Salmonella in Alaska

RALPH B. WILLIAMS, B.S., and MARIE W. DODSON, M.S.

TWENTY-ONE years of observation on the occurrence of salmonellosis in Alaska have been completed, and the findings are reported here. Much of the data presented are the result of detailed bacteriological studies on specimens received routinely in the four diagnostic laboratories of the Alaska Health and Welfare Department's Division of Health. The remainder are from reports made by Grumbles and Maciolek (*1*), Gordon and Babbott (*2*), Cullison (*3*), Fournelle and associates (*4*), Pauls (*5*), and Gaub (*6*), or from direct contact with personnel in hospitals and research laboratories in Alaska (personal communications from William H. Gaub, 1952; Alice T. Howarth, 1959; and Jerome P. Schmidt, 1959).

At least 60 percent of the isolations were from patients suspected of having enteric infections and from contacts in the course of infrequent epidemiological studies. The remainder were from the work of survey teams examining normal human and animal populations in Eskimo and Indian villages. We have relied upon the written and published reports of these observers, some of whom relied on our laboratories for the bacteriological phases of their projects.

Bacteriological procedures used have been modified from time to time, but since 1955 the techniques have closely conformed to those described by Edwards and Ewing (*7*).

The present work is a summation of the results obtained in the study of 246 *Salmonella* from various localities throughout Alaska. The most frequent type was *Salmonella typhimurium*. There were 81 strains isolated since the first of this type was cultured from 2 cases of salmonellosis in a February 1945 foodborne outbreak involving 17 children in a children's home near Auke Bay, Alaska. The remainder included 25 different serotypes, of which *S. typhosa* (68 strains) and *S. montevideo* (19 strains) were the next most common types encountered. Five other types frequently encountered were *S. reading* (11 strains), *S. muenchen* (10 strains), *S. oranienburg* (7 strains), *S. newport* (7 strains), and *S. enteritidis* (6 strains). The *S. typhosa* strain isolated February 18, 1938, from a Ketchikan patient was the first *Salmonella* cultured in Alaska.

Since 1944 the specific rank of each antigenically distinguishable type of *Salmonella* isolated has been verified by the Communicable Disease Center, Public Health Service, Chamblee, Ga., or the Salmonella Typing Center, University of Kentucky, Lexington.

In the accompanying table, the serotypes are listed in the order of greatest frequency, and the rarer types, of which only one or two strains were reported, follow in the order of the numbers isolated. The final group of five strains was not classified as to types, but only as to genus and therefore is listed last. Types were distributed among human beings, both children and adults, dogs, fur seal pups, seal lice, and gulls.

Three types, *S. minnesota* (1 strain, dog), *S. sandiego* (1 strain, gull), and *S. enteritidis* (6 strains, isolated by Jellison and Milner (*8*), from fur seal pups and seal lice) came from animal sources and were not isolated from man.

Seventeen types, isolated from man, came

Mr. Williams is director of laboratory services and research, Division of Health, Department of Health and Welfare, Juneau, Alaska. Mrs. Dodson was formerly a microbiologist with the department's Southcentral Regional Laboratory at Anchorage.

mainly from cases reported as mild to severe gastroenteritis or diarrhea occurring with greatest frequency in young children. Investigators at the Arctic Aeromedical Laboratory, Ladd Air Force Base, Fairbanks, in 1958 found that at Fort Yukon intestinal disturbances occurred eight times more often in children aged 0–9 years than in any other age group. A report on the results of this study is in preparation.

The occurrence of intestinal infections in Alaska has been reviewed by Gordon and Babbott (*2*), Fournelle and associates (*4*), and others. The division of health morbidity records support their findings and show prevalence of these infections to be greatest during July and August, with the highest incidence in children under 10 years of age. Single strains of *S. bareilly*, *S. cubana*, *S. derby*, *S. give*, *S. heidelberg*, *S. newington*, *S. paratyphi*, *S. urbana*, 2 strains of *S. infantis*, 10 strains of *S. muenchen*, 7 strains of *S. newport*, 2 strains of *S. panama*, 11 strains of *S. reading*, 4 strains of *S. tennessee*, 3 strains of *S. thompson*, 2 strains of *S. worthington*, and 68 strains of *S. typhosa* were isolated from human cases and carriers. The remaining types were isolated from both man and animals. *S. oslo* (3 strains), *S. montevideo* (19 strains), and *S. oranienburg* (7 strains) were isolated from man and dogs, while *S. schottmuelleri* (2 strains) and *S. manhattan* (4 strains) were isolated from man and gulls (*Larus glaucescens*). *S. typhimurium* was isolated from man, dogs, and gulls.

