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FEBRUARY 26, 1965

CDC
COMMUNICABLE DISEASE CENTER

SALMONELLA

SURVEILLANCE

TABLE OF CONTENTS

For the Month of January 1965

U. S. Department of Health, Education, and Welfare / Public Health Service

PREFACE

Summarized in this report is information received from State and City Health Departments, university and hospital laboratories, the National Animal Disease Laboratory (USDA, ARS), Ames, Iowa, and other pertinent sources, domestic and foreign. Much of the information is preliminary. It is intended primarily for the use of those with responsibility for disease control activities. Anyone desiring to quote this report should contact the original investigator for confirmation and interpretation.

Contributions to the Surveillance Report are most welcome. Please address to: Chief, Salmonella Surveillance Unit, Communicable Disease Center, Atlanta, Georgia, 30333.

Communicable Disease	Dr. James L. Goddard, Chief
Epidemiology Branch	Dr. Alexander D. Langmuir, Chief
Investigations Section	Dr. Philip S. Brachman, Chief
Salmonella Surveillance Unit	Dr. Charles E. McCall, Chief
	Dr. Richard N. Collins
	Dr. Read F. McGehee
	Mr. James B. Goldsby, Statistician
Veterinary Public Health Section	Dr. James H. Steele, Chief
Veterinary Public Health Laboratory	Mrs. Mildred M. Galton, Chief
	Dr. Kenneth D. Quist
	Dr. John R. Boring

Collaborators

Laboratory Branch	Dr. U. Pentti Kokko, Chief
Bacteriology Section	Dr. Philip R. Edwards, Chief
Enteric Bacteriology Unit	Dr. William H. Ewing, Chief

TABLE OF CONTENTS

I. SUMMARY

During January, 1,538 human isolations of salmonellae were reported. The average number of isolations per week, 385, was an increase of 41 over the figure for December 1964 (Figure 1).

A total of 538 nonhuman isolations were reported during January for an increase of 194 over December.

In the past, several factors have made it impossible to obtain accurate information on the annual incidence, seasonal variation, and geographical pattern of infection with Salmonella typhi in the United States. Previously, there was no uniform method of reporting routine S. typhi isolations from known carriers as distinct from isolations from presumptive clinical cases on the weekly salmonella surveillance forms. It has been estimated that between one quarter and one-third of the total reported isolations of S. typhi represent routine culturing of known typhoid carriers. Recently the State and Territorial Epidemiologists and Laboratory Directors approved a plan whereby isolations of S. typhi will be reported as (1) case, (2) carrier or (3) status unknown. These data should result in more accurate epidemiological information on the status of S. typhi in the United States today. With this issue, Table VII, summarizing the reported isolations of S. typhi by patient's status is initiated; it will be continued in subsequent issues of the Salmonella Surveillance Report.

Erratum: On page 4, SSR No. 33, an error in acknowledgment was made and a name was misspelled. Under An Outbreak of Gastroenteritis Due to Salmonella typhi-murium Phage Type 2a, C.A.E. Luval, M.D. should read C.A.E. Lund, M.D., and recognition should have been given the Calhoun County Health Department, Michigan. We apologize for this oversight.

II. REPORTS OF ISOLATIONS FROM THE STATES

A. Human

A total of 1,538 isolations of salmonellae were reported during January. The average number of isolations per week (385) represented an increase of 41 over December 1964 and 65 over January 1964 (Figure 1).

The seven serotypes reported most frequently during January were:

Rank	Serotype	Number	Per Cent	Rank Last Month
1	S. typhi-murium & S. typhi-murium var. copenhagen	432	28.1	1
2	S. heidelberg	126	8.2	2
3	S. enteritidis	103	6.7	4
4	S. infantis	87	5.7	3
5	S. saint-paul &	72	4.7	12
5	S. typhi	72	4.7	7
7	S. newport	65	4.2	5
Total		957	62.2	

Total salmonellae isolated (January) 1,538

These seven serotypes, which represented only 10.9 per cent of the 64 different serotypes reported during January, accounted for almost two-thirds of all isolations from man. The fact that only seven serotypes accounted for a large proportion of all recoveries is consistent with past experience.

Salmonella derby did not appear on the list of the seven most common serotypes this month, but accounted for 3.8 per cent of total isolates reported (Table VIII). Salmonella saint-paul appeared on the list of seven most common serotypes for the first time since October 1964.

The family case to total case ratio during January (.217) is consistent with past experience (Table II). The age and sex distribution (Table IV) is also consistent with past experience.

B. Nonhuman

There were 534 isolations of salmonellae from nonhuman sources reported in January. This is an increase of 191 from the previous month. There were 52 serotypes identified among those submitted from 34 States.

The seven most common types reported for January were as follows:

No.	Serotype	Number	Per Cent	Standing Last Month
1	S. typhi-murium S. typhi-murium var. copenhagen	90	16.9	1
2	S. heidelberg	77	14.4	2
3	S. infantis	47	8.8	3
4	S. pullorum	36	6.7	6
5	S. montevideo	25	4.7	Not listed
6	S. chester	22	4.1	Not listed
7	S. blockley	21	3.9	Not listed
		318	59.5	

These seven types accounted for 59.5 per cent of the total.

The four species from which most of the isolations were obtained in order of frequency are: turkeys, 194 (36.3 per cent); chickens, 165 (30.9 per cent); cattle, 46 (8.6 per cent); and swine, 16 (3.0 per cent).

Rare serotypes isolated from nonhuman sources this month are as follows. The two Salmonella mission isolates are the first recorded for the states of Arkansas and South Carolina. Random isolations have been previously recorded from 10 states with no evident pattern. The S. westerstede isolates were both from the same area in Mississippi. No immediate connection between the two was evident as the chicken was from a broiler flock which neither sent material to nor used meat scrap from the rendering plant in question. The geographic pattern of isolation of S. tallahassee from nonhuman sources closely parallels human isolates in its restriction to the southeast. The S. goerlitz isolate was the first reported in the United States. It was obtained from a sample of cotton seed removed from an unopened bag during a survey of a farm on which a human case of salmonellosis due to S. typhi-murium had occurred. The S. brandenburg isolation from a turtle was directly related to a family outbreak of salmonellosis in North Carolina (vide infra).

III. CURRENT INVESTIGATIONS

A. Interstate Outbreak of Salmonellosis Due to a Contaminated Food Supplement. Investigated through the combined efforts of State Health Departments, FDA, industry and CDC. Specific acknowledgment is given: Cecil B. Tucker, M.D., Director, Division of Preventable Diseases, and Danny Jones, M.D., EIS Officer, Tennessee State Department of Health; Charles Carraway, D.V.M., Division of Epidemiology, Louisiana State Department of Health, Van C. Tipton, M.D., Director, Communicable Disease Division, Texas State Department of Health; Sam D. Fine, John Sanders, M. T. Bartram, Ph.D., James Hyndman, Curtis Joyner, Dale Hunter, and Ronald Fischer of FDA; and the industries involved in the investigation.

Summary

In June 1964, an outbreak of salmonellosis in an institution for mental deficients in Tennessee affected 80 of 173 patients. (SSR #29). Six different salmonella serotypes were implicated in this outbreak of gastroenteritis which was characterized by fever, vomiting, and diarrhea, lasting from 1 to 3 days. Twelve patients were infected with more than one serotype. An epidemiologic investigation suggested that a dietary supplement was the vehicle of infection, and this hypothesis was subsequently confirmed by bacteriologic analysis. Four of the six serotypes isolated from patients with gastroenteritis were also recovered from the food supplement.

The contaminated food, which contained a combination of vitamins, minerals, protein, carbohydrates, and fats, was a product of interstate commerce used

by 22 institutions for mental deficients in 9 States. Culture surveys of patients from four of these institutions revealed that between 21 and 46 per cent of patients consuming the contaminated food were infected. Clinical symptoms for the most part were minimal or absent. As in the outbreak in Tennessee, infection with several serotypes was detected. Between 20 and 40 per cent of samples of the food supplement obtained from these institutions were contaminated with salmonellae.

An investigation of the plant producing the contaminated food supplement revealed that both the final product and 2 of its 19 ingredients were contaminated with salmonellae. The ingredients from which salmonellae were isolated were dehydrated Brewer's yeast and cotton seed protein. Five of the same six serotypes isolated from patients affected during the outbreak in Tennessee were recovered from the two ingredients.

The plants producing cotton seed protein and dehydrated Brewer's yeast were investigated and isolations of salmonellae were made from the production lines and final products of both plants. For the most part, the serotypes recovered from these plants conformed to those isolated both from patients and the food supplement, thus confirming their epidemiologic significance.

Investigations are underway to determine the routes by which contamination was introduced into the dehydrated Brewer's yeast and cotton seed protein plants. Regulatory procedures have been supervised by the Federal Food and Drug Administration.

Introduction

The multifaceted investigation of this complex epidemic required the combined efforts of nine State health departments, the Federal Food and Drug Administration, the CDC, and the involved industries. Without the co-operation of all groups, the final result, control of the public health problem would have been unapproachable. This epidemic demonstrates the co-operation necessary to attain such a goal, while at the same time telling a comprehensive story of a complex epidemic. A discussion of the outbreak and its investigation will be divided into three parts: (1) the outbreak at the State institution for the mental retarded in Tennessee which initiated all subsequent investigations, (2) the investigation of 4 of 22 similarily involved institutions and, (3) the investigation of the contaminated food supplement and its ingredients.

The Outbreak of Salmonella Gastroenteritis at a State Institution for the Mentally Retarded, Tennessee.

Between June 24 and 27, 1964, 80 of 173 residents at an institution for mental deficients in Tennessee developed an acute gastrointestinal illness which was characterized by diarrhea, vomiting, and fever. The outbreak was confined to a single building, housing 173 patients, the majority of whom were always confined to bed and unable to perform any self-care activities. Although most patients were ill for less than 24 hours, a few were ill for from 2 to 3 days. One death occurred in a 54-year old white female who developed bloody diarrhea on the evening of June 24 and died suddenly at 8:30 AM the following morning. A single stool culture

obtained at the onset of her illness was negative for enteric pathogens. No autopsy was performed.

Sixty-nine of the 80 acutely ill patients were cultured by rectal swab. Six of these cultures were positive for Salmonella schwarzengrund. All 80 patients ill were "isolated" and started on a five-day course of oxytetracycline.

Beginning approximately one week following antibiotic therapy, rectal swab surveys of all patients in the affected building were initiated. Nurses, aides, and other employees in the building were also cultured. Between June 25 and October 31, 36 of the 80 patients initially involved in the outbreak yielded positive cultures for one or more serotypes of salmonellae. Cultures from 13 patients not initially involved in the outbreak were also positive. Six different serotypes were recovered from these 49 patients. The results are summarized below.

Culture Results	Number of Patients Positive	
	Those in the Outbreak	Not in Outbreak
Recovery of 1 serotype	27	10
S. schwarzengrund	21	7
S. montevideo	5	2
S. tennessee	1	0
S. newport	0	1
Recovery of 2 serotypes simultaneously	8	3
S. schwarzengrund and S. montevideo	7	3
S. montevideo and S. simsbury	1	0
Recovery of 3 serotypes simultaneously	1	0
S. schwarzengrund S. montevideo and S. cubana	1	0
Total	36	13

Rectal swabs from nurses, aides, and food handlers in the affected building were negative for salmonellae during the four-months following the outbreak.

