6. Exercise in patients without sufficient insulin, endogenous or exogenous, causes no change in the concentration of glucose in the blood, but markedly increases the production of ketone bodies, with resultant acidosis and the likelihood of the supervention of a diabetic coma.

7. An hypothesis for the action of insulin is suggested from these experiments.

SOME OBSERVATIONS ON BLACKWATER FEVER.

BY

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"I am of opinion that our first duty is to inquire whether a thing be or be not, before asking wherefore it is."—HARVEY.

ENCOURAGED by my success in the treatment of blackwater fever, I feel justified in publishing my observations on 36 consecutive cases, and an account of the method of treatment I have followed.

The district of Bindura, situated about the middle of the Mazoe Valley, which runs from west to east for some sixty miles, has a somewhat scattered European population of 350. The district is traversed by the Salisbury-Shamva branch railway. Bindura station, 70 miles north-east of Salisbury, and 1,730 miles distant from Capetown, lies at an elevation of 3,737 feet above sea-level, and is the most northerly point on the railway system of Southern Rhodesia.

Bindura has the reputation of being the worst blackwater district in the country. The average mortality from blackwater fever in Southern Rhodesia, taken over a period of twenty years, is, according to the medical director's report for the year 1921, 20 per cent.

Since my arrival here in February, 1921, I have studied the local history of the disease and its treatment, both by the Roman Catholic sisters—who were the earliest nurses in the country—and the early settlers. It appears that they considered it imperative that blackwater cases should not be moved, but nursed on the spot where the disease was developed.

Blackwater fever may be defined as an acute non-infective disease associated with characteristic dark urine and grave constitutional disturbances. It is a condition affecting Europeans, very rarely natives, occurring at all ages, and most prevalent in males; it is consequent on chronic subtertian malaria, even though there be no definite paroxysms of fever.

I consider that blackwater fever should be regarded as para-malaria, and that its possible cause is a chronic anaemia, fulminated by a sudden lowering of the vitality from any cause; this leads to a temporary rapid hypotonic osmotic condition of the blood plasma, and consequent bursting of the red blood corpuscles.

My conclusions are based on my successful application, in the early stages of the disease, of normal saline injected subcutaneously, and sodium bicarbonate administered by the mouth. My belief is confirmed by the views expressed by various medical writers, including Manson (*Tropical Diseases*, seventh edition), of the value of subcutaneous and intravenous hypertonic and isotonic salt solutions. Further corroborative evidence lies in the fact that chronic malaria is associated with profuse sweating and consequent loss of salt.

SYMPTOMS.

Premonitory.—A relatively large number of patients complain of severe abdominal pain with constipation, about twenty-four to forty-eight hours before the onset of blackwater fever.

The *onset* is usually characterized by the passing of six to ten ounces of very dark urine, in colour and frothiness like porter, but when viewed in a thin layer of a dark red colour; this is the first warning to the patient that he has blackwater fever, although he may not have been feeling very well, and has assumed the onset of malaria. The patient looks ill and the pulse is rapid, but pyrexia is by no means a feature of the disease in all cases. Headache,

loin-ache, and nausea are usually present, and a rigor may occur. Jaundice in a slight degree may be present before the onset of blackwater, but usually it comes on some hours after, and grows very profound if the patient is moved or shaken. The liver and spleen are nearly always palpably enlarged and the latter tender.

Danger of Moving.

Mortality in cases who have been moved, even for a short distance, is very much higher than in those who have not been moved. Before I realized this two patients I moved with the utmost care, and only for a short distance, became suddenly intensely yellow and very collapsed within a few minutes of being lifted, and subsequently had two or three severe relapses in the following five or six days. One case, a slight one, moved ten days after the onset and seven days after the water was quite clear, was run slowly by car for a distance of five miles over a rather rough road, and immediately developed one of the severest attacks of blackwater I have seen. Another recent case went by train to Capetown twenty-seven days after the onset, and had a relapse.

Complications.—Acute nephritis, scanty urine, and complete suppression are perhaps the most trying and dangerous complications one has to be on the look-out for. Abdominal complications seem to figure largely; the pain is of a gripping character, and seems to be referred to the colon, and in most cases I have seen there has been obstinate constipation. In one case this appeared to lead to lighting up an old appendix, and in another to intussusception; in each of these cases the patient was too collapsed for operation to be urged. Two of my cases developed bronchopneumonia, and this, I think, was due to getting uncovered whilst hot and sweating profusely.

