who have performed a number of sclero-corneal trephings, and have expressed their satisfaction with the method. Among such are: Barraquer, of Barcelona; Coppez, of Brussels; Fuchs, of Vienna; Kuhnt, of Bonn; Sattler, of Leipzig; Schnaudigel, of Frankfurt; Vogt, of Aarau (Switzerland); von Mende, of Mitau (Russia); and Wagenmann, of Heidelberg.

From Canada and America the volume of evidence is overwhelming. There a host of surgeons are freely using the trephine; amongst others the list includes: de Schweinitz, Webster Fox, Friedenwald, Gifford, Jackson, Knapp, Marple, McReynolds, Reeve, Todd, Weeks, and Wyler.

With the view of laying emphasis on the work and opinions of others I have given no statistics of my own cases in this article, although I have an experience of over 1,000 trephinations to speak from. The statistics derived from this mass of figures will, however, be dealt with before long elsewhere.

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ON THE MULTIPLICATION AND INFECTIVITY OF *T. CRUZI* IN *CIMEX LECTULARIUS*.

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THE experiments described here were undertaken in order to ascertain whether *T. cruzi* is capable of existing and developing in *Cimex lectularius*, and if so, whether the forms found in the bed-bug are capable of infecting laboratory animals when injected into them, or when the bugs feed on the animals. Where not otherwise stated, the bugs used were not laboratory-bred, but were collected from infested houses. In order to exclude as far as practicable the possibility of natural infection with flagellates occurring in the insects examinations were made of the following:

1. A hundred and four unfed adults kept at laboratory temperature.
2. A hundred adults kept at 27° C.
3. Twelve adults fed once on a healthy mouse and thereafter kept at laboratory temperature.
4. (a) Twenty larvae taken from collecting jar and kept unfed at laboratory temperature; (b) 62 laboratory-bred larvae, once fed on a healthy guinea-pig and examined at intervals, kept at laboratory temperature.

The alimentary canal (stomach, gut, and rectum) was carefully examined for the presence of flagellates, but with a uniformly negative result, and the blood of the animals upon which adults and larvae were fed—mouse and guinea-pig—remained free from flagellates.

First Series of Experiments.

Having excluded natural infection in the bugs as far as was possible with the numbers available, adults were fed on a mouse infected with *T. cruzi*, and showing ten parasites to the field (Leitz obj. 6, oc. No. 4). The bugs were kept at laboratory temperature without being fed, and dissected at intervals. Several inoculations were made, with results as shown in Table I, from which it will be observed that the parasites proved infective on inoculation twenty-one and seventy-two hours after ingestion by *Cimex lectularius*. Crithidial forms with short flagellum were found in the stomach within twenty-four hours of the feed. Many of the inoculated mice died early of acute septicaemic infection. Several animals failed to become infected, although they were inoculated with bug contents containing large numbers of living parasites.

TABLE I.—Results of Examination and Inoculation of Intestinal Contents of Bugs fed once on an Infected Animal and then Starved.

No. of Experiment.	Time since Infecting Feed.	Parasites present in Material Injected (+).	Animal Inoculated.	Result of Inoculation.	Remarks.
1	6 hours	Stomach (+)	—	—	No inoculation done
	21 "	Stomach (+)	Mouse	Pos.	—
3	30 "	Stomach, gut, rectum, negative	—	—	No inoculation done
4	31 "	Stomach (+)	—	—	No inoculation done
5	46 "	Stomach (+)	Mouse	Neg.	—
6	72 "	Stomach, gut, rectum, negative	"	Pos.	—
7	72 "	Stomach, gut, rectum, negative	—	—	—
8	4 days	Stomach, gut, rectum, negative	—	—	No inoculation done
9	4 "	Stomach, gut, rectum, negative	—	—	No inoculation done
10	7 "	Stomach (+), gut (+)	Mouse	—	Died in 48 hrs.
11	8 "	Stomach, gut, rectum, negative	—	—	No inoculation
12	9 "	Stomach, gut, rectum, negative	—	—	No inoculation
13	10 "	Stomach, gut, rectum, negative	Mouse	—	bug dead Died next day
14	10 "	Gut (+)	"	Neg.	—
15	11 "	Gut (+)	"	"	—
16	12 "	Gut (+) rect. (+)	"	—	Died in 5 days
17	13 "	Gut (+)	"	Neg.	—

Second Series of Experiments.

