Clinical and other Notes

easily carried in a small pocket. When open it forms a tripod having a horizontal centre, as shown in accompanying Fig. 1, on which the fuel is placed, and three outer raised points on which any cooking utensil can be rested. The fuel consists of small squares of grease-soaked paper material, each individual piece being about 1 inch square and \( \frac{1}{2} \) inch thick. They appear to be made of paper pulp boiled in crude fats and then allowed to cool, and sections stamped out by machinery. These are very readily portable, do not deteriorate with damp or wet, and boxes of this fuel are very light, and a handful of pieces can be readily carried in each man’s pocket without inconvenience. The fuel burns with a steady slightly white flame at a comparatively slow rate. Each piece of fuel is sufficient to heat a pint mug of water to boiling point. The fuel is used by placing it on the tripod centre, or if the tripod cannot be used, a piece of fuel can be pinched between the arms of the tripod when folded, and used practically as a candle.

It appeared to me this type of cooker would be extremely convenient for our own Royal Army Medical Corps work, especially in dressing stations and regimental aid posts, where small quantities of hot water are wanted at short notice, and fuel, particularly methylated spirits, is hard to obtain. The easy portability of the article itself and its fuel is very marked when compared with our own “Tommy’s Cooker,” and a man can readily carry one of these cookers, a handful of fuel—which would last twenty or thirty times, and a box of matches in his pocket without any inconvenience.

INTRA VENOUS INJECTIONS OF ANTIMONIUM TARTARATUM (TARTAR EMETIC) IN BILHARZIASIS.

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Owing to the great and important advances which have recently been made in our knowledge of the subject of bilharziasis much attention has been attracted to this condition. These advances are chiefly due to the work of Leiper [1], Fairley [2, 3] and Christopherson [4, 5].

In 1915 Leiper [1] succeeded in working out the complete cycle of development of the Bilharzian worms, giving a connected story of their life-history. He found the non-eyed, bifid-tailed cercariae characteristic of the genus in two different genera of snails, Bulinus contortus and Planorbis boissyi. These snails were shown to harbour two different species, namely Bilharzia hamatobia which is characterized by a terminal-spined ovum and Bilharzia mansoni which is characterized by a lateral-spined ovum.

Fairley’s [2, 3] work demonstrated how bilharzial parasites and th...
duced, and a complement fixation test for bilharziasis has been devised by Fairley, comparable to the Wassermann test for syphilis. As antigen an alcoholic extract of the infected livers of snails (P. boissyi) was employed. Positive complement fixation was obtained in a high percentage of cases in man as well as in experimentally infected monkeys. The practical application of this test Fairley considers will facilitate the diagnosis of bilharziasis in the early stages of the disease before localizing symptoms have developed, and also in estimating the effect of the intravenous administration of drugs on the adult parasite.

Christopherson [4, 5] introduced, or independently re-introduced, the administration of intravenous injections of solutions of tartarated antimony (tartar emetic) with success, and claims that this method constitutes a specific cure for the disease. It was the satisfactory results obtained by himself and others, by the use of this method, in cases of Oriental sore, internal leishmaniasis and naso-oral leishmaniasis (espundia) as found in the Sudan which induced Christopherson to apply it to the treatment of bilharziasis, both vesical and rectal. This method of treatment of bilharziasis was commenced by him in the Khartoum Civil Hospital in May 1917. In September 1918 he recorded thirteen cases of *Schistosomum haematobium* treated by this method with apparently complete cure in all the cases, but with relapses in from one to eight months in three cases. As the result of his experience he considers that "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 bilharziasis, and that intravenous injections of tartar emetic kill the *Schistosomum haematobium* in the blood and render it harmless."

Christopherson's method consisted in giving a course of injections on alternate days for a period of fifteen to thirty days commencing with $\frac{1}{2}$ grain dissolved in six cubic centimetres of distilled water and increasing by $\frac{1}{2}$ grain up to 2 grains until a total of 30 grains have been injected. This is the amount which he considers to be the required killing dose notwithstanding the fact that all the symptoms of the disease often completely disappear after the first or second injection.

