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A Case of Q Fever Probably Contracted by Exposure to Ticks in Nature

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See also:

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## A CASE OF Q FEVER PROBABLY CONTRACTED BY EXPOSURE TO TICKS IN NATURE<sup>1</sup>

By CARL M. EKLUND, *Surgeon (R)*, R. R. PARKER, *Director*, and DAVID B. LACKMAN, *Senior Assistant Scientist, Rocky Mountain Laboratory, United States Public Health Service.*

Q fever, possibly contracted from a tick (*Dermacentor andersoni*) has been observed in a 24-year-old male, who on March 28, 1947, was in Chaffin Creek Canyon in the Bitterroot Mountains, 20 miles southwest of Hamilton, Mont. Ticks were numerous and those removed from his clothes were destroyed by being crushed with his fingers. Slight malaise was noted on April 13, and during the night he awakened feeling warm. The next day headache and malaise were present. During the evening of April 15, he had a severe chill. Chills recurred the evenings of April 16 and 17. A physician was consulted on April 17. His impression was that the patient had influenza. On April 18 the patient felt better, but next day the symptoms reached their greatest severity. The patient felt better again on April 20; on April 21 the headache was gone for the first time and the patient felt well except for weakness. From then on improvement was progressive. The prominent symptoms were head-

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ache, malaise, great difficulty in sleeping, and marked sweating during the night. Headache was continuous throughout the illness and seemed to be centered in back of the eyes. The patient felt fairly well in the morning but during the day became progressively more tired. Appetite was poor during the entire illness and there was a loss of weight of 10 pounds. Sweating at night was severe and appeared to follow the taking of aspirin. The patient was able to be up each day during the illness, but difficulty in sleeping was so marked that he disliked going to bed at night. A blood specimen was obtained April 21. At that time the patient appeared pale and showed evidence of weight loss, but stated that he felt well except for some weakness.

*Laboratory examination.*—On April 21 the white blood count was 8,000 with 60 percent polymorphonuclear leucocytes. The hemoglobin was 15.3 grams. Blood serum obtained on this day was negative for agglutinins for *Pasteurella tularensis*, Q fever rickettsiae, and sheep red cells. Agglutinins for *Brucella abortus* were present in insignificant titer. Further samples of serum were obtained on May 7 and May 21. No significant agglutinins for *P. tularensis* or *B. abortus* were observed in either of these specimens, and a Weil-Felix agglutination test was set up with the last specimen with no significant findings. The results of rickettsial complement fixation tests are summarized in table 1 and the results of rickettsial agglutination tests in table 2. Tests with other than Q fever antigens were negative.

TABLE 1.—Results of complement fixation tests with Q fever antigens. Dilution of serum giving complete fixation with 2 units of antigen

Serum			Antigen			
	Samples obtained		Henzerling strain (Italian)	Austral-ian strain	Paige strain (Italian)	Original American strain
	Date	No. days after onset				
1.....	Apr. 21	8	0	0	0	1:16
2.....	May 7	24	1:512	1:256	1:256	1:512
3.....	May 21	38	1:512	1:128	1:512	1:512

TABLE 2.—Results of agglutination tests with suspension of Q fever rickettsiae (Australian strain)

Serum	Date sample obtained	Antigen			
		1:10	1:20	1:40	1:80
1.....	Apr. 21	0	0	0	0
2.....	May 7	4	4	4	1
3.....	May 21	4	4	4	2
Normal human.....		0	0	0	0
Q fever, guinea pig.....		3	3	2	0

Because of the positive complement fixation obtained with the second specimen, 1 ml. amounts of the first serum (which had been stored in the refrigerator for 18 days) were injected intraperitoneally on May 9 into each of two guinea pigs, one of which showed a rise in temperature on the ninth day, the other on the tenth. One animal was killed on the fourth day of fever. The spleen was found to be about three times normal size, and rickettsiae were observed in impression smears. A suspension of liver and spleen from this animal was injected into 6 guinea pigs. Fever was observed in this group on the third day. The strain is now being carried in serial passage in guinea pigs. The second animal injected with the patient's serum recovered. This guinea pig and a second passage animal were each bled on the twentieth day after inoculation and their serums used for complement fixation tests for Q fever. Both serums were positive in a dilution of 1:256. The second animal originally inoculated and recovered passage animals were immune to subsequent inoculation with an American strain of Q fever.

*Epidemiological data.*—The patient lives in a small apartment in the business section of the town where there is no opportunity for contact with animals. When the weather is favorable his time is spent in taking pictures of mountain scenes, wild animals, and flowers; the remainder of his time is spent in town. During the few weeks prior to his illness, the weather had been stormy and his trips into the mountains had been few. Over a month prior to his illness he had handled dead mountain lions, and three days before his illness, dead beavers. He had had no contact with cattle. The contact with ticks on March 28 appears to be the likely source of infection. However, if the patient was infected through the medium of the ticks which he crushed with his fingers, it is obvious that tick bite was not involved. The question therefore arises, could infection have occurred through the contamination of an abrasion or perhaps even of the unabraded skin with infected tick tissue? Whether or not infection can take place in the latter manner, as is the case in Rocky Mountain spotted fever, is unknown.

Spontaneous infection of *D. andersoni* with *Rickettsia burneti* has been reported from Montana and Wyoming (1, 2). Another strain was recovered recently from 27 ticks of this species collected April 10, 1947, from a Rocky Mountain goat shot in Lost Horse Canyon, several miles north of Chaffin Creek Canyon.

There is no proved instance of human infection by the bite of *D. andersoni* or any of the other four species of ticks known to be spontaneously infected in the United States.

*Summary.*—A case of Q fever is described in which the likely source of infection was contact with ticks (*Dermacentor andersoni*) in nature.

A strain of the Q fever rickettsia was isolated from the first serum specimen by animal inoculation after 18-days storage in the cold room. Successive serum samples showed an increasing titer against Q fever antigen in the complement fixation and rickettsial agglutination tests.

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DEATHS DURING WEEK ENDED AUG. 30, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Aug. 30, 1947	Correspond- ing week, 1946
Data for 93 large cities of the United States:		
Total deaths	8,388	7,913
Median for 3 prior years	7,918	
Total deaths, first 35 weeks of year	326,903	321,066
Deaths under 1 year of age	713	730
Median for 3 prior years	638	
Deaths under 1 year of age, first 35 weeks of year	26,202	22,309
Data from industrial insurance companies:		
Policies in force	67,218,588	67,282,680
Number of death claims	11,537	10,600
Death claims per 1,000 policies in force, annual rate	8.9	8.2
Death claims per 1,000 policies, first 35 weeks of year, annual rate	9.4	9.3