

## Isolation of *Salmonella enteritidis*, Serotype Horsham, from Three American Indian Tribes

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*Salmonella enteritidis*, serotype Horsham, identified rarely worldwide, was isolated from the stools of six American Indians with gastroenteritis. The patients were from separate tribes located in three geographically distinct villages. Although significant contact was demonstrated between ill individuals within two tribes, no common source for the organism has been identified.

The following report describes the isolation of *Salmonella enteritidis*, serotype Horsham (*S. horsham*), from stool specimens submitted by six American Indians living in three New Mexico communities. This organism previously has been identified in the literature only four times worldwide since it was first isolated in 1944 from dried eggs obtained in the town of Horsham, England (1, 2, 6). Clinical illness caused by *S. horsham* has not been described previously. This report characterizes the clinical and epidemiological features of the illness, and describes the efforts to identify an environmental source for the organism.

Serotyping of *Salmonella* species isolated at two United States Public Health Service clinics was performed at the Scientific Laboratory Division, New Mexico Health and Environment Department. Fecal specimens were transported in buffered glycerol saline. They were inoculated onto MacConkey agar, Hektoen agar, and selenite-cystine broth, and then incubated at 35°C. After 16 to 20 h, the broth was subcultured to Hektoen agar. All non-lactose-fermenting colonies or hydrogen sulfide-producing colonies were screened on triple sugar-iron and lysine-iron agar slants. *Salmonella* species were confirmed biochemically on the commercial Micro-Id (General Diagnostics, Warner Lambert Co., Morris Plains, N.J.) test strip. Antimicrobial sensitivity tests were performed on four of the isolates, and all demonstrated susceptibility to the antibiotics tested: ampicillin, carbenicillin, chloramphenicol, cephalothin, colistin, gentamicin, kanamycin, tetracycline, tobramycin, and trimethoprim-sulfamethoxazole.

Serotypes of five isolates, from two New Mexico communities, were confirmed by the Centers for Disease Control, Atlanta, Ga. These five isolates had identical plasmid profiles consisting of a single, large-molecular-weight plasmid. Additional analysis with restriction endo-

nuclease digestion confirmed that the plasmids possessed related nucleotide sequences (5).

Clinical illness was typical of salmonellosis (Table 1) and was characterized by fever and diarrhea (loose greenish-yellow stools) for at least 24 h. Of the six cases, five were infants ranging in age from 1 to 7 months. The last reported case was a 29-year-old schoolteacher whose illness lasted 48 h.

Three cases were Navajo Indians residing in Canoncito, New Mexico, situated 40 miles west of Albuquerque. Two were infants living in the Santa Clara Pueblo. The single adult case occurred in a woman from San Felipe Pueblo. All case households were located in rural areas with numerous pets and farm animals in the vicinity. All three communities are situated in the Rio Grande valley, none closer than 40 miles to one another.

Patient or parent interviews did not reveal direct or indirect intercommunity contact among members of affected households, and no common source for food items, pets, medications, or water was identified. None of the 29 household contacts of the six affected individuals reported diarrheal illness within a 2-month period before the case identifications.

Significant contact was demonstrated between ill infants within two tribes. All Canoncito cases were first cousins. Two lived in the same household, and family members reported frequent contact with members of the other affected household. Living conditions among these Canoncito families were substandard, with no indoor plumbing in one house, and as many as 13 individuals inhabiting a single four-room dwelling. Potable water was hauled in metal canners from Albuquerque. Infants were fed commercial formula or shared food items with other family members. The two cases from Santa Clara Pueblo also were first cousins, who lived in separate households. No overcrowding was

TABLE 1. Characteristics and symptoms of patients with *S. horsham* gastroenteritis

Patient no.	Age	Sex	Residence	Date of first positive culture	Symptoms <sup>a</sup>
1	4 mo	F	Santa Clara	30 October 1980	BD, F
2	7 mo	M	Canoncito	2 December 1980	BD, SF
3	2 mo	F	Canoncito	5 December 1980	D, V, F
4	1 mo	F	Canoncito	17 December 1980	D
5	4 mo	M	Santa Clara	4 February 1981	D, SF
6	29 yr	F	San Felipe	29 December 1981	D, V, N, AC

