Human Enteric Pathogens in Dogs in Fairbanks, Alaska

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IN A PREVIOUS study it was reported that 27 percent of the family pet dogs in Fairbanks, Alaska, were harboring potentially pathogenic members of the bacterial family Enterobacteriaceae (*1*). In comparison, surveys in other States have shown 15.1 percent of the dogs in Florida positive for Enterobacteriaceae (*2*), 5.1 percent in Georgia positive (*3*), and 3.4 percent in Texas positive (*4*). Prior to this 1965 report the highest percentage of dogs in Alaska found positive for Enterobacteriaceae was 7 percent reported in a survey in Point Barrow (*5*).

A second yearlong survey (April 1964 to April 1965) was undertaken in Fairbanks immediately following the first. The objectives of the survey were to duplicate the high rate of recovery and determine if dogs in the same geographic location but maintained in a more controlled manner also harbored Enterobacteriaceae. As in the first study, the health of the animals was closely observed, and the liaison with the local laboratory of the State department of public health was continued so that the species recovered from human beings could be correlated with those recovered from dogs.

The high rate of recovery of Enterobacteriaceae from a single identifiable source other than human beings is important from a public health aspect. It is of interest because Fairbanks is in a subarctic area, in which this type of human intestinal pathogen is not considered endemic.

In order to examine the factors involved, rectal swabs from four groups of dogs were collected during the second survey: house pets kept within the city of Fairbanks, house pets on an adjacent military base, kennel dogs in or near the city, and military sentry dogs on duty in the area. Each group had distinctive factors in its environment. A generalized separation of characteristics is shown in table 1.

Methods

A total of 190 rectal swabs was collected from 132 dogs. The number of dogs in each group from which the cultures were obtained is shown in table 2. Swabs were collected from family pets while the dogs were either inpatients or outpatients at the city or the base veterinary clinics. Swabs from the sentry dogs were collected either at the base veterinary clinic or at their duty stations. Swabs from the kennel

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dogs were collected at private kennels. With the exception of one kennel dog and one sentry dog, all dogs were considered free from signs of intestinal disease.

Samples of dog food were collected periodically from the city clinic and sentry dog supplies. Canned and dried dog food were examined. These samples usually were collected at the same time that rectal swabs were obtained from the dogs.

All animal specimens were collected by inserting a sterile cotton swab 4 to 8 cm. into the rectum. The swab was placed immediately in 0.5 ml. of 1 percent peptone water. Inoculation to media was done usually within 1 hour after collection. Isolation and identification procedures were those described by Butler and Herd (*1*). Recovery of the organisms after enrichment in selenite broth (Difco) was emphasized.

The procedures as described by Galton (*6*) were employed for examination of all dog food.

All salmonellae cultures were sent to the Public Health Service's Communicable Disease Center, Atlanta, Ga., for confirmation. In some instances CDC had to identify the serotypes because the authors were unable to obtain specific antiserums. Organisms other than salmonellae were identified by characteristics as described by Edwards and Ewing (*7*).

Results

Answers to some of the questions raised during the first year of study were found in the results of this second survey. For example, this time 34 percent of the pet dogs in the city were found to be harboring potentially pathogenic members of the family Enterobacteriaceae as compared to 27 percent during the first year.

Table 1. Characteristics of groups of dogs, Fairbanks, Alaska

Type of dog	Degree of freedom	Contact with environment	Contact with people
House pet (Fairbanks).	Unlimited	Unlimited	Unlimited.
House pet (military base).	Relatively unlimited.	Relatively unlimited.	Do.
Kennel	Limited	Moderately limited.	Moderately limited.
Sentry	Extremely limited.	Extremely limited.	Extremely limited.

Specimens were taken from fewer dogs in the city during the second survey but each time specimens were obtained, positive cultures were found. Conversely, very few specimens from the other three groups were positive (table 3). No positive samples were found from family pets on the military base. This result indicates that in Fairbanks maintenance and care of the animal has a definite effect on whether or not animals acquire and disseminate these organisms. A summary of the serotypes or groups is given in table 4.