The abrupt onset of the outbreak suggested a common source and the epidemiologic investigation clearly implicated a dietary supplement. The food supplement was a dry meal which was prepared by adding hot water and mixing to a gruel. The material was supplied in 25 pound cartons which were stored in a walk-in refrigerator at approximately 40°F. It was available in 10 flavors and contained the following ingredients: potato flour, whole-wheat cereal, fat-free milk solids, shortening, full fat soya flour, cotton seed protein, wheat germ, powdered whole egg, Brewer's yeast, bone meal, sugar and dextrose,

and/or hydrolyzed protein, alfalfa meal, spices and flavors, and Vitamins A, D_2, ascorbic acid, and ferrous sulfate. When used, approximately 30 to 45 minutes before meal time a carton was removed from the refrigerator and the gruel prepared in a 10-gallon rotating kettle to which was added hot water from the coffee urn. The warm mix was then poured into a serving tray and kept on a counter for 15 to 30 minutes until the food for the other diets was prepared. Temperature determinations taken during preparation revealed inadequate levels for pasteurization.

No evidence suggested extrinsic contamination. In an attempt to document the theory that a number of cartons of the product were intrinsically contaminated, a culture surveillance program of the supplement was initiated in August. In mid-October, because of repeated negative results, a change in culture procedure was suggested and on November 4, after 80 consecutive negative cultures, S. tennessee was identified in one sample. This prompted additional cultures. Nine of 25 unopened cartons (36 per cent) of the product were then found positive. The serotypes recovered were S. schwarzengrund (5 isolates), S. tennessee (2 isolates), S. montevideo (1 isolate), and S. simsbury (1 isolate). The recovery from the food supplement of 4 of the 6 serotypes isolated from patients, of which one was S. simsbury, an extremely rare serotype (only 2 isolations from humans reported to CDC in 1964), was highly significant.

Infection in other Institutions

Inquiry into the distribution list of the contaminated dietary supplement revealed that it was used by 22 institutions for mental deficients in 9 States. The State Health Departments of these States were notified of the potential problem and requested to determine if any salmonella infections had been recently identified in the institutions. Three institutions had experienced sporadic cases of salmonellosis. The clinical illness had been mild and no major outbreaks had been identified.

A culture survey of patients in 4 of the 22 institutions was performed in early December 1964. Rectal swabs from approximately 50 individuals receiving the food supplement were obtained at each institution. No clinical gastrointestinal disease was recognized at any of the 4 institutions at the time of the surveys. Between 21 and 46 per cent of patients receiving the food supplement were positive for salmonellae. The following table lists the frequency of the specific serotypes isolated from each institution.

	Institution			
	1	2	3	4
Serotype	# Isolates	# Isolates	# Isolates	# Isolates
S. schwarzengrund	4	10	5	15
S. montevideo	3	3	7	8
S. tennessee	1	0	1	1
S. cubana	1	0	0	0
Total number cultured	39	50	50	50
Per Cent positive	21	24	28	46

Samples of the food supplement were also collected from each of the four institutions and between 20 and 40 per cent of these were positive for salmonella. The results of these cultures, which are listed below, further demonstrate the consistency of serotypes isolated from the food supplement and from patients.

	Institution (dietary supplement)			
	1	2	3	4
Serotype	# Isolates	# Isolates	# Isolates	# Isolates
S. schwarzengrund	0	0	1	1
S. montevideo	1	1	0	0
S. tennessee	0	1	0	0
S. cubana	0	0	0	0
Total number cultured	5	5	5	6
Per Cent Positive	20.0	40.0	20.0	16.7

Subsequent to these results, the Food and Drug Administration, with the co-operation of the producer of the food supplement, initiated an immediate recall of the product from the 22 institutions involved.

Food Supplement Investigation

Following notification by the Tennessee State Department of Health that the dietary supplement had been found contaminated, the FDA and Communicable Disease Center investigated the plant producing the contaminated food. An inspection of the plant was conducted and samples for culture were collected from the environment and from the ingredients used in making the product.

The food was produced by 2 employees in a single building measuring approximately 75 feet x 100 feet. The raw ingredients previously listed were stored in the factory in a dry state and the food product, which was produced on demand, was made by mixing approximately 1,000 pounds of basic formula into one large blender. The product was then distributed in 25-pound cardboard cartons lined with polyethylene bags. The final product received no treatment during production. The label recommended that water be heated to 160°F. before mixing, but this recommendation was to aid mixing and was not directed toward sterilization. No recommendations for storage appeared on the label. Some 200,000 pounds of the product were produced and sold each year.

Forty environmental swabs were taken from within the factory and rectal swabs were obtained from the 2 male employees. Four to five cultures were taken from each of 10 of the ingredients used in the food supplement. These were processed in the Veterinary Public Health Laboratory at the Communicable Disease Center. The results appear below.

Source	Number of Samples	Results
Environmental cultures	40	Negative
Potato pie	3	Negative
Whole-wheat cereal	3	Negative
Milk solids, fat free	3	Negative
Fat soya powder	3	Negative

Source	Number of Samples	Results
Cotton seed protein	3	2 out of 3 positive, *S. tennessee* (2)
Whole dried egg powder	10	Negative
Brewer's yeast	3	3 out of 3 positive, *S. montevideo* (1), *S. schwarzengrund* (2)
Bone meal	5	Negative
Alfalfa meal	3	Negative
Hydrolyzed protein	3	Negative
Spray-dried egg	1	Negative

Because the samples of Brewer's yeast and cotton seed protein had been collected from opened containers of raw material, repeat cultures were taken from closed containers. Both were again positive for the same serotypes. On the second survey, *S. simsbury* was also recovered from the cotton seed protein.

It appeared at this time that both ingredients were in part responsible for contamination of the final product and infection of patients in the institutions studied. Therefore, investigations were initiated by the FDA and CDC in the plants in which both the Brewer's yeast and the cotton seed protein were produced.

Six of 40 samples taken at various points along the production line of the cotton seed protein and from the final product were positive for salmonellae. Three of the positive samples were from the production line, *S. simsbury* (2), and *S. senftenberg* (1). The remaining 3 positive cultures (all *S. tennessee*) were from samples taken from the final product stored at the plant. At this point, the industry voluntarily withheld their product from the open market and conducted an intensive investigation of the contamination in their plant. Information suggested that the cotton seeds were contaminated before coming into the plant; that contamination established itself along the production line, thereby, developing reservoirs which resulted in a contaminated final product. An immediate change in the method of production was made and subsequently, no isolates of salmonellae have been recovered from the final product of cotton seed protein. The industry voluntarily instigated an intensive long-term quality control program, and an investigation is planned which will determine the method by which cotton seeds are contaminated before arriving at the processing plant.

The Brewer's yeast plant is also under investigation. Although no official results are available, unofficial reports indicate that salmonellae have been isolated at the plant, and that at least one of the two serotypes previously listed as being recovered from the yeast was isolated again. The Brewer's yeast plant has recalled all product in storage. As yet, the method of introduction of salmonellae into the yeast plant has not been determined.

These companies will be followed by repeat environmental culture programs to evaluate the adequacy of the attempts to control the salmonella infection problem.

Comments

This incident clearly demonstrates the extent to which salmonella food-borne infections may be disseminated. It also emphasizes the worth of an extensive and persistent epidemiologic investigation, which requires the co-operation of several organizations. Epidemics of common-source salmonella infections occurring in hosts residing in widely separated geographical areas are becoming increasingly common. These outbreaks, in large part resultant from modern marketing methods which allow for the widespread distribution of common food items, are difficult to recognize, investigate, and control. Investigations require an extensive effort and are expensive, but the need for such investigations is unquestionable.

It was fortuitous that the clinical illness which occurred in the institution for mental deficients in Tennessee was for the most part mild. Disease identified in the other three institutions was also mild and sporadic. Undoubtedly, a number of cases of mild diarrhea were treated symptomatically and not cultured. An outbreak of mild diarrhea in such institutions could easily go unrecognized. The outbreak in Tennessee was recognized because of the large number of cases occurring within a short period of time. Since all institutions were probably exposed to the same serotypes, it is likely that the outbreak in Tennessee resulted from a higher level of contamination of the product and/or the opportunity for prolonged incubation before serving. The fact that the gruel usually was served quickly following preparation, and perhaps even at times was subjected to temperatures which would kill at least a number of bacteria, may have protected the patients from ingesting large numbers of salmonellae.

Contamination of the food supplement clearly resulted from contamination of two of its ingredients. The consistency of serotypes appearing in the host, the vehicle of transmission, and two reservoirs is most impressive. Of the six serotypes recovered from patients, four were recovered from the food supplement and five from the cotton seed protein and Brewer's yeast. There was no overlap in the serotypes isolated from yeast with that of those isolated from cotton seed protein.

Salmonella schwarzengrund and S. montevideo were the most frequently isolated serotypes from patients at each of the five institutions studied. Of the 121 isolations made from patients, S. schwarzengrund accounted for 73 (60.3 per cent), and S. montevideo, 40 (33 per cent). Salmonella tennessee, the next most frequently isolated serotype, accounted for 4 (3.3 per cent). Although the number of samples of food supplement tested was small and no quantitative studies were performed, the prevalence of organisms recovered from the food supplement suggests a correlation between level of contamination of the food and infection in the patients.

Brewer's yeast and cotton seed protein have received little attention as reservoirs of salmonellae, although both have been recognized as such. Kunz and Ouchterlong (1) reported an outbreak of salmonellosis in a nursery which was traced to the consumption of contaminated dried yeast. Cotton seed protein, an ingredient frequently used in animal feeds, has resulted in salmonellosis in horses (2). The methods by which salmonellae are introduced

into Brewer's yeast and cotton seed protein plants have not been determined. Such studies are urgently needed.

Subsequent to changes in production employed by the producers of the cotton seed protein and Brewer's yeast and the producer of the food supplement, no new infection has been identified in institutions receiving the dietary supplement. Surveillance is being conducted to determine whether the problem has been totally alleviated.

B. Salmonellosis - Denver, Colorado. Reported by Samuel Johnson, M.D., Director of Denver City-County Health Department, C.S. Mollohan, M.D., Chief, Epidemiology Section, Colorado State Department of Health, Michael Cross, M.D., EIS Officer assigned to Colorado State Department of Health, and Bernard Goffe, M.D., EIS Officer, Investigations Section, CDC.

On October 24, 7 of 9 persons who attended a dinner party in Colorado became ill within 36 hours with gastroenteritis. Symptoms included fever, chills, severe abdominal cramps, diarrhea, some nausea and vomiting, as well as headache, malaise and myalgia. Salmonella newington was isolated from stools of several of the patients. Food histories implicated corn beef. Bacteriological analysis of the corn beef revealed a heavy growth of Proteus species but no salmonellae were isolated.

Coincident with this investigation, the laboratory of the State Health Department received 3 specimens of S. newington from Denver physicians who had been treating patients with gastroenteritis. Investigation of these cases revealed that they were employees of a local automobile dealer and had attended a common dinner meeting on the night of October 22. Food for this meeting was catered by the same delicatessen from which the food involved in the outbreak previously described was purchased. The food consisted of ham, braunschweiger, turkey, and cheese served in the form of sandwiches. Twenty-six persons attended the meeting. Eighteen of 23 who had eaten sandwiches developed severe febrile gastroenteritis. No illness was experienced by the 3 who had not eaten the sandwiches. On November 6, food histories and cultures for enteric pathogens were obtained from 21 persons who had been at the meeting. Ten of the 21 carried S. newington.

Investigation of the delicatessen revealed that a significant part of the activities of the delicatessen was devoted to catering affairs involving a few to several hundred persons. The food for the catering service was

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(1) Kunz, L.J., and Ouchterlony, O.T.G.: Salmonellosis originating in a hospital. A newly recognized source of infection. New Engl. J. Med. 253:761-763, 1955.