The diagnosis as a rule should present no difficulty in a patient who has lived in a country where malignant tertian malaria is prevalent, and whose first symptom of real illness is the characteristic urine.

TREATMENT.

Prophylactic treatment consists in protection from mosquitos (and therefore malarial infection), early diagnosis, especially in incipient cases of malaria, and efficient quinine treatment over a sufficiently long period, and maintenance of good general health by means of good food and housing, the removal of all scrub near dwellings, and the draining or protection of all pools of water wherein mosquitos might breed. The successful treatment of blackwater fever depends on taking care not to move or shake the patient in any way. Therefore, if the patient is not near any dwelling, every effort should be made to bring a bed to him and erect a shelter over him.

Having got the patient to bed and well covered, I now, as a routine, immediately inject subcutaneously 5 to 10 ounces of normal saline, and repeat it if necessary. With this I find the urine, even in severe cases, clears up more quickly, sometimes in a few hours, whilst the jaundice and the constitutional symptoms are less marked. I also give from 1/2 to 1 ounce of magnesium sulphate at the beginning. This is probably beneficial from its depletive effects.

As 20 grains of sodium bicarbonate hourly is found to be beneficial in these cases, and as nausea and restlessness are nearly always troublesome features, I generally give a mixture such as the following:

R Sodii bicarb.	gr. xx
Bismuth carb.	gr. x
Tr. chlorof. et morph. co.	℥ v

S. To be taken every hour in 5 oz. of water.

I have found vomiting less severe since giving up "Sternberg's mixture"; this, I think, is due to the fact that the mixture contains mercury perchloride. Abdominal or loin pains are best treated with hot-water bottles or antiphlogistine.

As a rule I do not prescribe quinine, but see no reason why it should not be given, and when symptoms of acute malaria have been present I have given it with good results; but it is best administered by intramuscular injection.

tion owing to its tendency to cause vomiting when taken by the mouth.

Large quantities of fluids should be given (water, barley water, etc.). Lactogen, slightly sweetened, has been well tolerated where there has been much nausea, and Benger's food has also been easily taken.

The patient should be kept in bed for at least fourteen days even in the mildest cases. It is owing to patients failing to realize the importance of this that the prognosis of a mild case is so bad.

RESULTS.

Since assuming the post of district surgeon, Bindura, I have seen 36 cases of blackwater fever (29 males and 7 females); 33 recovered and 3 died. The percentage of mortality was thus 8.33. All the deaths occurred in males. Only one was actually due to blackwater fever, and in that one my warning not to move the patient had been disregarded.

Deaths.

Case 1.—A middle-aged man, living temporarily in a tent, developed blackwater fever. On the day of onset I attended him, and found that he did not present any alarming symptoms. He was put on the treatment I have mentioned, and instructions as to diet were given to his wife. She was also warned not to allow him to be moved. On the third day of the disease I had a message stating that his water was now quite clear and that he was much better. On the morning of the fourth day I received a very urgent message saying that the patient had been moved, for better nursing, to a cottage a quarter of a mile away, and was then in an extremely critical condition. I found the patient quite collapsed and very yellow. All attempts to improve matters by the use of hot-water bottles, subcutaneous and rectal saline, injections of camphor, strychnine, and pituitary extract, failed to produce any improvement, and he died twenty-seven hours after having been moved.

Case 2.—A middle-aged man who had no blackwater for ten days, and who had a history of a severe kick in the epigastrium from a mule three months before, developed what clinically appeared to be intussusception and died. He had complete stoppage, passed blood per anum, and had a well defined sausage-shaped tumour in the region of the transverse colon; the diagnosis, therefore, was probably correct. Operation was refused, and I did not urge it owing to the weak state of the patient; the relatives refused a *post-mortem* examination.

Case 3.—A young man developed severe blackwater fever, with scanty urine and retention, which necessitated catheterization during the whole of his illness. The urine became clear in two days, when bronchopneumonia developed; this cleared up in four days and the patient's condition seemed most hopeful. The patient then developed a very severe attack of mumps, and after another twenty-four hours an old appendicitis of five years' standing lit up. The patient was too ill to stand an operation, and died twenty-four hours later.

