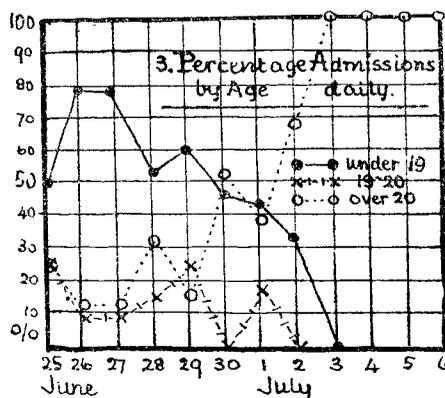
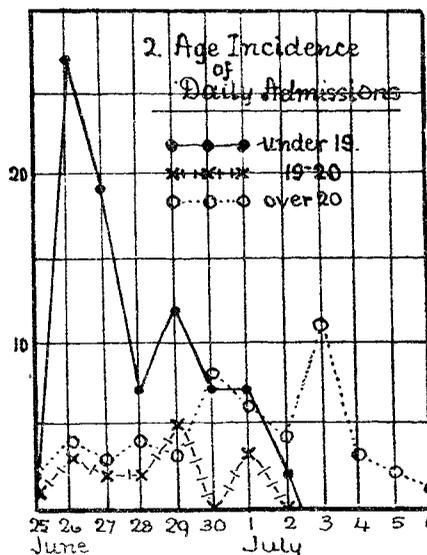
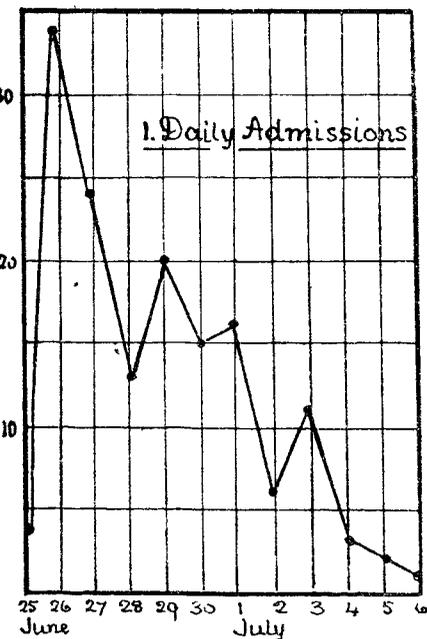


were slight, but the pharyngitis appeared to cause considerable discomfort. Laryngitis was not uncommon, and cough was frequent and troublesome. The pulse-rate was not rapid, considering the temperatures, and usually fell, when the temperature became normal, to about 80 per min. The tongue in nearly every case was heavily furred. In 11 cases labial herpes was severe.



The age of men affected was very interesting. At first the younger men went down, while as time went on it was the older ones who succumbed.

The figures were as follows:—

No. in camp under 19	157
Over 19 and under 20	72
„ 20	287
Total	516

No. of influenza cases:—	
Under 19	83 or 53%
Over 19 & under 20	16 „ 22.2%
„ 20	50 „ 17.4%
Total	149 28.9%*

* Of number in camp.

Symptoms.	No.	Per-centage of cases.
Headache ...	140	94.0
Frontal ...	88	59.0
Occipital ...	11	7.4
General ...	41	27.5
Pains in back or limbs ...	99	66.5
Sore throat ...	39	26.2
Pain in eyes	40	26.9
(No pains in back or limbs)	14	9.4
Objective.		
Conjunctivitis ...	57	38.2
Pharyngitis ...	29	19.5
Laryngitis ...	21	14.1
Herpes ...	8	5.3
Tonsillitis ...	2	1.3
Bronchitis ...	1	0.6
Epistaxis ...	2	1.3
Diarrhoea ...	3	2.0

Treatment of symptoms by drugs was unavailing. Rest in bed till the temperature subsided was the only thing that could be done.

As to methods of prophylaxis, avoidance of confined atmospheres, as far as possible, was insisted upon; morning and evening nasal lavage and gargling with normal saline was carried out. Coughing, spitting, and cigarette-smoking were discouraged.

Tents were struck frequently and bedding put out in the sun daily.

The graphs attached show: (1) total daily admissions; (2) admissions by age, daily; and (3) per cent. admissions by age, daily.

THE SUCCESSFUL USE OF ANTIMONY IN BILHARZIOSIS

ADMINISTERED AS INTRAVENOUS INJECTIONS OF ANTIMONIUM TARTARATUM (TARTAR EMETIC).