(2) Ellis, E.M.: Salmonellosis in cattle, horses, and feeds. Presented at the Midwest Interprofessional Seminar on Disease Common to Man and Animals, Iowa State University, Ames, Iowa. Sept. 17, 1962.

prepared in the regular kitchen, where it was then loaded into special unrefrigerated travel containers and taken to the locations where it was to be served. The food was allowed to stand at room temperature for 2 to 6 hours before being eaten. The restaurant employed 17 persons, all of whom ate food either prepared in the restaurant or served by the catering department at the restaurant at various times. Histories taken from employees revealed that 14 of the 17 employees had been symptomatic with gastroenteritis some time between the 5th and 24th of October. The majority of the cases occurred from the 22nd through the 25th of October. One of two cooks had been vacationing in Switzerland during the month of September. While there he experienced a severe episode of febrile gastroenteritis of several days duration. After returning to work he had an exacerbation of symptoms during the 22nd, 23rd, and 24th of October, but continued to work.

The preparation of food was investigated and revealed that the corn beef and other meats served at the restaurant were all cooked thoroughly at high temperatures, and were cooled and refrigerated until served, except for the food served by the catering service. Two cooks handled the meat both before and after it was prepared in bulk state, but seldom had anything to do with the slicing or making of sandwiches.

Cultures were obtained from all employees in the restaurant. Twelve cultures taken from the 15 previously symptomatic employees were positive for S. newington and 2 positive cultures were obtained from 2 individuals who had been completely asymptomatic. Both cooks carried high numbers of organisms. Environmental cultures revealed no salmonellae.

On November 1 the restaurant was closed and underwent a thorough cleaning with disposal of all suspect food. It was reopened on the 5th of November and only those employees with negative cultures were allowed to return to work in any food handling capacity. Although the investigators could not implicate the specific source of this outbreak, they suggested that in all probability the cook who had been having mild diarrhea since his trip to Europe was the index case. However, endogenously contaminated food consumed by restaurant employees could have produced the carrier state among them with later secondary spread to the patrons. Since completion of the investigation there have been no further reports of restaurant-associated salmonellosis in the Denver area.

C. Outbreak of Gastroenteritis, Rugters University, New Brunswick, New Jersey. Reported by William J. Dougherty, M.D., Director, Division of Preventable Disease Control, New York State Health Department, and Carl Ruch, M.D., Chief of Student Health Center, Rugters University, and Jonas Shulman, M.D., EIS Officer, Investigations Section, CDC.

On Thursday, November 12, 1964, large numbers of students at Rugters University began arriving at the student infirmary complaining of gastrointestinal symptoms. By Friday, November 13 at 12:00 noon, over 250 patients had been seen in the infirmary. Patients described of sudden onset of nausea,

vomiting, and cramping pain. Vomiting was frequently violent, lasting from 2 to 6 hours and was generally followed by diarrhea. In general, the students felt much better in 6 to 12 hours although the diarrhea and weakness lasted from 1 to 2 days. About 25 to 30 per cent of the students had fever greater than 100° but few had fever over 102°. No bloody diarrhea was reported. The infirmary beds were filled to capacity within the first few hours, and thus many ill students had to be sent back to the dormitories with medication for symptomatic relief. Many students also brought medication back to their roommates who were too ill to go to the infirmary. At this stage, stool cultures taken from acutely ill patients were negative for salmonella and shigella.

At this point, health officials were in a quandry as to the cause of this outbreak. Staphylococcal food poisoning was doubted because of the slow trailing off of new cases as seen in the epidemic curve in Figure 2. An additional possibility was that the illness was secondary to contamination of the water supply. This was considered because a large fire had occurred in New Brunswick on November 11 and large quantities of water had been pumped all that day and the following day. Sanitarians from the state and local health departments were notified in view of this possibility and after a detailed investigation, the water supply was discarded as a possible source of infection.

Additional stool cultures were obtained in the hope of clarifying the situation. Thirty students ill during the epidemic and hospitalized in the infirmary were recalled on November 24 for stool cultures. In addition, fecal samples from 60 food handlers at the university dining hall were cultured. Salmonella heidelberg was isolated from three students (10 per cent), and Salmonella blockley was recovered from one food handler.

A questionnaire was given to 4,000 persons on the Rugters University campus. An attempt was made to reach faculty, fraternity students, and commuters as well as dormitory students. These groups were picked because of their different eating habits. A total of 2,250 forms were returned (53.6 per cent). Results of this survey indicated that a total of 589 persons on the university campus had been ill during this period. A second epidemic curve (Figure 3) based on the results of the questionnaire was constructed. When compared to Figure 2, it is clear that the low number of cases seen on November 14 in the infirmary was the result of the weekend rather than the natural history of the epidemic. The results of the questionnaire clearly showed that the disease occurred primarily among the resident and dormitory students who ate at the university commons. The graduate students who did not eat at the university commons had little or no illness. The attack rates were calculated for each specific item served in the commons on November 11 and 12. No specific food could be incriminated as causing the outbreak.

On December 4, 1964, stool specimens were cultured from 100 students who had been ill, 100 students who had been well, and the remaining food handlers at the university commons. This stool survey was done 22 days after the onset of the outbreak. The results of this survey are summarized in Table IX.

Among the ill students, 11.7 per cent were positive for salmonella of various serotypes. Salmonellae were also recovered from 6.7 per cent of the students who were not ill. No salmonellae were isolated from students who did not eat in the university commons.

The data presented strongly suggested that the outbreak of gastroenteritis at Rugters University was a common source epidemic. The epidemic curve further implied that in addition to a common source, there may have been secondary person to person spread. Although three types of salmonella, S. heidelberg, S. typhi-murium and S. blockley were found, this probably was due to the fact that the product responsible for the outbreak was contaminated with multiple serotypes of salmonellae.

It is estimated that at least 1,000 people at Rugters were ill during this outbreak. A high incidence of inapparent infection is suggested by the finding of salmonellae in 6.7 per cent of students cultured who were not ill. The failure to isolate salmonellae from the first of ill patients cultured undoubtedly caused considerable consternation in attempting to find the etiology of the outbreak. It is possible that the specimens were mishandled during transportation from Rugters to the State Laboratory at Trenton.

D. Typhoid Fever in New Mexico (preliminary report). Reported by H. Gordon Doran, Jr., D.V.M., M.P.H., Department of Comparative Medicine, New Mexico State Health Department, John H. Tiedemann, M.D., District Health Officer, Los Lunas, New Mexico, Michael Cross, M.D., EIS Officer assigned to Colorado State Health Department, and Richard N. Collins, M.D., Investigations Section, CDC.

An outbreak of typhoid fever occurred recently in Albuquerque and Belen, New Mexico. To date, 25 cases including both adults and children have been bacteriologically confirmed (Salmonella typhi, phage type F1). Several of these persons have been quite ill and required hospitalization but no deaths have occurred. With one exception, all of the cases thus far discovered attended a common gathering at a wedding reception during the last week of November 1964. There is some evidence of secondary spread of cases among family contacts. Epidemiologic investigation indicates that chicken salad sandwiches served at the wedding probably served as the vehicle of infection. One of the persons involved in the preparation of the chicken salad who was not ill had a positive stool culture for S. typhi, phage type F1 and was considered by public health officials to represent a previously unknown typhoid carrier. Additional studies are in progress and will be reported in a subsequent issue.

IV. REPORTS FROM STATES

A. Illinois

Outbreak of Hospital-Associated Gastroenteritis Due to Salmonella typhi-murium. Reported by Norman J. Rose, M.D., Chief, Bureau of Epidemiology, State of Illinois Department of Public Health, and Lucy Saunders, Nursing Supervisor, Will County Health Department.

On October 30, 1964, a child was admitted to a hospital in Will County, Illinois because of diarrhea and malnutrition. Stool culture upon admission was positive for Salmonella typhi-murium. Investigation of this case indicated that the patient and a sibling who was also found to be positive for S. typhi-murium may have acquired the infection from their grandfather, a visitor from another state. Over the next 10 days, 4 additional children, aged 6 months to 4 years developed symptomatic gastroenteritis due to S. typhi-murium while in the pediatric section of the same hospital. Only 1 of the 4 additional children had been admitted to the hospital because of diarrhea and in this case, a stool culture on admission was negative; however, a stool culture 4 days after admission was positive for S. typhi-murium. Diagnoses in the other cases included severe burns, malnutrition, and convulsions of unknown etiology. The index case expired on November 8; his cause of death was certified as S. typhi-murium, gastroenteritis, bleeding ulcer, and malabsorption syndrome.

It is felt that salmonella infection due to S. typhi-murium was introduced into this hospital via the index case with symptomatic diarrhea and infection of the other children in the pediatric section resulted from person-to-person spread. Investigation indicated that isolation technique failure could have occurred on at least 2 occasions during this period. Measures have been taken to improve and enforce isolation practices at the hospital in question.

Editor's Comment: This outbreak is typical of hospital-associated salmonellosis localized in a given area of the hospital. These outbreaks probably occur frequently but are not thoroughly investigated or reported to public health officials unless a large number of patients are involved or a death occurs as was the case in this outbreak. Spread of infection within the unit in the hospital may occur via fomites or more commonly, person-to-person. Nurses, aides, and physicians are frequently important steps in the transmission of infection from the original symptomatic case to other susceptible patients.

B. Indiana

Food-borne Outbreak of Gastroenteritis Due to Salmonella blockley and Salmonella enteritidis. Reported by A.L. Marshall, Jr., M.D., Director, Division of Communicable Disease Control, Indiana State Board of Health.

In December 1964, approximately 400 people attended an evening banquet. Twenty-nine persons became ill after the banquet with symptoms of nausea,

headache, vomiting, diarrhea, fever, and malaise. Seven persons were hospitalized. The onset of symptoms was between 12 and 36 hours after the banquet. Salmonella organisms were recovered from all persons who were ill and from several persons who ate at the banquet but did not have symptoms. Stool cultures were positive for either Salmonella enteritidis and/or S. blockley. The menu consisted of turkey, dressing, gravy, fried chicken, ham, baked beans, potato salad, cold slaw, rolls, cake, and pie. Food histories gave highest attack rates for those who ate potato salad and the gravy. Cultures of the chicken cracklings used for making the gravy were positive for both S. blockley and S. enteritidis. Other food samples were not available for study. Cultures of the food handlers involved in preparation of the meal yielded 2 asymptomatic positives for S. blockley. Large numbers of chickens used were placed in warming ovens for up to 6 hours before the time to serve, and it is felt that this may have served as a suitable incubation time.

C. (1) Minnesota

Outbreak of Gastroenteritis Due to Salmonella enteritidis. Reported by D.S. Fleming, M.D., Director, Division of Disease Prevention and Control, and Leslie P. Williams, Jr., D.V.M., Veterinary Epidemiologist, Minnesota State Department of Health.

In the month of November 1964, it became apparent that there was an unusual number of isolations of Salmonella enteritidis from stool specimens submitted from the twin cities area. Only 11 isolations of this serotype had been made during the first 10 months of the year. November isolations had passed that figure by November 20. The total for the month was 15. When these 15 cases were spotted on a map, 8 of the cases formed a cluster in the area of northeast Minneapolis. Permission was obtained from physicians concerned to interview these 8 patients. Questions were asked as to foods eaten 24 hours before onset, public gatherings attended, and pets and animal contacts. The only thing in common to all was the fact that they had all stopped at a large supermarket in the area and had accepted a sample of spaghetti sauce being handed out as a sales promotion on November 6 or 7. Members of their families who had not eaten this item remained well. Interviewees named 3 additional persons who had suffered an illness similar to their own during November 7 or 8. Two of these were cultured and both were positive for S. enteritidis. All 3 had eaten the sample of spaghetti sauce.

Symptoms included vomiting, diarrhea, fever and chills, stomach cramps and muscle pains. One of the patients, a 5½ year old girl was sick for only 24 hours. The others experienced diarrhea for up to 1 week. Two required hospitalization. Several persons are still known to be excreting the organism 3 months after the exposure.

