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THE PRESENCE OF *ENTAMÆBA HISTOLYTICA* AND *E. COLI* CYSTS IN PEOPLE WHO HAVE NOT BEEN OUT OF ENGLAND.

Result of an investigation carried out at the Liverpool School of Tropical Medicine.

BY PROFESSOR WARRINGTON YORKE, M.D.

During the last two or three years much time and labour have been devoted in different parts of the country to the detection of carriers of *Entamæba histolytica* cysts among soldiers invalided to this country from the various theatres of war. This routine procedure was undertaken for two main reasons:—

(1) Carriers of *E. histolytica* cysts were regarded as dangerous to the community, in that they might be a means of infecting others.

(2) So long as a man harboured these cysts it was considered that he might be subject to a relapse of acute dysentery or to hepatic abscess.

In all about 3,000 convalescent dysenterics have been examined three or four times each at the Tropical School in Liverpool, and *E. histolytica* cysts have been found in about 11.5 per cent. of cases.

Somewhat later it was decided to examine the soldiers who were in hospital for diseases other than dysentery. Of 450 such cases examined, about twice each, 7.8 per cent. were found to be infected. This discovery was very striking, and led naturally to the question whether the infection exists among soldiers and civilians who have never been out of England and Wales.

The results of one examination of a considerable number of persons who have never been abroad are given in the following table:—

CLASS OF CASE EXAMINED.	Date of Examinations.	Number of Cases examined.	PERCENTAGE FOUND INFECTED WITH					
			<i>E. histolytica.</i>	<i>E. coli.</i>	<i>E. nana.</i>	<i>Lambia.</i>	<i>Tetramitus.</i>	<i>Trichomonas.</i>
1. Convalescent dysenteries in military hospitals	May, 1916, to May, 1918.	3000	11.5 p.c.	29.4 p.c.	16.0 p.c.	17.2 p.c.	3.2 p.c.	.9 p.c.
2. Patients in military hospitals for diseases other than dysentery	June, 1916, to June, 1917.	450	7.8 p.c.	21.1 p.c.	...	9.5 p.c.	2.0 p.c.	.9 p.c.
3. Persons who have never been abroad :—								
A. Civilians in Liverpool Royal Infirmary	1917	450	1.5 p.c.	6.7 p.c.	2.4 p.c.	6.0 p.c.	1.5 p.c.	
B. Children under 12 years old in Liverpool Children's Infirmary.	Feb.-May, 1918	246	.8 p.c.	10.0 p.c.	1.2 p.c.	13.0 p.c.	1.6 p.c.	
C. Recruits 18-19 yrs. old in training camp: <i>Batch. Av. sojourn in camp before exam.</i>								
i. 2-3 months	April, 1917	263	3.0 p.c.	12.1 p.c.	?	4.5 p.c.		
ii. 2-3 months	Aug., 1917	241	6.6 p.c.	23.2 p.c.	6.6 p.c.	7.5 p.c.	1 case	
iii. 5 months	Oct., 1917	230	3.9 p.c.	14.8 p.c.	5.7 p.c.	6.1 p.c.		
iv. 1 month	April, 1918	98	6.1 p.c.	21.4 p.c.	6.1 p.c.	8.2 p.c.		
v. 2-5 days	May, 1918	84	8.2 p.c.	22.4 p.c.	6.0 p.c.	11.8 p.c.	1 case	
vi. 9 days	May, 1918	105	6.6 p.c.	17.1 p.c.	12.3 p.c.	6.6 p.c.		
Total Recruits ...		1021	5.2 p.c.	17.1 p.c.	5.3 p.c.	6.7 p.c.	2 cases	
D. Lunatics in an asylum	June, 1918	46	19.5 p.c.	43.5 p.c.	10.8 p.c.	4.3 p.c.	26.1 p.c.	
4. Soldiers returned from abroad stationed at camp in which were recruits mentioned above ...	Oct., 1917	90	7.8 p.c.	23.3 p.c.	6.7 p.c.	5.6 p.c.	2.2 p.c.	

As is shewn in the table these cases can be divided into various groups :—

A. Civilians in an ordinary general hospital : of 450 examined, 1·5 per cent. were infected with *E. histolytica* cysts and 6·7 per cent. with *E. coli* cysts.

B. Children under twelve years of age in a children's hospital : of 246 examined, 8 per cent. were infected with *E. histolytica* cysts and 10·0 with *E. coli* cysts.

C. Army recruits, 18-19 years of age, in a training camp : of 1,021 examined, 5·2 per cent. were infected with *E. histolytica* cysts and 17·8 with *E. coli* cysts.

D. Inmates of a lunatic asylum : of 46 examined, 19·5 per cent. were found to be infected with *E. histolytica* cysts and 43·5 per cent. with *E. coli* cysts.