CONCLUSIONS.

A case of blackwater fever should never be moved if it can be avoided, and then only with the greatest care and for the shortest possible distance.

No case should be moved for at least fourteen days after the onset, however slight the case may be.

If possible a trained nurse should be obtained to see that the treatment is properly carried out.

If subcutaneous saline injections are given at once the urine will clear up more quickly.

I feel confident that quinine does not cause this disease, or even act as the fulminant, and think the reason this idea has been entertained is that, the premonitory symptoms being indistinguishable from malaria, quinine is taken, and the onset of blackwater is credited to it.

That blackwater fever is undoubtedly due to malignant tertian malaria has been conclusively proved by Professor J. G. Thomson of the London School of Tropical Medicine during his recent researches in Rhodesia.

The prevention of malaria, and therefore of blackwater, lies in the hands of the colonists, if they will only take the extremely valuable advice published for their benefit by Dr. A. M. Fleming, the medical director for Southern Rhodesia.

CONTACT CASES OF LEPROSY IN THE BRITISH ISLES.

BY

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At a recent meeting of the Dermatological Section of the Royal Society of Medicine a contact case of leprosy was shown in a boy, aged 14, who was born in England, had never been abroad, and who contracted the disease from his father, a leper, who died four years ago. This is the first case which has been exhibited at the Section in which the disease was contracted in this country.

Within the last few years I have seen three other similar cases, and in view of the impression, not only among laymen but even among certain members of the medical profession, that leprosy in this country is either non-contagious, or its contagiousity is so slight as to be negligible, I have considered it advisable to put these cases briefly on record.

CASE I.

A boy, aged 12, with nodular leprosy, was born in a southern county in Ireland, and was never out of Ireland until he was brought over to London for advice with regard to his disease. His father was a Russian, who had emigrated to Ireland, and who was in comparatively poor circumstances. When I saw the father he was suffering from nodular leprosy in an advanced stage, and had had the disease when he reached Ireland. As far as I could ascertain, the mother was not infected.

CASE II.

A boy, aged 15, was admitted to the St. Giles's Homes for British Lepers in 1920, suffering from nodular leprosy, with ulcerated lesions. He was born in a town in Lancashire and had never been out of England. His parents were healthy and came from British Guiana, bringing an elder son who had nodular leprosy. The boy was born a fortnight after their arrival in England. During his childhood he had been in close association with his infected brother, with whom he had slept for five years, and from whom he contracted the disease. He died in the St. Giles's Homes after being there seven months, two years after the death of his leper brother.

CASE III.

A married woman, born in Belgium, who suffered from leprosy of the mixed type, with both nodular and anaesthetic lesions. She was married in England and had lived here since then. She contracted the disease from her husband, who had nodular leprosy, and died in the St. Giles's Homes in 1916. Down to the time of her husband's admission to the Homes, she had taken no precautions to avoid infection, and had lived with him.

It is only comparatively of late years that the contagiousity of leprosy has been recognized, and it was not until 1897, at the first Leprosy Congress held in Berlin, that leprosy was definitely agreed to be a contagious disease, and resolutions were passed recommending compulsory notification and segregation. Since then numerous instances have been recorded of the transmission of leprosy by contact in countries where the disease prevails.

In Great Britain, largely owing to good hygienic conditions, leprosy has come to be a rarity, though at one time it was common, and the cases which exist here, with few exceptions, are exotic lepers who have come home from different parts of the empire where they had become infected with the disease.

The last place where a leper settlement of any importance existed in this country was in the Shetland Islands. There the disease seemed to have been rife, possibly because the natives were of Scandinavian origin, and were in more or less frequent communication with Norway and Iceland, where leprosy was prevalent. The value of segregation was early appreciated by the Shetlanders, and several centuries ago a leper colony was established in the island of Papa Stour, to which all suspected cases were sent. This is a remote island situated to the west of the Shetland group, and separated from the mainland by a stormy sound, which effectively isolates it in anything but fine weather. The last case of leprosy in Papa Stour—as far as I have been able to ascertain—died more than a century ago, and the