Correlative studies between serotypes recovered from human beings and those found in dogs in the area again failed to show any relationship. *Salmonella typhimurium* (1 case), *Salmonella oranienberg* (1 case), *Salmonella blockely* (1 case), and *Salmonella anatum* (39 cases) were recovered from human beings in the area during the period of this second survey. The 39 cases of *Salmonella anatum* occurred during an outbreak at the University of Alaska during September and October 1964. The other infections were isolated cases. Informa-

Table 2. Cultures obtained from groups of dogs, Fairbanks, Alaska

Type of dog	Number of dogs sampled by—				Number of dogs sampled
	1 culture	2 cultures	3 cultures	4 cultures	
House pet (Fairbanks)	25	3	1	0	29
House pet (military base)	51	0	0	0	51
Kennel	25	0	0	0	25
Sentry	3	6	7	11	27
Total	104	9	8	11	132

Table 3. Distribution of positive cultures in dogs sampled, Fairbanks, Alaska

Type of dog	Number of dogs sampled	Number[1] positive for—			Total positive cultures
		Salmonella	*Shigella*	Potential pathogens	
House pet (Fairbanks)	29	7	0	3	10
House pet (military base)	51	0	0	0	0
Kennel	25	0	0	1	1
Sentry	27	1	0	1	2
Total	132	8	0	5	13

[1] Each is counted only once, regardless of the number of positive repeat cultures obtained.

tion on all cases of illness in human beings was obtained from the public health laboratory in Fairbanks. Only *S. oranienberg* was isolated from both a dog and a human being (in a previous study), and a relationship between the animal and human case was not established. It appears that this lack of correlation between human and animal cases was due, for the most part, to an exiguity of culture results from human specimens.

Table 4. *Salmonella* serotypes and related groups of organisms recovered from dogs, Fairbanks, Alaska

Dog	*Salmonella* serotype and related group of organisms recovered from dog
House pet	*S. worthington.*
Do	*S. senftenberg, S. minnesota.*
Do	*S. cerro, S. lexington.*
Do	*S. montevideo.*
Do	*S. siegburg.*
Do	*S. urbana.*
Do	Bethesda-Ballerup group.
Do	Arizona group.
Do	Hafnia group.
Sentry dog	*S. give,* Bethesda-Ballerup group.
Do	Alkalescens-Dispar group.
Kennel dog	Do.

Table 5. Replicate positive cultures from dogs, Fairbanks, Alaska

Dog	Dates of cultures	Organism recovered
House pet	Feb. 3, 1965	None.
	Feb. 15, 1965	*Salmonella cerro.*
	July 7, 1965	*Salmonella lexington.*
House pet	Feb. 3, 1965	*Salmonella senftenberg.*
	Feb. 15, 1965	*Salmonella minnesota.*
	Feb. 15, 1965	*Salmonella senftenberg.*
Sentry	Apr. 20, 1964	*Salmonella give.*
	June 8, 1964	Bethesda-Ballerup group.
	Sept. 14, 1964	Do.
	Apr. 5, 1965	None.

Some additional results were obtained from this survey. Again, the presence of the organisms in dogs appeared to be transitory. Replicate cultures of specimens on some animals showed that the organisms were excreted on an intermittent basis or for a short period only (table 5). This transitory effect had been reported by other investigators (*8*, *9*).

One very unusual result observed during this survey was the recovery of *Salmonella worthington* in an apparent pure culture from one of the city pets. Three attempts, involving numerous colonies each time, to find other organisms from the agar plates were made, but the findings remained unchanged. The agar plates used for direct inoculation, MacConkey, *Salmonella-Shigella*, and Eosin methylene blue, were designed to permit morphological differentiation of *Salmonella* and *Shigella* from lactose fermenters, not to inhibit totally the growth of other organisms. All colonies observed on the plates were lactose nonfermenters and were morphologically indistinguishable from one another except for a slight variation in size.

While this could be interpreted to mean that the dog was overwhelmingly infected, the animal was free of any overt signs of an intestinal disease. Data from this and other investigations (*2*, *8*) indicate that very few dogs displayed signs of disease when this group of organisms was present in cultures. When disease signs were exhibited, however, they were

usually similar to those produced in human beings.

All samples of commercial dog food were negative for bacteria belonging to the Enterobacteriaceae family.

Discussion and Conclusions

Data from this survey, as well as that from the previous survey, indicates that *Salmonella* and related members of the Enterobacteriaceae family (*Shigella*, Bethesda-Ballerup group, Arizona group, Providence group, Alkalescens-Dispar group, and Hafnia group) were present in a significant percentage of family pet dogs within the city of Fairbanks, Alaska. The combined results of both years' studies show that 37 of 123 pet dogs living within the city were harboring human intestinal pathogens. At the same time the organisms were found in only 1 of 100 kennel dogs, 2 of 27 sentry dogs, and none of the pet dogs on the adjacent military base.