No samples of the food used during the promotion campaign were available for sampling. Investigation showed that the meat balls were cooked and allowed to remain at room temperature for 4½ hours while the sauce was prepared. Subsequently, the meat balls were added to 18 gallons of sauce and a batch

was taken home and put in a deepfreeze. They were removed the following day at 3:30, heated on the kitchen stove, and subsequently served that evening between 5:30 and 9:00 pm, being kept warm on a hotplate. The remaining sauce was again taken home and again placed in the deepfreeze where it was removed the next day and served from 10:00 am to 5:30 pm while kept on a warming plate.

Editor's Comment: In this outbreak the epidemiologists responsible are to be commended for both their initial high index of suspicion aroused by an increasing incidence of a serotype in their area and subsequent splendid detective work to relate it to a common source outbreak. They have built a strong case implicating the meat sauce as the vehicle in this outbreak. They point out that this is the first known outbreak traced to food samples passed out in a supermarket. In many states no official agency has control over the serving of sales promotion samples. This report indicates that closer supervision of this type of activity is desirable.

(2) Minnesota

Fatal Salmonella Meningitis. Reported by D.F. Fleming, M.D., Director, Division of Disease Prevention and Control, and Leslie P. Williams, D.V.M., Veterinary Epidemiologist, Minnesota State Department of Health.

A white female was born in a large Minneapolis Hospital on November 10, 1964. She was apparently healthy and was discharged on November 15. On November 17, she became ill with spiking fever and discomfort; there was no diarrhea or vomiting reported. She was readmitted to the hospital on November 23 with fever and signs of meningitis and died on December 1, 1964. Salmonella enteritidis was isolated from cerebral spinal fluid. None of the 5 persons in close contact with this infant experienced diarrhea or other gastrointestinal symptoms within 2 weeks of her illness. There was an 8-month old dog in the household that had had diarrhea most of the time. The dog and 3 members of the immediate family were negative on culture for salmonellae. The baby had been breast fed, and received standard commercial dietary supplements. No source for the infection in this case was determined from interview of family contacts.

Editor's Comment: This report again emphasizes that salmonella is a frequent cause of meningitis occurring in infants up to 6 months of age. The fact that the patient became symptomatic within 48 hours of leaving the hospital and the absence of cases in the home suggests that the child probably acquired the infection while in the hospital. It is unfortunate that there was no opportunity to culture other infants in the nursery at the same time, and nursery personnel.

D. New York

Outbreak of Typhoid Fever in New York City. Reported by F.N. Tilley, M.D., Epidemiologist, and Tibor Fodor, M.D., Acting Chief, Bureau of Preventable Diseases, New York City Health Department.

An outbreak of typhoid fever occurred among children in the lower Bronx in August of 1964. Salmonella typhi, phage type T, was isolated from 8 cases. Two additional children were considered highly suspicious and probable cases because of the clinical history and high typhoid O and H agglutinations. Among the 8 bacteriologically confirmed cases, S. typhi, phage type T, was recovered from the blood in 7 and from the stool in 1. Several of the children were hospitalized but there were no deaths. Ages of the children ranged from 4 to 19 years. Dates of onset ranged from August 11 to August 31 of 1964 with 7 cases falling within a 7-day period from August 11 to August 17. All the cases occurred in 4 apartment buildings which were in close proximity. All the patients involved knew one another and played together frequently. An intensive search was made for a possible typhoid carrier in the neighborhood but none was found. It was subsequently learned that all of the ill children had eaten watermelon which had been fished out of the Hudson River sometime in the latter part of July 1964. It was learned that 1 adult and 7 additional children had eaten the same watermelon but did not become ill. One observer noted that the watermelon contained a soft spot. Therefore, the possibility that river water entered the melon could not be excluded. The melon was brought home, rinsed off, divided up and eaten. This specific area of the river which the watermelon was floating was the 125th Street pier. The Bureau of Sanitary Engineering indicated that this area was polluted with raw sewage. It was felt that this was a common source outbreak and the watermelon was the likely vehicle of infection. Members of the involved families were visited by Public Health nurses and field epidemiologists and instructed in personal hygiene. All family contacts were immunized with typhoid vaccine.

Editor's Comment: This well-studied outbreak is quite similar to that which occurred in Atlanta, Georgia in August of 1964 (SSR #29). In both outbreaks, cases were limited to children in a common neighborhood who played together frequently. Diagnosis was made readily by positive blood culture in over 80 per cent of the cases in these 2 studies. The Atlanta outbreak was traced to the presence of a missed case as a major food handler in one of the households, but the initial source of her infection was never determined. The possibility that a watermelon obtained from grossly polluted water was the major vehicle of infection as suggested by the authors in this outbreak, is indeed an intriguing one. Water samples or placement of Moore swabs in the area from which the watermelon was removed would have been of interest on the outside possibility that S. typhi, phage type T, could be recovered. Watermelon had been previously reported as the vehicle of infection in an outbreak of gastroenteritis due to Salmonella miami which occurred in Massachusetts.

(1) Gayler, G. E. et al, Public Health Reports 70:311, 1955.

E. (1) North Carolina

Outbreak of Gastroenteritis Due to Salmonella infantis. Reported by Martin P. Hines, M.D., Director, Ronald H. Levine, M.D., EIS Officer assigned to Division of Epidemiology, North Carolina State Board of Health.

In December 1964, a large number of individuals became ill with gastroenteritis approximately a day and a half following attendance at a community sponsored barbecue dinner. Salmonella infantis was cultured from the stools of individuals reporting gastrointestinal symptoms as well as from several individuals with no symptomatology who also attended the dinner. At least 50 individuals were known to have become ill following the meal. The mean incubation period was 31 hours with a range of 4½ to 58 hours. The average length of illness was 3½ days. Two patients required hospitalization with severe symptomatology but there were no fatalities.

The menu at the barbecue consisted of the following items: barbecue, potato salad, cold slaw, hushpuppies, coffee and asorted deserts. A carton of barbecue which had been obtained at the dinner but not opened and subsequently placed in a home freezer was obtained for analysis. Salmonella infantis was isolated from this specimen. Two of the 6 persons assisting in the serving of the dinner were found to be positive for S. infantis; both of these individuals had eaten barbecue and one had developed gastrointestinal symptoms. The barbecue was prepared by a firm whose sole product was barbecue pork. On the day prior to the dinner, a rack of hog shoulders was placed in the barbecue pit at 7:00 AM. The shoulders were removed at 4:30 PM and approximately 100 pounds of barbecue was chopped and placed in 10-pound cardboard buckets. An additional 25 one-pound containers were also prepared. One individual was responsible for the entire process. A stool culture from this person was negative. Subsequently, a visit was made to the barbecue pit and sanitary conditions were noted to be poor. One inspector commented that if a sanitary rating had been carried out on the day of the visit, that the operator's permit would have been revoked. The employee responsible for the preparation of the barbecue wore the same apron through the entire process; from the time he personally lifted the raw hog shoulders and placed them in the pit until the time he placed the chopped barbecue in the cardboard cartons with his hands. It was unlikely that he washed his hands at any point during this process. The members of the inspection team voiced the unanimous opinion that the techniques of food preparation and food handling were substandard and that contamination of the finished product might easily have taken place under these circumstances.

(2) North Carolina

Outbreak of Gastroenteritis Due to Salmonella brandenburg Related to Pet Turtles. Reported by Martin P. Hines, M.D., Director, Ronald H. Levine, M.D., EIS Officer assigned to Division of Epidemiology, North Carolina State Board of Health.

An isolation of Salmonella brandenburg, a rare serotype from a Wake County, North Carolina cow, prompted an epidemiological investigation. The family involved was composed of 2 parents and 3 children ranging in age from 4 months to 4 years. The entire family had been well when, during the first week of September the father brought 3 turtles home from a local variety store. The turtles appeared to be in good health. The mother changed the water every day. The two older children played with the turtles frequently and the baby was known to have kissed the turtle at least once. The husband also admitted handling the turtles on several occasions. One week following the purchase of the turtles, the mother developed nausea, fever, and diarrhea. No stool culture was obtained. The father complained about the same time of anorexia, nausea, but had no diarrhea. The symptoms lasted only 2 to 3 days. Three days later 1 child, age 2 years, developed fever, abdominal pain, and diarrhea. She was treated symptomatically and no stool cultures were obtained. Two weeks after the purchase of the turtles, the four-month old baby developed diarrhea. Stool culture revealed S. brandenburg. Because of this isolation, cultures were repeated on the entire family. The two other children, one of whom had symptoms and the other had had no symptoms, were both positive for S. brandenburg. Repeated cultures on the parents were negative. The 3 turtles, as well as the water from the turtle bowl, were obtained and 3 different serotypes were isolated from the turtles and turtle water: S. brandenburg, S. bredeney, S. urbana. Additional turtles were obtained from the variety store at which the initial purchase had been made but yielded only arizona organisms on culture. The turtles in question had been raised in Louisiana and subsequently shipped to North Carolina.

Editor's Comment: Reports of salmonella gastroenteritis related to contact with pet turtles continue to be reported frequently. The manner in which the turtles acquire their infection is presently obscure but is being investigated by workers in the States and at the Communicable Disease Center.

SPECIAL REPORTS

None.

INTERNATIONAL

A. Salmonellosis in Japan. Abstracted from an article by Hideo Fukumi, Department of Bacteriology, National Institute of Health, Tokyo, entitled "Salmonellosis in Japan," reprinted from The World Problem of Salmonellosis (Monographiae Biologicae Vol. XIII) Den Haag, The Netherlands.

The annual occurrence of salmonella food-poisoning incidents in Japan from 1954-1960 is shown in the table below. The data, provided by the Ministry of Welfare and Public Health of Japan, are obtained primarily from outbreaks and do not reflect sporadic cases. The data do not reflect a trend in the occurrence of salmonella outbreaks. In the United States there has been

a reported increase in salmonellosis since 1950. An analysis of the monthly data for 1959 and 1960 in Japan demonstrated that outbreaks of salmonellosis in those years were more prevalent in the period July to October. Data from other countries, including the United States, have portrayed a similar picture.

Year	Incidents	Cases	Deaths
1954	42	1,161	15
1955	94	3,597	17
1956	50	1,411	11
1957	47	2,330	8
1958	63	2,044	7
1959	83	3,495	18
1960	57	1,337	9

From 1955 to 1959, 120 human outbreaks of salmonellosis in Japan were attributed to 16 different serotypes. The vast majority of these were attributed to S. enteritidis (88, 73.3 per cent). Salmonella typhi-murium, the second most common, accounted for 9 (7.5 per cent).

During 1959, 2,481 isolations of salmonellae were made in Japan. Of these, 168 were from human and 2,313 from nonhuman specimens. The most commonly recovered serotypes were S. gallinarum and S. pullorum, which were almost exclusively from chickens and eggs. Salmonella enteritidis, the second most frequently isolated serotype, was recovered primarily from laboratory animals (guinea pigs, mice and rats) and dogs. The most common nonhuman sources of salmonella isolations were eggs, 759 (32.8 per cent); chickens, 540, (23.3 per cent) and dogs, 429 (18.5 per cent).

The most frequently recovered serotypes from human specimens during 1959 were: S. typhi, 47 (28.0 per cent); S. enteritidis, 21 (12.5 per cent); and S. paratyphi B and S. typhi-murium, 20 each (11.9 per cent).

B. Salmonella Isolations Typed During the Third Quarter of 1964, Utrecht, The Netherlands. Reported by E.H. Kampelmacher, D.V.M., Head, Zoonoses Laboratory, National Institutes of Health, The Netherlands.