BY J. B. CHRISTOPHERSON, M.A., M.D. CANTAB., F.R.C.P. LOND., F.R.C.S. ENG., DIRECTOR OF THE CIVIL HOSPITALS, KHARTOUM AND OMDURMAN.

AFTER trying and confirming the conclusions of previous workers on the use of intravenous injection of antimonium tartaratum (tartar emetic) in cases of Oriental sore, internal leishmaniasis, and naso-oral leishmaniasis (espundia) as found in the Sudan,¹ in May, 1917, I commenced at the Khartoum Civil Hospital to treat bilharziosis (vesical and rectal) by the same drug. Amongst the natives of the Sudan bilharziosis is not so frequent as amongst Egyptians; still, in the clinic of a hospital such as Khartoum Civil Hospital there are sufficient cases to give the treatment a very fair trial.

The treatment of bilharziosis up to the present has been altogether palliative and unsatisfactory. It has baffled all attempts to find a satisfactory remedy. Time was the sole hope of cure, but as time takes years (a considerable number, perhaps 10)* to effect a cure, and in the meanwhile the patient is running no small risk, to say nothing of the pain and inconvenience of repeated attacks of cystitis and the debilitating effect of loss of blood, anything which promises even alleviation is to be welcomed.

There is no doubt that antimony given as intravenous injections of tartar emetic considerably interferes with the bilharzia and suspends its activities, even when it does not actually kill. My own opinion, based on the cases treated during the last year, is that antimony (antimony tartrate) is a definite cure for bilharziosis, and that the intravenous injections of tartar emetic kill the *Schistosomum hæmatobium* in the blood and render it harmless.

List of Cases.

No.	Age.	Nationality.	Date.	Quantity injected.	No.	Age.	Nationality.	Date.	Quantity injected.
1	21	Egyptian.	5/6/17	15*	7	15	Sudanese.	14/11/17	27
2	21	„	5/6/17	15†	8	17	„	3/3/18	25½
3	20	Sudanese.	10/6/17	22‡	9	17	„	5/3/18	29‡
			12/3/18	11	10	17	„	5/3/18	33‡
4	25	Egyptian.	23/10/17	22‡	11	12	Egyptian.	6/4/18	30
5	17	Sudanese.	4/11/17	20‡	12	19	Arab.	17/4/18	—‡
6	13	„	6/11/17	18‡	13	11	Shagii.	20/4/18	22

* Treatment suspended. † Relapse. ‡ Treatment not completed. § Details mislaid.

Record of Cases.

These observations are based on 13 cases of *Schistosomum hæmatobium* (see Table); more than 13, however, were treated by the method.

Three of the cases were 13 years of age or under, the remainder from 15 to 21. Three were Egyptians, the others natives of the Sudan. Three had relapses; the total amount of tartar emetic injected in these cases was:—

- (1) 15 gr. in 6 injections in 10 days, relapse after 25 days.
- (2) 10 gr. in 10 days, relapse after 8 months.
- (3) Had 7 injections, relapse in one month.

Two patients were discharged before completion of treatment, being "time-expired" soldiers.

The case (No. 2) which relapsed in 25 days was an Egyptian soldier who had a heavy infection of bilharzia of rectum and bladder, and injections had to be suspended after six had been given in ten days (15 gr.) owing to phlebitis. He was one of the time-expired soldiers who would not remain in hospital after their time had expired.

In Case 4, Egyptian, the injections were suspended owing to the patient being weak, but they were resumed again after ten days. He had 22½ gr. of antimony tartrate in 13 injections in 30 days. He was 44 days in hospital; discharged at own request, being a "time-expired" soldier. The ova were very scanty, if present at all, on discharge, but as ova had only been absent a few days previous to discharge, this case can at most be put down as improved.

* Loos says the worms only live three to five years, while the eggs remain, and are the real cause of the disease.

SHORTAGE OF NURSES.—The Queen's Hospital for Children (Hackney-road, London, E. 2) is appealing, with the support of the Bishop of London, for the nursing service at the hospital. The number of beds lying vacant for want of nurses is now 24, with a prospect of further reduction in the near future. The weekly attendances at the hospital number about 2000.

The following case may be taken as a type.

