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COMMUNICABLE DISEASE CENTER

SALMONELLA

SURVEILLANCE

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For the Month of November 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:

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I. SUMMARY

A total of 1,557 isolations of salmonella were reported during November, representing a decrease of 353 from October. The average number of isolations per week (389) represented a decrease of 89 from November 1964. The decrease this month (illustrated in Figure 1) was seasonally expected. Nonhuman isolations during November totaled 579, a decrease of 182 from October.

A report of a large common source outbreak of *Salmonella enteritidis* gastroenteritis traced to a restaurant chain in Georgia is described under REPORTS FROM THE STATES. Follow-up information of the recent outbreak of typhoid fever in Switzerland is now available, and is included in the INTERNATIONAL section along with a review of recent isolations of salmonellae from animals, foods, and feeds in West Germany.

A new series of review articles is initiated this month under SPECIAL REPORTS. This series prepared by the Salmonella Surveillance Unit and entitled "Current Concepts in Salmonellosis" will review selected aspects of salmonellosis of interest to laboratorians and epidemiologists with pertinent references to the recent literature on the subject. The initial article this month deals with the status of typhoid vaccines. Comments and contributions are invited.

II. REPORTS OF ISOLATIONS FROM THE STATES

A. Human

The seven most frequently reported serotypes during November were:

Rank	Serotype	Number	%	Rank Last Month
1	*S. typhi-murium* and *S. typhi-murium var. copenhagen*	497	31.8	1
2	*S. heidelberg*	127	8.1	3
3	*S. newport*	110	7.0	2
4	*S. infantis*	97	6.2	5
5	*S. enteritidis*	58	3.7	4
6	*S. typhi*	54	3.5	10
7	*S. saint-paul*	50	3.2	6
	Total	993	63.8	
	Total (All serotypes-November)	1,557		

A total of 71 different serotypes were reported during November, 14 less than last month. However, while representing a larger proportion of the number of serotypes this month as compared to October, the above serotypes accounted for a slightly smaller proportion of total isolations. The seven most commonly reported serotypes this month represented 63.5 per cent of all isolations as compared to 65.1 per cent during October.

Only minor variations occurred in the relative positions of the seven most common serotypes, with only one exception. *Salmonella typhi*, which was tenth most common during October, jumped to sixth during November. California reported 15 isolations of *S. typhi* for the largest number, 8 of which were from Los Angeles County. The proportion of these which represents cases as distinct from carriers is unknown. No more than four were reported from any other reporting center (See Table I).

The age and sex distribution of individuals found harboring salmonellae during November appears in Table III. Fifty-three per cent of the isolations made were from males. This percentage is significantly different from 50 per cent (expected on the basis of surveillance experience) with P less than .05. The 1 - 4 year age group appeared to be responsible for the divergence with 60 per cent more males than females. Surveillance experience has shown that this age group usually accounts for approximately 30 per cent more males than females. However, no outbreak which could be responsible for the divergence could be detected. During November, 291 (18.7 per cent) persons, reported as harboring salmonellae, had other members of their family simultaneously infected. This is consistent with past experience.

B. Nonhuman

There were 579 isolations of salmonella reported during November, 182 less than October. A total of 60 different serotypes were represented among these isolations, which were submitted by 35 different states (See Table V).

The seven most frequently reported serotypes were:

Rank	Serotype	Predominant Source and number	No.	%	Rank Last Month
1	S. typhi-murium and S. typhi-murium var. copenhagen	Bovines (43)	110	19.0	1
2	S. heidelberg	Turkeys and chickens (51)	58	10.0	2
3	S. saint-paul	Turkeys and chickens (30)	31	5.4	4
4	S. infantis	Turkeys (16)	26	4.5	5
5	S. blockley and	Chickens (17)	25	4.3	7
	S. schwarzengrund	Turkeys (19)	25	4.3	Not listed
7.	S. anatum	Bovines and turkeys (11)	24	4.1	6
		Total	299	51.6	

The four sources from which most of the recoveries were obtained were: turkeys 168 (29.0 per cent); chickens 158 (27.3 per cent); bovine 60 (10.4 per cent) and meat and bone scraps, 40 (6.9 per cent). See Table IV for other sources.

III. CURRENT INVESTIGATIONS

A. Report on An Unusual Family Outbreak of Salmonellosis. Reported by Max Backer, M.D., Division of Communicable Disease, Suffolk County Health Department, Long Island, New York and Julia Frietag, M.D., Acting Epidemiologist, New York State Health Department.

On September 7, 1965, three youngsters in a Long Island family experienced a sudden onset of fever, vomiting, abdominal pain and diarrhea. The illness was moderately severe; two of the three children required the care of a physician. The victims included a 3-year-old girl and 6 and 8-year-old boys. The 6-year-old boy was most severely affected; he developed a temperature of 105° and illness manifested by watery stools persisted for a full week. The mother and father were not ill during

this period. Stool samples were obtained from all three children and both parents. Two of the family members (the 3-year-old girl and the father) had negative stool cultures. The 6-year-old boy was found positive for Salmonella heidelberg; the 8-year-old boy was found positive for S. siegburg and the mother was found positive for S. tennessee. All members of the family recovered following therapy.

Investigation revealed that there were no pets or animals in the household. For a number of years the family had observed the practice of eating raw eggs for breakfast. The raw eggs were beaten up and poured over dry cereal. On the morning of September 7, 1965, the mother reported that she took one egg from the refrigerator and mixed this egg with two fresh eggs. It was noted that the egg from her refrigerator was cracked. The eggs were beaten up in the usual fashion and spread over the cereal. Onset of illness followed breakfast by approximately 11 to 12 hours. Subsequent investigation revealed that the eggs had been purchased from a supermarket chain on Long Island. During the period in question the chain was receiving eggs exclusively from a large New Jersey wholesaler. Efforts are being made to obtain egg and feed samples from this wholesaler.

Editor's Comment: Salmonella siegburg, a relatively rare serotype, offers the best opportunity for tracing the epidemiology of this family outbreak to the ultimate source. Salmonella siegburg has recently been isolated from eggs and egg products in Wisconsin, New York City and Florida. In addition, several human cases have occurred this year in counties along the eastern shore of Florida.

B. Outbreak of Gastroenteritis Due to Salmonella thompson. Reported by E. A. Belden, M.D., Epidemiologist, Missouri State Health Department, Betty P. Carlin, M.D., Director, Communicable Disease Control, St. Louis County Health Department, Paul Schnurrenburger, D.V.M., Public Health Veterinarian, Illinois State Health Department, Arnold F. Kaufmann, D.V.M., Investigations Section, CDC, and the Laboratory Services Unit, Investigations Section, CDC.

On August 23, a call was received in the St. Louis County Health Department from a practicing pediatrician who stated that he had a mother and six children in his office, all of whom were either vomiting or very nauseated. The mother reported to the physician that they had all eaten homemade ice cream the previous day and that each member of the family had subsequently become ill. Subsequent investigation by the St. Louis Health Department revealed that the family had purchased a dozen eggs from their local supermarket and when they unpacked the eggs on arrival home, they noticed that some of the eggs were cracked. A batch of homemade ice cream was prepared on August 20 from six of these eggs, one additional egg yolk, nine cups of whole milk, one can of evaporated milk, sugar and vanilla. The mixture was not cooked prior to freezing. At about 3:00 pm on August 22 the ice cream was served with packaged cookies to the family concerned (2 adults and 6 children) and their guests, a family of five (2 adults and 3 children). Twelve of the 13 persons at risk developed nausea, vomiting, fever and diarrhea between 15 and 22 hours after consumption of the ice cream. The only person who did not have symptoms was a 10-month-old male child of the visiting family who had consumed only 1 spoonful of ice cream. All 13 persons at risk including the asymptomatic infant were found positive on stool culture for Salmonella C1. This organism was initially thought to be S. irumu, but subsequent study indicated that it was S. thompson. All persons involved in the outbreak have recovered following antibiotic therapy, but it is of interest that 9 of the 12 were still excreting the organism one month after onset of symptoms.