The following ten cases of bilharziasis of the bladder have recently been treated by this method at the Bermondsey Military Hospital:

**Case 1.—Pte. C.,** admitted to the Bermondsey Military Hospital on September 21, 1918, under the care of Dr. R. H. Townend for bilharziasis for which he was sent straight from Egypt. He first noticed blood in the urine when in Egypt in August, 1916. Terminal-spined bilharzia ova were found on that date, and he was classed B3. He had been bathing in the canal at intervals for nine months. Since the original attack he has twice been in hospital, for haematuria and general weakness. Has had loin and bladder pains without intermission since onset of the disease. On admission to the Bermondsey Military Hospital patient complained of pain in the urethra and of passing red urine. Microscopic examination of the urine on September 24 showed the presence of much blood and many terminal-spined bilharzia ova. Treatment with antimonium tartaratum intravenously was begun with $\frac{1}{2}$ grain on October 9, 1918. The dose was gradually raised to 2 grains and the injections were given
about every other day until December 2, 1918, when a total of 29½ grains in seventeen injections had been given. Blood was found in the urine microscopically for the last time on October 26, and no ova were found after the commencement of the treatment. Stiffness of the neck and shoulder muscles was the only thing patient complained of after the injections. He was discharged well on December 12, 1918.

Case 2.—Pte. T., aged 27, East Riding Yeomanry, was admitted to the Bermondsey Military Hospital on September 21, 1918, under the care of Captain F. Talbot, R.A.M.C., having been transferred straight from Egypt for bilharziasis. He was admitted to the Onwa El Worka General Hospital on July 27, 1918, having been stationed in the Fayoum for thirteen months previously, where he contracted the bilharziasis and was unable to carry on with his unit. He complained of pain in the lower abdomen and passing blood in the urine. Blood, albumin and terminal-spined bilharzia ova were found in the urine. On admission to the Bermondsey Military Hospital he complained of weakness and of pain in the hypogastrium, with burning pain along the urethra on micturition. There was blood in the urine every day towards midday, and any exertion made this condition worse. Patient said he had lost seven pounds in weight in the last three weeks. Repeated examination of the urine always showed the presence of albumin, blood-cells and terminal-spined bilharzia ova. Large numbers of ova were found on November 16, 1918, but from January 9, 1919, no albumin, blood, or ova were ever found. Antimonials tartaratum was intravenously injected in ½ grain dose on September 28, 1918, but on account of some induration at site of injection this treatment was suspended and was resumed on November 14, 1918, the dose being gradually raised to three grains. A total of ten injections and 21½ grains of antimonials tartaratum were given, the last injection being given on December 11, 1918. Patient then went for twelve days Christmas leave. On his return he felt quite fit, having been free from symptoms during his leave, and the urine was free from albumin, blood, and ova. He was “dispersed” on January 20, 1919.

Case 3.—Cpl. B., A.S.C., aged 29, with eight years’ service, was admitted to the Bermondsey Military Hospital under the care of Captain F. Talbot, R.A.M.C., on September 21, 1918, having been transferred to England from Egypt for bilharziasis. He was stationed in the Fayoum district of Egypt in 1915-1916 where he developed haematuria, dysuria and pain, and was bored in July, 1917, for bilharziasis. At the Onwa El Worka General Hospital in 1917 he complained of haematuria with abdominal pain and pain at the end of micturition, having been ill for a year and becoming worse. Bilharzia ova along with blood and albumin were present in the urine. When admitted to Bermondsey Military Hospital patient stated that he passed more blood than usual owing to the fatigue of the journey, exertion always producing this result. Examination of the urine on September 24 showed the presence of some red blood-cells and a trace of albumin, but no ova were found. On October 8, albumin and red blood-cells were abundantly present and bilharzia ova were found. Intravenous injections of antimonials tartaratum were commenced with ½ grain on October 2, 1918, increasing by ½ grain twice weekly, 3 grains being reached on November 29, this dose being repeated five times. By November 17, a total of 27½ grains had been given. A few red blood-cells were found in.
the urine on November 16, but no ova and frequent subsequent examinations failed to reveal any ova or red blood cells. Cough and irritation of the throat were complained of after several injections and vomiting occurred after the first injection of three grains. Patient went for twelve days' leave and returned feeling quite fit and free from all symptoms. Was "dispersed" on December 18, 1918.