During the third quarter of 1964, 4,322 isolations of salmonellae were typed in the Zoonoses Laboratory of the National Institute of Health in the Netherlands. This represented an increase of 1,382 (47.0 per cent) over the previous quarter. Of the 4,322 recoveries, 2,926 (67.7 per cent) were from human specimens.

The seven most common types from human and nonhuman sources appear in Table X. Salmonella typhi-murium and S. panama were the only types appearing among the seven most common from both human and nonhuman sources. Salmonella dublin, the second most common nonhuman isolate, was recovered predominantly from cattle; only five human isolations were reported. The vast majority of S. bareilly nonhuman recoveries were from meat and meat

products, chickens and eggs and egg products. Nonhuman isolations of S. panama were primarily from pigs, sewage, slaughterhouse scrapings and meat and meat products.

The most prominent nonhuman sources of salmonellae during the third quarter of 1964 were domestic fowl, 476 (34.1 per cent), meat and meat products and slaughterhouse scrapings, 242 (17.3 per cent); pigs, 203 (14.5 per cent); and cattle, 164 (11.7 per cent). In addition, 81 recoveries were made from eggs and egg products and 70 from sewage.

VII. FOOD AND FEED SURVEILLANCE

A. Abstract: Brezenski, F.T., Russomanno, R., and DeFalco, P., Jr. The Occurrence of Salmonella and Shigella in Post-chlorinated and Non-chlorinated Sewage Effluents and Receiving Waters. Health Lab. Sci. 2:40-46, 1965.

The effects of post-chlorination on sewage treatment plant effluent in the Raritan Bay area was studied with respect to salmonella and shigella. Four sewage treatment plant effluents and the tidal portion of the Raritan River were examined. Salmonella or shigella were not recovered from chlorinated effluents and river samples. After post-chlorination of effluents was discontinued salmonellae were isolated from 2 of the 4 effluents and from the Raritan River. After chlorination was resumed samples were again negative. Salmonellae were isolated from 5 of 6 untreated sewage outfalls affecting Raritan Bay waters. The authors refer to a current study on the occurrence of salmonellae in shellfish in Raritan Bay in which evidence reveals that clams may concentrate the organisms. The data on salmonellae in Bay clams is to be reported in a future publication.

B. Abstract: Guinee, P.A.M., Kampelmacher, E.H., and von Schothorst, M. Investigations on the Presence of Salmonella in Ground (minced) Meat. Tijdschr. Diergeneesk., 89:1740-1741, 1964.

From July 1959 through 1964 ground meat samples from all butcher shops in a certain town in the Netherlands were examined for the presence of salmonellae. During this 6½ year period, 977 samples were cultured and salmonellae were isolated from 107 (11.0 per cent). Between 120 and 160 samples were examined each year and the per cent of isolations ranged from a low of 5.8 per cent in 1962 to a high of 18.7 per cent in 1964.

Editor's Comment: In a recent letter to Dr. P.R. Edwards, Dr. Kampelmacher stated that they are now conducting an evaluation of methods for the examination of ground meat for salmonella with 5 participating laboratories in Europe. When each laboratory used their own method, considerable variation in findings was observed. Currently the evaluation is being continued with each laboratory using the same method.

C. Results of the Examination of Oysters for the Presence of Salmonella.

Following a report of an outbreak of gastroenteritis in Illinois associated with consumption of oysters, the Veterinary Public Health Laboratory obtained samples of shucked and unshucked oysters from Atlanta fish markets and examined them for salmonellae. A total of 22 samples of shucked oysters and 39 shellstock were cultured. They were obtained from 3 markets and originated from 4 sources on the Gulf Coast. Salmonella rubislaw was isolated from one sample of shucked oysters and one sample of the shellstock. Although these oysters were from 2 different markets, they were found to have been obtained from the same Gulf Coast company. Salmonella java was recovered from another sample of shellstock obtained from a different market and a different gulf producer (see table below). At present these findings cannot be linked to human disease but it provides evidence to support the fact that raw oysters may be another food source of human salmonellosis.

Laboratory Results of the Examination of Oysters for the Presence of Salmonella

Store	Brand	Number of Samples	Number of Positives	Serotype
A	1	8 (shucked)	1	S. rubislaw
	2	6 (shucked)	0	
B	1	23 (shellstock)	1	S. rubislaw
C	3	8 (shucked)	0	
	4	16 (shellstock)	1	S. java

Figure 1.

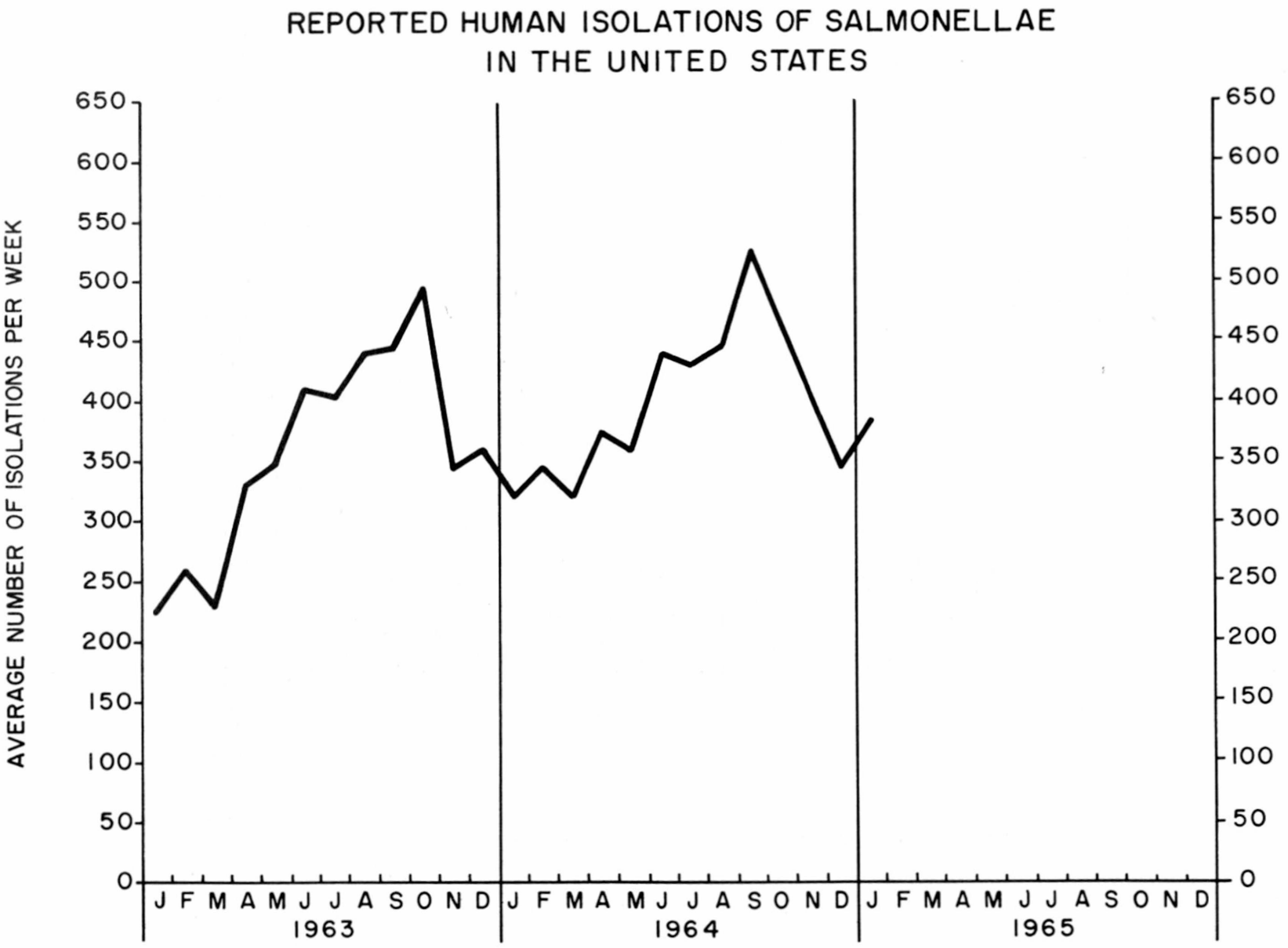
REPORTED HUMAN ISOLATIONS OF SALMONELLAE
IN THE UNITED STATES
AVERAGE NUMBER OF ISOLATIONS PER WEEK
650
600
550
500
450
400
350
300
250
200
150
100
50
0
J F M A M J J A S O N D
1963
J F M A M J J A S O N D
1964
J F M A M J J A S O N D
1965

Figure 2.

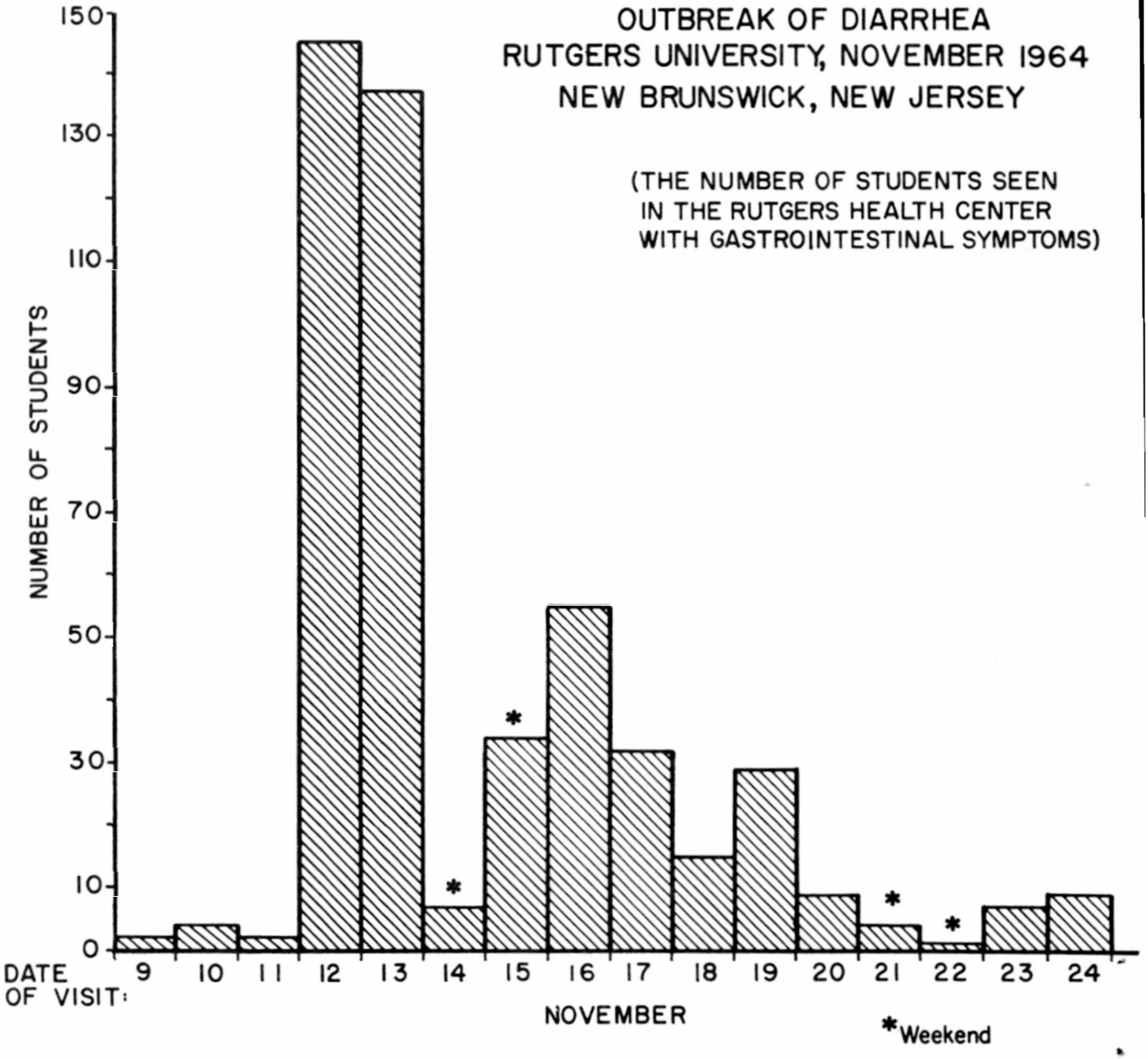
OUTBREAK OF DIARRHEA
RUTGERS UNIVERSITY, NOVEMBER 1964
NEW BRUNSWICK, NEW JERSEY
(THE NUMBER OF STUDENTS SEEN IN THE RUTGERS HEALTH CENTER WITH GASTROINTESTINAL SYMPTOMS)
NUMBER OF STUDENTS
150
130
110
90
70
50
30
10
0
DATE OF VISIT:
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
NOVEMBER
*Weekend

Figure 3.