Left over ice cream had been frozen and this was examined by the health department and found positive for S. thompson. Additional investigation revealed that the store where the eggs had been purchased was part of a large chain in the St. Louis

area and that all eggs were purchased from a single egg and poultry wholesaler. The wholesaler had in turn obtained eggs during the period in question from a single large farm. The farm was visited and samples of eggs, droppings, and feeds were obtained for analysis. Two out of 15 slurries of eggs examined were positive for S. thompson. Salmonella anatum was recovered from 1 out of 10 samples of droppings and S. newport was recovered from 1 out of 4 samples of feed. The feed used at the farm in question had been produced in a feed company in Illinois. This plant was in turn visited and samples obtained from 7 different feed ingredients. One out of two samples of soybean were positive for S. cubana and two out of two meat scraps samples were found positive for S. bredney, S. meleagridis, and S. worthington.

C. Further Studies on Contamination of Cottonseed with Salmonellae. Reported by Arnold F. Kaufmann, D.V.M., Investigations Section, CDC, Chasten D. Murphy, D.V.M., USDA, ARS, ANH, and Wallis Dewitt, Microbiologist, Laboratory Services, Investigations Section, CDC, and Zada Morrison, Veterinary Public Health Laboratory, CDC.

In previous issues of the Salmonella Surveillance Report (No. 34,35) an interstate outbreak of salmonellosis in mental institutions was described in which a dietary formula was implicated as the vehicle of infection. Subsequent studies indicated that two ingredients of the dietary product, cottonseed protein flour and brewer's yeast were the source of contamination for the final product. The discovery of a cottonseed product as a possible vehicle for salmonella infection was of significant interest in view of the fact that this item had not previously been implicated in outbreaks of human salmonellosis. It was determined that the cottonseeds were contaminated prior to their arrival at the processing plant, and samples positive for salmonellae were found at several of the gins supplying the plant with cottonseed. The manner in which the cottonseeds become contaminated has remained obscure. Additional studies have now been undertaken in the past month at 4 different gins in the state of Texas. A total of 415 specimens were obtained including samples of cottonseed meal, incoming cotton bolls, environmental samples from seed houses, soil, water, and oil used to spray the product. No salmonellae were isolated. Additional studies are planned in the hope of eventually defining the manner in which the cottonseed became contaminated.

IV. REPORTS FROM THE STATES

A. Georgia

An Outbreak of Salmonella enteritidis in a Large Group of Restaurants Drawing from a Central Commissary. Reported by John E. McCroan, Ph.D. Chief Epidemiologist, and Thomas W. McKinley, Assistant Epidemiologist, Epidemiologic Investigations Branch, Georgia Department of Public Health, Atlanta.

Salmonella enteritidis, although more frequently reported in the past two years than in previous years, is nevertheless still relatively uncommon in Georgia. Of 516 salmonella isolates in 1963, 16 were S. enteritidis. Of 636 isolates in 1964, only 11 were this serotype. Prior to September of the current year, 10 isolations of this organism had been reported.

The first indication of a possible S. enteritidis outbreak came on September 9, 1965, when two college students were reported positive for this organism. The following day the school physician called and stated that a third student, who later proved to have the same salmonella, had also become ill. All three of these students had eaten dinner together in an Atlanta restaurant on September 6; two became ill around 2:00 a.m. the next morning but the third was not affected until quite late September 8.

About this time additional S. enteritidis cases began to appear, primarily in the Atlanta area - although some were scattered in or near the cities of Macon and Albany. Five cases of gastroenteritis caused by a salmonella in serologic Group D (probably S. enteritidis) were also reported from Ohio among members of a family who had recently visitied in Atlanta.

As reports were received, each adult patient or in the case of a small child, a parent was called by telephone and asked whether he had eaten out within a week prior to illness. If so, he was asked to name the establishment and the foods consumed. At first the results of this querying were confusing because not only were several different places named but a variety of foods was given as well. Whereas some individuals stated that they had eaten only fried chicken from a take-out store, others had eaten a full course meal in a particular restaurant or cafeteria, while still others had eaten a number of foods at several places. Only when it was discovered that the restaurants, cafeterias, and take-out stores being named were all related through commissary operations did the epidemiologic pattern begin to take shape. It appeared that one or more contaminated foods were being supplied from a common base operation.

In addition to the five cases of Group D salmonella from Ohio, 40 laboratory confirmed cases of S. enteritidis and 6 other clinical cases, probably due to the same serotype, have now been reported. Also, 3 asymptomatic individuals were found positive for S. enteritidis.

Not all the 40 laboratory confirmed cases had a history of eating at one of the related establishments. Seven had no contact and two had only indirect contact, i.e., did not eat, themselves, but were in the household where someone did. Nevertheless, this would mean that 31 of 40 cases or 77% ate at one of these establishments. If indirect contact is counted the number would be 33 of 40 or 82 per cent. The epidemic curve suggests that infective foods were served from August 31 to September 17, 1965; although one case was discovered who ate as late as October 25.

The headquarters for this large group of food service establishments is located in Atlanta. The management was notified of the situation and questioned relative to commissary operations. It was learned that there are 4 commissaries rather than only 1 and that all are in the Atlanta area. These will be referred to as A, B, C, and D.

An inspection was made of all four commissaries and food samples together with surface swabs were taken to determine the possible presence of S. enteritidis. In addition, two food service outlets whose patrons had recently reported illness were inspected and food and swab samples taken. Stool specimen containers were also given to food handlers in these two establishments, the four commissaries, and later another of the food service establishments.

Of 78 food handlers examined, 2 had positive stool cultures for salmonella. A baker's helper in Commissary C had S. enteritidis and a baker in Commissary D had S. heidelberg. In addition it was learned that an assistant manager at one of the cafeterias had been ill previously with S. anatum and an employee of another cafeteria had suffered a bout with S. enteritidis.

Salmonella infantis was recovered from a poultry swab at Commissary A. This was the only positive among 43 swabs taken. All 9 foods sampled from commissaries and food service establishments were negative for salmonella.

Quite obviously there was no scarcity of salmonellae but S. enteritidis was not as prevalent as had been expected. Certainly no food item or one commissary operation emerged through culture survey as the most probable source. However, it seems most likely that the contaminated item was dispensed through Commissary A since the other

three do not ship food to all establishments which were implicated. In view of the well-established frequency with which salmonellae can be recovered from raw poultry, it further seems that poultry was probably the food which spread the organism.

Commissary A is the largest of the four commissaries and supplies various fresh meats, processed meats, poultry, eggs, cheeses, seafoods, frozen vegetables, and frozen fruits. Meats are cut and ground in a special refrigerated room. Poultry is handled in a separate room which is also refrigerated. Some birds are cut up and bagged in plastic sacks, while others are left whole and shipped to the various food service places in the original crate as they come from the processing plant. Spread from contaminated to uncontaminated birds could easily occur in the cutting operation and even crated poultry could be contaminated when set in water which constantly stands an inch or more deep on the workroom floor. It is possible to see how contamination might even be spread from the poultry to the meat room or vice versa even though traffic between the two rooms is kept at a minimum.

The group of food service establishments in question specialize in fried chicken and a majority of those who were ill had eaten some form of chicken. The poultry handled by Commissary A during the infective period (August 30 - September 17) came from one Atlanta processor. An unusually large supply was ordered by the commissary for the first weekend in September. This being Labor Day weekend, the demand was expected to be greater than usual and in addition the processing plant was not to be in operation on Monday so no deliveries of fresh birds could be made before late Tuesday afternoon. Although it could not be established, some of the chickens must have warmed up too much during holding that weekend because it was reported from several of the food service outlets that obvious spoilage could be detected in some birds within a relatively short time after delivery.

That S. enteritidis is more prevalent in poultry this year than in past years is suggested by reports received from Georgia Poultry Laboratories. Birds positive for this serotype were found in 2 flocks each year from 1962 through 1964. So far in 1965 positives have been found in 6 flocks.

Assuming, then, that birds were contaminated with S. enteritidis, a large population of these organisms probably developed during holding. Even so, they should have been destroyed by the cooking process which consists of 8 minutes in hot fat under 15 lbs. pressure. But chicken is handled in the kitchens in such a manner that there is ample opportunity for contamination to be transferred from the raw to the cooked chicken and to other food items as well. In preparation for cooking, pieces of chicken are dropped into a milk and egg batter. After soaking a few minutes the pieces are removed literally by the handfuls and placed on an expanded metal screen to drain briefly before being rolled in a special flour mixture. Once floured, chicken is dropped into a pressure cooker of hot fat where it remains under 15 lbs. pressure for 8 minutes. The well-done chicken is then transferred to a pan, more floured chicken added to the hot fat, and the process repeated.