Case 4.—Spr. S., R.E., aged 39, with three and half years' service, was admitted to the Bermondsey Military Hospital on September 21, 1918, under the care of Dr. R. H. Townend. Went to Egypt, December, 1915. Began to pass blood and clots in urine in November, 1916. Infection said to be due to bathing in fresh water tank under Royal Army Medical Corps control.

In addition to haematuria he complains of burning sensation at end of micturition, with general weakness, wasting and anaemia. Weight has fallen from 14 stone to 10 stone 7 pounds.

Urine examined September 24, 1918, showed the presence of terminal-spined bilharzia ova, red blood cells and a trace of albumin. Ova were never subsequently found and no red blood cells after October 2, 1918. Intravenous injections of antimonium tartaratum commenced October 9, 1918, with ½ grain in five cubic centimetres distilled water, gradually increased to two grains. A total of seventeen injections and 27½ grains antimonium tartaratum given, the last on November 29, 1918. Complained at various times after injections of irritation in throat with tickling cough, nausea, vomiting, diarrhoea and stiffness in muscles of neck and shoulder. Discharged well December 4, 1918.

Case 5.—Pte. L., aged 22, with three and a half years' service, was admitted to the Bermondsey Military Hospital on September 8, 1918, under the care of Dr. R. H. Townend. Had been in Egypt since April, 1916. Haematuria commenced in January, 1917. Reported sick July, 1918, complaining of pain in the back and passing blood in the urine and general weakness so as to be unable to carry on. Was exposed to infection from the water of a sweet water canal at Elkoton, Egypt. Has gradually got weaker. Has been in hospital in Egypt three times and was sent home for bilharziasis, terminal-spined bilharzia ova having been found in the urine. The longest interval free from symptoms was two months.

September 24, 1918: Urine showed a trace of albumin and a few red blood cells, no ova found. Has been free from urinary discomfort lately.

September 27, 1918: Micturition frequent, but no pain.

October 3, 1918: Urine contained calcium oxalate crystals and a few leucocytes, but no ova or red blood cells found. Had occasional bladder pains.

Intravenous injections of antimonium tartaratum commenced October 9, 1918, with ½ grain dissolved in six cubic centimetres of distilled water. Next day a few red cells in urine.

Subsequently neither ova nor red cells were found. A total of seventeen injections and twenty-nine grains was given ending on December 13, 1918. Had a slight rigor with temperature of 103° F. after thirteenth injection, two grains, total 22½ grains. Other symptoms were nausea, vomiting (twice), headache, pain in the body and shakiness of the feet. Was discharged December 19, 1918, fairly fit and free from bladder symptoms.

Case 6.—Pte. M., Area E. Co., aged 21, with five years' service, was admitted to the Bermondsey Military Hospital under the care of Dr. R. H. Townend, September 21, 1918, having been sent direct from Egypt, where he had been.
since December, 1915. Bathed in sweet water canal in May, 1916, previous to this being forbidden. First had haematuria, May, 1917, was in hospital five weeks and classed B2 on July 18, 1917. Had never been free from blood in urine and pain in loins for more than three days at a time. Again reported sick July, 1918, for general weakness. On admission was passing red urine and complained of pains in the loins. Urine examined on September 24, 1918, showed a trace of albumin, an abundance of red blood cells and many terminal-spined bilharzia ova.

Began intravenous injections of antimonium tartaratum on October 9, 1918, with ½ grain in six cubic centimetres of distilled water, gradually increasing doses every other day up to two grains. A total of eighteen injections and 30½ grains administered, the course finishing November 29. Symptoms produced were immediate cough, slight giddiness, vomiting (twice) slight diarrhoea and stiffness in the muscles of the shoulder.

