obviate the necessity for the operator to maintain pressure on the plunger was found to be ineffective after repeated trials.

The syringe described by W. O. Gross (1954) seems to offer an advance in mass inoculation technique in that it provides a more rapid method than others described. Again, however, with this syringe the thumb must control the plunger carefully during injection and withdrawal from the patient. Whether such control with a syringe of this bulk is practicable will have to be determined in a series of field trials by regimental medical officers. In our hands it proved possible to use the syringe in this fashion, and it may well prove to be a step forward in the provision of a safe mass inoculation technique.

REFERENCES

SCHISTOSOMIASIS AMONGST RHODESIAN TROOPS

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The marked increase in the incidence of schistosomiasis in Central and Southern Africa in recent years amongst all sections of the community is well known. Public Health authorities are faced with a formidable task when considering the preventive aspects of the disease on a nation-wide scale.

To approach the task by directing the attack mainly against the intermediate host, the snail, is inadequate because it would be impossible to cover all the rivers, streams and dams in such an immense area, although the value of these measures, however limited, cannot be disputed.

It would appear, then, that the maximum effort should be expended in dealing with the problem as it appears in the case of the definitive host, man. Here it is not sufficient to wait for symptoms to appear before dealing with them, but rather to look for evidence of the disease before it becomes clinically obvious. Under such circumstances treatment would be far more efficacious than when the lesions are well established.

This object was held in view by the writer when he was appointed in February, 1956, to be regimental medical officer to an infantry battalion of Rhodesian troops who were destined to do a tour of duty in the Far East commencing in April, 1956. The battalion consisted of 56 European officers and other ranks
and 856 Africans. The writer, unfortunately, joined the battalion only a short while before embarkation and was unable to carry out a survey before departure in order to discover how many were infected at that time. Enquiries, however, revealed that a survey had in fact been carried out in October and November the previous year on approximately three-quarters of the personnel who eventually accompanied the battalion to Malaya.

This survey involved the microscopical examination of the urine of all available personnel and 60 positive cases were found. All of these men were treated with nilodin, which was given by mouth in tablet form. Unfortunately no follow-up was done on any of these, but it was found that 30 presented again in Malaya with ova in their urine. The first of these was discovered two months after arrival and the last, sixteen months later. This does not speak well for the treatment used, but it appears that the men reacted unfavourably to it and difficulty was encountered in getting them to take the tablets.

Within five weeks of arrival in Malaya the first new case reported, and during the course of the ensuing twenty months cases continued to occur with increasing regularity. During the period under review 61 cases in all presented (including the 30 recurrences mentioned above), which represents 7 per cent of the personnel concerned. Of the 61 cases three were amongst the European personnel and 58 amongst the African. Of these, 12 presented within six months of leaving Rhodesia, an additional 19 within twelve months and a further 30 within twenty months. The insidious onset of the disease must be adequately appreciated, and it is remarkable to note that all these seemingly healthy men were undoubtedly carriers of this unpleasant condition and had been in some cases for quite a considerable period. The inference is that all these men would have been potential infectors of others had they remained in Rhodesia.

Manson-Bahr (1954) makes it clear that patients may go for as long as two and a half years from the time of infection until they have symptoms and this series of cases supports that view. Because of the mildness of the initial symptoms, these may easily be ignored by the patient unless he is specifically asked about them; thus the two-and-a-half-year period may be considerably exceeded before the symptoms become severe enough for his own attention to be drawn to them, and his potential as a carrier is therefore increased accordingly.

All these cases presented with very vague symptoms; in none was the diagnosis obvious and it was made only as a result of repeated urinary investigations; in some it was necessary to resort to cystoscopy. A mild dysuria was the most common symptom, marked hematuria was never seen. All cases, however improbable, were subjected to careful urine examination and the number of positive findings was very gratifying. Fifty of the cases were diagnosed microscopically and 11 by cystoscopy. All proved to be cases of Schistosoma haematobium; neither S. mansoni nor S. japonicum was seen.

Nothing but microscopical evidence was regarded as diagnostic in any of these cases, and if there was any doubt, cystoscopy was done and in very few suspected cases was this found to be negative. Cases which had recently been subjected to vigorous operational activity or physical training were invariably
positive, which bears out the observation so frequently made that all suspected cases should be exercised prior to their urine being examined. The simple microscopical examination of a centrifuged specimen of urine proved to be the most successful procedure, as a large number of such examinations can rapidly be undertaken by a properly trained technician. In this series this was done by a specially trained African orderly, and he proved to be quite uncanny in his ability to demonstrate ova in the urines he examined.