While this is in progress the milk and egg batter may stand unrefrigerated in a stainless steel pot for several hours. The drain rack remains at room temperature and so does the flour mixture which after a while contains numerous flour beads formed by droplets of batter. Flour is frequently reused over a period of several days by sifting to remove these beads.

If contaminated early in the morning the batter could contain large numbers of salmonella by the end of the day. The drain rack would undoubtedly develop a coating of enormous numbers and the flour would serve as a continuous source of recontamination. When a person in this potentially salmonella laden environment is allowed to handle the cooked chicken and perhaps other cooked foods as well, it is not difficult to imagine how contamination of the finished product might occur. This is especially

true when handwashing, as was observed in one of the restaurant kitchens, consists of dipping the hand which had just fished several pieces of chicken from the batter into a bowl of warm water and then wiping this hand dry on an apron.

Recommendations were made relative to the preparation of chicken and the prevention of cross contamination from raw to cooked foods was stressed. One case has occurred since that time, this one having eaten October 25. However, it is interesting to note that cases had all but ceased by the time the outbreak was recognized and before any recommendations could be made.

Seemingly all the factors necessary for a recognizable foodborne outbreak to occur are difficult to assemble and seldom come together at once. When they do, they usually persist for only a short period. But incorrect food handling procedures, whether through ignorance or design, must frequently create circumstances which permit the development of sporadic cases. Measures calculated to guard against these sporadic cases will undoubtedly prove effective against outbreaks as well.

In summary it might be said that a rather sharply defined outbreak of Salmonella enteritidis occurred in Georgia during the month of September, 1965. At least 40 laboratory confirmed cases and 6 other clinical cases, undoubtedly due to this same serotype, were reported. It was also reported from Ohio that a family of 5 who were visiting in Atlanta during September had all been ill with a Group D salmonella, which if typed would likely have been S. enteritidis. In addition to all these, 3 asymptomatic individuals were found positive for this organism. Most of those affected shared the common experience of having eaten within 5 days prior to illness at one of the more than 50 food service establishments over Georgia which obtain some of their food from the same commissary. Although it could not be definitely established, contamination was believed to have been introduced into these food service outlets through poultry and from there spread to other foods.

B. New York

Outbreak of Hospital-Associated Salmonellosis due to Salmonella thompson. Reported by Max Backer, M.D., Division of Communicable Disease, Suffolk County Health Department, Long Island, New York and Julia Freitag, M.D., Acting State Epidemiologist, New York State Health Department.

During the summer of 1965, an outbreak of salmonellosis occurred in a hospital in Long Island. This hospital has approximately 200 beds including 22 pediatric beds, 24 full-term infant bassinets and 4 premature infant bassinets. A 3-week-old was admitted to the pediatric section on July 13, because of fever and diarrhea with the diagnosis of gastroenteritis. Investigation revealed that the infant had been born at the same hospital on June 15 and discharged in good condition on June 19. Diarrheal symptoms had begun two days prior to the present admission. The patient responded to a regimen of sulfonamides and antibiotics. Stool culture on July 13 was reported as salmonella group C1 subsequently identified as Salmonella thompson. Of interest was the simultaneous isolation of an enteropathogenic strain of Escherichia coli 055:B5. Over the next ten days intensive scrutiny for diarrheal disease in the nursery was made by personnel from county and state health departments. Seven infants with symptomatic diarrheal illness were identified. Of these, two were found on culture to be positive for S. thompson alone and an additional two infants positive for S. thompson and two different strains of enteropathogenic E. coli. No samples were available on the other three symptomatic infants. As a result of a nursery survey, eight additional asymptomatic infants were identified as excretors of S. thompson and one infant was identified as an excretor of an enteropathogenic E. coli. The nursery was closed on July 28 for remodeling and completion of additional construction projects which had been undertaken early in July.

Extensive environmental cultures of the nursery failed to reveal the presence of salmonella organisms. Culture survey of the entire maternity staff was then undertaken. Among those found positive for S. thompson were: 3 nurses' aids employed in the nursery; 3 nurses in the delivery room; 3 nurses' aids in the maternity postpartum room and 1 employee in the formula room. A survey of the professional staff identified 2 general practitioners, 1 anesthesiologist and 1 pediatrician as excretors of S. thompson. Survey of the main kitchen dietary services in the hospital identified 2 food handlers as positive for S. thompson. None of the culture positive employees or staff members had had symptomatic illness. All the involved infants recovered without serious consequences and no deaths were recorded. The nursery was reopened on August 7, and no subsequent cases have been reported. Staff members with positive cultures were not allowed to return to work until several stool specimens were negative.

Editor's Comment: This interesting and well-studied outbreak has resulted in several significant observations. It would appear that the strain of S. thompson involved in this outbreak was of relatively low virulence in view of the fact that none of the adults experienced symptomatic illness and only one third of the infants excreting the organisms had symptoms. The large number of excretors among the staff in the delivery room-post partum-nursery area is astounding. It is always difficult under such circumstances of heavy contamination to determine how the outbreak initially started. In this regard the recovery of S. thompson from two food handlers in the main kitchen of the hospital is the single most significant and helpful observation in this study. This establishes with reasonable certainty that the initial outbreak in the hospital originated through the food services of the main kitchen. Reconstructing the events on the basis of this hypothesis, it would appear that the outbreak actually began in June at which time a large number of the staff throughout the hospital became infected through general food services but did not develop symptoms. Ironically the infant admitted from the community on July 13, which resulted in the investigation, probably represents an asymptomatic excretor who was infected during his previous admission in June. It is suggested that the symptoms resulting in the July admission were due to the enteropathogenic E. coli. A large number of infants in the nursery population were probably asymptomatically infected with S. thompson from early June through the time of the investigation through contact with asymptomatic excretors among the employees of the nursery.

V. SPECIAL REPORTS

Current Concepts in Salmonellosis. I. Status of Typhoid and Paratyphoid Vaccines.

The history of development of immunization against the enteric fevers in the past 60 years has been characterized by continuous doubt and confusion about indications for use, efficacy, dosage, and route of the administration. In the past year, several important contributions to the literature on this subject has led to a more orderly and critical understanding of the value of these vaccines.[1,2]

In the past 10 years, extensive and well-controlled field trials of typhoid vaccines have been conducted under the auspices of the World Health Organization in Yugoslavia, USSR, Poland, and British Guiana. For the most part these studies have been carried out with vaccines identified as International Reference Preparations, carefully characterized and assayed by the Division of Immunology of the Walter Reed Army Institute of Research. The vaccines most studied include acetone - inactivated vaccine (given the code letter K) and the heat-phenol inactivated vaccine (code letter L). The results of WHO studies on these two vaccines as summarized as Cvjetanovic and Uemura are shown in Table VI.

Both acetone and phenol preparations showed a statistically significant protective capacity as compared to the control vaccine (tetanus toxoid) and the acetone preparation was significantly superior to the phenol preparation. Further analysis indicated that the protective value of these vaccines was not only substantial but long-lasting and led the authors to conclude that "a booster dose is not needed more often than perhaps every 3 to 5 years when an initially potent vaccine is used".[2] Superiority of the acetone preparation was also suggested by the fact that its protective value declined more slowly over time than the phenol preparation. A single dose vaccine would clearly be of great practical value in under-developed countries. Failure of persons to return for the second dose is a frequent problem in typhoid vaccine studies. WHO studies in Poland[2] and British Guiana[1] have indicated that a single dose of the acetone or phenol preparation is effective (78-100 per cent) but the numbers of persons studied to date is relatively small and additional studies are planned to further evaluate the feasibility of a single dose typhoid vaccine.

For the most part, vaccines used in the WHO field trials have been given by deep subcutaneous injection. Reaction to vaccination (fever, local edema and erythema) was not thought to be excessive during the trials. In the Poland trial the acetone and phenol preparations produced temperatures over 38°C in 9 to 12 per cent of the 3 to 20 year age group and 23 per cent of the 19 to 31 age group. The intracutaneous route of administration is favored by some authorities because of the smaller dose involved, but has been associated with a higher incidence of systemic and local reactions, and the efficacy of the vaccine administered by this route is yet to be proven in field trials.[4] The use of oral vaccines has been studied in pre-school children in Rumania,[5] and serological follow-up has indicated satisfactory levels of protective antibodies. Their value remains uncertain, however, in view of previous observations that such serological studies cannot be fully correlated with effectiveness of vaccines in field trials.