In this series of experiments bugs fed once on an infected animal were subsequently fed upon healthy animals. Laboratory animals were inoculated at intervals either with faeces passed by the bugs or with bug contents. Such inoculations were only made when flagellates were found to be

TABLE II.—Results of Examination and Inoculation of Contents of Bugs once fed upon an Infected Animal and subsequently upon Healthy Animals.

No. of Experiment.	Time since Infecting Feed.	Parasites present in Material Injected (+).	Animal Inoculated.	Result of Inoculation.	Remarks.
1	11 days	Rectum (+), faeces	Mouse	Pos.	
2	11 "	Rectum (+), faeces	"	Neg.	
3	11 "	Rectum (+), faeces	"	"	
4	20 "	Faeces (+)	Guinea-pig	"	
5	25 "	Rectum (+), gut	"	"	
6	26 "	Rectum (+), gut (+), stomach	"	Pos.	{ Bug dead; forms like "blood forms" found.
7	38 "	Serum (+)	Mouse	Neg.	
8	38 "	Serum (+)	"	"	
9	38 "	Rectum (+), gut	"	Pos.	{ Bug dead; forms like "blood forms" found.
10	38 "	Faeces (+)	"	Neg.	
11	38 "	Faeces (+)	"	"	
12	38 "	Rectum (+), gut (+)	"	Pos.	{ Bug dead; forms like "blood forms" found.
13	39 "	Rectum (+), gut (+), stomach (+)	"	Neg.	
14	39 "	Rectum (+), gut (+), stomach (-)	"	Pos.	
15	42 "	Rectum (+), gut (+), stomach (+)	"	Neg.	
16	42 "	Rectum (+), gut (+), stomach (+)	"	"	
17	43 "	Faeces (+)	"	Pos.	
18	58 "	Rectum (+)	"	Neg.	
19	69 "	Gut (+)	"	"	
20	69 "	Gut (+)	"	"	
21	77 "	Rectum (+)	Guinea-pig	Pos.	
22	77 "	Rectum (+)	"	Neg.	
23	79 "	Rectum (+)	"	"	Bug dead.

present on microscopic examination. Table II gives the results of the inoculations. Animals which did not live for a reasonable time for infection to show itself are not considered in the table, the average incubation period in strain mice and guinea-pigs—namely, ten and eleven days—being taken as the criterion.

It will be seen from this table that inoculations into mice were successful eleven, thirty-eight (2), thirty-nine, and forty-three days after the infecting feed. Inoculations into guinea-pigs were successful twenty-six and seventy-seven days after the infecting feed. It will be noted that in three cases where the bug had died before dissection forms closely resembling blood forms were found in the rectum, and in each case the animal inoculated became infected.

Taking the foregoing two series of experiments, we find that of 26 mice inoculated at varying periods from the infecting feed 7 became infected, the incubation period being on an average twenty-two days and the duration thirty-one days. Guinea-pigs, 6 in number, were inoculated, and of these 2 became infected. The period from the infecting feed ranged from twenty to seventy-nine days, and the two which became infected were inoculated twenty-six and seventy-seven days respectively from the date of the infecting feed. The average incubation in these two was twenty-five days and the duration of the disease fifty-eight days. Of a total of 32 animal inoculations, therefore, 9 gave a positive result.

Form of Flagellate Injected.

In most cases there were present in the material used for injection large numbers of parasites, of very varying type, a large bulky crithidial form with a long free flagellum predominating. Frequently long, very slender parasites were encountered, and flagellates which approached the form found in the blood of infected animals. In the faeces of three bugs—all of them dead—parasites resembling "blood forms" were found, and in each case inoculation resulted in infection. Such forms were found twenty-six and thirty-eight days after the infecting feed. It was, however, not possible to decide which form or forms of flagellate caused infection on inoculation, as so many types were present.

Third Series of Experiments.

