

## Illinois Branch.

*University of Illinois, October 30, 1928.*

4193

### Rôle of Ectoparasites in Bartonella Infection of Albino Rats.

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The importance of the albino rat as an experimental animal makes *Bartonella* infections a serious problem in experimental medicine. In addition, the similarity of the *Bartonella* infection of rats to the human infection, Oroya Fever, suggests the possibility that the 2 diseases may have a number of points in common, particularly as to modes of transmission. This report deals with the latter problem.

Lauda<sup>1</sup> showed that the anemia resulting from splenectomy of albino rats was transmissible by injection of liver emulsion, although at that time he was unaware of the presence of *Bartonella* organisms in the infected animals. Later, Haam, Lauda and Sorge<sup>2</sup> discovered that uninfected rats might become infected after being kept in cages with animals that were known to be infected.

We have confirmed the results of Lauda as to the transmission of the infection by injection of liver emulsion from infected rats into normal ones, and have even transmitted the disease by the injection of less than one drop of blood from a *Bartonella* infected animal into a normal one. As normal controls we have used rats from the Wistar Institute strain. Thus far we have splenectomized 34 of these animals varying in age from 3 weeks to 15 months and have never observed any significant anemia. Furthermore, the spleen weight-body weight ratio of these has averaged approximately 0.25%, whereas the average in the case of over 75 *Bartonella*-infected animals is 0.75%.

The fact that uninfected rats may become infected by contact

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<sup>1</sup> Lauda, E., *Virchow's Arch. f. path. Anat.*, 1925, cclviii, 529.

<sup>2</sup> Haam, E., Lauda, E., and Sorge, G., *Klin. Wchnschr.*, 1927, vi, 2240.

with infected ones suggested the possibility that ectoparasites might play an important rôle in this transmission. Three Wistar strain rats were placed in a small cage with a rat from the *Bartonella*-infected stock and known to be infested with lice and mites. Fifteen days later, all of the Wistar rats were splenectomized and all developed the typical anemia, fatal in one case. A control Wistar rat, isolated during this period and splenectomized at the same time had an essentially normal hemoglobin and blood picture during the entire period of observation.

Next, 12 lice (*Polyplax spinulosus*), engorged with fresh blood, were picked from *Bartonella*-infected rats and placed on each of 6 Wistar rats, which were then kept in sterilized cages. At the same time, 2 Wistar rats from the same lot were isolated in sterilized cages. At the end of 15 to 19 days all of the animals were splenectomized. The 6 louse-infested Wistar rats developed the typical anemia with countless *Bartonella* organisms being present on the erythrocytes, whereas the 2 control Wistar rats showed no significant changes following splenectomy and no *Bartonella* organisms were seen in the blood smears.

Two rats known to be infected with the *Bartonella* were then carefully "deloused" by means of Tincture of Larkspur and kept in close contact with 5 Wistar rats for 11 days. The latter were then splenectomized and again placed in contact with the infected animals. No significant blood changes occurred in 30 days of observation in the case of 3 Wistar rats, and in 15 days of observation in the case of the other 2.

It is evident that the louse is an important vector of the *Bartonella* virus. In order to prevent spreading of the infection in rat colonies this ectoparasite must be eliminated. Furthermore, a similar mode of transmission may be in force in Oroya Fever. This disease has a regional distribution, is more prevalent among people living under poor economic conditions, and is believed by many of them to be spread by body lice. In any event, the rôle of an ectoparasite in conveying the *Bartonella muris* suggests that similar ectoparasites, particularly the body louse (*Pediculus corporis*) and the bed-bug (*Cimex lectularius*) may act as vectors of the *Bartonella* bacilliformis of Oroya Fever.