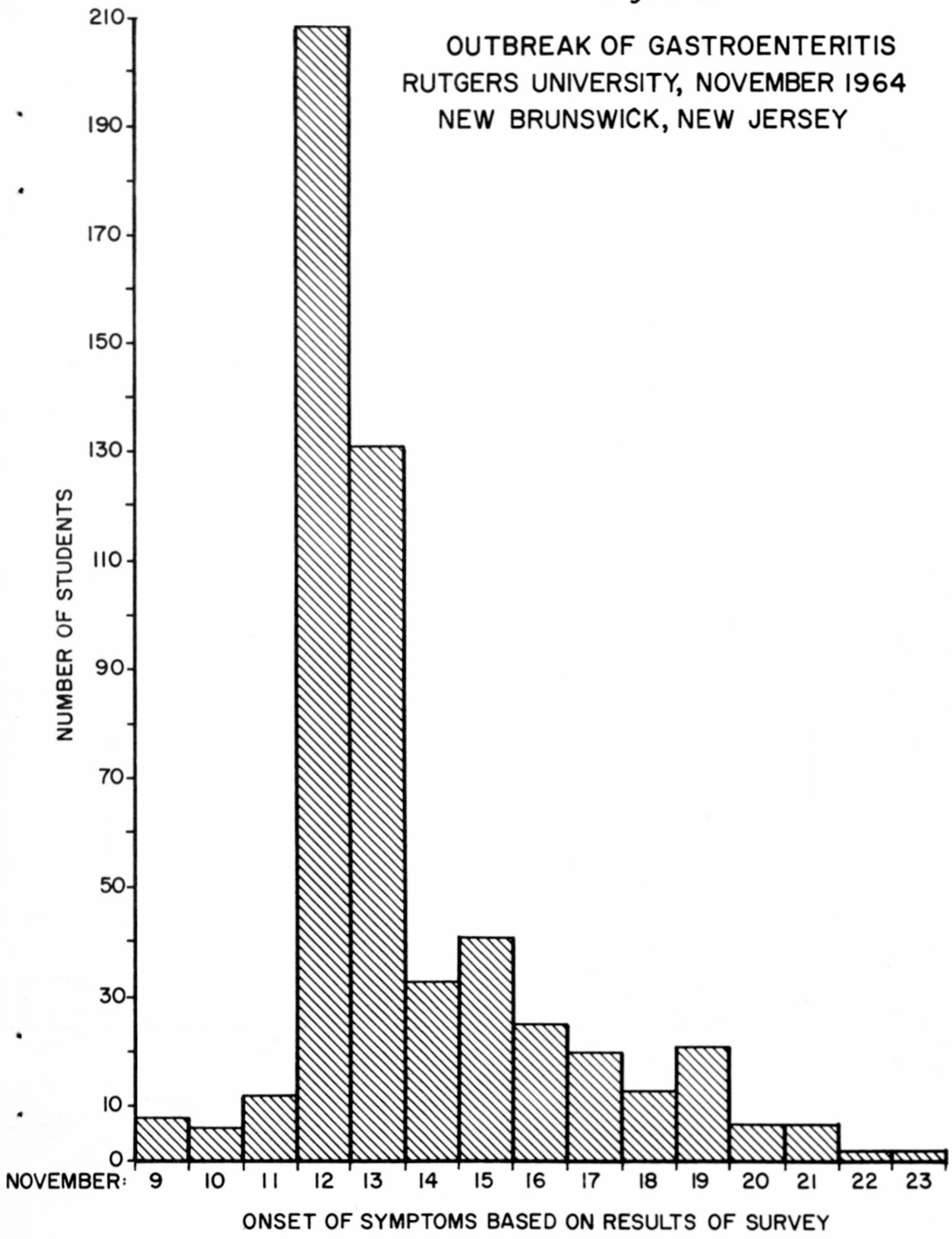
OUTBREAK OF GASTROENTERITIS
RUTGERS UNIVERSITY, NOVEMBER 1964
NEW BRUNSWICK, NEW JERSEY
NUMBER OF STUDENTS
210
190
170
150
130
110
90
70
50
30
10
0
NOVEMBER: 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
ONSET OF SYMPTOMS BASED ON RESULTS OF SURVEY

TABLE I

SALMONELLA SEROTYPES ISOLATED FROM HUMANS DURING JANUARY, 1965

SEROTYPE	REGION AND REPORTING CENTER																	
	NEW ENGLAND							MIDDLE ATLANTIC						EAST NORTH CENTRAL				
	MAINE	NH	VT	MASS	RI	CONN	TOTAL	NY-A	NY-BI*	NY-C	NJ	PA	TOTAL	OHIO	IND	ILL	MICH	WIS	TOTAL
albany																1			1
anatum				1			1		2				2	1		2			3
bareilly				1		1	2		2			1	3			2			2
berta				1			1											1	1
blockley								2				1	3		16	1			17
braenderup				1			1		1	1			2						
bredeney																			
california												1	1						
carrau																			
chester																			
cholerae-suis														1					1
cholerae-suis v kun																1			1
colorado																			
cubana									1				1			1	1		2
derby				7		4	11	8		2	2	4	16			3	2	5	10
duesseldorf														1					1
enteritidis				5		2	7	10	4	4	5	9	32	3	17	16	1		37
florida																			
give									1				1				2		2
hartford															1				1
heidelberg		1		11		6	18	8	3	5	3	6	25			7	14		21
heilbron																			
indiana																	1		1
infantis				5		4	9	7	1	2		12	22	10	2	5	2	5	24
irumu																			
java																2			2
javiana																			
kentucky																			
litchfield								6	2				8						
luciana																			
manhattan								1	1	2			4			1			1
meleagridis																1			1
miami																			
mississippi																			
montevideo	1			3		1	5	4		2	1	2	9	1			5	2	8
muenchen										1		1	2						
newington										1			1			1			1
newport				7		1	8		2			2	4		1	3	3	3	10
norwich																			
oranienburg				1	1	1	3	2		3	2		7	2	4	1	4	2	13
oslo																			
panama														1		4			5
paratyphi A																			
paratyphi B									2	2			4	1			6		7
poona																1			1
rubislaw																			
saint-paul				3			3	4	1			2	7	5	2	2	1	2	12
san-diego				2		5	7	3					3						
schwarzengrund																			
senftenberg																1			1
siegburg																1			1
stanley																			
taksony									1				1						
tennessee				1			1			1	1	1	3		1	1			2
thomasville											1		1						
thompson				7		1	8	1	2	3			6	2		2		1	5
typhi					2		2	1	1	1	1		4	1	1	2	2		6
typhi-murium			1	25	6	11	43	23	7	18	6	22	76	21	1	13	28	5	68
typhi-murium v cop				5			5				1		1				2		2
urbana																1			1
virchow																			
weltevreden																			
worthington																2	1		3
untypable Group B					4		4							1					1
untypable Group C-1									1				1						
untypable Group C-2																			
untypable Group D																			
untypable Group E																			
untypable Group G																			
untypable Group O																			
unknown		2					2									1		2	3
TOTAL	1	3	1	86	13	37	141	80	35	48	23	64	250	51	46	79	75	28	279

New York (A-Albany, B-Beth Israel Hospital, C-City)

*The Beth-Israel Salmonella Typing Center in New York is a reference laboratory and processes many cultures from other states which are assigned to the respective states although reported by N.Y.-B.I.

TABLE I (CONTINUED)

REGION AND REPORTING CENTER																		
WEST NORTH CENTRAL								SOUTH ATLANTIC										
MINN	IOWA	MO	ND	SD	NEBR	KAN	TOTAL	DEL	MD	DC	VA	WV	NC	SC	GA	FLA	TOTAL	SEROTYPE
																		albany
									1						2	1	4	anatum
						1	1		1								1	bareilly
											1						1	berta
1							1				3		1		2	3	9	blockley
													1				1	braenderup
																2	2	bredeney
																		california
																		carrau
		1					1				1		1			3	5	chester
																		cholerae-suis
															1		1	cholerae-suis v kun
																		colorado
									1								1	cubana
1							1	1	1				1		1	1	5	derby
																		duesseldorf
1						1	2			1	3		1		2	7	14	enteritidis
																1	1	florida
																		give
											1					2	3	hartford
		3				1	4		1		1		8		6	5	21	heidelberg
		1					1											heilbron
																		indiana
1		2				2	5				4		5		1	2	12	infantis
		1					1											irumu
1		1					2	1									1	java
											1					6	7	javiana
																		kentucky
5							5								1	1	2	litchfield
																		luciana
									2								2	manhattan
																3	3	meleagridis
																		miami
		1					1			1	1					2	4	mississippi
																		montivideo
		1				1	2											muenchen
															1		1	newington
		1					1		4						2	3	9	newport
															1		1	norwich
6		2				2	10		6		2				1	4	13	oranienburg
																		oslo
	1						1				1						1	panama
																		paratyphi A
													1				1	paratyphi B
1							1									2	2	poona
																		rubislaw
1		1					2	1	6				2		2	3	14	saint-paul
									1								1	san-diego
2							2						3		1		4	schwarzengrund
											1						1	senftenberg
																		siegburg
						1	1											stanley
																		taksony
1		1					2								1		1	tennessee
																		thomasville
						2	2		2							1	3	thompson
1		4					5		3			1	2		2	2	10	typhi
6	2	4		3		9	24	4	13	2	18		5		18	12	72	typhi-murium
																		typhi-murium v cop
																		urbana
																		virchow
																		weltevreden
																		worthington
										3							3	untypable Group B
										1							1	untypable Group C-1
										8							8	untypable Group C-2
																		untypable Group D
																		untypable Group E
																		untypable Group G
																		untypable Group O
													2		1		3	unknown
28	3	24	-0-	3	-0-	20	78	7	42	16	38	1	33	-0-	46	66	249	TOTAL

TABLE I (CONTINUED)

