

The Appearance of *Bartonella muris* (M. Mayer 1921) in the Albino and Wild Rat after Splenectomy.

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INTRODUCTION.

IN 1921 Mayer described *Bartonella muris* in the blood of rats that had recovered from a severe attack of trypanosomiasis after the treatment with germanin. Further experiments by Mayer, Borchardt and Kikuth in 1925 showed that the anaemia and haemoglobinuria in splenectomized rats were produced by *B. muris* and not by an ultraviolet virus as had been suggested by Lauda in 1925. The observations of Mayer have been confirmed by numerous workers from all over the world.

OBSERVATIONS.

The experiments to be described were undertaken in order to establish whether white mice and albino rats which are reared at the Onderstepoort Veterinary Laboratory and wild rats caught on the grounds of the institute harbour a latent infection of *Bartonella*. An examination of the rodents showed that they are infested with lice (*Polyplax serrata* and *P. spinulosa*) and on the wild rats fleas were also found.

Experiment 1.

Object.—To ascertain whether locally bred mice harbour any blood parasites.

Method.—Five white mice were splenectomized and blood smears stained with Giemsa were examined every alternate day.

Result.—The details of the observations are mentioned in Table 1. No parasites were found in any of the mice.

Experiment 2.

Object.—To infect the white mice with *Bartonella muris*.

Method.—Three of the mice that had remained free of parasites for a period of 28 days in experiment 1 were injected subcutaneously with 0·5 c.c. of blood from a splenectomized rat harbouring *B. muris*.

Result.—In one mouse *B. muris* appeared on the 8th day and in the other two on the 12th day after injection.

Numerous parasites were seen and a marked anaemia developed. One of the mice died on the 8th day after the appearance of parasites.

TABLE 1.

Splenectomy of White Mice.

No. of Mouse.	Date of splenectomy.	Smears examined for.	Result.	Date of Injection of <i>B. muris</i> .	Incub. period in Days.	Result.
1	22/9/36	8 days	Negative	—	—	—
2	22/9/36	14 days	Negative	—	—	—
3	22/9/36	28 days	Negative	21/10/36	8	<i>Bartonella muris</i> appeared on 29/10/36 in the blood. A severe anaemia and icterus developed but the mouse recovered.
4	22/9/36	28 days	Negative	21/10/36	12	<i>Bartonella muris</i> appeared on 2/11/36 in the blood. A severe anaemia and icterus developed but the mouse recovered.
5	22/9/36	28 days	Negative	21/10/36	12	<i>Bartonella muris</i> appeared on the 2/11/36. A severe anaemia and icterus developed and the mouse died 9/11/36.

Experiment 3.

Object.—To ascertain whether locally bred albino rats harbour a latent infection of *B. muris*.

Method.—Two rats were splenectomized and daily blood smears examined for a period of 14 days.

Result.—Both rats reacted to *B. muris* and recovered. See Table 2.

TABLE 2.
Splenectomy of Albino Rats.

No. of Rat.	Date of splenectomy.	Smears examined for.	Parasites appeared on.	Remarks.
1	24/9/36	14 days.	28/9/36	<i>Bartonella muris</i> appeared on the fourth day after splenectomy. A marked anaemia and icterus developed, but the rat recovered.
2	24/9/36	14 days.	28/9/36	<i>Bartonella muris</i> appeared on the fourth day after splenectomy. A marked anaemia and icterus developed but animal recovered. 27 days after splenectomy blood of this rat was injected into mouse 3, 4, and 5 mentioned in Table I.

Experiment 4.

Object.—To ascertain what parasites are harboured by wild rats caught at Onderstepoort.

Method.—Eight out of the ten rats were splenectomized and blood examined before and after splenectomy.

Result.—The details of the experiment are mentioned in the appended Table 3.

Four rats were infected with *T. lewisi*. Two rats died during the operation. Rat No. 5 did not react to *B. muris*, but died from *T. lewisi* infection six days after splenectomy. *B. muris* appeared on the 4th and 5th day in rats 6, 7, 8, 9 and 10.

Haemoglobin and bile pigments were found in the urine twenty-four hours after the appearance of parasites in rats 6, 7, 8 and 10. One rat recovered, two died and two were killed *in extremis*. The two control rats did not show any clinical symptoms.

Experiment 5.

Object.—To infect splenectomized sheep with *B. muris*.

Method.—The organs of rats 9 and 10 were emulsified and injected intravenously into two sheep 41496 and 41596.

Result.—Daily blood smears were examined for a period of 28 days, but on no occasion did *B. muris* appear.

TABLE 3.
Splenectomy of Wild Rats.