CASE 7.—Patient, 15, student, Sudanese; pain on micturition and passage of a little blood with last portion of urine for one year. Bilharzia ova found in urine. Injections were commenced Nov. 14th, 1917, with 1/3 gr. antimony tartrate, increased by steps to 2 gr., injections being given every other day. On Dec. 10th (26 days after treatment) his urine became free from ova, after 21 gr. in 13 injections; treatment was continued until the 16th. He had in all 27 gr. in 16 injections in 32 days, without reaction. For three months he reported once a fortnight, and remained free from signs of bilharzia. On May 30th, 1918, his urine was normal to chemical and microscopical tests; he said he was cured, and there had been no signs of recurrence.

In the following case the patient relapsed after eight months:—

CASE 3.—Patient first seen in June, 1917; hæmaturia for five years; had never been free from it; no frequency or pain. When admitted the first time 22 gr. antimony tartrate were given in 20 days in 13 injections. They were generally well tolerated; on three or four occasions moderate reaction, local pain, rise of temperature, and some retching. The urine became clear after he had had 10 gr. ten days after admission; discharged for observation on June 30th, 1917.

Urine remained clear and free from blood and ova for eight months until March 12th, 1918, when it became smoky—microscopic blood was found and two B. ova. Injections were resumed with 1 gr. The next day 2 gr. were given; some reaction, rise of temperature, vomiting, metallic taste, and feeling of weakness. After a day's interval 2 gr. were injected again; he vomited three times, and had metallic taste in throat; injections reduced to 1 1/2 gr. every other day. On one occasion he had nausea, diarrhoea, giddiness, with 1 1/2 gr. He had 11 gr. injected in 12 days; then was discharged at request of his master; ova and blood had completely disappeared from urine. He was seen periodically until May 20th, no blood or ova present on any examination; is presumed cured.

After 22 gr. during first course, and 11 gr. during second course I trust that patient is cured.

CASE 8.—Patient, 17, student, Gordon College, was admitted to hospital for diarrhoea with blood in stools; lateral spiked B. ova were found. Treatment commenced with 1/2 gr. antimony tartrate; next day 1 gr., continued daily five times; then 2 gr. were injected. Cough, salivation, lacrymation, metallic taste in mouth, and vomiting ensued. After interval of one day 1 1/2 gr. were injected every other day; slight reaction followed first two injections of 1 1/2 gr.; then injections were well tolerated. Stools became free from B. ova after 13 gr. had been injected; patient had 25 1/2 gr. in 19 injections in 28 days. No return of symptoms two months afterwards.

CASE 9.—Patient, 17, student, Gordon College, from Dongola Province; March 5th, 1918. Had passed blood in urine for three years or more; nearly every time blood came at end of micturition; very little pain. In December, 1917, he had come to hospital with same symptoms; received seven injections; was free from symptoms for a month, when they returned. Urine smoky, with heavy brown deposit; B. ova easily found. He commenced with 1/2 gr. antim. tartr., 3/4 gr. next day, 1 gr. third day until seventh day, when injections were discontinued owing to dermatitis of both elbows due to iodine. Injections were resumed after five days, 1 gr. being given, increased to 2 gr. next day, 2 gr. being given on two occasions; this was reduced to 1 1/2 gr. every other day for three weeks. Urine became quite free from B. ova 25 days after treatment and remained so. In consequence of relapse patient had 29 3/4 gr. antimony tartrate in 22 injections within a period of 28 days. No untoward symptoms except irritation due to iodine on the skin and reaction on two occasions, when 2 gr. were injected; metallic taste, giddiness, and vomiting once.

CASE 11.—Patient, 12, Egyptian, was infected at Damanhour in Egypt. For two and a half years he has passed blood in urine which, he said, was never free. The boy was anæmic to a degree, had dirty sallow complexion of person suffering from intestinal and other parasites, and was undersized; weight, 4 st. 13 1/2 lb. Large number of B. ova in urine. He was, as usual, a week in hospital under observation before commencing treatment; he improved somewhat. Treatment commenced on April 6th, 1918, with 1/2 gr.; two days later 1/2 gr. After five doses of 1/2 gr. every two days 1 gr. given on alternate days; then 1 1/2 gr. The first 1 1/2 gr. followed by cough, giddiness, vomiting. 1 1/2 gr. dose was, however, continued for three times with no further reaction; 2 gr. were then given. Giddiness, nausea, and vomiting occurred. After two days this was repeated with the same result. Dose then reduced to 1 1/2 gr. on alternate days; slight reaction. After three doses 2 gr. were again tried; vomiting occurred four times, giddiness all afternoon. Dose reduced to 1 1/2 gr. on alternate days. 30 gr. altogether were given in 23 doses over 49 days.