It is by no means clear why the young recruits should be so much more heavily infected than the civilians in hospital. At first it was considered that possibly the recruits were infected in the training camp from men who had returned from abroad and were stationed at the camp. Ninety such men were examined, and 7·8 per cent. found to be infected with *E. histolytica*. This hypothesis, however, had to be dropped, as later investigation, conducted during the last two months, shewed that of 84 recruits who had been in the camp for an average of only 2·5 days, 8·2 per cent. were infected. This batch of recruits were almost certainly infected before they went to camp, or, as they had been recruited only a day or two before going to camp, before joining the army.

Assuming that the cysts found in the indigenous cases are the same as those occurring in convalescent dysenterics, and there seems no reason to doubt that this is so—as morphologically, both in fresh and stained preparations, they are indistinguishable, and from one of the indigenous cases a kitten was infected with acute amoebic dysentery—these results are of considerable importance both to the military and to the civilian authorities.

At the present time an elaborate machinery is in operation for the examination of dysenteric soldiers returning to this country, for the special treatment of such as are found to harbour *E. histolytica* cysts, and for the subsequent segregation in special camps of such as are apparently sterilised by this treatment. Cases in which treatment fails to clear the cysts are sent to substitution work. I do not intend to comment here upon the present regulations as regards dysentery, but simply to point out that it is strangely illogical to legislate specially for the returned dysenteric whilst ignoring altogether men who have been invalided for diseases other than dysentery and young recruits just entering the army, both of which classes are infected with *E. histolytica* cysts to an extent approaching the convalescent dysenterics.

The chief point of interest to civilians is whether the discovery of *E. histolytica* infection amongst persons who have never been out of England forecasts the appearance of indigenous cases of amoebic dysentery, which up to the present are practically unknown in this country. I have been able to find in the literature records of only three well-authenticated cases. If the infection amongst the population of this country is old standing and existed before the war, the discovery would appear to have little or no pathological importance; but if the infection is largely or wholly of recent importation, and due to the return of numerous infected soldiers, it may well have much more significance.

Unfortunately no information is available regarding the degree of infection with *E. histolytica* of the civilian population of this country before the war. With a view to obtaining further information on this subject it was decided to endeavour to examine a section of the community which had to a great measure been shut off from contact with the outside world during the past few years. It was considered that the inmates of a lunatic asylum might to some extent serve this purpose. A number of asylum patients (46) were examined with the following remarkable results:—infection with *E. histolytica* cysts 19·5 per cent. (9 cases), with *E. coli* cysts 43·5 per cent. (20 cases).

It is unnecessary to speculate at present upon the exact significance of the results of this investigation, but the information already obtained is obviously of sufficient importance to show the necessity for further work.

In conclusion I wish to point out that Messrs. J. R. MATTHEWS and A. MALINS SMITH, both of whom are temporarily on the staff of the Liverpool School of Tropical

Medicine, have made the majority of the examinations the results of which are recorded in this note, and to them the credit of the investigation is mainly due.

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DISCUSSION.

Mr. CLIFFORD DOBELL: The results given in this paper are similar to those which we obtained in the investigations carried out originally in London. Mr. SMITH and Mr. MATTHEWS started their investigations at my suggestion in consequence of these results. In 1916 I began to examine the patients admitted to the second New Zealand General Hospital. I examined seventy men who had been admitted on account of gunshot wounds and diseases other than dysentery, and I found over 15 per cent. of these cases to be carriers of *Entamoeba histolytica*. I concluded, therefore, that it was important to have the civil population of this country investigated. Another point I may mention is, that I think if we had an accurate series of records we should find there are more cases indigenous to the country than we suspect. Probably some cases of amoebic dysentery in this country have been included among those put down as ulcerative colitis. With regard to the cases in lunatic asylums an important point is that lunatics, of course, are very dirty in their habits, and if there was one infected case in an asylum the condition would probably spread. One finds bacillary carriers behaving in this way in other asylums.

Sir WILLIAM LEISHMAN: I am sure we all recognise at once the importance of these observations of Professor YORKE. There are two things in connection with them on which I would say a word. The first is, that being apparently a new and very important observation, one would like it repeated on a wider scale. It appears of such moment that it is desirable to extend the experiment by searching other sections of apparently healthy people, to see if they too yield a similar percentage of carriers. The other point concerns the possible practical dangers. I think I may say a word bearing on that, because though a new observation, this can be no new thing, at least not new during the last two or three years. This means, of course, that a proportion of the reinforcing drafts which have gone over to France have probably been, unknown to us, passing cysts of *E. histolytica*. Yet, in spite of that, I can testify that there has been no outbreak on any scale of amoebic dysentery in France. Professor YORKE's observation is a most valuable one, and it is obviously one on which we want to get the best information, as it has a direct bearing on the conservation of our man-power.