicit it in the morning, while in the afternoon one may be quite unsuccessful, the symptoms returning later in the evening. It occurs in most cases, but is often absent in young children. In very severe cases it may be general in distribution, the patient resenting pressure on any part.

Rash.

Judging from those cases as to which a definite history has been obtainable, the rash makes its appearance fairly constantly on the fourth or fifth day, and, like that of small-pox, it is all out in about three days. We have been able to observe its first appearance in a fair number of cases, owing to the early removal to hospital by the health authorities of cases of sickness occurring in infected houses. In our experience the sites where the rash is first to be seen are over the pectoral muscles, the shoulders, and the back of the forearm and wrist. It is rarely met with on the face, but spreads rapidly downwards over the trunk and limbs. Unlike enteric fever, the severity of the attack is usually in direct proportion to the copiousness of the eruption, the number of maculae in a severe case probably equalling or exceeding those of a thick measles rash.

The characteristics of the typhus eruption are best seen on the back and other dependent parts. At first it disappears on pressure, is slightly raised, and is not deep in hue, and a characteristic feature is the lack of a definite outline to the individual maculae. Within a few days there is a definite haemorrhagic stain of deeper hue, which cannot be removed by pressure, and towards the crisis in severe cases the intensity of the haemorrhage forms a valuable indication as to progress. In the more favourable cases the haemorrhage begins to clear at some date during the second week, and the rash may be little in evidence at the crisis.

We are inclined to think that too much stress is laid on the "mottling" which seems to be somewhat of a stumbling-block to those unfamiliar with typhus. It is, no doubt, the appearance presented by a portion of the eruption at a deeper level in the skin, and is not observed in all cases. This subcuticular mottling on the back of the wrists and hands and dorsal aspect of the feet may be of considerable diagnostic value in children in cases where the typically-developed rash is absent and the only other signs are a watery condition of the eyes and puffiness of the face. It is not unusual for the mottled condition of an ill-nourished skin, especially in children, to be mistaken for the mottling of typhus fever.

Odour.

As regards the "mousy" odour, there is certainly an odour characteristic of typhus which needs to be experienced to be appreciated, but it is not a sign that we have cared to investigate closely, as it is hardly worth the accompanying risks.

Nervous System.

As to the delirium of typhus, we would particularly point out that when the attack is well established the delirium is very active, and not infrequently so violent as to require some form of restraint. Towards the end of the attack it gives place to the low muttering of the "typhoid" state, and accompanies that extreme degree of prostration which is so marked a feature of the disease. We have avoided the use of opium to control delirium, believing that the tendency to coma in typhus renders it undesirable. After local depletion by leeches, bromidia would appear to be the most satisfactory sedative, and, where an opiate has proved absolutely necessary, nepenthe has been given.

Circulation.

No further allusion to the circulatory system will be made than to say that in our experience the changes in the heart muscle have a special incidence on cases occurring among better-class people. The medical men and nurses who have come under our observation have been small in number, but their attacks have been characterized by a marked tendency to heart failure, which may persist after the crisis.

Temperature.

The temperature chart may best be described as that of a lobar pneumonia prolonged to fourteen days, the range being high, 103° F. to 105° F., with a remission frequently towards the tenth day. The termination, by crisis in most cases, is

very rapid, and a rise usually occurs in the middle of its course. Unless there is severe lung trouble masking the crisis, the temperature reaches normal in twenty-four to thirty-six hours, and remains down. During the critical period there is often, though not always, a very considerable diaphoresis. In a minority of cases this form of crisis, even in the absence of pulmonary complications, is not observed, the fall of temperature to normal occupying several days.

Crisis.

The rapidity of the typical termination of an attack of typhus is very striking; the tongue cleans rapidly from the edges, and the patient, who has lain helplessly on his back low down in the bed, turns voluntarily on his side. The improved appearance is very observable and convalescence is rapid, the patient being able to take solid food within two or three days, and to leave his bed in a week's time. We have seen no case of relapse.

While speaking of the crisis we would express our strong conviction as to the value of alcohol as a stimulant in typhus. It is hardly necessary to say that no one familiar with infectious diseases would systematically stimulate all cases, but our experience goes to show that in severe cases of typhus, from about the tenth day, indications of circulatory failure are manifested which are most effectually combated by the free administration of alcohol. In alcoholic subjects typhus is extremely fatal, and alcohol is called for almost from the earliest stages. We have found also that frequent subcutaneous injections of strychnine have been of great value.