Experiments were undertaken in order to ascertain whether bugs previously fed on infected animals were capable of transmitting the infection to healthy animals. In the first attempts the bugs were fed on mice, but these animals did not prove suitable for this purpose, as they frequently died before the disease had time to develop. Guinea-pigs were more satisfactory, as the insects could be fed on them at short intervals without producing such ill effects as in the case of mice. The results of these experiments are given in Table III.

It will be observed that of the 28 animals used for transmission experiments, only one, a guinea-pig, became infected. The bugs which caused infection were kept at 27° C. During the experiments the bugs, with the exception of those kept in the cold, passed faeces very frequently upon the shaved skin of the animals used, and in many cases the faeces contained large numbers of parasites of various types. Such faeces produced infection in several animals into which they were inoculated. It is clear, therefore, that, although *Cimex lectularius* is capable of retaining the parasites in an infective condition for long periods, it fails, as a rule, even under the most favourable circumstances as regards feeding, to transmit the infection to healthy animals.

Examination for flagellates was made in the following groups of laboratory-bred larvae of bugs infected with *T. cruzi*:

12 hatched at 27° C. examined without being fed.

143 hatched at 23° C. examined without being fed.

25 hatched at laboratory temperature and fed and examined as in previous group.

All the examinations proved negative. Bugs kept in the cold did not feed well, and did not, as a rule, lay eggs. No evidence of hereditary transmission of the flagellates in bed-bugs was obtained from these experiments.

TABLE III.—Results of Transmission Experiments.

No. of Experiment.	Time since Infecting Feed in Days.	Animal on which Fed.	Number of Bugs Fed.	Number of Days on which Fed.	Result.
1	2	Mouse	21	1	Neg.
2	4	"	21	1	"
3	7	"	21	1	"
4	9	"	20	1	"
5	10	"	19	1	"
6	11	"	19	1	"
7	13	"	19	1	"
8	16	"	9	2	"
9	23	Guinea-pig	9-7	10	"
10	72	"	6	5	"
11	84	"	6	5	"
12	114	"	5	1	"
13	5	Guinea-pig	13-10	5	Neg.
14	11	"	25	1	"
15	16	Mouse	10	2	"
16	17	Guinea-pig	12	5	"
17	23	"	10-4	11	Pos.
18	25	"	10-5	5	Neg.
19	26	"	9	2	"
20	28	Mouse	1	5	"
21	39	Guinea-pig	9	1	"
22	42	"	4-3	4	"
23	72	"	3-1	2	"
24	79	"	1	2	"
25	11	Guinea-pig	33	1	Neg.
26	17	"	12-8	5	"
27	27	"	8	5	"
28	41	"	8-7	5	"

In experiments 1 to 12 the bugs were kept at laboratory temperature (average 13.5° C.; max. 20°, min. 5° C.).

In experiments 13 to 24 the bugs were kept at a temperature of 27° C.

In experiments 25 to 28 the bugs were kept in a cold room (average 7.2° C.; max. 15°, min. 2.2° C.).

Conclusions.

1. *T. cruzi* is capable of living and multiplying in *Cimex lectularius* for long periods.
2. The parasites found in the bed-bug are infective on inoculation as early as twenty-one hours and as late as seventy-seven days from the infecting feed.
3. It is not possible to say which of the many different forms occurring in the bug causes infection in the vertebrate host.
4. Transmission of the disease to healthy animals by feeding infected bugs on them is of very rare occurrence. It was only once observed in the course of these experiments.
5. There is no evidence of hereditary transmission of *T. cruzi* in *Cimex lectularius*.

THE sixth congress of the Association of French-speaking Doctors of North America will be held this year at Quebec from August 31st to September 3rd, under the presidency of Professor Arthur Rousseau. The subjects proposed for discussion are: Accidents to workers in the province of Quebec; the feeding of children in Quebec; various forms of nephritis; drinking waters in the province of Quebec; high altitude cures in the province of Quebec; and mineral waters in the province of Quebec. Dr. Triboulet, of Paris, will deliver an address on the hygiene of nurslings and particularly of crèches, and will also give a lecture on some subjects to which he has given special attention. The general secretary is M. A. Vallée, 22, rue Sainte Anne, Quebec.