Because of these results we decided to examine the dogs' environments for factors that would contribute to these findings. The factors considered were food, water, soil, refuse, garbage, and human contact. Geographically, the animals were all located within a small area. Through cultures, comparative studies, and histories, a factor unique to the city pets was found—almost unlimited contact with refuse and garbage. In the city, refuse and garbage were placed in the standard garbage cans for pickup. These containers were not animal-proof and were used as feeding stations by stray animals and family pets that were permitted to wander. House pets on the military base did not have access to refuse and garbage since large, animal-proof dumpsters are used. The kennel and sentry dogs were denied access to this source by virtue of their confinement. The other factors in the dogs' environments could not be incriminated.

Since none of the human cases of salmonellosis in Fairbanks was attributed to dogs, the role of dogs in transmitting the infection remains unknown. However, the high carrier rate and almost unlimited movement of the city dogs qualifies them as potential intermediate vectors of intestinal infections in human beings in the area. This potential is increased during the long, severe winter months when the family pet has close, prolonged contact with human beings.

Summary

A second yearlong survey (April 1964 to April 1965) of *Salmonella* and related enteric pathogens in dogs in Fairbanks, Alaska, showed that house pet dogs within the city have a much higher incidence rate than other groups of dogs in the area. During this second survey nine different serotypes of *Salmonella* and four related Enterobacteriaceae were recovered. A consideration of the factors that constitute a dog's environment indicated that the acquisition and dissemination of these pathogens was related directly to the animal's freedom of movement and particularly to its access to refuse and garbage.

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phr synopses

WOODSIDE, NINA B. (District of Columbia Department of Public Health), and SHAPIRO, JEROME: *Podiatry services at clinics of a local health department. Experience of District of Columbia. Public Health Reports, Vol. 82, May 1967, pp. 389–394.*

The first full-time podiatry clinics in a municipal health department were established late in 1964 in the District of Columbia.

By 1966, the number of new eligible patients seeking services at these clinics had increased by 65 percent over the preceding year. The proportion of patients who were male (35 percent) and of patients under age 60 (47 percent) who visited the clinics in these 2 years is regarded as high. Also, a large number of adolescent and preadolescent children (under age 18) sought podiatric care; this group represented 13 percent of the 456 new patients seen in 1966.

The observation that only 11 of 277 new patients seen in 1965 were discharged as requiring no further care underscores the chronicity of most foot conditions. While painful hyperkeratoses and nail disorders were the most prevalent complaints, a substantial number of foot conditions associated with chronic disease were also observed.

The increasing demand for podiatric services over the first 2 years of operation of the podiatry clinics clearly indicates a need for expansion. The number of regular podiatry clinics should be increased and additional ones established to meet the requirements of children and of public housing residents. Consolidation of the podiatry programs of the District of Columbia Department of Public Health into a separate unit of the department also appears desirable.

BOWES, JAMES E. (Pitman-Moore Division of The Dow Chemical Company): *Rhode Island's End Measles campaign. Public Health Reports, Vol 82, May 1967, pp. 409–415.*

In Rhode Island a statewide measles immunization campaign reached 67 percent of an estimated 52,000 susceptible children aged 1–12 years. The single-dose further attenuated live virus measles vaccine was used at 37 clinics located throughout the State. Despite severe snowstorms, almost 35,000 children were vaccinated on two End Measles Sundays in January 1966.

The Rhode Island Medical Society, assisted by the Woman's Auxiliary to the society, the State department of health, and about 2,000 volunteers, sponsored the campaign. It was funded by surplus funds from a 1963 End Polio program and 25-cent donations collected at the clinics. The cost per child was approximately $2.

Much of the campaign's success was attributed to a barrage of publicity—informing the public about the vaccine and the hazards of common measles—provided by a public relations and advertising firm.

During 1966 only 75 cases of measles were reported in Rhode Island in contrast to a median of 3,652 cases for the previous 5 years—a reduction of 97 percent.

HUBBERT, WILLIAM T. (National Communicable Disease Center, Public Health Service): *Leptospirosis in California: diagnostic and epidemiologic problems. Public Health Reports, Vol. 82, May 1967, pp. 429–433.*

In addition to classic Well's disease (leptospiral jaundice), leptospirosis is probably an important segment of the group of diseases producing aseptic meningitis in California. Prompt generic diagnosis by agglutination or fluorescent antibody tests will allow initiation of specific therapy.

