did not then or subsequently present any scarlatinal symptoms.

To make assurance doubly sure, I thought it would be interesting to take the temperatures of the remaining 299 children. On August 23rd and on each of the two or three following days this was carefully done, and much to my surprise, although these children appeared to be in their usual health, no less than 131 had temperatures of 99° and upwards, and 29 of this number had temperatures between 100° and 101°. In all cases this slight pyrexia had disappeared within two or three days, and in no single instance was there subsequently any symptom of scarlatina or peeling, though the children were kept under special observation. It was ascertained that out of the 131 children, 23 had a history of a previous attack of scarlatina. No further cases occurred during this or the following year.

On September 19th, twenty-seven days after the first taking of temperatures, as a control experiment I had the temperatures of all the children taken again, and they were all then found to be normal with the exception of three, the probable cause of the slight pyrexia in these cases being respectively tuberculous glands, an ordinary cold, and a bilious attack. It cannot be often that opportunities present themselves for taking temperatures on such a large scale when a community is exposed to the infection of a zymotic disease; if any similar observations have been recorded they have escaped my notice. This pyrexial condition of a large group of children coincident with the possibility, if not the probability, of their inhaling the micrococci of scarlatina may be interesting enough to place on record. It may be fairly assumed that it was more than a coincidence that 131 out of 299 children should all be suffering from a slight elevation of temperature, though it is, of course, possible that in some instances the small excitement of having the temperatures taken may have sent up the thermometer to a moderate extent, although this did not occur in a single instance in the subsequent control experiment. On neither occasion was there any catarrhal or other ailment running through the school. It is difficult to resist the inference that most of these children had received a dose of the scarlatinal poison, but that their powers of resistance were sufficiently great to prevent the occurrence of any of the usual symptoms except the moderate amount of pyrexia. Whether the daily disinfection of the mouth and fauces with the perchloride solution modified or inhibited the action of the scarlatinal virus is a matter of opinion. My own experience on this and on other occasions leads me to believe that an active disinfectant such as 1 in 2,000 perchloride solution has an undoubtedly useful effect, and with ordinary care it can be safely used as a prophylactic in a disease like scarlatina where it is probable that the micrococci find their entrance to the system from the faucal mucous membrane. It is, of course, a common experience to limit an outbreak of scarlatina in a school to one or two cases without any other precaution than prompt isolation.

The experiences above related tend to suggest that in a community infected with scarlatina, in addition to those who show definite symptoms of the disease, there are others who are affected by the poison to a minor extent as shown simply by an elevation of temperature; and it may be a useful precaution to take the temperature of contacts, with the view of keeping under special observation those who though apparently quite well are suffering from a moderate degree of pyrexia.

NOTE ON THE TREATMENT OF EXPERIMENTAL TRYPANOSOMIASIS.

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Mercury Perchloride.

In 1903 Low and myself while in Uganda treated four cases of sleeping sickness with intravenous injections of mercury perchloride solution, applying in this way to sleeping sickness the method of treatment devised by Baccelli for various forms of septicaemia. In our report¹ we

stated that the intravenous injection of perchloride caused constantly a fall in the temperature, and this condition persisted for several days. The improvement was not lasting in any of the four patients, and the disease ran its fatal course.

The remarkable fall in the temperature after the sublimate injections has, however, always remained impressed on my mind, and at various times I have in Ceylon made experiments with the object of seeing whether mercury had any influence in experimental trypanosomiasis; as the results were not very striking I did not publish them. In Ceylon sleeping sickness does not occur, and having been unable to import animals experimentally inoculated with *Trypanosoma gambiense* I have made my experiments on monkeys, which I have inoculated with a trypanosome derived from a bullock of Indian breed. The trypanosome is probably a strain of *T. evansi*, though it is much less virulent than the typical *T. evansi*. All the inoculated monkeys develop a fever of remittent type and polyadenitis; death takes place after several months. The monkeys I have used for my experiments are of the genus *Macacus* and *Cercopithecus*. The solution of perchloride used is according to Baccelli's formula:

Mercury perchloride	...	...	0.10 gram.
Sodium chloride	...	...	0.80 "
Sterile water	...	...	100 c.cm.

Half c.cm. or 1 c.cm. of this solution was injected daily intravenously. It is to be noted that in the monkeys I have used the superficial veins are not clearly visible, and it is necessary in most cases to make a small cut in the skin and partly dissect the vein chosen for inoculation.

Without entering into the particulars of the investigation I may say that mercury perchloride given intravenously caused, almost constantly, the temperature to fall to normal for a certain period of time; in some cases the enlarged glands became smaller; the trypanosome, however, never disappeared completely from the general circulation and the improvement was not maintained.

Quinine Cacodylate.

In 1906 it occurred to me to try the action of quinine cacodylate in experimental trypanosomiasis. I had at that time under observation an obscure case of low intermittent fever of six months' duration; the patient, apart from the fever and a very slight enlargement of a few superficial lymphatic glands, did not show anything abnormal on physical examination; the liver and spleen were not enlarged. The case had been variously diagnosed as malaria, paratyphoid, Malta fever, syphilitic fever, beginning pseudo-leukaemia, trypanosomiasis, kala-azar, latent tuberculosis. The microscopical and bacteriological examination of the blood, urine, and faeces never gave any clue by which to form a definite diagnosis. The patient had been drenched with quinine, mercury, and liquor arsenicalls. Although I was unable to make a definite diagnosis, I tried empirically injections of quinine cacodylate. Thirty such injections (0.20 gram each injection) were sufficient to bring the temperature to normal, and the patient is at the present time enjoying perfect health. I then tried the same treatment in a typical case of kala-azar I had in the clinic; the improvement after forty injections was remarkable; the patient, however, feeling so much better, left the clinic to go to his distant village, and I cannot therefore say whether the improvement was maintained. It is worth noting that the drug gave me fairly good results also in yaws.