This was an interesting case; the boy put on weight and his haggard expression became quite a happy one. The urine became normal, B. ova disappeared in about three weeks. He was still in hospital at the time of writing, but all symptoms and signs of bilharziosis had disappeared.

Loos³ states that the ova remain and produce symptoms after the parent worms have died. This fact might account for the finding of a stray ovum in an apparently cured case; it would also account for the discovery of a small clot containing six or seven ova passed in Case 11 on April 22nd, 1918, 14 days after all other symptoms had disappeared, and subsequent to which nothing was discovered.

Method of Administration.

The method adopted was briefly as follows:—

The cases were all well-marked cases of bilharziosis of bladder or rectum, or both, of average intensity. The ova were easily found in the excretions. A careful note was made of: (1) the patient's (subjective) symptoms; (2) how long he had been infected; and especially (3) whether he had intervals of complete freedom from symptoms.

The patients were not kept in bed, rest having a tendency to allay the hæmaturia and bring about a temporary

suspension of symptoms, &c. When possible the patient was under observation for a week previous to treatment, the urine being tested in the morning, when it might be free from blood, and in the evening after day's exercise, when it was more likely to contain blood and shreds.

A 10 c.cm. record syringe, with a fine needle, was used. The injection was given into one of the conspicuous veins at bend of elbow, generally the median cephalic, made prominent by application of tourniquet on upper arm. (The anatomical relationship between median basilic vein and brachial artery at bend of elbow should be borne in mind.) Patient lay down for an hour on bed after injection, or longer if symptoms intervened. The solution used was tartar emetic, 1/2 gr. to 20 m. aq. destill., and diluted with 2 vols. of aq. destill. at time of use. (Too strong solution causes phlebitis, and injection round vein instead of into vein causes necrosis of surrounding tissues.) The injection was repeated and the dose increased by 1/2 gr. every other day until 2 gr. was reached, and this was continued until 30 gr. had been injected.

A boy of 10 years commenced with 1/2 gr.; some of the older cases had as much as 3 gr. at an injection.

It would appear that, generally speaking, the maximum should be for a boy of about age 10, 1 gr.; age 17, 1 1/2 gr.; for an adult the maximum should be 2 gr.

There is scope for the exercise of judgment with regard to frequency of injection and amount injected at one time. It is essential to be on the watch for symptoms of: (1) acute and subacute antimony poisoning; (2) chronic antimony poisoning.

Metallic taste in mouth and throat and cough immediately after the injection need scarcely be considered as poisoning, but vomiting, giddiness, delirium, a considerable rise or fall in temperature, diarrhoea, and cramp in calves should all be taken seriously. They are danger signals, and when they occur the injections should be temporarily suspended, and when injections are resumed decreased in strength, and not given so often.

Rapid small pulse, cold clammy skin, signs of collapse, in fact, are serious symptoms of poisoning.

Chronic antimony poisoning should especially be watched for. Weakness, loss of weight, anæmia, glossitis, cracked tongue with ulcers, diarrhoea call for suspension of the antimony and for appropriate treatment.

Improvement in symptoms is often noticed after the second or third injection by the clearing up of the urine.

The disappearance of clots of blood, shreds, &c., of smokiness, is the first favourable sign, together with improvement of subjective symptoms. The ova disappear from the urine more gradually. The patient's own feelings form a good guide as to progress. He has had his complaint for some years, and quickly and accurately notices any improvement.

There is also the frequency, pain on micturition, and character of urine, and the objective symptoms of the patient to indicate improvement or otherwise, as well as patient's weight. Increase in weight, together with improvement in symptoms, is a favourable sign, whereas loss of weight and continuance of anæmia indicate chronic intoxication by the antimony. It is more necessary to be on the watch for loss than for gain in weight. There is the blood and albumin in the urine, all valuable in estimating result of treatment. Finally, the microscope is the most valuable guide of all, because ova may continue to be found after other symptoms have cleared up, and after the urine, to ordinary rough tests, has become normal. The urine tested should be passed fresh, that at the end of micturition should be taken, and it should stand for a short time to allow solid particles to settle, or it may be centrifugalised.

When to Stop Injections and Amount of Antimony Required.

The periods of freedom from symptoms often seen in the natural course of untreated bilharziosis render it difficult to say how long injections should be continued after the urine becomes normal and the symptoms disappear.