When the battalion left Rhodesia it was considered to be at the peak of physical fitness as a result of selection, training and medical examination. In Malaya, it was understood that suitable snails for transmitting the disease were not found; thus the possibility of new cases developing or old ones becoming reinfected did not exist. Work by Sandosham (1956) has shown, however, that species of snails similar to those found in Rhodesia, e.g. Bulinus and Lymnaea, exist in Malaya, but attempts to transmit schistosomiasis with these local snails were not successful. Previous experiments carried out by workers in Egypt and India along similar lines had also failed. It was felt, however, that if enough ova were set free in Malaya over a sufficiently long period, then there might be danger of mutation to a strain capable of establishing itself in local snails. Past experience has shown that this has occurred in America where ova had been brought in by negro slaves and in Australia, after World War I, where the ova were introduced by troops returning from endemic areas. The risk in Malaya might be entirely a function of time and weight of attack, and it was thought that neither of these criteria had as yet been fulfilled.

With regard to treatment it was found that intravenous sodium antimony tartrate (S.A.T.) was superior to all other forms tried. Although unpleasant side-reactions, for which this drug is well known, occurred, there were no cases of recurrence in the 30 cases where it was used in treatment. Intramuscular stibophen, nilodin and anthiomaline were also tried, particularly in those cases which had reacted unfavourably to S.A.T. In the 31 cases so treated there were 10 recurrences. As far as possible all cases were followed up after their return to duty from hospital; their urines were examined fortnightly for three months, starting one month after discharge. A total of 1,294 days were spent by these 61 men in hospital (average 21 days per man). This represents a minimum loss to the Governments of £776 in pay and rations.

As a result of this survey it is reasonable to assume that other battalions must be similarly affected and that in the armed forces alone the country has a considerable reservoir of infection. This is important in view of the highly mobile role these men are called upon to play during the course of their military duties in all parts of the Central African Federation, with resulting further dissemination of ova into the various rivers and streams.

This spread of infection could be prevented provided all members of the forces were subjected to urine examination at regular intervals and all positive cases treated. If such a system were introduced in the armed forces it should be possible to extend it to cover civilian organisations as well. It is appreciated that it would be a tedious and difficult undertaking, but in the absence of any
other practicable alternative, and because schistosomiasis is becoming as big a menace as tuberculosis, a concentrated effort to combat it is justified.

REFERENCES


SEVEN NEW SALMONELLA SEROTYPES

_A Report from The David Bruce Laboratories, East Everleigh, Wiltshire_¹

_During_ an extensive survey of _faeces_ from West African lizards carried out in 1956 (Vella, 1958), seven new salmonella serotypes were isolated. These are now included in the 1958 Schema (with the exception of the monophasic variant of _Salmonella canastel_).

The new serotypes are:

- _Salm. legon_ ... ... ... 4,12 : c : 1,5
- _Salm. tamale_ ... ... ... (8),20 : z₂₉ : —
- _Salm. canastel_ var. monophasic ... 9,12 : z₂₉ : —
- _Salm. akuabo_ ... ... ... 16 : y : 1,6
- _Salm. ghana_ ... ... ... 21 : b : 1,6
- _Salm. kokomlemle_ ... ... ... 39 : l,v : e,n,x
- _Salm. teshie_ ... ... ... 47 : 1,2₃,2₅ : e,n,z₁₅²

These new serotypes were all motile and possessed the biochemical characteristics of the salmonella group. They fermented glucose, maltose, mannitol, sorbitol, dulcitol, arabinose, rhamnose, trehalose and xylose promptly with the production of acid and gas. They failed to ferment lactose, sucrose, salicin, adonitol and raffinose. The only biochemical variation found was that while _Salm. tamale_, _Salm. canastel_ var. monophasic and _Salm. kokomlemle_ fermented inositol with production of acid and gas, the other strains failed to do so. They all gave positive methyl red and negative Voges-Proskauer reactions, did not produce indole, hydrolyse urea, grow in KCN broth or liquefy gelatin. They grew readily in Kosser's citrate medium and on Simmons citrate agar, produced _H₂S_, and reduced nitrate to nitrite. Tests with salts of organic acids (d-tartrate, mucate and citrate) and Stern's glycerol fuchsin broth were positive. Phenyl pyruvic acid and malonate tests were negative.

**SEROLOGY**

In each case the somatic and flagellar antigens were determined by the use of diagnostic sera in routine use. Rabbit sera, “O” and “H,” were prepared from

¹ Those responsible were: Colonel M. H. P. Sayers, Majors M. M. Munro and R. C. Stewart, Sergeant I. G. Hopkins, Corporals K. B. Easterbrook and D. J. Maddox, all of the Royal Army Medical Corps; and Mr. A. E. Vincent, A.I.M.L.T.

² The final identification of _Salm. teshie_ was carried out by Dr. Joan Taylor, but it is included here at her request.