Complications and Sequelae.

Long lists of complications and sequelae are to be found in the textbooks, but in actual practice few are met with. Hypostatic pneumonia during the course of the attack has already been referred to, and we may here record the cases of a man and a woman, aged 63 and 80 respectively, who weathered their attacks of typhus only to succumb to rapidly-fatal hypostatic pneumonia which commenced some days after the crisis.

The meningeal congestion may at times amount to actual meningitis, but this is not common. We can recall a case of typical meningitis in a man, with a much-faded rash, where the diagnosis of typhus fever was only fully established by the admission of a typical case of that disease from the same family. Hyperpyrexia may be mentioned as a phenomenon which usually accompanies fatal toxæmia.

Retention of urine is often met with in severe cases, chiefly in males; and a careful examination daily is desirable for its detection, as the patient is not in a position to give information. The catheter twice daily is the only method of dealing with this condition. If overflow from the bladder be avoided by care in this direction, there should be small opportunity for the formation of bedsores.

Among pregnant women abortion seems almost inevitable, and appears to be beneficial rather than otherwise.

As in enteric fever, suppurative parotitis may be met with either as a complication or a sequela, and forms a dangerous though not necessarily fatal condition. After the crisis we have seen much pus accumulate without any rise of temperature. Multiple abscesses form a not infrequent sequela, more being met with in the upper extremities.

Another common sequela is thrombosis of veins of the lower extremity, which differs in no way from that met with after enteric. A striking feature of typhus is the weakening of the mental faculties which results for a time in many cases, and which we have known to persist for a considerable period in a few instances. Sir J. W. Moore refers to uræmic convulsions as not infrequent. We have not met with this complication, though we have seen uræmic coma diagnosed inaccurately as typhus fever.

DIAGNOSIS.

As might be expected in connexion with a disease so little known the proportion of cases of erroneous diagnosis to total admissions is rather high, amounting to 17.2 per cent. of the combined total. The following are the percentages of the total error:

Enteric fever ...	...	...	...	...	41.6
Pneumonia ...	...	...	...	...	17.5
"Febricula" ...	...	...	...	...	16.6
Meningitis ...	...	...	...	...	5.0
Scarlet fever ...	...	...	...	...	4.1
Measles ...	...	...	...	...	3.3
Other diseases ...	...	...	...	...	11.9

It will thus be seen that enteric fever stands out prominently as a source of incorrect diagnosis in a locality where typhus fever is known to exist. Certainly at times there is a difficulty in deciding between the two diseases, but this is not frequent. We may remark in passing that the spleen may be enlarged in typhus, though not to the same degree as in enteric. A copious enteric eruption probably often accounts for inaccuracy, especially when it is met with on the limbs and if the delirium be of a low type. The points with regard to the rash which distinguish typhus from enteric fever are its early appearance, the fact that the whole crop is out in three days, its typical distribution as before described, its petechial character after the first few days, the absence of definite outline to the spots, and the mottling of the subcuticular eruption when present. As a rule also the facial appearance is sufficiently distinctive; but alcoholism as a complicating factor may tend to confusion. So also in the case of pneumonia, which, after enteric fever, we have found to be most frequently diagnosed as typhus. We have so seldom, if ever, seen true pneumonia with typhus that we should almost regard its existence as exclusive of the latter diagnosis. Many of the cases so diagnosed are alcoholic, with congested face and much delirium, and are also associated with copious fleabites, which we have not infrequently known to be regarded as a typhus eruption. The febricula cases, which were hardly less frequent than those of pneumonia, were also not infrequently the subjects of petechiae of parasitic origin. Possibly a few of these were cases of abortive typhus, while others were only regarded with suspicion because they occurred in infected houses. Alcohol also plays its part in conducing to error in diagnosis in such cases. Similar factors also probably combined to bring the six cases of meningitis into hospital, as, apart from the cerebral manifestations, there is no great resemblance.

The comparative infrequency of erroneous admission of cases of measles is, at first sight, a matter for some surprise, as there is a certain resemblance between the eruptions in the early stages during which the typhus rash disappears on pressure. Measles, however, is naturally the diagnosis which would occur to one first, and the case would remain at home in consequence. Doubtless the mistake which is really made is in regarding cases of typhus in children as measles, the absence of effective isolation thus assisting in the spread of typhus. The points of resemblance are in the date of appearance and rapidity of development of the rash, the irregularity of outline and the hue of the spots, aided by facial congestion, bronchitis, and the frequent absence of typical constitutional disturbance in typhus occurring in children. The absence of rash from the face in the latter disease, and thus the difference in distribution in the early stages, is the most reliable point of distinction apart from such characteristics of measles as well-marked coryza and Koplik's spots.