As previously stated, the urine clears up after the second or third injection, as a general rule, but it is a mistake to conclude that a permanent cure has resulted after two or three injections. My personal opinion is that a course of injections lasting over 15–30 days, injected on alternate days, commencing with 1/2 gr., and increasing by 1/2 gr. up to 2 gr. or 3 gr. until 30 gr. have been used, represents the required killing dose. In this connexion it may be said that cases of bilharziosis do not, as a rule, suffer from the intense debility that is found in leishmaniasis, and so the debilitating and poisonous effects of the drug are not so readily produced, and the same amount of watchfulness is not so necessary in cases of bilharziosis as in leishmaniasis. The chronic toxic effects of the drug must be looked for in bilharziosis rather than the acute toxic effects which are more likely to be seen in treating leishmaniasis with antimony.

I do not think that injections of less than 1 gr. each time have much effect on the *Schistosomum hæmatobium*, but

injections of less than 1 gr. are necessary to commence with in order to establish a tolerance for the drug.

We thought that we noticed in cases of boys where a small dose was used to commence with, and where the dose was not increased with sufficient rapidity, that there was a tendency for the bilharzia to establish a tolerance for this drug.

Having regard to the large number of bilharzia worms, male and female, which are often seen in the portal vein and its tributaries post mortem, it may happen that all are not equally affected by the injection. Some are killed, but it may be that there are some remain whose activities are only suspended for a time, thus accounting for a return of symptoms.

From the experience I have gained my opinion is that three or four injections may in some cases effect a cure, but that a total of 30 gr. or more is required lasting over 15-30 days.

Reappearance of Symptoms after Period of Freedom or Apparent Cure.

Reappearance of symptoms may be explained in one of the following ways:—

1. A period of freedom from symptoms may be accounted for by the fact that in bilharziosis clinical symptoms may be absent altogether at times; this is tantamount to saying that antimony has no effect on bilharzia. It is scarcely possible that in so many of the cases tried these natural periods of rest would coincide with the administration of tartar emetic.

2. The bilharzia may be scotched, not killed—treatment has not been continued for long enough.

3. When a great number of bilharzia worms are present some may be killed, others only placed temporarily hors de combat by the antimony treatment. Some may be more resisting than others.

4. As antimony is excreted from mucous surfaces and the bilharzia worm does not like antimony, it may avoid the mucous surfaces (bladder and rectum) whilst the antimony is being excreted. In other words, it will return to the portal vein whilst the mucous surfaces are infected with antimony. In this way its activities may be suspended for some time, as antimony is an accumulative poison, and remains in the tissues for some considerable time.

The bilharzia worms by instinct will find their way back to the bladder and rectum in order to deposit their ova as soon as these organs become free from antimony. Relapses may possibly be accounted for in this way.

5. Re-infection. This is not likely—in any case not for some months afterwards.

Further Points in Treatment.

It must be remembered that tartar emetic is a poison; $\frac{3}{4}$ gr. has caused death in a child, 2 gr. in an adult.³ It is an accumulative poison. On the other hand, large doses have been tolerated. It is safe to say that, generally speaking, for children the commencing dose should be $\frac{1}{4}$ gr. and for adults $\frac{1}{2}$ gr., but the maximum dose should be reached as soon as possible.

It has always appeared to me that the logical and natural way to attack bilharzia would be directly through the blood stream, and in the case of vesical infection through the dorsal vein of the penis, which terminates in the pudendal plexus, surrounding the prostate, the neck, and the fundus of the bladder. The injection of tartar emetic into the veins offers an opportunity to try this where the dorsal vein of the penis is conspicuous. The vein joins the hæmorrhoidal plexus, and so directly communicates with the portal venous system in which the bilharzia worms are located; it also communicates with a systemic venous system by means of the internal pudendal vein which opens into the internal iliac.

Of the two great germicidal drugs we possess—arsenic and antimony—arsenic given as salvarsan and atoxyl appears to have little or no effect on *Schistosomum hæmatobium*, although in sleeping sickness, yaws, and syphilis it displays specific qualities; antimony given in the form of a metallic salt, or as tartar emetic, appears to be a specific cure for leishmaniasis, and there seems to be good reason to believe that it is a specific cure in the case of bilharziosis as well.

Other Successful Results.

In confirmation of the extremely satisfactory results I have obtained during the year in the intravenous injection of antimony (tartar emetic), Dr. V. S. Hodson, who very kindly continued the treatment of bilharzia cases with tartar emetic at Khartoum Civil Hospital during my absence in 1917, and afterwards at Atbara, carried on a series of trials quite independently, sends me the successful results of the treatment of seven cases.