Administration schedules most frequently used in typhoid vaccination are 2 doses 3 to 4 weeks apart. For adults the first dose is usually 0.5 ml subcutaneously (0.1 ml intracutaneously) followed by a second dose of 1.0 ml (0.2 ml intracutaneously). In the United States typhoid vaccine is administered primarily to members of the armed forces and to contacts of known cases. It is recommended although not required by International Regulations for those persons traveling in areas of endemic typhoid. Mass immunizations are also considered in some communities in this country when natural disasters, (earthquakes, floods), threaten the integrity of communal water supplies. The value of immunization under the latter circumstances is uncertain particularly in view of the considerable time lag before adequate protective levels can be reached and the small possibility that S. typhosa organisms are in the area and can contaminate the water supply.

In the United States the most readily available and frequently employed vaccine includes antigens of Paratyphoid A and B in addition to the standard typhoid antigen and is commonly referred to as TAB. The rationale for the use of the combined vaccine in the United States has recently been questioned because of (1) the fact that the efficacy of paratyphoid vaccine has never been established in well-controlled field trials and (2)the paratyphoid fevers are rare in the United States and often produce mild illness. Thus to many it seems unwise to add an antigen of doubtful effectiveness that adds to vaccine reaction but does not necessarily add to protection against enteric fevers. Many states (e.g. Georgia) have discontinued the use of TAB in favor of preparations using only the antigens of S. typhi.

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VI. INTERNATIONAL

A. Germany

Isolations of Salmonella from Nonhuman Sources in West Germany in 1964, abstracted from the Annual Report for 1964 of the Salmonella Laboratory in the Division of Veterinary Medicine in the Max von Pepttenkofer Institute of the West German Public Health Service, Berlin-dahlen. Reported by Dr. Bulling.

During 1964, a total of 6,327 salmonella isolations from non-human sources were made at the Veterinary Research Institutes in West Germany and West Berlin. This represents a slight increase over the number reported during 1963 (6251).

Of the 6,327 isolations during 1964, 1,709 were the result of bacteriological meat examinations and 4,618 were from other investigations of animals, foodstuffs, and feeds. Of these, approximately 1300 isolations were made in the investigation of imported foods and feed.

The 6,327 isolations made in 1964 represented 128 salmonella serotypes. The most important sources of salmonella discovered were: animals, 4,257 isolations and 92 serotypes; food and feed, 1,666 isolations and 78 serotypes; water, sewage and sludge, 129 isolations and 30 serotypes.

Of the 92 salmonella types isolated from animals, 18 occurred exclusively in reptiles, birds, and mammals from zoological gardens and markets. In domestic animals, including fowl as well as a few native wild animals, 76 different salmonella types were discovered.

The following table presents results presented in earlier annual reports from 1961 to 1964 for selected animals.

Year	Cows	Calves	Pigs	Fowl	Feed
1961	477/31*	623/25	315/27	641/24	209/45
1962	537/36	556/27	448/38	619/22	256/52
1963	925/56	657/32	491/42	890/25	438/47
1964	794/42	819/29	364/31	1027/30	539/58

*Isolations/Serotypes

Between 1963 and 1964 the number of isolations as well as the number of serotypes recovered from cows and pigs decreased as compared to 1963. In the case of calves, the number of isolations increased while the number of serotypes decreased. The figures under fowl do not include slaughtered fowl from which an additional 645 isolations with 28 salmonella types were made.

The total number of salmonella isolations from foods declined in 1964 as compared to 1963. This can be accounted for primarily by the discontinuation of the imports of Argentine hares (in 1963 there were 1344 isolations from Argentine hares and in 1964 there were 248). On the other hand, isolations from slaughtered fowl (mostly imported commodities) increased from 34 in 1963 to 645 in 1964. It is obvious that these figures constitute no criterion for the actual vitiation of these foods with salmonella in the years mentioned, but rather reflect the direct interest of the food supervising authorities. In view of the fact that domestic slaughtered fowl were infected to a similar high percentage as the imported goods, import prohibitions could no longer be considered effective measures for the prevention of the spread of salmonella by slaughtered fowl. Therefore, the efforts to produce salmonella-free slaughtered fowl have been directed to measures in the flocks of fowls and above all in the fowl-slaughtering places.

Among the remaining foods, egg products, which was a prominent source during 1963 (83 isolations) accounted for 144 isolations and 17 types during 1964. Following that in order of prevalence, was meat and sausages, with 32 isolations, fresh eggs with 6 isolations, and milk and milk products including sherbert with 4 isolations. Environmental samples from food processing plants and slaughtering houses represented 44 isolations, 29 of which were S. typhi-murium.

During the period of the report, six episodes of food poisoning due to salmonella were reported:

Food	Serotype	No. of Cases
horsemeat	S. bovis-morbificans	7
homemade pork and liver sausage	S. typhi-murium	4
meat, salad and potato salad	S. braenderup	69
country sausage	S. heidelberg	Unknown
chopped pork and sauce	S. typhi-murium	Unknown
pork liver	S. reading	10

These low figures stand in contrast to statistical data on reportable diseases in West Germany (regular publication in the Bundesgesundheitsblatt). According to this source there were 4,323 cases (exclusive of carriers) of salmonellosis in 1964 and there is no doubt that the actual number of cases was significantly higher. These discrepancies can be explained only by the fact that foods involved in outbreaks are rarely sent to the veterinary research offices for investigation.

Among animal feeds of animal origin, fish meal is the most prominent source of salmonella. In 1964, that source accounted for 348 isolations of 47 different serotypes. Feeds examined were divided into imported and domestic products, and in contrast to 1963, more isolations of salmonella were made from domestic feeds.

The monthly arrangement of the number of isolations found in bacteriological meat sampling showed that the proportion of positive results (with relatively low variation in the number of tests completed each month) was definitely dependent on the season. The proportion declined from 0.83 in January to 0.38 in April and then rose until August to 1.64. By December the proportion had declined to 0.84. The influence of the warm seasons on the distribution of salmonella infections in

slaughtered animals is apparent.

In the examination of feces from cows and calves a total of 1,198 primary salmonella isolations of 22 different serotypes were made. Of these, S. typhi-murium accounted for 690 and S. dublin for 441 isolations. The high number of S. typhi-murium recoveries was traced primarily to calf feeding operations. In addition, a number of asymptomatic excretors were uncovered:

Serotype	Source
S. dublin	114 cows and 2 calves
S. typhi-murium	8 cows and 101 calves
S. montevideo	1 cow and 1 calf
S. tennessee	1 calf

Overall, the seven most common serotypes isolated from nonhuman sources were:

Rank	Serotype	No.	Per Cent
1	S. typhi-murium	2,339	38.1
2	S. dublin	1,471	23.5
3	S. gallinarum-pullorum	322	5.2
4	S. newington	244	3.9
5	S. anatum	222	3.6
6	S. enteritidis	151	2.4
7	S. infantis	122	2.0
	Total	4,911	78.6
	Total (all serotypes)	6,327	

The isolations of S. dublin were almost exclusively from cattle and swine. Of the 322 isolations of S. gallinarum-pullorum 314 were from chickens. Two-hundred and four of the 244 isolations of S. newington were from frozen turkeys.

B. Panama

Isolation of Salmonellae from a Neo-tropical bat. Abstract of an article by P. D. Klite and Miguel Kourany, U. S. Army Medical Research Unit, AMARU, Canal Zone, Panama, appearing in the Journ. of Bact., Vol. 90, No. 3, September (1965).

The authors report the recovery of two salmonella serotypes from feces of neo-tropical bats. To their knowledge bats have not been previously shown to harbor bacterial enteric pathogens.

Six normal appearing neo-tropical bats (Glossophaga soricina), a common nectar-feeding bat were captured in a culvert at an Air Force Base in the Canal Zone. One bat yielded S. typhi-murium var. copenhagen and one bat yielded S. saint-paul. Twenty frugivorous bats (Carollia perspicillata) were captured in the same culvert at the same day but did not yield salmonellae.