The battery of antigens and antiserums employed in laboratory tests should include at least the five serotypes now recognized in the State—*Leptospira icterohaemorrhagiae, Leptospira canicola, Leptospira pomona, Leptospira grippotyphosa,* and *Leptospira ballum*—as well as representatives from other serogroups, in order to detect as many infections as possible. Isolation should be considered if a serotype-specific diagnosis is desired.

BUTLER, CLIFFORD E. (University of Arizona), and BUSBEE, CHARLES E.: *Human enteric pathogens in dogs in Fairbanks, Alaska. Public Health Reports, Vol. 82, May 1967, pp. 465–468.*

A second yearlong survey (April 1964 to April 1965) of *Salmonella* and related enteric pathogens in dogs in Fairbanks, Alaska, showed that house pet dogs within the city have a much higher incidence rate than other groups of dogs in the area. During this second survey nine different serotypes of *Salmonella* and four related Enterobacteriaceae were recovered.

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phr synopses

MORRIS, LEO (National Communicable Disease Center, Public Health Service), WITTE, JOHN J., GARDNER, PIERCE, MILLER, GEORGE, and HENDERSON, DONALD A.: ***Surveillance of poliomyelitis in the United States, 1962–65. Public Health Reports, Vol. 82, May 1967, pp. 417–428.***

From 1955 to 1965, the incidence of poliomyelitis in the United States declined so dramatically that the disease is no longer considered a major public health problem in this country. This decline coincides with the period of widespread usage of inactivated poliomyelitis vaccine, from 1955 to 1961. By 1961 less than 1,000 paralytic cases of poliomyelitis occurred in the United States. During that 6-year period the total poliomyelitis case rate declined from more than 20 per 100,000 to less than 1 per 100,000.

During the period covered by this report, 1962–65, the oral poliovirus vaccines were licensed and used on a large scale. The sharp decline in incidence continued throughout this period, though somewhat less dramatically, because the incidence was already quite low by 1962. In 1965 only 61 cases of paralytic poliomyelitis were reported in the United States.

No large epidemics occurred during 1962–65, and no outbreaks of any size occurred in 1963 or 1964. Most of the reported cases were in preschool children, the vast majority either unvaccinated or inadequately vaccinated.

BOCK, H. BARRETT (Pennsylvania Department of Health), and ZIMMERMAN, J. HARVEY: ***Study of selected congenital anomalies in Pennsylvania. Public Health Reports, Vol. 82, May 1967, pp. 446–450.***

Two hundred and thirty-five cases of imperforate anus, omphaloceles, tracheo-esophageal fistulas, diaphragmatic hernias, and intestinal obstructions were found in a study using hospital questionnaires, birth certificates, and death certificates. These congenital anomalies occurred in 216,005 infants born in Pennsylvania during 1962. It was estimated that about one congenital defect of these types would be found in each 1,000 births.

Two hundred and six (87 percent) of these malformations were reported in the hospital questionnaires and 129 (55 percent) on birth certificates. Of the 122 infant deaths in the study, 109 (89.3 percent) were reported on the death certificates as caused by these congenital anomalies.

The distribution of newborns with these congenital defects by weight at birth was significantly different from the birth weight distribution of all births. More of these babies weighed 2,500 grams or less than would have been expected. The distribution by age of mother or birth order of babies born with these malformations was not significantly different.

More than half of the 235 babies with these congenital anomalies died before age 1.

HANDY, VINCENT H. (New York State Department of Health), and KLEIN, PETER: ***Useful indices in evaluating a cervical cytology program. Public Health Reports, Vol. 82, May 1967, pp. 461–464.***

Three indices which have been useful in measuring progress in cervical cytology programs are the cytology activity index, which is the number of cervical cytology tests per 1,000 women age 21 and over, the ratio of in situ to invasive carcinomas detected, and the mortality rate from cancer of the cervix. Application of these indices allows the study of trends over periods of time, permits comparisons among different areas, and gives the health officer a means of indicating his progress toward his immediate and long-range program goals. The immediate goal in New York State is that each woman receive a cervical cytology test every third year, giving a cytology activity index of 333.

In New York State, excluding New York City, these indices have enabled assessment of the use of cervical cytology tests year by year for the entire area as well as by individual county, permitted the measuring of progress in detecting the disease in its earliest, most curable stage, and indicated how close the health department might be to eliminating all deaths from this disease.

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