There was no relapse of the bladder symptoms when patient was discharged on December 19, 1918.

Case 7.—Lance-Cpl. D., Warwicks, aged 22, with five years' service, was admitted to the Bermondsey Military Hospital on September 9, 1918. Went to Egypt November, 1915, and reported sick on August 17, 1918, complaining of pain in the lumbar region, passing blood in the urine and unable to carry on. Had first noticed blood in the urine in October, 1916, at Fayoum, Egypt. Infection said to have been contracted from sweet water canal. Has had incessant haematuria from the start, with constant aching pain over bladder and in the small of the back for three months. Also scalding pain on micturition.

October 3, 1918: A good deal of blood and bladder pain. Urine contained terminal-spined bilharzia ova, red blood cells and a trace of albumin.

October 7, 1918: Sharp shooting bladder pains and urine more bloody than usual. Began treatment with intravenous injections of antimonium tartaratum (½ grain in five cubic centimetres distilled water) on October 11, 1918. Gradually increased to two grains every other day. Treatment consisted of sixteen injections and a total of twenty-nine grains and ended on November 26. Nausea, slight diarrhoea and muscular stiffness in neck and shoulders complained of during treatment. Blood and ova last found in urine October 24, every subsequent examination being negative. Weight increased during treatment from 10 stone 7 pounds, to 11 stone 4½ pounds.

On discharge patient states that he has now no symptoms except slight weakness.

Case 8.—Pte. G., R.A.E., aged 23, with five years' service, was admitted to the Bermondsey Military Hospital, under the care of Dr. A. E. Wilson, on January 17, 1919, having been sent from Egypt for bilharziasis, arriving in England December 15, 1918. Was in Egypt October, 1915, to December, 1918. Believes he was infected in Fayoum district 1915 to 1916. Blood noticed occasionally in urine for a year before reporting sick, November, 1917. The frequency of haematuria gradually increased from about once a month to every day, so that except for first thing in the morning patient never passed urine without observing blood in it for about a year before returning to England. Blood and bilharzia ova abundant in urine till February 8, 1919.

Intravenous injections of antimonium tartaratum commenced January 28, 1919, with ¼ grain. Doses twice weekly increasing by ½ grain till March 11, 1919, eight doses and three grains being given. Total 31½ grains.
No symptoms followed injections except a temperature of 100°F. one night after three grains and a total of 19½ grains, and general pruritis after the last injection but one. No urinary symptoms, last time blood being seen in urine three weeks ago. Colour much better and patient feels stronger and better.

Case 9.—Cpl. M., R.A.S.C., aged 30, with four years' service, was admitted to the Bermondsey Military Hospital on October 12, 1918, under the care of Dr. A. M. Cato from H.M.A.T. Essequibo, direct from Egypt, where he had been since October, 1915, being stationed in the Fayoum Province till October, 1916, when he went to Palestine. Symptoms first noticed February, 1917, passing blood in urine with sharp pain in urethra during micturition, with left hypogastric pain. The hematuria was at first intermittent about once a week, later every day. Reported sick at Bela in June, symptoms being more marked with headache and general weakness, so that patient could not carry on any longer. Symptoms less severe while resting in hospital.

Urine examinations showed the presence of terminal-spined bilharzia ova and blood cells on January 16, 1919. Several examinations in March negative. Intravenous injections of antimonial tartaratum were commenced December 10, 1918, with 1 grain. Interrupted by twelve days Christmas leave and again for a week in February because of a severe cold. Injections given twice a week and gradually increased till three grains was reached on February 2. Injections finished February 28, total thirty grains. During injections patient lost weight from 10 stone 4 pounds to 10 stone. Had much irritative cough at end of injections and complained much of headache after injections (patient had some error of refraction which has since been corrected by glasses).

No bladder pains or symptoms and no blood in urine since January 20. Still has slight dull pain in small of back. Patient considers he is weaker and more easily tired than before submitting to injections.