Glossophaga bats are found throughout Central America and tropical South America. They roost by themselves or in association with other bat species in culverts, caves, trees, abandoned buildings, and on occasion within and under buildings inhabited by man. Bats defecate up to 60 times a day, usually around their harborages and feeding sites. They are, therefore, a potential source of food contamination especially when they are frugivorous or when they roost in proximity to man or both.

Salmonella typhi-murium var. copenhagen has in the past been associated with pigeons. Salmonella saint-paul has been responsible for several recent cases of salmonellosis in Panama.

C. Switzerland

Follow-Up Report on Outbreak of Typhoid Fever in Etzel, Switzerland. Reported by Professor Dr. E. Wiesmann, Director, Institute for Medical Microbiology, University of Zurich, Zurich, Switzerland.

Additional information is now available on the recent epidemic of typhoid fever in Switzerland (SSR #43). Between October 1 and October 15, 1965, 48 school children developed typhoid fever. The school children belonged to four school classes from different villages (Arbon, Gommiswald, Meilen, and Stafa). Investigation revealed that on September 15, 1965, all 4 classes independent of each other had taken an excursion to Etzel, a Swiss mountain resort, where they consumed hot soup and cooled tea in a restaurant. The tea had been prepared at 7:00 am and was served at 12:00 noon. Only those children who had drunk this tea were effected by the illness. It was subsequently learned that on the same day other school classes as well as some 100 individual persons had made an excursion to the same place. All of them drank only cold (unboiled) water coming from the water supply at the Etzel restaurant, but no cooled tea. None of these persons fell ill with typhoid fever.

The causitive organism was Salmonella typhi phage type E1. Although the same phage type was isolated during the Zermatt typhoid epidemic of 1962, there is not thought to be any epidemiological link between the two epidemics. Despite an intensive search no chronic excretors of S. typhi were detected at the establishment. The working hypothesis remains that the tea was contaminated in some manner and acted as the vehicle of infection.

All patients have recovered though some of them are still excreting S. typhi. No deaths were recorded.

VII. FOOD AND FEED SURVEILLANCE

A. Occurrence of Salmonellae in the Bovine Rumen. Abstract of an article by F. H. Grau and L. E. Bronlie, C.S.I.R.O., Division of Food Preservation, Meat Research Laboratory, Brisbayne, Queensland. Aust. Vet. Jour., Vol. 41, October, 1965.

Recent studies,indicating the presence of fecal organisms in the rumen (fore-stomach) liquor and the possibility that this material may contaminate the carcasses of cattle prompted an examination of rumen liquor to determine if salmonellae are also present. Rumen liquor was obtained after slaughter and transferred to the laboratory in sterile bottles at ambient temperature. Samples of rumen liquor were taken at random from animals slaughtered at 5 abattoirs in southeastern Queensland. The cattle examined included both dairy cows and mixed beef cattle. A total of 193 animals were tested and of these 87 (45 per cent) were found positive for salmonellae. There were 135 isolations of salmonellae involving 31 different serotypes. The five most common serotypes were S. oranienburg (13 per cent), S. vejle, (12 per cent), S. typhi-murium (11 per cent), S. san diego (9 per cent), and S. saint-paul (7 per cent). These five serotypes accounted for 52 per cent of the 135 organisms identified. Infections with multiple serotypes were detected in 30 animals. No significant differences in the percentage of positives could be found between dairy cattle and beef cattle, or between places of known origin. Infection with multiple serotypes was detected in 30 animals.

It is evident that a considerable percentage of healthy animals have salmonellae in the rumen liquor at the time of slaughter. This report emphasizes that the animals had not shown clinical signs of salmonellosis and anti-mortem inspection had not lead to their rejection for slaughter. All the rumen samples were taken after the viscera had passed the normal veterinary inspection. The considerable number of cases in which salmonellae were isolated raises several problems. It is obviously important to avoid rupture of the rumen and hence contamination of the carcass during the slaughtering and dressing. Likewise it is important to wash very thoroughly, preferably with hot water, organs such as tongue and cheek meats, these being commonly contaminated by rumen liquor through vomiting. Measures to reduce the incidence of infection at the time of slaughter are also important and further studies are being undertaken to ascertain possible sources of infection and determine the fate of organisms ingested.

B. Recovery of Salmonellae from Animal By-Products, Abstract of an Article by James D. Clize, Edward E. Swezker, appearing in Public Health Reports, Vol. 80, No. 10, October 1965.

It is common practice to process the offal, blood, feathers, and hair from poultry in large-animal slaughtering operations, and to reclaim the protein in these materials for use as a feed supplement. Reclaiming is done by heating the offal to facilitate removal of the grease and moisture in milling the solid residue. The product is a common source of protein supplement for both large-animal and poultry feeds. Since salmonella organisms can normally be found in offal from infected animals the potential hazard in such procedures is evident.

This study was made to evaluate the effectiveness of the procedures followed in the processing and use of offal. It was also an effort to demonstrate the significance of animal byproducts in the spread of salmonellae. When offal is processed, two finished products result. The first is byproducts meal, derived from the rendering and milling of the solid offal. Its protein content is approximately 50 per cent. The second product is blood and feather meal, made from the blood and feathers of poultry or the blood and hair from large animals, and its protein content averages 85 per cent.

Eight of 11 offal reduction plants in Maryland were found to be producing supplements containing salmonellae. In view of the fact that processing temperatures reached 180 it was felt that the major problem was re-contamination of the finished product in part due to unprotected storage.

TABLE I
BY SEROTYPE AND REPORTING CENTER

REGION AND REPORTING CENTER

WEST NORTH CENTRAL								SOUTH ATLANTIC										SEROTYPE
MINN	IOWA	MO	ND	SD	NEBR	KAN	TOTAL	DEL	MD	DC	VA	WV	NC	SC	GA	FLA	TOTAL	
																		alachua
													1		6	3	10	anatum
															1	1	2	bareilly
																		berta
																		binza
1						1	2		1	1			2		1	2	7	blockley
																		braenderup
									2							4	6	bredeney
															2		2	california
																		cambridge
						1	1											cerro
																		champaign
											1						1	chester
						1	1						1				1	cholerae-suis v kun
		1					1											clifton
															3		3	cubana
									1									
													3	2	2		8	derby
								1	2	3					4		10	enteritidis
																		gatuni
																		give
																		hartford
																		hato
		1					1		5		4		20		11		40	heidelberg
													1				1	indiana
2	1	1				8	12	1	1	2	3		1		5	3	16	infantis
																1	1	inverness
						1	1									3	3	java
		1					1								1	14	15	javiana
																		johannesburg
																		kentucky
																		litchfield
																		livingstone
																		manhattan
																8	8	miami
																1	1	mission
		1					1									4	4	mississippi
		1					1				1		1		1	1	4	montevideo
																1	1	muenchen
									1		1						2	muenster
																		new-brunswick
																1	1	newington
3	1	1				3	8	2	1		1		1		10	9	24	newport
																1	1	norwich
																		nyborg
																		ohio
1		2				3	6		1						1	6	8	oranienburg
																		panama
																		paratyphi A
													1				1	paratyphi B
																1	1	poona
																		portland
																		reading
																1	1	rubislaw
						3	3		2						5	6	13	saint-paul
	1						1								1		1	san-diego
										1						4	5	schwarzengrund
													1				1	senftenberg
																1	1	siegburg
																		stanley
																		takoradi
					1		1									1	1	tallahassee
																		tennessee
		1				2	3		1			1					2	thompson
		2					2		1			1		1	2	2	7	typhi
5	4	5	1	2		3	20	1	6	6	7		9		26	5	60	typhi-murium
																		typhi-murium v cop
																		urbana
																		weltevreden
																1	1	westerstede
																		westhampton
																1	1	worthington
	1						1			4							4	untypable group B
										1				2			3	untypable group C_1
										1							1	untypable group C_2
										1							1	untypable group D
										1							1	untypable group E
																		untypable group L
										2							2	unknown
12	8	17	1	2	1	26	67	5	25	23	18	2	42	5	82	86	288	Total

TABLE I (Continued)