Poultry and other birds are frequently associated with salmonellosis in other parts of the world. However, poultry and other domestic birds are not common in Alaska, but 77 different species of wild birds, totaling 399 individuals, were collected during the period September 22, 1944, to May 5, 1955. The majority of these were migrant birds visiting southeastern Alaska. A few birds were collected in the Fairbanks area and along the Richardson and Glenn Highways to and including the Anchorage area. The contents of the gizzard and intestine were cultured directly on *Salmonella-Shigella* agar and into enrichment broths and, with the exception of pellets and intestinal contents from *L. glaucescens*, were negative for salmonellae.

In addition to 14 gulls collected and examined in Ketchikan (*9*) (1 strain of *S. manhattan*), 173 gull pellets, indigestible material cast out by regurgitation, were examined at Juneau during December–March of each of the years 1951–55. Two strains of *S. typhimurium*, one strain of *S. schottmuelleri* phage type variation of group I, and one strain of *S. sandiego* were isolated.

A survey of *Salmonella* in dogs in Alaska was made by Schlotthauer in 1955–56 (personal communication). A total of 452 samples were collected by means of rectal swabs for bacteriological examinations and 1.5 percent of the animals sampled had *Salmonella*. Six isolations of *S. typhimurium* were made at Fort Yukon in June 1955 and one isolation of *S.*

Frequency of occurrence of Salmonella types

Salmonella type	Strains		*Salmonella* type	Strains	
	Number	Percent		Number	Percent
S. typhimurium	81	32. 9	*S. schottmuelleri*	2	0. 8
S. typhosa	68	27. 7	*S. worthington*	2	. 8
S. montevideo	19	7. 7	*S. bareilly*	1	. 4
S. reading	11	4. 5	*S. cubana*	1	. 4
S. muenchen	10	4. 1	*S. derby*	1	. 4
S. oranienburg	7	2. 9	*S. give*	1	. 4
S. newport	7	2. 9	*S. heidelberg*	1	. 4
S. enteritidis	6	2. 5	*S. minnesota*	1	. 4
S. manhattan	4	1. 6	*S. newington*	1	. 4
S. tennessee	4	1. 6	*S. paratyphi*	1	. 4
S. thompson	3	1. 2	*S. sandiego*	1	. 4
S. oslo	3	1. 2	*S. urbana*	1	. 4
S. infantis	2	. 8	*Salmonella* spp	5	2. 0
S. panama	2	. 8			

montevideo from a Ladd Air Force Base dog during May 1956. No isolations were made during the autumn periods of the years 1955–56. The survey teams working in the Eskimo and Indian villages collected specimens from dogs as possible sources of human infections. *S. typhimurium* was the only type isolated.

The 26 types isolated in Alaska were classified into the O groups of the Kauffmann-White schema (*10*) with the following distribution:

Group	Number of types	Number of strains
A	1	1
B	6	97
C_1	7	39
C_2	3	21
D	3	76
E_1	1	1
E_2	1	1
E_3	None	
E_4	None	
F	None	
G	2	3
H	None	
I	None	
Further groups	2	2
Unclassified		5

Thus far experience has shown that the majority of types encountered in Alaska belong to groups B, C_1, C_2, and D, to which 233 strains were assigned out of the 246 *Salmonella* reported. The other eight strains classified represented a single strain for each group A, E_1, and E_2, three strains for two types in group G and a single strain each for two types not assigned by the schema to specific groups. Kauffmann (*10*) reports that in other parts of the world the majority of *Salmonella* most frequently cultured are in the first five groups, A, B, C, D, and E.

The data on the clinical cases were too limited for detailed comment, except to note that specimens sent to aid in diagnosis for diarrheal disease were frequently found to contain *Salmonella*. A handicap of many past investigations of enteric disease in isolated and remote areas of Alaska has been their retrospective character. In a number of cases, the major epidemic wave was over when detailed analyses were begun. Obvious limitations resulted, particularly regarding observation of acute phases of the illness. The clinical impressions obtained from the data supplied did not materially differ from those reported elsewhere. An investigation by Cullison and Davis (*11*) of the population at Barrow for salmonellosis showed a relatively high incidence of the causative organisms in all age groups. A seasonal variation was demonstrated with 100 percent increase of isolations in summer as compared with those in winter.

Geographically the various *Salmonella* types were scattered widely. The evidence did not suggest that there were foci of infection with the different types.

Many of the isolations were from apparently healthy individuals. Followup specimens were submitted on individuals found to be carriers. The data suggest that the carrier state is relatively transient. Repeated isolations were uncommon over a long period of time and the organisms could not be cultured after 3 to 4 months. An exception was the *S. typhosa* carriers from whom cultures have been repeated years after the initial isolation.

