mal life span when they are allowed to continue their daily feedings on human blood.

Summary and Conclusions. Contrary to general belief, the experiments reported above indicate that guinea pig blood *per se* is not toxic to the human body louse.

In the first experiment it was demonstrated that the red blood cells of guinea pigs remain undigested in the gut of the louse.

In the second experiment it was shown that lice starved for an average period of 36 hours and then fed once on a guinea pig, die within 72 hours, apparently of starvation. Control lice fed only on human blood, likewise were found to die 4 to 4½ days following their last human blood meal.

In the third experiment it was shown that lice fed once on guinea pig blood live their normal life span when their daily feedings are continued subsequently on human blood.

It would appear that human body lice secrete a digestive enzyme specific only for human red blood cells which makes it impossible for them to digest guinea pig blood.

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Mass Infection of Body Lice with *Rickettsia prowazeki.*

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In a preceding article[1] it was reported that body lice *(Pediculus humanus corporis)* which have engorged on guinea pig blood are unaffected and remain alive for their normal life span if subsequent feedings are continued almost immediately (within 2 hours) on human blood. As a result of this observation, infection of human body lice with *Rickettsia prowazeki* was achieved on a large scale, following a single meal on an infected guinea pig.

The inconveniences and disadvantages of infecting lice by the rectal route, the method employed by Weigl[2] for the preparation of typhus vaccine, are well known. Infection of body lice by feeding them on human typhus cases, while feasible, is nonetheless rather impractical. Guinea pigs, on the other hand, may be easily infected and maintained in the laboratory. The advantages of feeding lice on infected guinea pigs, followed by feeding the lice subsequently on *typhus immune humans,* for the ultimate preparation of typhus vaccine are obvious.

Method of infection. Fifty female lice 12-13 days of age were starved for 30 hours. These lice, as could be seen through the integument, were devoid of blood. They were then allowed to feed on a guinea pig infected 10 days previously with the Tunis strain of classical louse-borne typhus.

The flank of the guinea pig had been shaved and rubbed with alcohol, as lice often refuse to feed if the guinea pig is not prepared in this manner. In 30 minutes the lice were fully engorged, as indicated by the large red spot visible in the mid-gut.

The lice were then placed for 2 hours in an incubator at 37°C, in order to induce rapid dehydration and reduction in volume of the engorged guinea pig blood. They were then allowed to feed on a typhus-immune man for one-half hour. Subsequent human blood feedings on a typhus-immune individual were continued twice daily. By the end of the 8th day, 37 of the 50 lice were still alive, while 13 had succumbed.

A number of the surviving lice were dissected and preparations of their intestines were stained with a mixture of May-Grün-

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1 Cabasso, V., PROC. SOC. EXP. BIOL. AND MED., 1947, **64**, 437.

2 Weigl, R., *Arch. Inst. Pasteur Tunis,* 1933, **22**, 315.

wald-Giemsa. Microscopic examination of these preparations showed, without exception, rickettsiae in large numbers. The following experiments were carried out to identify the rickettsiae present.

Experiment I. Excreta of the infected lice, collected between the 8th and 10th days following the infective meal, were suspended in saline and inoculated intraperitoneally into 4 guinea pigs (51B, 58N, 62N and 64N). Three guinea pigs showed signs of classical typhus 8 to 13 days following the inoculation; the fourth (64N) died prematurely.

Forty days after the infective inoculation, guinea pigs 51B and 58N were immune to a challenge inoculation with a guinea pig brain suspension of the Tunis strain of typhus virus. Guinea pig 62N was sacrificed on the 10th day; the brain was triturated, suspended in saline, and injected intraperitoneally into guinea pigs 72N and 73N. Both of these latter guinea pigs showed typical clinical signs of typhus beginning on the 6th day and were immune to the challenge inoculation given 40 days later.

Experiment II. The intestines of 10 infected lice were triturated, suspended in saline and inoculated intraperitoneally into guinea pigs 68N and 69N. Both animals showed signs of classical typhus on the 6th day.

Guinea pig 68N was sacrificed on the 10th day and a suspension of its brain inoculated intraperitoneally into guinea pigs 74N and 75N. Both showed signs of classical typhus on the 6th and 7th days respectively, and were immune to the challenge inoculation on the 40th day.

Experiment III. Ten intact lice were sterilized externally with 70% alcohol, ground in a mortar and suspended in saline. The suspension was inoculated intraperitoneally into guinea pigs 50B, 52B, 65N and 66N. On the 2nd day following inoculation all 4 guinea pigs showed severe signs of typhus and all showed signs of pronounced cachexia at the end of the 5th day.

Guinea pig 50B was sacrificed on the 10th day and a suspension of its brain inoculated intraperitoneally into guinea pigs 55N and 56N. Guinea pig 55N died prematurely while 56N showed signs of typhus on the 7th day and was sacrificed on the 12th day. A suspension of its brain was inoculated intraperitoneally into guinea pigs 60N and 61N, both of which showed signs of typhus on the 6th day and were immune to the challenge inoculation on the 40th day.

Guinea pigs 65N, 66N and 52B died on the 7th, 7th and 16th days, respectively, following inoculation. On autopsy the organs showed no abnormal appearance except that the viscera were covered with a glossy white, membranous-like film. Smears of this material when stained with Giemsa showed innumerable rickettsiae, both free or enclosed in protoplasm of endothelial cells.

The virus which proved to be extremely virulent on direct inoculation of infected lice into guinea pigs, assumed its normal characteristics with the usual incubation period on the first passage from guinea pig to guinea pig.

Summary and Conclusions. The experiments reported above indicate that human body lice fed once on a typhus-infected guinea pig at the height of the febrile period, and subsequently fed on a typhus-immune human, develop massive infection with *Rickettsia prowazeki.* In comparison to the rectal inoculation of lice for the preparation of the Weigl type typhus vaccine, this method of infecting lice seems to offer certain advantages.