Of the scarlet-fever cases we can only recall one which offered any real resemblance to typhus—a malignant case in an adult, with hæmorrhages into the skin, much facial congestion, and coma. The other diseases admitted as typhus call for no special comment.

Infection.

We wish to lay stress upon the manner in which the experience of the hospital staff bears out the opinion held as to the value of the free use of fresh air in the management of typhus fever. The treatment of the cases upon which this paper is based has extended over a period of some years, during which the staff has been constantly changing, and we feel justified in expressing some satisfaction that no case of typhus has occurred among porters, nurses, or ward maids during our period of office. We do not wish it to be understood that it is not within our knowledge that at some periods members of the staff have contracted the disease. That is not the case, but we are dealing with our own experience under conditions known to us personally, and fortunately have not witnessed such an occurrence. We attribute this result to the treatment of the cases in large wards with plenty of air space, the use of smaller wards having been systematically avoided. Each bed is placed between two windows which are thrown widely open during the winter as well as in the summer months. In our opinion this is in no way prejudicial to the patient, but rather the reverse, and in that we are borne out by others of much wider experience. Care in the disposal of the sputum may have assisted, and also the avoidance of careless or rough handling of the bedclothes while preparing a patient for inspection. Unnecessarily frequent and close contact with the patients have also been discouraged.

The circumstances under which nurses have been admitted suffering from typhus fever have been those where their patient has been treated for an unrecognized attack, and unusually free admission of fresh air and other necessary precautions have not, therefore, been adopted. We can recall several such instances, notably two cases of supposed pneumonia which resulted in the admission of three and four nurses respectively with typhus, the attack in all cases being severe. Such occurrences go to prove not only the value of fresh air as a diluent of typhus contagion, but also its virulence at close quarters.

It is the duty of the hospital porters to carry patients from the ambulance to the wards, and within our experience none of these men have contracted typhus fever. Their contact is of short duration and not very intimate, so that the opportunity for contracting the disease may be slight. The case of the nurses is different, as they have to wash the patients and remove their clothing.

At Aberdeen typhus has occurred only among those who have assisted in removal and cleansing of patients, those nurses not so engaged having escaped infection. This has led Dr. Hay to regard fleas with suspicion as possible carriers of infection, but though they are in abundant evidence among the Liverpool cases the nurses have, within our experience, enjoyed immunity from typhus. They express some surprise, as a matter of fact, that they are seldom bitten by fleas, but it is hardly likely that the experience of nurses in the two cities differs greatly in this respect.

It is interesting to note also the experience of the nursing staff on another point relating to immunity, namely, the possibility of the protection by repeated small doses of the contagion, probably in a diluted condition. It has been thought that repeated headaches among those attending on typhus patients are an indication of such diluted dosage. Frequent frontal headache is complained of by nurses during their spell of typhus duty, which is now limited to a few weeks for this reason. At the same time it should be noted that the bulk of the cases are admitted during the winter months, and that the low temperature of the air, which is freely admitted, might possibly contribute to cause this. The nurses state, however, that the headache is less frequent during the coldest weather.

In conclusion, we wish to express our indebtedness to Dr. R. I. Richardson, Visiting Physician to the City Hospital North, Liverpool, for his kind permission to make use of the cases in hospital for the purposes of this paper.

SOME EXPERIMENTS IN THE TREATMENT OF TRYPANOSOMIASIS.

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THE discovery of a trypanosome affecting man by Dutton,¹ and, quickly following upon this, the finding by the Royal Society's Commission² that trypanosomes play such an important rôle in sleeping sickness, has stimulated the efforts made to find some drug which would act on the trypanosomata as quinine does on the plasmodium of malaria.

Trypanosomiasis has for many years engaged the serious attention of the veterinary profession; the heavy loss amongst horses and cattle in tropical countries from various trypanosomic diseases naturally caused the trial of many drugs. Of all the drugs tried arsenic is the only one which seems to have given favourable results; reports concur that it mitigates the disease, and in some cases cures have been recorded.

