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Dissociation of Rickettsia and Proteus X_{19} Antibodies in Experimental Typhus Infections.

SAMUEL H. ZIA AND P. Y. LIU.

From the Department of Bacteriology and Immunology, Peiping Union Medical College, Peiping.

In our studies[1] on the immune response of individuals vaccinated against typhus Rickettsiæ it was found that while the majority of the sera of these persons presented both rickettsial as well as Proteus X_{19} agglutinins, a number of them had either only one or the other. Furthermore, it has been found that the Proteus X_{19} antibodies tended to persist longer than the other. As it is difficult to study individuals repeatedly for their antibody content, and in order to find out if similar absence of correlation between the 2 antibodies is also seen in cases of actual disease, this was studied in experimental infection in animals. It has been shown[2] that *Myospalax fontanieri* differed from guinea pigs in giving, in addition to rickettsial antibodies, high Proteus X_{19} agglutinins in their serum. These animals have, therefore, been utilized in the present study, and the results herewith are communicated.

Rodents *(Myospalax fontanieri)*, which are susceptible to experimental typhus infection, have been employed. It has been found that serum from normal animals does not give a positive Weil-Felix reaction or rickettsial agglutination. The animals were infected by inoculation of brain emulsion of infected guinea pigs. At different times after the onset of fever, blood was taken by cardiac puncture, and sera examined for Proteus X_{19} and rickettsial agglutination. It was possible to bleed some animals as many as 5 to 6 times, but in the majority of cases only one bleeding was possible. Altogether 34 samples of blood were obtained from 19 animals at different times. The technic for agglutination tests has been previously described.[1] The agglutinin response of a representative animal is presented in Fig. 1 and the combined results of the experiment are summarized in Table I.

It can be seen from Fig. 1 and the table that while rickettsial agglutinin tended to appear and disappear early, the Weil-Felix reaction in the majority of the animals did not appear until after the

[1] Liu, P. Y., Zia, S. H., and Wang, K. C., PROC. SOC. EXP. BIOL. AND MED., 1938, **38**, 682.

[2] Zia, S. H., and Hu, C. H., PROC. SOC. EXP. BIOL. AND MED., 1938, **32**, 26.

TABLE I.

Weil-Felix Reaction and Rickettsial Agglutination Produced by Serum of Rodents at Various Times During the Course of Experimental Infection.

		Weil-Felix reaction							Rickettsial agglutination				
			No. of positives at							No. of positives at			
Day of fever	Total No. examined	No. of negatives	1:10	1:20	1:40	1:80	1:160-1:320	1:640-1:1280	No. of negatives	1:10	1:20	1:40	1:80
1-2	6	6							1	1	1	2	1
2-3	4	2					2		0	1	1	2	
4-5	5	3		2					0	2	1	1	1
6-7	6	0	1	1			4		0	4	2		
8-11	3	0				1	1	1	0	1	1	1	
12-15	4	1						3	0	1	2	1	
16-19	3	0					1	2	1	1	2		
20-25	3	0					2	1	3				

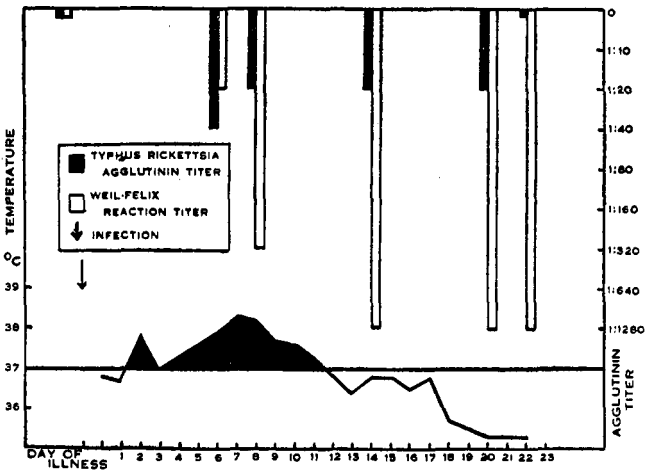

FIG. 1.

Agglutinin response in relation to the course of experimental infection in animal No. 10.

first week, and then, except for one animal, persisted long after the fever had subsided. This seems to be in general agreement with the serological results obtained in individuals following typhus vaccination.

While it is generally known that 2 distinct antibodies are produced by the Rickettsiæ, one of which is identical to an anti-Proteus X_{19}, little knowledge has been found in regard to the degree of their association during infection or after artificial immunization with rickettsial suspensions. In a previous report, we have shown that in single specimens of blood serum taken from individuals inoculated with the louse typhus vaccine, little correlation of the 2 antibodies was found. In the present communication, when repeated examinations on several individual animals were possible, a similar lack of strict parallelism was also found in experimental typhus infection. The reason for this is not clear. However, if the same principle should be applied to human cases, the rickettsial agglutinin might offer an aid to earlier diagnosis of the disease, since in experimental animals it seems to appear in most cases much earlier than the Weil-Felix reaction.