No. of Rat.	Examination of blood before splenectomy.	Date of splenectomy.	Bartonella observed on.	Haemoglobinuria observed on.	Remarks.
1	Negative...	20/4/37	—	—	Died from anaesthetic.
2	Negative...	29/4/37	—	—	Died from anaesthetic.
3	<i>T. lewisi</i> frequent	—	—	—	—
4	<i>T. lewisi</i> rare	—	—	—	—
5	<i>T. lewisi</i> very frequent	29/4/37	—	—	No <i>B. muris</i> appeared. <i>Tryp. lewisi</i> increased rapidly. The rat stopped feeding 4 days after the operation and died on the sixth day from the trypanosome infection.
6	<i>T. lewisi</i>	20/4/37	4th day..	5th day..	Died on the sixth day after the operation, showing marked anaemia and distension of the bladder with haemoglobin and bile stained urine. There was no perceptible increase of <i>T. lewisi</i> . <i>B. muris</i> appeared in extremely great numbers.
7	Negative...	20/4/37	4th day..	5th day..	Died on the seventh day after the operation showing marked anaemia, generalized icterus and distention of the bladder with haemoglobin and bile stained urine. <i>B. muris</i> appeared in extremely great numbers.
8	Negative...	29/4/37	5th day..	6th day.	<i>B. muris</i> appeared in extremely great numbers. Haemoglobinuria was noticed for two days. Rat recovered.
9	Negative...	29/4/37	5th day..	—	<i>Bartonella</i> frequent. Killed on the sixth day and organ emulsions were injected into 2 splenectomized sheep 41496 and 41596.
10	Negative...	29/4/37	4th day..	5th day..	<i>Bartonella</i> appeared in large numbers. Haemoglobinuria was noticed for one day. Rat was killed on the sixth day and showed generalized icterus, marked anaemia and bile pigments in the urine. Organ emulsions were injected into two splenectomized sheep 41496 and 41596.

CONCLUSIONS.

1. Five of the locally-bred mice did not harbour blood parasites although they were infested with lice. The mice were found to be susceptible to *B. muris*.
2. Splenectomy activated a latent infection of *B. muris* in two albino rats.
3. Four out of the ten wild rats were infected with *T. lewisi*.
4. Five out of the six splenectomized wild rats reacted severely to *B. muris*. One rat recovered, two died and two more were killed *in extremis*. The splenectomized rat that did not react to *B. muris* died from *T. lewisi* infection.
5. The two splenectomized sheep which were injected with *B. muris* were found to be refractory.

LITERATURE.

- KIKUTH, W. (1932). Die Bartonellen und verwandte Parasiten bei Mensch und Tieren. *Ergebnisse der Hygiene Bakteriologie Immunitätsforschung und Experimentellen Therapie*. Bd. 13, pp. 559-619.

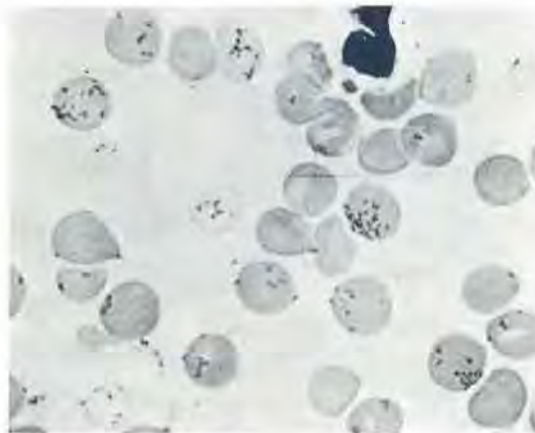


Fig. 1.—*Bartonella muris* in the blood of the albino rat, *Rattus rattus*.
Magnification 1,100 \times .

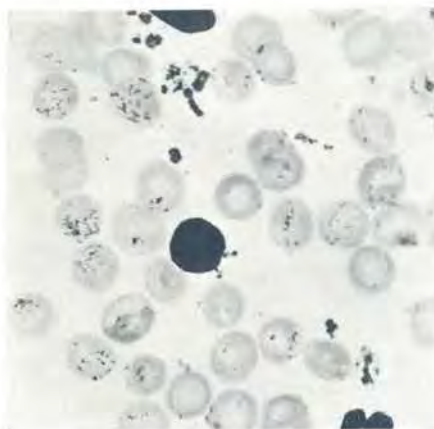


Fig. 2.—*Bartonella muris* in the blood of the wild rat, *Rattus rattus*.
Magnification 1,100 \times .

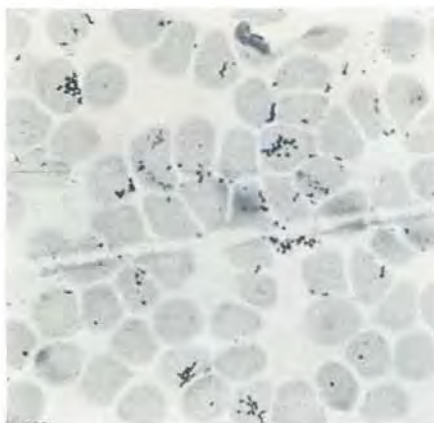


Fig. 3.—*Bartonella muris* in the blood of the white mouse, *Mus musculus*.
Magnification 1,100 \times .