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THE OCCURRENCE OF COXIELLOSIS AMONG RODENTS AND SHREWS IN THE TARAI AREA OF UTTAR PRADESH[1][2]

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Abstract: Rodents and shrews were screened for serologic evidence of *Coxiella burnetii.* Attempts were made to isolate the organism from the spleen and liver. Seroreactors: total positive/total tested (% positive), in rats *(Rattus rattus, R. norvegicus),* ground shrews *(Suncus murinus),* bandicoots *(Bandicota indica, B. bengalensis)* and the house mouse *(Mus musculus),* respectively, were 13/105 (12.38), 6/42 (14.3), 2/15 (13.3) and 1/7 (14.3). Of the eight rickettsial isolants recovered including four from field and household rats, three from ground shrew and one from bandicoots, only three comprising one each from rat, shrew and bandicoot, could be typed as *C. burnetii.* This appears to be the first record of rodents and an insectivore as reservoirs of *C. burnetii* in India.

INTRODUCTION

Rodents are known to act as reservoirs for a number of zoonoses, including rickettsial diseases.[12] Smith and Derrick[20] found that bandicoots *(Isoodon torosus)* in Australia were naturally-infected with *Coxiella burnetii.* Subsequently, a number of workers reported Q-fever infection in various species of rodents by isolation of *C. burnetii* or by demonstration of *C. burnetii* antibodies.[2,3,4,6,21] The intention of the present communication is to record natural Q-fever infection in wild rodents and shrews in the State of Uttar Pradesh.

MATERIALS AND METHODS

Serology: Field and household rats, house mice, ground shrews and bandicoots (Table 1) were trapped from the Tarai area of Uttar Pradesh mainly near the Pantnagar campus. These were bled within 2 to 8 hr of capture to collect the serum. Sera were inactivated at 56 C for 30 min in a water bath before examination by the capillary agglutination test (CAT).[10] Phase I *C. burnetii* CAT antigen prepared from infected chick embryo yolk sacs[10] was obtained from the Center for Disease Control, Atlanta, Georgia USA. Glass capillaries measuring 9 cm in length and having 0.4 mm internal diameter were filled from one end to 1/3 their length with the antigen. The tube was then filled with serum, using the same end. The tubes were inverted and fixed in plasticin, followed by 3 to 5 hr incubation at 37 C. Samples producing blue to black aggregates (revealed to be flocculation under low power of the microscope) were diluted with phosphate buffered saline (PBS), into appropriate two-fold dilutions beginning with 1:4. The test was repeated with the serum dilutions to determine the titre, incubated at 37 C for 2 hr, then allowed to stand overnight at room temperature. Known positive and negative serum controls were employed with each test. A sample giving a titre of 1:8 or more was considered to be positive.

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Isolation: Spleen and liver samples from various species of animals were inoculated into the yolk sac of chick embryos to attempt isolation and identification of *C. burnetii*.[16]

RESULTS

Of the 169 sera from rats, shrews, bandicoots and house mice subjected to CAT, 22 (13.01%) were positive for Q-fever agglutinins (Table 1). Sero-positive individuals were encountered in all the four species examined. CAT titres were as high as 1:32 among rats, whereas in shrews, house mice and bandicoots the titres were 1:8. Thirty-two samples, consisting of 15 from 33 rats, 14 from 20 shrews and 3 from 10 bandicoots were processed for isolation of Q-fever rickettsia. Of the 8 rickettsial isolants (four from rats, three from shrews and one

TABLE 1. *Coxiella burnetii* antibodies in rodents and insectivores in Uttar Pradesh.

Species	No. of serum samples		Percent positive	CAT titres
	Tested	Positive		
Rat - *Rattus rattus) R. norvegicus)*	105	13	12.38	1:8-1:32
House mouse - *Mus musculus*	7	1	14.30	1:8
Shrew - *Suncus murinus*	42	6	14.30	1:8
Bandicoot - *Bandicota indica) B. bengalensis)*	15	2	13.30	1:8
Total	169	22	13.01	

TABLE 2. Isolation of *Coxiella burnetii* from rodents and insectivores in Uttar Pradesh.

Species	Total samples	Positive for	
		Rickettsiae	*C. burnetii*
Rat - *Rattus rattus) R. norvegicus)*	15 (33)	4	1*
Shrew - *Suncus murinus*	14 (20)	3	1
Bandicoot - *Bandicota indica*	3 (10)	1	1**
Total	32	8	3

The figures in parenthesis represent the total number of animals involved.
*Isolation from a pool of 6 rat samples.
**Isolation from a pool of 5 bandicoot samples.

from bandicoots) only three, one from each species could be typed as *C. burnetii*. These induced antibodies specific for *C. burnetii* on intraperitoneal inoculation of mice and guinea pigs, were thermostable at 62 C for 30 min, produced pyrexia in guinea pigs between 4 to 12 days post-inoculation but did not produce testicular swelling in male guinea pigs or clinical signs in mice.

DISCUSSION

Although some information is available regarding Q-fever infection among domestic animals and man in Indian States, including Uttar Pradesh, the epidemiological links have not been elucidated.[1,5,7,8,9,11,13,15,19] Recently, the importance of ticks, poultry, dairy animals and reptiles in the epidemiology of Q-fever has been reported in Uttar Pradesh.[16,17,18,22] In the present investigation bandicoots, rats, shrews and house mice had serologic evidence of *C. burnetii* infection. Isolation of *C. burnetii* from the bandicoot, shrews and rats seems to be the first record of the recovery of Q-fever agent from these species in India. Another species of bandicoot *(Isoodon torosus)* has been reported to be naturally-infected with Q-fever in Australia.[20] Shrews *(Sorex araneus)* have been incriminated as reservoirs for *C. burnetii* in Czechoslovakia.[14] The unidentified rickettsial isolants from rats and shrews were not studied further. Rodent and insectivore species (rat, house mouse, bandicoot and shrew), by virtue of their indoor and outdoor habitat including dairy farms, granaries, kitchens and fields, can form a link between domestic and feral cycles and also transmit Q-fever infection to humans. The findings suggest rickettsial infection in rodents and insectivores could be significant from epidemiological and public health aspects, especially in a densely populated developing country like India, and warrants further investigation.

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