SEROTYPE	REGION AND REPORTING CENTER																	
	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
alachua																			
anatum							6			6									
bareilly							1			1									
berta							2			2		1							1
binza									1	1									
blockley		2			2		2			2				3					3
braenderup			1		1				1	1									
bredeney			1		1		6			6									
california							1			1									
cambridge																			
cerro			1		1														
champaign																			
chester								1		1									
cholerae-suis v kun																			
clifton																			
cubana																			
derby	1		1		2		2			2									
enteritidis		3	3		6				1	1									
gatuni									3	3									
give							2			2									
hartford									1	1									
hato							1			1									
heidelberg	2	3			5		9		1	10				2			1		3
indiana																			
infantis		1			1		6		2	8						1			1
inverness																			
java		2			2		1		2	3		5							5
javiana						3	9		5	17									
johannesburg			1		1														
kentucky																			
litchfield							18			18									
livingstone									1	1									
manhattan			1		1				1	1									
miami																			
mission																			
mississippi						1	2			3									
montevideo	1				1		1		1	2									
muenchen								2	1	3						1			1
muenster																			
new-brunswick							1			1									
newington																			
newport		2	1		3	2	22	1	10	35						1			1
norwich									1	1									
nyborg																			
ohio																			
oranienburg	1				1				1	1						2			2
panama							1		1	2									
paratyphi A																			
paratyphi B									3	3	1			1					2
poona																2			2
portland																			
reading																			
rubislaw							2	2		4									
saint-paul							4			4									
san-diego																			
schwarzengrund							2			2									
senftenberg							3			3									
siegburg																			
stanley																			
takoradi																			
tallahassee																			
tennessee																			
thompson			2		2				2	2									
typhi		1	1		2	2	3	2	4	11									
typhi-murium	2	7		1	10		23	18	18	49	1			5		4	2		12
typhi-murium v cop		1			1	1	3			4									
urbana																			
weltevreden																			
westerstede																			
westhampton																			
worthington																			
untypable group B				3	3	1			1	2					3				3
untypable group C_1															4				4
untypable group C_2															2				2
untypable group D															1				1
untypable group E				1	1														
untypable group L																			
unknown			1	1	2														
Total	7	22	14	6	49	10	133	16	62	221	2	6	0	11	10	11	3	0	43

TABLE I (Continued)

REGION AND REPORTING CENTER						OTHER VI	TOTAL	PERCENT OF TOTAL	11 MONTH TOTAL	% OF 11 MONTH TOTAL	1964 11 MO TOTAL	% OF 1964 11 MONTH TOTAL	SEROTYPE
PACIFIC													
WASH	ORE	CAL	ALASKA	HAWAII	TOTAL								
							1		5		5		alachua
1		1			2		24	1.5	278	1.4	262	1.3	anatum
				2	2		5		97		91		bareilly
		1			1		5		38		47		berta
							1		19		20		binza
5		10			15		41	2.6	356	1.8	383	1.9	blockley
							8		76		94		braenderup
				3	3		17		141		198		bredeney
							3		19		28		california
1					1		1		3		1		cambridge
							3		3		8		cerro
							1		1				champaign
							6		104		68		chester
		1			1		3		34		29		cholerae-suis v kun
							1		1				clifton
							7		131		58		cubana
				3	3		26	1.7	575	2.9	2,292	11.5	derby
1		3			4		58	3.7	955	4.8	687	3.4	enteritidis
							3		3		1		gatuni
		1		4	5		8		110		75		give
							1		19		9		hartford
							1		1		1		hato
6	3	14		5	28		127	8.1	1,473	7.4	1,568	7.8	heidelberg
							6		23		48		indiana
1		16		5	22		97	6.2	1,053	5.3	1,387	6.9	infantis
							1		7				inverness
		11			11		30	1.9	185	0.9	207	1.0	java
							34	2.2	304	1.5	230	1.2	javiana
							1		2		2		johannesburg
							3		16		21		kentucky
							20	1.3	96	0.5	58	0.3	litchfield
		1			1		5		29		8		livingstone
	1			2	3		13		115		170		manhattan
							8		88		43		miami
							1		13		1		mission
							3		35		36		mississippi
		7		4	11		31	2.0	421	2.1	478	2.4	montevideo
		4			4		17		205		243		muenchen
							2		10		6		muenster
							4		18		4		new-brunswick
							2		51		68		newington
3		6			9		110	7.0	1,126	5.6	949	4.7	newport
							2		22		12		norwich
							1		1				nyborg
		1			1		1		8		3		ohio
1		2			3		34	2.2	556	2.8	509	2.5	oranienburg
1		1		8	10		14		217		169		panama
							1		12		7		paratyphi A
2					2		14		171		160		paratyphi B
							3		43		42		poona
							1		1				portland
		2			2		2		19		34		reading
							5		9		18		rubislaw
1	2	12			15		50	3.2	687	3.4	587	2.9	saint-paul
	1	1			2		5		222		138		san-diego
		2			2		9		95		141		schwarzengrund
							7		70		99		senftenberg
							2		14		2		siegburg
							1		7		6		stanley
							2		3				takoradi
							1		4		2		tallahassee
		1			1		5		168		320		tennessee
1					1		24	1.5	510	2.6	362	1.8	thompson
2	1	15			18		54	3.5	666	3.3	637	3.2	typhi
20	10	51		15	96		497	31.8	5,991	30.0	5,174	25.9	typhi-murium
							14		173		189		typhi-murium v cop
							2		31		22		urbana
				5	5		5		34		21		weltevreden
							1		2		1		westerstede
1					1		1		4		1		westhampton
		2		5	7		8		43		43		worthington
	2	1			3		25		271		288		untypable group B
							7		82		77		untypable group C_1
							3		56		48		untypable group C_2
							6		39		40		untypable group D
							2		49		25		untypable group E
		1			1		1		1				untypable group L
	1				1		8		107		87		unknown
47	21	168	0	61	297	0	1,557		19,052		19,413		Total

(VI - Virgin Islands)

TABLE I-A

OTHER SEROTYPES REPORTED DURING 1965 FROM HUMANS

SEROTYPE	MONTH(S)	REPORTING CENTER(S)	NUMBER OF ISOLATIONS
adelaide	May	NY-A	1
albany	Jan-Feb-Sept	Ill(3)	
	Feb	Conn(1)	
	Aug	Va(1)	
	Sept	Fla(1)	6
allandale	Jul-Sept	Fla	2
amager	Jul	NY-BI	1
arkansas	Jun	Calif	1
atlanta	June(1)		
	July(2)		
	Aug(2)		
	Sept(1)		
	Oct(1)	Ga	7
belem	Jul	Texas	1
bilthoven	Apr-Jun	Calif(2)	
	May	Mich(1)	3
blegdam	Feb	SD	1
bovis-morbificans	Mar	Calif(1)	
	Apr-Jul-Aug-Sept	Hai(26)	
	May-Jun-Sept	Mass(4)	31
brandenburg	Jun	Ill	1
butantan	Aug	Mich	1
carrau	Jan	La(1)	
	Aug	Fla(2)	
	Sept	Texas(1)	4
chailey	Sept	NY-BI	1
chingola	Oct	NY-BI	1
cholerae-suis	Jan-Apr	Ohio(2)	
	Jun	Ind(1)	
	Jul	Calif(2)	
	Aug	Texas(1)	
	Aug	W. Va(1)	
	Sept	Hai(1)	8
colorado	Jan-May-Jun	Hai	3
corvallis	Feb	Hai	1
daytona	Mar	Tenn(1)	
	Sept	La(1)	2
denver	Feb	La	1
dublin	Feb-Mar-Apr	Calif	3
duesseldorf	Jan	Ohio(1)	
	Apr-Jun	La(2)	
	Sept	Fla(1)	
	Sept	NY-BI(1)	5
duisburg	Jul	Ark	1
eastbourne	Jun-Aug-Sept	Calif(3)	
	Jul	Ark(1)	4
eimsbuettel	Sept	NC(1)	
	Oct	Tenn(1)	2
emek	May	Tenn(1)	
	Sept	Colo(1)	
	Oct	Calif(1)	3
essen	Jan	Colo(1)	
	Jun	Ariz(1)	
	Aug	Mass(1)	3
fayed	Mar	NC	1
florida	Jan-May	Fla	2
fresno	Mar	Tenn	1
gaminara	Mar	Texas(2)	
	Apr	NY-C(1)	
	Jun	Mass(1)	
	Jun	NY-A(1)	
	Jul-Sept	Fla(5)	
	Sept	La(1)	11
glostrup	Jul	La	1
guinea	Aug	Ill	1
haifa	Sept	NY-BI	1
heilbron	Jan	Mo	1