Experiments have been carried out on monkeys inoculated with the same strain of trypanosome as those on which the mercury treatment was tried. The drug was given by subcutaneous injections (0.10 gram per injection) once or twice daily. The monkeys stood the drug well. I may say briefly that the drug shows a well-marked trypanocidal action for this particular strain of trypanosome. After 15 to 25 injections the trypanosomes are no longer present in the peripheral circulation nor in the enlarged lymphatic glands; the fever disappears. In a certain percentage of cases, however, about 30 per cent., recurrences take place; when this happens, quinine cacodylate given in large doses seems to have much weaker action than in the first attack.

Combined Treatment.

Ehrlich demonstrated that trypanosomes may become partially or totally immune to a given drug, and he

¹ Reports of the Royal Society Sleeping Sickness Commission, No. 5, p. 36.

emphasized the utility of combined treatments for trypanosomiasis, as, for instance, atoxyl and trypanoth. Soon after Moore, Nierenstein, and Todd published the results of their important investigations on the treatment of experimental trypanosomiasis by various combined treatments. They state that Thomas and Breinl's atoxyl treatment was not sufficient to prevent recurrences in a number of cases, and from their experiments on *T. brucei* they came to the conclusion that Thomas and Breinl's treatment should be followed by a mercury treatment. According to them atoxyl acts on the ordinary adult stage of the trypanosome as found in the peripheral circulation, but not on the developmental forms of the parasite, which are not seen in the general circulation.

The combined treatment I have tried is quinine cacodylate and mercury perchloride. The experiments were made on monkeys inoculated with the same strain of trypanosome as those on which the quinine cacodylate alone and the mercury treatments had been tried.

Three monkeys were treated with quinine cacodylate (0.10 gram per injection) and perchloride of mercury (0.005 gram per intravenous injection), contemporarily; that is to say, they received one injection of cacodylate in the morning and the mercury in the evening. The treatment lasted forty days. Three other monkeys received quinine cacodylate for twenty days and then perchloride of mercury for twenty more days. Three more monkeys received a daily intravenous injection of perchloride of mercury for twenty days, and for twenty days more a daily subcutaneous injection (0.10 gram) of quinine cacodylate.

The treatment, therefore, lasted in all the three groups of monkeys forty days. The trypanosome disappeared from the general circulation about the same time in the first two groups (between the fifteenth and nineteenth day); in the monkeys of the third group the trypanosome did not disappear completely during the mercury treatment; it disappeared between the twenty-second and thirtieth day.

At the present time, two months after the combined treatments were discontinued, the monkeys of the first and second groups are apparently free from the trypano-

some; as regards the third group, a recurrence has taken place in one of the monkeys, though the trypanosome is present in very small numbers.

CONCLUSIONS.

1. Quinine cacodylate shows a well-marked trypanocidal action in monkeys experimentally inoculated with a strain of trypanosome closely resembling *T. evansi*.

2. Mercury perchloride improves the general condition of the inoculated monkeys, and frequently causes the temperature to subside to normal. Given alone, however, its trypanocidal action is not very marked. In patients affected with sleeping sickness, it would seem from the experiments made by Low and myself in 1903 that mercury perchloride given by intravenous injection induces a fall in the temperature, but the improvement is only temporary.

3. I suggest that quinine cacodylate alone, or, better, in combination with intravenous injections of perchloride of mercury, should be tried in sleeping sickness, using large doses. If it should be found that quinine cacodylate has a marked trypanocidal action also on *T. gambiense*, the advantage of this drug over other preparations would be its powerful action on the malaria parasites. This would be an appreciable advantage, as in the experience of many observers, among whom Low and myself, a large number of sleeping sickness patients are suffering also from chronic malaria.

4. Quinine cacodylate besides its trypanocidal properties and its action on Laveran's parasites, has apparently some action on other protozoa, as, in my experience, its use is beneficial in kala-azar and yaws.

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AN UNUSUAL DEFORMITY OF THE FOOT.

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THE following abnormality of both feet recently came under my notice, and its rarity and biological interest make the case worth reporting.

It occurred in a boy, aged 12 years, who consulted me for some minor ailment. There was nothing like it in the family record, as far as the parents could remember, and the family history was unimportant.

The abnormality consisted in an extremely short first metatarsal bone, the head not reaching within an inch of that of the second metatarsal.

When a young child the great toe projected slightly inwards away from the foot, but now, probably from long wearing of a boot, it lies parallel with the others.

The skilagram, taken by Mr. Fryett, shows the bones of the foot, the condition being bilateral. There is little power of abduction, but adduction of the toe is unusually powerful, though it cannot be brought in apposition with the outer members.

The absence of the usual support given by the head of

the first metatarsal causes the boy to bear most of his weight on the outer side of the foot, and the parents volunteered the statement that his boots always wore out on this side. He is not so active in running and walking as his brothers.

There is a marked flexion of the first phalanx at the metatarso-phalangeal joint, so that on standing the head of the phalanx is touching the ground. This explains the apparently very short length of that phalanx in the

skilagram, as it is taken almost end on. Actually the bone is of normal size. I regard this flexion at the joint as a secondary occurrence, the object being to allow part of the body-weight to be transmitted to the ground through the first phalanx.

It is obvious that the disability does not lend itself to treatment, but the interest lies in the fact that it closely resembles the condition normally present in

the anthropoid apes. In them the foot is a grasping organ, and the big toe is somewhat like the thumb, being shorter than the other toes and apposable.

The great toe is still apposable in the human fetus, and is much more movable in childhood than in adult life.

The resemblance to the skeleton of the ape would be still closer if the great toe did not lie parallel with the