Case 10.—Pte. C., aged 25, with seven years' service, was admitted to the Bermondsey Military Hospital on November 12, 1918, under the care of Dr. J. Howard Cook. He was perfectly fit until being sent to Egypt in September, 1915. He was stationed in the Fayoum Province until November, 1916, when he was sent to Palestine. He started, passing blood in the urine at first very intermitently, but gradually getting worse, but did not report sick until March, 1917. He was sent back to Cairo in May, 1917, and there the diagnosis of bilharziasis was established, terminally-spined bilharzia ova having been found in the urine. He returned to England in October, 1918, and was sent direct to the Bermondsey Military Hospital. Intravenous injections of antimonial tartaratum were commenced on December 6, 1918, beginning with ½ grain dose and gradually increasing up to three-grain doses at bi-weekly intervals until March 12, 1919, with an interval of three weeks because of an attack of influenza. A total of 30½ grains was given. Bilharzia ova, blood and albumin were found on examination of the urine on October 10, 1918. Blood was occasionally passed until February, 1919, but ova were not found after the commencement of the injections. At the end of the course of injections the urine was free from ova, blood and albumin, but patient still complained of pains in the back and over the bladder. During the following week there was a relapse of the hematuria with more pain on micturition and headache, and examination of the urine showed the presence of red blood cells, granular epithelial cells and calcium oxalate crystals,
but no bilharzia ova were found. Patient was then transferred to 4th London General Hospital.

In all these cases the solutions used in the injections were made by dissolving the tartar emetic in freshly distilled sterile water at the strength of one grain in six cubic centimetres and then sterilized by autoclaving for one hour. At first the injections were administered every two days with a maximum dose of two grains, whilst on the later cases of the series I worked up to doses of three grains administered twice a week.

No serious drawback, no marked toxic manifestations, and no severe reactions followed the injections. With one exception all the patients were troubled with irritation of the pharynx and a spasmodic outburst of coughing either during or after the injections, usually just at the end of their administration. In four cases stiffness and cramp of the muscles of the neck and shoulder girdle were complained of. Gastro-intestinal symptoms were fairly frequent, comprising nausea in 3 cases, vomiting (usually once only) in 4 cases and slight diarrhoea in 3 cases. Headache was noted in two cases. There was induration at the seat of injection in two cases. Pyrexia (to 103° F.), slight giddiness, pains in the body, general pruritus and loss of weight were noticed in one case each. These untoward effects of the injections may be tabulated thus:

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cases:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cough and pharyngeal irritation</td>
<td>9</td>
</tr>
<tr>
<td>Stiffness of neck and shoulder muscles</td>
<td>4</td>
</tr>
<tr>
<td>Nausea</td>
<td>3</td>
</tr>
<tr>
<td>Vomiting (slight)</td>
<td>4</td>
</tr>
<tr>
<td>Diarrhoea (slight)</td>
<td>3</td>
</tr>
<tr>
<td>Headache</td>
<td>2</td>
</tr>
<tr>
<td>Induration</td>
<td>2</td>
</tr>
<tr>
<td>Pyrexia (to 103° F.)</td>
<td>1</td>
</tr>
<tr>
<td>Giddiness (slight)</td>
<td>1</td>
</tr>
<tr>
<td>Pains in the body</td>
<td>1</td>
</tr>
<tr>
<td>General pruritus</td>
<td>1</td>
</tr>
<tr>
<td>Loss of weight</td>
<td>1</td>
</tr>
<tr>
<td>Relapse of haematuria</td>
<td>1</td>
</tr>
</tbody>
</table>

The immediate beneficial results of the injections were very striking and comprised a rapid disappearance of the blood and ova from the urine, disappearance or mitigation of the hypogastric and perineal pains and pain in micturition, improvement in the anaemia, gain of weight and a quite striking improvement in the general appearance and feeling of well-being in the patients.