REGION AND REPORTING CENTER

SEROTYPE	EAST SOUTH CENTRAL					WEST SOUTH CENTRAL					MOUNTAIN								
	KY	TENN	ALA	MISS	TOTAL	ARK	LA	OKLA	TEX	TOTAL	MONT	IDA	WYO	COLO	NM	ARI	UTAH	NEV	TOTAL
albany																			
anatum			1		1		1		2	3									
bareilly																			
berta		1			1														
blockley	1				1		3		1	4									
braenderup								1		1									
bredeney																			
california									1	1									
carrau							1			1									
chester														9		2			11
cholerae-suis																			
cholerae-suis v kun																			
colorado																			
cubana																			
derby		1			1		4		1	5									
duesseldorf																			
enteritidis	3				3			1		1							2		2
florida																			
give							3			3		1							1
hartford																			
heidelberg		2	1		3		4	1	2	7	2			1			4	1	8
heilbron																			
indiana																			
infantis		1			1	2	2			4									
irumu																			
java		1			1		3			3									
javiana		1	1		2	1	2		5	8									
kentucky																			
litchfield						1				1									
luciana																1			1
manhattan																			
meleagridis																			
miami																			
mississippi							2			2									
montevideo		3			3		2		8	10				3					3
muenchen							2	1		3						1			1
newington																			
newport		5			5	3	2	1	3	9						5			5
norwich									1	1									
oranienburg		2			2		3		9	12									
oslo																			
panama									1	1									
paratyphi A																			
paratyphi B	2				2				1	1									
poona							1			1									
rubislaw							2			2									
saint-paul							23			23									
san-diego														9			1		10
schwarzengrund	1				1									1					1
senftenberg							1			1									
siegburg																			
stanley																			
taksony																			
tennessee		2			2									3					3
thomasville																			
thompson							1	1	1	3									
typhi	1			3	4	5	8	1	4	18	1				14				15
typhi-murium		4	1		5	1	9	1	19	30		2	1	8		1	6		18
typhi-murium v cop							12			12									
urbana																			
virchow														1					1
weltevreden																			
worthington																			
untypable Group B															8				8
untypable Group C-1								1		1					8				8
untypable Group C-2																			
untypable Group D															1				1
untypable Group E															1				1
untypable Group G																			
untypable Group O																			
unknown																			
TOTAL	8	23	4	3	38	13	91	9	59	172	3	3	1	35	32	10	13	1	98

TABLE I (CONTINUED)

REGION AND REPORTING CENTER						OTHER	TOTAL	PERCENT OF TOTAL	1964 1-MONTH TOTAL	% OF 1964 ONE MONTH TOTAL	SEROTYPE
PACIFIC											
WASH	ORE	CAL	ALASKA	HAWAII	TOTAL	VI					
							1		2		albany
		1	1	8	10		24	1,6	19	1.2	anatum
		1			1		10		4		bareilly
		1		1	2		6		4		berta
		2			2		37	2.4	23	1.4	blockley
							5		4		braenderup
		1		2	3		5		29		bredeney
							2		2		california
							1				carrau
							17		8		chester
							1		1		cholerae-suis
							2		4		cholerae-suis v kun
				1	1		1		1		colorado
							4		8		cubana
		3		6	9		58	3.8	213	13.3	derby
							1				duesseldorf
2		3			5		103	6.7	67	4.2	enteritidis
							1				florida
		2		1	3		10		4		give
							4				hartford
5	1	12		1	19		126	8.2	114	7.1	heidelberg
							1				heilbron
							1		2		indiana
1	1	6		2	10		87	5.7	77	4.8	infantis
							1				irumu
		6			6		15		20		java
1					1		18		11		javiana
		1		1	2		2		1		kentucky
		1			1		17		3		litchfield
							1		1		luciana
		3		5	8		13		21	1.3	manhattan
							3		1		meleagridis
							3		2		miami
		1			1		3		2		mississippi
	1	3		3	7		50	3.2	39	2.4	montevideo
1					1		9		16		muenchen
							3		9		newington
		13		1	14		65	4.2	62	3.9	newport
							2				norwich
		1			1		61	4.0	49	3.1	oranienburg
				1	1		1		1		oslo
				4	4		12		26		panama
		2			2		2				paratyphi A
		1			1		16		11		paratyphi B
							5		3		poona
							2				rubislaw
1	1	7		2	11		72	4.7	37	2.3	saint-paul
1		5	1		7		28		12		san-diego
		2			2		10		5		schwarzengrund
		1			1		4		4		senftenberg
							1				siegburg
							1				stanley
							1				taksony
	2				2		16		30		tennessee
							1				thomasville
		2			2		29		30		thompson
		7		1	8		72	4.7	56	3.5	typhi
13	3	43		17	76		412	26.8	487	30.4	typhi-murium
							20		14		typhi-murium v cop
							1		3		urbana
							1		1		virchow
				4	4		4		1		weltevreden
		1			1		4		10		worthington
							16		14		untypable Group B
							11		4		untypable Group C-1
							8		1		untypable Group C-2
							1		1		untypable Group D
							1				untypable Group E
		1			1		1				untypable Group G
		3			3		3				untypable Group O
							8		5		unknown
25	10	135	2	61	233	-0-	1,538		1,601		TOTAL

(VI-Virgin Islands)

TABLE II

Number of Salmonella Isolates from Two or More Members of the same Family - January 1964

Reporting Center	Total Number of Isolates Reported	Number of Isolates From Family Outbreaks	Per Cent of Total
Alabama	4	0	0.0
Alaska	2	0	0.0
Arizona	10	0	0.0
Arkansas	13	8	61.5
California	135	22	16.3
Colorado	35	16	45.7
Connecticut	37	6	16.2
Delaware	7	1	14.3
District of Columbia	16	9	56.2
Florida	66	13	19.7
Georgia	46	7	15.2
Hawaii	61	0	0.0
Idaho	3	0	0.0
Illinois	79	15	19.0
Indiana	46	10	21.7
Iowa	3	0	0.0
Kansas	20	5	25.0
Kentucky	8	0	0.0
Louisiana	91	8	8.8
Maine	1	0	0.0
Maryland	42	20	47.6
Massachusetts	86	21	24.4
Michigan	75	33	44.0
Minnesota	28	9	32.1
Mississippi	3	0	0.0
Missouri	24	3	12.5
Montana	3	0	0.0
Nevada	1	0	0.0
New Hampshire	3	0	0.0
New Jersey	23	7	30.4
New Mexico	32	12	37.5
New York 1-A	80	19	23.7
New York 2-BI	35	3	8.6
New York 3-C	48	4	8.3
North Carolina	33	7	21.2
Ohio	51	9	17.6
Oklahoma	9	0	0.0
Oregon	10	0	0.0
Pennsylvania	64	17	26.6
Rhode Island	13	9	69.2
South Dakota	3	1	33.3
Tennessee	23	4	17.4
Texas	59	14	23.7
Utah	13	4	30.8
Vermont	1	0	0.0
Virginia	38	12	31.6
Washington	25	6	24.0
West Virginia	1	0	0.0
Wisconsin	28	3	10.7
Wyoming	1	0	0.0
Totals	1,538	334	21.7

TABLE III

Infrequent Serotypes

Serotype	Center	January	Total 1963 & 1964*	Comment
S. albany	ILL	1	9	First reported from GA; subsequent isolations sporadic from all regions of U.S.
S. carrau	LA	1	4	Three of the 4 from the S.E.
S. colorado	HAI	1	5	Three of the 1963-64 isolates from HAI; FLA accounted for 2.
S. duesseldorf	OHIO	1	7	Bulk of recorded nonhuman isolates from VA, poultry.
S. florida	FLA	1	8	All recorded human isolates from FLA, GA, and Tex.
S. heilbron	MO	1	1	First U.S. isolation of record in 1964 from LA.
S. irumu	MO	1	83	Aside from single large outbreak involving 69 in N.C., most commonly isolated in COLO.
S. luciana	ARIZ	1	1	1963-64 isolate also from ARIZ. In 1962, cause of illness in mother and child traced to carrier nurse in FLA.
S. norwich	GA & TEX	2	25	Nonhuman sources of record include dogs, swine and chickens.
S. oslo	HAI	1	14	All of 9 nonhuman isolates in 1964 from an alligator tank.
S. paratyphi A	CALIF	2	15	Majority of isolates came from CALIF and NY; both areas with heavier than usual travelers from the orient.
S. rubislaw	LA	2	29	LA regularly reports the bulk of the isolates in both human and nonhuman.
S. siegburg	ILL	1	2	Nonhuman sources include chickens, eggs, poultry feed, dogs and monkeys.
S. stanley	KANS	1	22	Not uncommon in poultry but has been found most frequently in monkeys.
S. taksony	NY-BI	1	1	Only nonhuman isolates recorded in Salmonella Surveillance Unit are from turkeys.
S. thomasville	NJ	1	14	Cause of a family outbreak in Ill. in 1963; nonhuman sources recorded include dogs, feed and turkeys.
S. virchow	COLO	1	4	Reported isolates from eggs and red meat.

*Represents 39,781 human isolations of salmonellae during 1963 and 1964.

TABLE IV

Age and Sex Distribution of 1,503 Isolations of Salmonellae Reported for January 1964

Age	Male	Female	Total	%	Cumulative %
Under 1	95	85	180	17.8	17.8
1-4 yrs.	144	120	264	26.1	43.9
5-9 yrs.	47	47	94	9.3	53.2
10-19 yrs.	58	41	99	9.8	63.0
20-29 yrs.	36	56	92	9.1	72.1
30-39 yrs.	31	44	75	7.4	79.5
40-49 yrs.	35	39	74	7.3	86.8
50-59 yrs.	29	31	60	5.9	92.7
60-69 yrs.	14	27	41	4.0	96.7
70-79 yrs.	7	18	25	2.5	99.2
80+	3	6	9	0.9	100.1
Unknown	270	220	490		
Total	769	734	1,503		
% of Total	51.0	49.0			

TABLE V

REPORTED NONHUMAN ISOLATES BY SEROTYPE AND SOURCE, JANUARY, 1965

SEROTYPE	chicken	turkey	pigeon	domestic fowl environment	canary	parrot	quail	secretary bird	cowbird	fowl environment unknown	equine	bovine	ovine	porcine	canine	feline	lab mouse	guinea pig	mink	raccoon	capybara	antelope	egg	egg albumen	egg yolk	frozen egg	human dietary supplement	poultry feed unknown	cotton seed meal	bone meal/meat scraps	animal feed unknown	fish meal	tankage	turtle	snake	water	unknown	Total	SEROTYPE
alachua		1		1																																		2	alachua
anatum	2	3		2			1			4		3												1														16	anatum
binza		6								2																		1										9	binza
blockley	9	12																																				21	blockley
branderup	2																																					2	branderup
brandenburg																																	1					1	brandenburg
bredeney	1	6																	1														1					9	bredeney
california	1	1																																				2	california
cerro	1																																					1	cerro
chester		21												1																								22	chester
cholerae-suis v kun	1													6																								7	cholerae-suis v kun
cubana																																2						2	cubana
derby		2												1					1							4				1								9	derby
dublin												4																										4	dublin
enteritidis								1							1																							2	enteritidis
florida																																		1				1	florida
gallinarum	3																																					3	gallinarum
give		1										2																	1									3	give
goerlitz																																						1	goerlitz
heidelberg	17	54																								2					1						3	77	heidelberg
indiana	4																																					4	indiana
infantis	17	11		2								1		1		1							4			8				1							1	47	infantis
java		1																																				1	java
javiana																																		1				1	javiana
kentucky	4																																					4	kentucky
lexington																																	1					1	lexington
livingstone	10	2												1	1	1																						15	livingstone
manhattan	1																																					1	manhattan
meleagridis																																	1					1	meleagridis
minnesota	1																				1																	2	minnesota
mission	1													1																								2	mission
montevideo	12	9																								1											3	25	montevideo
muenchen		1																1										1										3	muenchen
muenster	1																					1																2	muenster
newington														1																								1	newington
newport	1	5										2																										8	newport
oranienburg																								3														3	oranienburg
orion																												1		1							2	orion
poona												1																										1	poona
pullorum	36																																					36	pullorum
reading	4	1											1													6												5	reading
saint-paul	1	12																									5											20	saint-paul
san-diego	8	10		1																																		19	san-diego
schwarzengrund	1	4																																				10	schwarzengrund
senftenberg	2	5																																				7	senftenberg
tallahassee												1																										1	tallahassee
tennessee	1																						4	1			2											8	tennessee
thompson	7	2		1																			1															12	thompson
typhi-murium	3	12	2		2	1			1		3	29		3	2		1		1	1					1											1	62	typhi-murium
typhi-murium v cop	11	12	1									3	1																									28	typhi-murium v cop
westerstede	1																													1							2	westerstede
worthington	1									3																												4	worthington
untypable group B														1																								1	untypable group B
unknown																																		1				1	unknown
TOTAL	165	194	3	7	2	1	1	1	1	9	3	46	2	16	3	2	1	1	3	1	1	1	9	5	1	21	8	2	2	4	1	2	2	4	1	1	7	534	TOTAL