TABLE I-A

OTHER SEROTYPES REPORTED DURING 1965 FROM HUMANS - (Continued)

SEROTYPE	MONTH(S)	REPORTING CENTER(S)	NUMBER OF ISOLATIONS
irumu	Jan-Feb-Mar-Aug-Sept	Mo(18)	
	Feb	Colo(1)	
	Sept	Vt(1)	20
kaapstad	Feb-Jun	Colo	2
kottbus	Feb-Sept	NY-A(5)	
	Feb-Sept	Colo(2)	
	Mar	Ind(1)	8
leeuwarden	Jun-Aug-Sept	Texas	3
lexington	Feb	Calif(1)	
	Jun	Ill(1)	2
lindenburg	May	Colo(1)	
	Sept	Kan(1)	2
loma-linda	May-Oct	Ore	2
lomita	May	Ore(1)	
	Jun	Ohio(1)	
	Sept	La(1)	3
london	May	NY-C	1
luciana	Jan	Ariz	1
maastricht	Sept	Ill	1
madelia	Mar	Pa(1)	
	Mar	Fla(1)	2
meleagridis	Jan-Apr-Aug	Ill(3)	
	Jan-May-Jun-Jul-Aug	Md(84)	
	Mar-May-Jun	DC(4)	
	Jun-Jul	Va(39)	
	Jun	NJ(5)	
	Sept	Texas(1)	
	Oct	Hai(1)	
	Oct	Wash(1)	
	Oct	Conn(1)	139
michigan	Sept	Calif	1
minnesota	Apr-May-Sept	Ind(6)	
	Apr	La(1)	
	Jun-Sept-Oct	Calif(3)	
	Aug-Sept	Texas(2)	12
minneapolis	Jul	Conn	1
mishmar-haemek	Feb	Calif(1)	
	May	Texas(1)	2
nagoya	Jun	Texas	1
nottingham	May	Ark	1
oslo	Jan-Jun	Hai(3)	
	Mar-May-Oct	Calif(3)	
	Apr-May	Wisc(7)	
	Aug	Mich(1)	14
paratyphi C	Jun	Iowa	1
pensacola	Feb	Okla(1)	
	May	NC(1)	
	Jul	Ga(1)	
	Oct	NC(1)	4
pomona	Apr	Fla(1)	
	May	Calif(1)	2
remo	Mar	Va(1)	
	May	Pa(1)	2
richmond	Jul	Kan(1)	
	Jul	Fla(1)	2
saphra	Sept-Oct	Texas	13
sarajane	Sept	NJ	1
simsbury	Aug	NY-BI	1
sundsvall	Jun	Calif	1
taksony	Jan	NY-BI	1
tamale	Aug	Fla	1
thomasville	Jan	NJ(1)	
	Sept	Tenn(1)	2
uganda	Sept	Ill(1)	
	Oct	La(1)	2
virchow	Jan	Colo	1
yalding	Jun	Texas	1
Total			370

TABLE II

Infrequent Serotypes

Serotype	Center	November	1965*	Total 1963 & 1964**	Comment
S. alachua	RI	1	5	15	Being isolated with increasing frequency from animals and animal feeds in many parts of the U.S.
S. cambridge	WASH	1	3	3	Third isolate from WASH this year.
S. champaign	NJ	1	1	0	First human isolate reported to this unit.
S. clifton	MO	1	1	1	First isolated from a turtle; Previous isolate from LA.
S. gatuni	TEX	1	1	2	Previously reported from MINN and FLA; No non-human isolate recorded.
S. hartford	TEX	1	19	27	A turtle associated case of salmonellosis.
S. hato	LA	1	1	1	Reported in 1964 from COLO.
S. inverness	FLA	1	7	4	Isolated from a racoon in LA earlier this year.
S. johannesburg	ALA	1	2	4	Has been isolated from poultry, eggs and poultry feeds.
S. mission	FLA	1	13	4	A continuing problem in a single FLA county.
S. nyborg	NY-C	1	1	0	First human isolate reported to this unit.
S. ohio	CALIF	1	8	4	Also reported during past two months from CALIF.
S. paratyphi A	NY-C	1	12	15	Most isolations of this serotype came from CALIF or NY.
S. portland	NY-C	1	1	0	First time reported to this unit; Isolated in Oregon in 1954.

Table II (Cont'd)

Serotype	Center	November	1965*	Total 1963 & 1964**	Comment
S. stanley	NY-C	1	7	22	A common isolate from primates.
S. takoradi	NY-B	2	3	0	Last month's isolate was from NY-C.
S. tallahassee	FLA	1	4	9	Majority of isolates are from FLA; originally isolated in FLA in 1944.
S. westerstede	FLA	1	2	2	An infrequent serotype.
S. westhampton	WASH	1	4	2	Reported from meat scraps and bone meal in WASH during 1964.

*Represents 19,052 human isolations during the first 10 months of 1965.

**Represents 39,762 human isolations of salmonellae during 1963 and 1964.

TABLE III

Age and Sex Distribution of 1,525 Isolations of Salmonellae Reported for November 1965

Age (Years)	Male	Female	Total	Per Cent	Cumulative Per Cent
Under 1	100	84	184	17.3	17.3
1 - 4	162	99	261	24.6	41.9
5 - 9	77	52	129	12.2	54.1
10 - 19	76	53	129	12.2	66.3
20 - 29	44	49	93	8.8	75.1
30 - 39	26	32	58	5.5	80.6
40 - 49	19	37	56	5.3	85.9
50 - 59	24	41	65	6.1	92.0
60 - 69	22	22	44	4.1	96.1
70 - 79	11	14	25	2.3	98.4
80 +	9	8	17	1.6	100.0
Unknown	238	226	464	___	_____
Total	808	717	1525		
Per Cent	53.0	47.0			

TABLE IV

REPORTED NONHUMAN ISOLATES BY SEROTYPE AND SOURCE, NOVEMBER 1965

Serotype	chicken	turkey	duck	pigeon	lavrakeet	guinea fowl	parakeet	pheasant	quail	avian	equine	bovine	porcine	canine	lab mouse	lab monkey	raccoon	mink	woodchuck	lemur	eggs	frozen eggs	egg meat	headcheese	meat unknown	egg custard	poultry feed	meat and bone scraps	animal feed unknown	turtle	alligator	water	sewage	drinking water	turtle water	honey pot	grocery store environment	unknown	Total	11 Month Total	Serotype
alachua		1																																					1	16	alachua
amsterdam																													1										1	1	amsterdam
anatum	2	5		1					1	1		6	1								1			3		1		1	1										24	231	anatum
bareilly																												3					1						4	32	bareilly
berta	3																																						3	21	berta
binza	3																											1											4	49	binza
blockley	17	4																			1									1					2				25	189	blockley
braenderup										1																													1	22	braenderup
bredeney	5	8																				1						2			2								18	94	bredeney
california	1																																						1	48	california
cambridge																								1				1											1	3	cambridge
cerro																												1	1										2	58	cerro
chester		18																																					18	179	chester
cholerae-suis v kun	1												13																										14	108	cholerae-suis v kun
cubana		1																																					1	20	cubana
derby	2	2											1	1														3							1			1	11	97	derby
dublin												4																											4	40	dublin
duesseldorf																						5																	5	7	duesseldorf
eimsbuettel	2												1															4											9	60	eimsbuettel
enteritidis	1																			3																		1	5	49	enteritidis
gallinarum	2	2						1																															5	33	gallinarum
give	2												2																										4	90	give
heidelberg	25	26								5																		1		1									58	698	heidelberg
hidalgo		1																																					1	1	hidalgo
indiana	2																																		1				3	36	indiana
infantis	16	1		1						3	1		1	1							1																1	26	344	infantis
java																														1									1	14	java
javiana	1																																						1	11	javiana
kentucky		2																																					2	37	kentucky
litchfield		1												1																									2	18	litchfield
livingstone	2																												1										3	77	livingstone
manhattan		1																																					1	39	manhattan
meleagridis	2	2																											1										5	69	meleagridis
miami												1		1																									2	11	miami
minnesota	1																					3																	4	32	minnesota
montevideo	8	1										1																7					1			1			19	202	montevideo
muenchen																														2									2	49	muenchen
muenster													3																										3	11	muenster
new-brunswick												1																											1	1	new-brunswick
newington		1																										1								9			11	37	newington
newport		7	1									3		1	1							1																	14	179	newport
ohio																																		2					2	7	ohio
oranienburg	2																				1				2			5	1	1									12	164	oranienburg
orion																												1											1	6	orion
oslo																1																							1	12	oslo
panama	1	4																1							1			1											8	30	panama
paratyphi B																																			1				1	7	paratyphi B
pullorum	2									1																													3	196	pullorum
reading		2																																					2	42	reading
saint-paul	10	20										1																											31	227	saint-paul
san-diego		20																												1									21	128	san-diego
schwarzengrund		19																										3										3	25	139	schwarzengrund
senftenberg		6																									1	1											8	114	senftenberg
siegburg																													1										1	9	siegburg
tennessee																					1							3	1										5	103	tennessee
thomasville																												1										1	10	thomasville
thompson	14	2																			4														1				21	178	thompson
typhi-murium	10	8		4	1	1	1			1	5	43	3				1											1		1		1		2			2	2	87	894	typhi-murium
typhi-murium v cop	19	2											1						1																				23	264	typhi-murium v cop
worthington	2	1																																					3	72	worthington
untypable group D																							2																2	2	untypable group D
untypable																																				1			1	2	untypable
Total	158	168	1	6	1	1	1	1	1	12	6	60	26	5	1	1	1	1	1	3	9	10	2	4	3	1	3	40	8	8	2	1	4	2	6	11	2	8	579	6,091	Total