ADDENDUM: Two additional serologic types of *Salmonella* and another strain of *S. derby* have recently been isolated in Alaska: *S. blockley* from a child; *S. anatum* from an infant; and *S. derby* from commercial dog meal.

REFERENCES

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(10) Kauffmann, F.: Enterobacteriaceae. Ed. 2, Copenhagen, E. Muksgaard, 1954.
(11) Cullison, J. W., and Davis, T. R. A.: The isolation of enteric pathogens at Barrow, Alaska. Armed Forces Med. J. 8: 534–538, April 1957.

CDC Training Program, 1960–61

Training courses in the epidemiology and control of communicable diseases offered by the Communicable Disease Center, Public Health Service, from October 1960 through June 1961 are listed below. This list, together with the courses in laboratory methods listed in *Public Health Reports*, July 1960, represents the complete schedule for the period. Courses listed under "Organization and Orientation" are especially developed for people from other countries. Additional information and application forms may be obtained from either the Chief, Communicable Disease Center, Atlanta 22, Ga., or the appropriate regional office of the Department of Health, Education and Welfare.

Epidemiology

Principles of epidemiology (101). Jan. 16–20; Atlanta.
Applied epidemiology (112). Nov. 14–18; Atlanta. Apr. 10–14; Cincinnati.
Epidemiology for nurses (121). Spring; Atlanta.
Principles of epidemiology for nurses (122). To be announced; by arrangement with schools of nursing in universities and colleges.
Epidemiology for veterinarians (140). Feb. 6–10; Atlanta.

Vector Control

Epidemiology and control of vector-borne diseases (201). Feb. 13–17; Atlanta. Apr. 3–7; Denver.
Rodent control, operational (212). By arrangement; Atlanta.
Insect and rodent control (221). June 5–16; Atlanta.
Mosquito control (231). Oct. 31–Nov. 4; Atlanta.
Identification and biology of arthropods (241). Jan. 9–20; Atlanta.

Environmental Control

Environmental sanitation (301). Feb. 13–May 12; Atlanta.
Epidemiology and control of food-borne diseases (311). Nov. 14–18; Region II. May 22–26; Atlanta.
Applied procedures for control of food-borne diseases (312). Oct. 24–28; Denver.
Milk pasteurization controls and tests (332). Oct. 3–21; Region II. Nov. 1–3; Atlanta. Spring (2 weeks); Region III. Spring (3 weeks); Region IV.
Milk sanitation, administrative (333). Feb. 6–10; Denver.
Housing hygiene, operational (363). Mar. 13–Apr. 14; Atlanta.
Housing hygiene, environmental (367). Mar. 27–31; Atlanta.

Venereal Disease Control

Venereal disease annual postgraduate course (401). Time and place to be announced.
Nursing work conferences on the control of venereal disease (421). Time and place to be announced.
Nursing in venereal disease control (422). Monthly, September through June; New York Department of Health, Bedford Health District, John F. Mahoney Training Center, Brooklyn.
Venereal disease contact interview and investigation (431). Oct. 24–Nov. 4; Jan. 16–27; Feb. 20–Mar. 3; Mar. 27–Apr. 7; May 15–26; Venereal Disease Training School, Fulton County Health Department, Atlanta. Nov. 28–Dec. 9; Jan. 16–27; Mar. 20–31; May 8–19; Venereal Disease Training School, Detroit City Health Department. Nov. 14–25; Feb. 6–17; May 8–19; Venereal Disease Training School, Los Angeles Department of Health.
Current laboratory methods in the serology of syphilis (454). Nov. 28–Dec. 16; Jan. 30–Feb. 17; Apr. 10–28; Chamblee.
Management and control of syphilis serology by the central laboratory (455). May 8–19; Chamblee.
The *Treponema pallidum* immobilization (TPI) test (456). By special arrangement only; Chamblee.
Introduction to fluorescent antibody methods—identification of the *Neisseria gonorrhoeae*. Oct. 17–21; Mar. 6–10; Chamblee.
The fluorescent treponemal antibody (FTA) test (458). Oct. 24–28; Mar. 13–17; Chamblee.

Laboratory Methods

Fluorescent antibody techniques in the public health laboratory (845). Nov. 7–18; Atlanta.

Organization and Orientation

Principles, organization, and practice of communicable disease control (701). Summer 1961; Atlanta.
Applied epidemiology in communicable disease control (712). June 19–July 14 (tentative); Atlanta.
Nursing aspects of communicable disease control (720). June 26–30 (tentative); Atlanta.
Environmental aspects of communicable disease control (730). June 12–July 7; Atlanta.