<sup>a</sup> D, Diarrhea; V, vomiting; BD, bloody diarrhea; F, temperature  $\geq 38.1^{\circ}\text{C}$ ; SF, subjective fever; N, nausea; AC, abdominal cramping.

apparent in these households, and both had running water with indoor toilets. The children's grandmother, however, frequently cared for both of them during daytime hours. The single adult case from San Felipe was a preschool teacher who had four children. Her home was equipped with indoor plumbing.

Stool specimens were collected from 10 consenting household contacts and cultured for the presence of *Salmonella* species. All were negative. Environmental cultures from all affected households included: potable water, wipe samples from kitchen floors and appliances, barnyard soil, animal feed, and fecal samples from household pets and farmyard fowl. Samples of foods that may have been consumed by cases were not available at the time of the investigation. Additionally, case interviews did not reveal a common food item. However, the index household in Canoncito had several pet chickens and two geese on the premises. Although family members denied ever eating the fowl or their eggs, several eggs and fowl droppings were cultured. Cultures from fowl droppings and chicken feed were also obtained from four non-case households in the affected communities, and from 13 feed store establishments serving these areas. Composite fecal samples were collected from bird droppings along the banks of a pond situated 100 m from the home of the index case and from sylvatic fowl droppings along the Rio Grande between Santa Clara and San Felipe Pueblos.

*S. horsham* was isolated from one of two pet geese belonging to the family in Canoncito, and from cat litter obtained at the second Canoncito household. Cultures of the remaining environmental samples were negative for the organism.

Case households were visited by a public health nurse, informed of the culture results, and educated concerning the prevention of salmonellosis. United States Public Health clinics serving the affected communities were requested to increase their *Salmonella* surveillance by obtaining stool cultures from all patients with diarrhea and fever.

Although a common source for the organism was not identified during this investigation, the isolation of this rare serotype from three distinct communities suggests a common source of exposure. All five human isolates analyzed had identical plasmid profiles, and the four isolates tested demonstrated the same antimicrobial sensitivities. These factors suggest that all *S. horsham* isolates were from the same infective strain. However, this plasmid profile is the only one ever described for the organism. It is possible that all *S. horsham* isolates possess this single large-molecular-weight plasmid.

Five of the six cases reported were infants. Characteristically, the manifestations of salmonella gastroenteritis are more severe for infants than for adults (4). This may have increased the likelihood that stool cultures were obtained from the infants, thus leading to their selective identification as cases. It is also possible that infants were exposed preferentially to the agent. The organism may have been transmitted from one community to another via a common medicinal or food substance not uncovered during the interviews. Since cases were from communities representing three separate Indian tribes with differing traditions, habits, foods, and folk medicines, this does not seem likely.

Another possibility is that *S. horsham* could have been introduced into the three communities through the sylvatic fowl population. Fowl were present in all three localities and are known to be *Salmonella* carriers (3). The two pueblos, Santa Clara and San Felipe, are located along the Rio Grande, which is a migratory pathway for fowl. Canoncito is located approximately 40 miles from the river. The index household in this community, to which the *S. horsham*-positive goose belonged, is near a seasonal pond, which was littered with bird feces at the time of the investigation. Although it is conceivable that the infant acquired *Salmonella* species from the pet goose, it is equally likely that the child, who frequently played outside undiapered, infected the goose with this organism.

In 1981, health officials reported isolating *S.*

*horsham* from three people living in Oregon. These isolates have the same plasmid profile as the New Mexico isolates. A source of exposure for the Oregon cases has not been identified (personal communication).

In summary, six cases of *S. horsham*-associated gastroenteritis occurred over a 14-month period among American Indians living in three New Mexico communities. The clustering of cases with this unusual serotype, and the identical plasmid profiles of four isolates, indicated a probable common source for the organism. Investigation did not uncover the mode of introduction of the organism into the three communities.

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