The remote results of these cases I am unable to discuss owing to the short time which has elapsed since the injections were given and to the fact that all the patients have left the hospital. As far as is known all the cases have remained free from symptoms except Case 9 who developed a small haematuria within a week of the completion of his course of injections, although no ova could be discovered on microscopic examination of his urine. Case 3 was so pleased with the results of his treatment that he writes from the country under date December 22, 1918: “The haemorrhage has completely stopped, and bar a little pain in the affected region I am practically fit” (although he states elsewhere his duties are not of a very light character). “There are one or two fellows here who are discharged with bilharzia and have had no treatment whatever. They are naturally anxious to undergo this particular treatment. I should be greatly obliged if you could inform me as to the course they should adopt to obtain it.”
That tartar emetic when injected intravenously exerts a striking beneficial effect on vesical bilharziasis is amply demonstrated by the cases here recorded, but the manner in which this effect is produced is not so evident. That the drug kills or inhibits the activity of the parasite appears to be the most reasonable suggestion. At what stage in the life history of the parasite this occurs, whether ovum, miracidium, or adult worm, or all three, has not yet been demonstrated. Christopherson claims that the tartar emetic exerts a direct helminthicidal action on the adult worm. Direct experimental proof on this point is still lacking, though Archibald and Innes's case, the only one so far submitted to post-mortem examination, provides some support for this view.

The high toxicity of tartar emetic has always been a matter of serious concern to all who have employed it in the form of intravenous injections, specially in the intensive manner which now prevails for the treatment of bilharziasis, trypanosomiasis and leishmaniasis. That such injections are not free from risk is shown by recent paper by Knowles [6], and by Archibald and Innes [7]. The former recorded five deaths out of twenty cases of kala-azar treated by tartar emetic, whilst the latter record a fatal case of bilharzia so treated. The case of Archibald and Innes was a strong Egyptian soldier suffering from hematuria, whose urine showed a heavy infection with terminal-spined ova of bilharzia. The solution employed for intravenous injection contained one grain of the drug dissolved in two cubic centimetres of sterile water being mixed immediately before use with an equal amount of sterile normal saline solution. The initial dose was grain gradually increasing to a maximum of two grains until a total of thirty-three grains was given, the injections being given every second day. At the end of the treatment the urine contained blood, but no ova. The patient then developed influenza and died on the fourth day of the illness from broncho-pneumonia. At the autopsy no adult worms could be found though the congested mucous membrane of the bladder contained large numbers of bilharzial ova. The liver and kidney cells and the tunic intima of the inferior vena cava showed fatty degeneration and fatty infiltration, changes which were attributed to the action of tartar emetic and were not sequel of bilharzia, influenza or a previous malarial infection.

This opinion of Archibald and Innes appears to be correct as somewhat similar lesions are found in certain toxic conditions, especially in the liver in the closely allied conditions of arsenic and phosphorus poisoning and as was found by Gregorson and Taylor [8] in trinitrotoluol poisoning:

The toxicity attributed to the ova and miracidia of bilharzia by two Japanese observers, Kiyono and Murakami [9], do not appear to produce fatty changes in the liver but lead to a cirrhotic condition of that organ.

Although in Archibald and Innes' case the cause of death appears to have been influenzal broncho-pneumonia the degenerative changes in the liver and kidneys may have been recoverable, or may have been due to undue susceptibility of the patient to antimony. That very much larger doses of tartar emetic can be given intravenously with perfect safety is evident from a case under the care of Dr. C. W. Daniels and treated by Dr. H. B. Newham, C.M.G. [10], at the Seamen's Branch Hospital attached to the London School of Tropical Medicine. This was a patient infected with Trypanosoma rhodesiense, who received 236 bi-weekly intravenous injections of tartar emetic in the course of two and a half
years. The maximum dose was 24 grains and the total quantity administered amounted to the enormous total of 550 grains. The patience of the physician and the fortitude of the patient were finally rewarded by the complete recovery of the patient from the most virulent of all the forms of trypanosomiasis, and the patient happily remains free from symptoms both of the disease and of antimony poisoning until the present day.