Laveran,³ working experimentally on trypanosomiasis, published in 1902 his results on the treatment by means of sodium arseniate of rats infected with the nagana parasite (*T. brucei*). Since that time he has published several papers on arsenic in the treatment of various experimental trypanosomic diseases. Moore⁴ and Chichester⁵ record their results on the treatment of cattle in Southern Nigeria with sodium arseniate. Broden⁶ and others have treated cases of human trypanosomiasis with arsenic, usually in the form of Fowler's solution, with very encouraging results.

Another drug which in the last year was introduced by Ehrlich and Shiga⁷ is trypanroth. The authors treated rats and other animals infected with the trypanosoma of mal de Caderas (*T. equinum*). Their results are most encouraging.

Laveran has since then recorded his results with the treatment of trypan red in various trypanosomic diseases, and more recently on mixed treatment with trypan red and sodium arseniate. Wendelstadt⁸ has reported on the use of malachite green. His results are not very successful, and the dangers of producing necrosis are too great to warrant its use as a therapeutical agent.

Arsenic in the treatment of the various pathogenic trypanosomic diseases in animals seems rather to mitigate the disease, to cause the parasite to apparently disappear from the animal's blood, and to prolong the life of the animal. Unfortunately the usual history is that if treatment be discontinued, even after a prolonged course of the drug, the animal after a varying length of time once more exhibits the symptoms, and finally succumbs to the disease. Undoubtedly some of the more resistant animals do recover. Laveran and Mesnil in their classic work, *Trypanosomes et Trypanosomiasis*, from their numerous experiments conclude that the administration of arsenic kills the trypanosomes which are free in the blood, but when once the drug is eliminated or fixed in the tissues the surviving parasites commence to multiply and the organisms once more reappear in the peripheral circulation unless another injection of arsenic be given. On the administration of a second dose, the parasites disappear only to reappear, and even though treatment be kept up, the majority of the animals succumb either from the disease or from the toxic effects of the drug. Some of their animals, rats and dogs, have been cured. Laveran records the extensive necrosis and the pain which is apt to follow the administration of arsenious acid.

In 1903, while at McGill University, I repeated some of the experiments with arsenic on animals infected with the nagana parasite. On my taking up trypanosomiasis research in the Liverpool School of Tropical Medicine, I started a series of experiments with sodium arseniate. My experiences were the same as Laveran's. Many of my rats either died from the disease, were killed by the drug, or succumbed to an extensive ulceration around the site of injection.

On the publication of Ehrlich and Shiga's result with trypan red, a series of animals infected with different trypanosomes were treated with the dye. The best results were obtained with mal de Caderas infected animals. The results were not so good with animals infected with surra and nagana parasites. The results were still worse with dourine, Gambian horse, and *T. gambiense* strains. The parasite disappeared for a few days, to reappear, and the duration of the disease was not greatly prolonged. A combination of trypan red and arsenic seemed to be worth trying; the results obtained were more promising, but unfortunately trypan red also caused a nephritis, and by its chemiotaxic properties very extensive necroses sometimes resulted. On monkeys especially, the subcutaneous injection of the dye, either alone or in combination with arsenious acid, induced ulceration, which so undermined the health of the animals that they succumbed to any outbreak of disease, which occurred only too frequently amongst my numerous animals. It was these untoward accidents which induced me to seek a preparation of arsenic less toxic, and the subcutaneous injection of which entailed less danger of necrosis. An aniline compound, meta-arsensaureanilid (atoxyl), having the formula $C_6H_4NO_2As$, attracted my attention. This preparation has been before the profession since 1900, and various workers have recorded its worth in the treatment of various skin affections and in anaemia. It contains 37.69 per cent. arsenic, and is claimed to be 40 times less toxic than liquor Fowleri. It is especially suitable for either subcutaneous or intravenous administration. It produces no necrosis, no pain, and very much higher doses of arsenic can be given without producing toxic results. (I have tried the drug in high doses intravenously on myself without ill effects.)

Tentative experiments on rats and rabbits appeared so favourable that I decided to institute a series of experiments. These observations have been in progress for the last ten months, and have on the whole been most promising. In all my therapeutic experiments certain conditions were laid down to be followed out:

1. That the animal should be well infected and the presence of parasites determinable in its blood.
2. That the disease should have been established some time (I cannot expect to treat either man or beast suffering from the disease in the very early stages when no definite symptoms are manifested).
3. That some symptoms besides the presence of parasites should be in evidence.
 - (a) Anaemia.
 - (b) Loss of weight.