Source: National Disease Laboratory, Ames, Iowa and Weekly Salmonella Surveillance Reports from Individual States

TABLE VI

REPORTED NONHUMAN ISOLATES BY SEROTYPE AND STATE, JANUARY, 1965

SEROTYPE	STATE																																SEROTYPE
	Ala	Ark	Calif	Colo	Conn	Dela	Fla	Ga	Ida	Ill	Ind	La	Md	Mass	Mich	Minn	Miss	Mo	Mont	N.J.	N.C.	Ohio	Okla	Ore	Pa	S.C.	Tenn	Tex	Utah	Vt	Va	Wash	Wisc	Wyo	Total	
alachua			2														1	1				1												2	alachua
anatum			12																			1										1		16	anatum
binza			8													1																		9	binza
blockley	1	1	4					3										2			1					1		5				3		21	blockley
branderup					1						1																							2	branderup
brandenburg																					1													1	brandenburg
bredeney			1													5	1				1			1										9	bredeney
california																1	1																	2	california
cerro																															1			1	cerro
chester			4											1		14					1											2		22	chester
cholerae-suis v kun	3		3																							1								7	cholerae-suis v kun
cubana																					2													2	cubana
derby										1				4					1							2						1		9	derby
dublin			4																															4	dublin
enteritidis			1																	1														2	enteritidis
florida										1																								1	florida
gallinarum																1					1							1						3	gallinarum
give			1																													2		3	give
goerlitz																															1			1	goerlitz
heidelberg	2		50					10						3		7	1											2			1	1		77	heidelberg
indiana											4																							4	indiana
infantis	2		18								5			2			2	2	1			3		1				2	9					47	infantis
java																1																		1	java
javiana							1																											1	javiana
kentucky			1				2										1																	4	kentucky
lexington																											1							1	lexington
livingstone		2	3												1		7		1							1								15	livingstone
manhattan											1																							1	manhattan
meleagridis																1																		1	meleagridis
minnesota	1									1																								2	minnesota
mission		1																								1								2	mission
montevideo		1	18				1										1										1		3					25	montevideo
muenchen																1		1													1			3	muenchen
muenster							1										1																	2	muenster
newington																											1							1	newington
newport	1		4																								1					2		8	newport
oranienburg																						3												3	oranienburg
orion																	1		1															2	orion
poona																											1							1	poona
pullorum	1					2		8			5		2								5		2		2	2				2	5			36	pullorum
reading		1	4																															5	reading
saint-paul	1		6													4								1				2	6					20	saint-paul
san-diego		1	16																									2						19	san-diego
schwarzengrund			3					1													1						5							10	schwarzengrund
senftenberg																5	2																	7	senftenberg
tallahassee							1																											1	tallahassee
tennessee							1															5					2							8	tennessee
thompson		1	1								1					2	5					2												12	thompson
typhi-murium	1		17	1	2		1		1	2	2	1		1	3	8		3						2	4	3	1	2	1		3		2	1	62	typhi-murium
typhi-murium v cop	1		8				4				1		1	1		2	2	1						1	4			1					2		28	typhi-murium v cop
westerstede																	2																	2	westerstede
worthington			3																					1										4	worthington
untypable group B											1																							1	untypable group B
unknown																					1													1	unknown
TOTAL	14	8	192	1	3	2	12	22	1	5	20	1	3	12	4	53	28	10	4	1	14	14	2	7	10	11	13	15	21	2	8	4	16	1	534	TOTAL

Source: National Disease Laboratory, Ames, Iowa and Weekly Salmonella Surveillance Reports from Individual States

TABLE VII

REPORTED ISOLATIONS OF *S. TYPHI*, BY PATIENT STATUS – JANUARY 1965

STATE	REPORTED TO SALMONELLA SURVEILLANCE UNIT								CLINICAL CASES REPORTED IN MMWR	
	Cases		Carriers		Unknown		Total			
	Jan.	1965 Cuml.	Jan.	1965 Cuml.	Jan.	1965 Cuml.	Jan.	1965 Cuml.	Jan.	1965 Cuml.
UNITED STATES	14	*14*	20	*20*	38	38	72	72	26	*26*
NEW ENGLAND	–	–	–	–	2	2	2	2	–	–
Maine	–	–	–	–	–	–	–	–	–	–
New Hampshire	–	–	–	–	–	–	–	–	–	–
Vermont	–	–	–	–	–	–	–	–	–	–
Massachusetts	–	–	–	–	–	–	–	–	–	–
Rhode Island	–	–	–	–	2	*2*	2	*2*	–	–
Connecticut	–	–	–	–	–	–	–	–	–	–
MIDDLE ATLANTIC	1	*1*	1	*1*	2	2	4	*4*	2	*2*
New York	1	*1*	1	*1*	1	*1*	3	*3*	2	*2*
New Jersey	–	–	–	–	1	*1*	1	*1*	–	–
Pennsylvania	–	–	–	–	–	–	–	–	–	–
EAST NORTH CENTRAL	2	*2*	1	*1*	3	3	6	*6*	1	*1*
Ohio	–	–	1	*1*	–	–	1	*1*	–	–
Indiana	–	–	–	–	1	*1*	1	*1*	–	–
Illinois	–	–	–	–	2	*2*	2	*2*	–	–
Michigan	2	*2*	–	–	–	–	2	*2*	–	–
Wisconsin	–	–	–	–	–	–	–	–	1	*1*
WEST NORTH CENTRAL	1	*1*	2	*2*	2	2	5	*5*	1	*1*
Minnesota	–	–	1	*1*	–	–	1	*1*	–	–
Iowa	–	–	–	–	–	–	–	–	–	–
Missouri	1	*1*	1	*1*	2	*2*	4	*4*	1	*1*
North Dakota	–	–	–	–	–	–	–	–	–	–
South Dakota	–	–	–	–	–	–	–	–	–	–
Nebraska	–	–	–	–	–	–	–	–	–	–
Kansas	–	–	–	–	–	–	–	–	–	–
SOUTH ATLANTIC	1	*1*	5	*5*	4	*4*	10	*10*	9	*9*
Delaware	–	–	–	–	–	–	–	–	1	*1*
Maryland	–	–	–	–	3	*3*	3	*3*	3	*3*
District of Columbia	–	–	–	–	–	–	–	–	–	–
Virginia	–	–	–	–	–	–	–	–	–	–
West Virginia	–	–	1	*1*	–	–	1	*1*	1	*1*
North Carolina	–	–	2	*2*	–	–	2	*2*	4	*4*
South Carolina	–	–	–	–	–	–	–	–	–	–
Georgia	–	–	1	*1*	1	*1*	2	*2*	–	–
Florida	1	*1*	1	*1*	–	–	2	*2*	–	–
EAST SOUTH CENTRAL	–	–	2	*2*	2	2	4	*4*	2	*2*
Kentucky	–	–	1	*1*	–	–	1	*1*	–	–
Tennessee	–	–	–	–	–	–	–	–	1	*1*
Alabama	–	–	–	–	–	–	–	–	1	*1*
Mississippi	–	–	1	*1*	2	*2*	3	*3*	–	–
WEST SOUTH CENTRAL	7	*7*	9	*9*	2	2	18	*18*	8	*8*
Arkansas	1	*1*	4	*4*	–	–	5	*5*	3	*3*
Louisiana	3	*3*	5	*5*	–	–	8	*8*	1	*1*
Oklahoma	–	–	–	–	1	*1*	1	*1*	1	*1*
Texas	3	*3*	–	–	1	*1*	4	*4*	3	*3*
MOUNTAIN	2	*2*	–	–	13	*13*	15	*15*	2	*2*
Montana	–	–	–	–	1	*1*	1	*1*	–	–
Idaho	–	–	–	–	–	–	–	–	–	–
Wyoming	–	–	–	–	–	–	–	–	1	*1*
Colorado	–	–	–	–	–	–	–	–	–	–
New Mexico	2	*2*	–	–	12	*12*	14	*14*	1	*1*
Arizona	–	–	–	–	–	–	–	–	–	–
Utah	–	–	–	–	–	–	–	–	–	–
Nevada	–	–	–	–	–	–	–	–	–	–
PACIFIC	–	–	–	–	8	8	8	8	1	*1*
Washington	–	–	–	–	–	–	–	–	–	–
Oregon	–	–	–	–	–	–	–	–	–	–
California	–	–	–	–	7	*7*	7	*7*	–	–
Alaska	–	–	–	–	–	–	–	–	–	–
Hawaii	–	–	–	–	1	*1*	1	*1*	1	*1*
Virgin Islands	–	–	–	–	–	–	–	–	*	*

* Does not report.

TABLE VIII

Salmonella derby Isolations and Total Salmonella Isolations Reported by Month*

		Total Salmonella Isolations	S. derby Isolations	Per Cent of Total
1962	November	922	18	2.0
	December	794	16	2.0
1963	January	1,111	30	2.7
	February	1,059	22	2.1
	March	931	28	3.0
	April	1,330	61	4.6
	May	1,738	139	8.0
	June	1,640	203	12.4
	July	2,133	303	14.2
	August	1,770	155	8.8
	September	1,786	164	9.2
	October	2,462	228	9.3
	November	1,381	127	9.2
	December	1,439	175	12.2
1964	January	1,601	213	13.3
	February	1,442	301	20.9
	March	1,279	290	22.7
	April	1,882	399	21.2
	May	1,545	277	18.0
	June	1,758	195	11.1
	July	2,159	217	10.1
	August	1,777	151	8.5
	September	2,624	109	4.2
	October	1,848	85	4.6
	November	1,595	69	4.3
	December	1,719	76	4.4
1965	January	1,538	58	3.8

*As reported to the Salmonella Surveillance Unit from 50 States and the District of Columbia.

TABLE IX

Results of Rectal Culture Survey

on December 4, 1964

	Number Persons Cultured	Number Positive for Salmonella	Percentage
A. Students with history of gastroenteritis -- (Nov. 10 - 23)	94	6 - S. typhi-murium) 2 - S. heidelberg) 3 - S. blockley)	11.7
B. Students with no history of gastroenteritis who eat at University Commons	80	5 - S. typhi-murium) 2 - S. blockley)	8.7))) 6.7
C. Students with no history of gastroenteritis who do not eat in the University Commons	25	0	0.0)
D. Commons food handlers	70	4 - S. typhi-murium) 1 - S. blockley)	7.1

TABLE X

Seven Most Commonly Recovered Salmonella Serotypes from Human & Nonhuman Sources in The Netherlands - 3rd Qtr., 1964

Human				Nonhuman			
Rank	Serotype	No.	%	Rank	Serotype	No.	%
1	S. typhi-murium	1325	45.3	1	S. typhi-murium	434	31.1
2	S. panama	528	18.0	2	S. dublin	153	11.0
3	S. stanley	483	16.5	3	S. bareilly	146	10.5
4	S. bovis-morbificans	105	3.6	4	S. panama	141	10.1
5	S. heidelberg	86	2.9	5	S. newington	123	8.8
6	S. infantis	50	1.7	6	S. enteritidis, S. enteritidis var. chaco & S. enteritidis var. essen	63	4.5
7	S. muenchen	47	1.6	7	S. give	35	2.5
	Total	2,624	89.7			1,095	78.4
	Total (all serotypes)	2,926					