Since the risks of antimony poisoning as the result of intravenous injections, though apparently not very great, cannot be ignored, other forms of antimony should be sought with equal therapeutic effects and a diminished toxicity. Antimony and arsenic are so closely allied in their chemical characters that this condition would probably be brought about by the productions of organic compounds of antimony. Since antimony and arsenic are very closely allied in their chemical characters and the toxicity of arsenic has been greatly reduced without diminishing its therapeutic action by introducing arsenic in organic combinations in such drugs as salvarsan and its substitutes, it would appear highly probable that similar organic compounds of antimony would be similarly influenced. In view of the prevalence of trypanosomiasis, leishmaniasis and bilharziasis in various parts of the world and the undoubted beneficial effects of antimony compounds on these diseases the production and thorough investigation of such organic compounds of antimony is one of the pressing problems of the day in Tropical Medicine.

Meanwhile Sir Leonard Rogers [11], has drawn attention to the occasional danger from the toxicity of tartrate emetic intravenously and has done the pioneer work in searching for equally efficient but less toxic forms of antimony. In 1916, he recommended sodium antimony tartrate, Plimmer's salt. More recently he has employed colloid antimony sulphide intravenously in kala-azar. He found it effective in smaller doses, being retained in the blood longer than the soluble tartrates of antimony and concludes that colloid antimony sulphide appears to be a distinct advance on soluble antimony tartrates in the treatment of kala-azar and thinks it would be well worth trying in sleeping sickness. In view of the efficacy of the soluble tartrates in bilharziasis as well as of the occasional danger arising from their toxicity it is evident that colloid antimony sulphide given intravenously would be well worth trying in bilharziasis.

I am indebted to Lieutenant-Colonel Marett Timms, R.A.M.C., officer commanding the Bermondssey Military Hospital, for permission to publish these cases, and to Capt. F. Talbot, R.A.M.C., and to Drs. R. H. Townend, J. Howard Cook, A. M. Cato and A. E. Wilson for permission to use the cases under their care.

REFERENCES.

INAGGLUTINABLE PARATYPHOID BACILLI (? PARATYPHOID C) IN INDIA.

By LieuTaENt-ColonoEL J. A. KENNEDY.

Royal Army Medical Corps.

In my Report on the Enteric Convalescent Depot, Naini Tal, for 1914 (Indian Government Reports), I made the following note on the identification of cultures received in the laboratory during the year. "One of these was a paratyphoid but could not be classified as either 'A' or 'B' and the opinion was expressed at the time that it was Bacillus suipesier aertrycke. This opinion was expressed by my predecessor in Naini Tal (Lieutenant-Colonel Grattan) into whose hands this organism came.

Again in the Report for the same laboratory for the year 1917, I made the following statement under the heading "Notes on Organisms": "Five strains are included in the above figures (one from an Indian) all isolated in blood culture, which do not conform absolutely to either 'A' or 'B.' They are definitely of a specific nature but do not give the typical serum reactions of either 'A' or 'B.' One, at least, is apparently closely allied to B. Gaertner. These are at present under investigation."

During 1918 I was investigating a series of these strains, hoping to make a definite statement in my Report for 1918, but in the middle of the year I was transferred to Mesopotamia and the investigation was still incomplete. Though I had tried all the likely laboratories in India I was unable to obtain a culture of B. aertrycke.

On arriving in Mesopotamia I found that bacteriologists were noting the occurrence of "inagglutinable" paratyphoids and I understand that quite recently Lieutenant-Colonel Ledingham, Consultant Bacteriologist, and Major Mackie, I.M.S., have come to the conclusion that certain of these should be classified as a species of paratyphosus distinct from paratyphosus A or B, but were unable like myself to make a complete serological scrutiny.

Finally, in the Lancet of February 22, 1919, Dr. Hirschfeld published a paper on "A new Germ of Paratyphoid" which he called "Paratyphoid C." It is very probable that this is the same organism as I have noted in India and as has been noted here in Mesopotamia.