Dr. Hodson has for some years been working at the treatment of bilharzia, and it is of particular interest to have his favourable opinion on the cases treated by antimony. Of his

7 cases, 5 had 4 injections; 1 had 3 injections; 1 had 2 injections. He commences with $\frac{1}{2}$ gr., and injects every other day for three injections, increasing $\frac{1}{2}$ gr. each injection—the interval between $1\frac{1}{2}$ gr. and 2 gr. being three days or longer.

The immediate result of this method was found to be satisfactory, but I am personally inclined to think that three or four injections will not give a permanent result, although sufficient to paralyse the activity of the worm for a time.

Some Necessary Precautions.

Finally, I would point out that the intravenous treatment of both bilharziosis and leishmaniasis by antimony should be undertaken with:—

1. Appropriate and reliable apparatus which is not necessarily elaborate and expensive—e.g., a proper syringe and needle and sterilising arrangements for the same, and small flasks for keeping the solution in, &c.

2. A proper sense of responsibility when injecting remedies directly into the general circulation via the vein.

3. The due appreciation of the fact that the drug injected is a poison, and that its reckless use will kill the patient.

4. The exercise of judgment as to dosage and length of time of administration, stopping altogether, suspending, increasing dosage, according to circumstances.

5. And last, but not least, a good note should be made of the case before commencing treatment and a daily note of symptoms during the treatment, examination of urine and fæces, &c., without which any useful conclusion will be impossible. The subsequent history for a considerable time should be watched.

Without these the placing of intravenous injections as routine treatment in the hands of medical officers in out-stations and elsewhere whilst such treatment is in the experimental stage will do more harm than good, and will bring discredit, perhaps undeserved, on the remedy.

In conclusion, I would thank Dr. Mustafa Izzedin, who has done so much of the work of injecting these cases, and Mr. J. R. Newlove, who has carried out many of the microscopic examinations connected with the urine.

References.—1. Notes on a case of Espundia and three cases of Kala-Azar in the Sudan treated by the Intravenous Injection of Antimonium Tartaratum, J. B. Christopherson, Jour. Trop. Med. and Hyg., Oct. 17th, 1917. 2. Loos: Cairo Scient. Jour., June, 1910. 3. Anomalies and Curiosities of Medicine, p. 449. See also THE LANCET, 1916, ii., 732; 1918, ii., 45.

A CASE OF ACUTE DELIRIOUS MANIA: RECOVERY.

BY F. WYATT-SMITH, M.B., B.C. CANTAB.

THE combination of fever, mania, constipation, and insomnia in a clinical picture is sufficiently rare to make the publication of the following case desirable, especially in view of recovery having taken place.

A man, aged 28, was discharged from the Army as "unfit" two years ago. Since then, never robust, he has been continually overworking himself at a munition factory at Woolwich, his only holidays being a few interruptions through illness. On June 22nd, 1918, a Saturday, he could not go to work, being flushed, feverish, delirious, and suffering from headache. He continued in this condition until the following Tuesday (the 25th), when, suddenly, unexpectedly, and without any warning, he attempted to cut his throat, and was brought to Constance-road Institution, East Dulwich, struggling violently with four policemen, and admitted. He was so violent that, I being temporarily absent, a neighbouring practitioner was called in, and at 5.20 P.M. gave him I.H. hyosc. hydrobrom., gr. 1/100, and ordered gloves to be used if necessary. The patient slept for three and a half hours. At 11 P.M. I saw him. He was then awake, flushed, with two men standing over him to prevent his falling out of bed, and so restless that I could not take his temperature. As there was a good deal of influenza at Woolwich at the time, I thought he might be suffering from a toxic delirium and gave him tr. quininæ amm., 1 dr. three-hourly; calomel, 5 gr., statim; and paraldehyde, 2 dr.

On the next morning (the 26th) I found that he had had but a few snatches of sleep up to 3 A.M. and none since, and that he had tried to drink his urine during the night. He was talkative, incoherent, resistive, restless, abusive, and obscene, but I thought his physical condition had improved. T. 99.6° F. I ordered him 20 gr. of sulphonal, night and morning. At 3 P.M. he had marked flight of ideas, with rhyming and punning. At 6.30 P.M. his temperature was 102° in spite of the quinine he had been taking, and, after four days illness, made me doubt if he was suffering from the present mild epidemic of influenza, so, thinking that the quinine might possibly be giving him headache, though