Source: National Disease Laboratory, Ames, Iowa, weekly Salmonella Reports from individual States and US-FDA-Division of Microbiology, Washington, D.C.

*Includes October late reports.

TABLE V

REPORTED NONHUMAN ISOLATES BY SEROTYPE AND STATE, NOVEMBER 1965

Serotype	Ala	Ark	Calif	Colo	Conn	Fla	Ga	Ill	Ind	Iowa	Kans	Ky	La	Me	Md	Mich	Minn	Miss	Mo	Mont	NJ	NY-A	NC	Ohio	Okla	Ore	Pa	SC	SD	Tenn	Texas	Utah	Va	Wash	Wisc	Total	11 Mo Total	Serotype
alachua			1																					1										1	16	alachua
amsterdam																								1											1	1	amsterdam
anatum			6			2	1					2					1				1	2		1						3			5		24	231	anatum
bareilly			1																															3	4	32	bareilly
berta							3																												3	21	berta
binza							3	1																											4	49	binza
blockley			4				9	2									5		1					1									2	1	25	189	blockley
braenderup																	1																		1	22	braenderup
bredeney			4								2						1	4	1		1				1					1				3	18	94	bredeney
california																		1																	1	48	california
cambridge							1										1																1		1	3	cambridge
cerro																	3																		2	58	cerro
chester								3		2		2					3																	8	18	179	chester
cholerae-suis v kun			1						10								1	1					1												14	108	cholerae-suis v kun
cubana			1																																1	20	cubana
derby			1										1				3	2	1									1					1	1	11	97	derby
dublin			4																																4	40	dublin
duesseldorf																					5														5	7	duesseldorf
eimsbuettel							2										5										1			1					9	60	eimsbuettel
enteritidis	1		3											1																					5	49	enteritidis
gallinarum																	2													2				1	5	33	gallinarum
give			1					1										2																	4	90	give
heidelberg			6				15		1				1		4		21		6							4									58	698	heidelberg
hidalgo			1																																1	1	hidalgo
indiana									2										1																3	36	indiana
infantis		2	6				1	3	5				1					2		1	1		1	2										1	26	344	infantis
java					1																														1	14	java
javiana																														1					1	11	javiana
kentucky							1																											1	2	37	kentucky
litchfield													1												1										2	18	litchfield
livingstone			2																					1											3	77	livingstone
manhattan							1																												1	39	manhattan
meleagridis			1			1																		1										2	5	69	meleagridis
miami						2																													2	11	miami
minnesota																														1	3				4	32	minnesota
montevideo			3				6	2													1					1		1	1					4	19	202	montevideo
muenchen											2																								2	49	muenchen
muenster																		3																	3	11	muenster
new-brunswick			1																																1	1	new-brunswick
newington			10														1																		11	37	newington
newport			4			1											1			1	1									6					14	179	newport
ohio			2																																2	7	ohio
oranienburg								3									2	2	1					2						2					12	164	oranienburg
orion																																		1	1	6	orion
oslo								1																											1	12	oslo
panama			2														3													1				2	8	30	panama
paratyphi B																																	1		1	7	paratyphi B
pullorum																				1							1					1			3	196	pullorum
reading			1							1																									2	42	reading
saint-paul							2		3						3	1	6			1				2		3		1		2				7	31	227	saint-paul
san-diego			7				2				1															3				8					21	128	san-diego
schwarzengrund			21														1																1	2	25	139	schwarzengrund
senftenberg							2										6																		8	114	senftenberg
siegburg																	1																		1	9	siegburg
tennessee								1								1	2							1											5	103	tennessee
thomasville																	1																		1	10	thomasville
thompson		2							3							2	4	3	1		2	1		3											21	178	thompson
typhi-murium	1	2	38	1		3	4		11	1	3	2	1				7	2	1				1				1				1	1	2	4	87	894	typhi-murium
typhi-murium v cop	2	2					3		1						1		2	8	2								1				1				23	264	typhi-murium v cop
worthington																		2																1	3	72	worthington
untypable group D																										2									2	2	untypable group D
untypable			1																																1	2	untypable
Total	4	8	133	1	1	9	56	17	36	4	8	6	5	1	8	4	81	32	15	4	12	3	3	15	2	13	2	4	2	1	28	4	3	12	42	579	6,091	Total

Source: National Disease Laboratory, Ames, Iowa, weekly Salmonella Reports from individual States and US-FDA-Division of Microbiology, Washington, D. C.

*Includes October late reports.

(NY-A - New York-Albany)

TABLE V-A

OTHER SEROTYPES REPORTED DURING 1965 FROM NONHUMAN SOURCES

SEROTYPE	MONTH(S)	REPORTING CENTER(S)	NUMBER OF ISOLATIONS
alabama	Aug	Ind	1
albany	Feb	Texas(1)	
	Mar	Ind(1)	
	Jul-Aug	Miss(2)	
	Sept	Md(1)	5
bern	Oct	Minn	1
bonariensis	Sept	Kan	1
brandenburg	Jan	NC	1
carrau	Apr	Ind	1
cholerae-suis	Sept	Ala	1
corvallis	Oct	Ill	1
drypool	Jul	Fla(1)	
	Aug	Wisc(1)	2
florida	Jan	Ill	1
gaminara	Aug	Ind	1
gatow	Jul	Pa	1
goerlitz	Jan	Wash	1
grumpensis	Jul	Miss	1
hartford	Apr	Minn	1
illinois	Mar-Jul	Minn(2)	
	May	Md(1)	
	Jul	Ind(2)	
	Sept	Iowa(1)	6
inverness	Jun	Calif(1)	
	Oct	La(1)	2
irumu	Sept	Mo	1
johannesburg	Mar	Utah(1)	
	Jul	Ga(4)	
	Aug	Ind(1)	
	Aug	Miss(1)	7
lexington	Jan	Tenn(1)	
	June	Conn(1)	
	Jul-Oct	Ind(3)	
	Oct	Ga(1)	6
lindenburg	Jun	La	1
madelia	Sept	Minn	2
manila	Apr	Tenn(1)	
	Jul	Ind(1)	
	Aug	Dela(2)	4
menston	Mar	Va(1)	
	Apr-Jun	Wash(2)	3
mikawashima	Mar	Ind	1
minneapolis	Oct	Minn	1
mission	Jan	Ark(1)	
	Jan	SC(1)	
	Jul	Miss(1)	3
norwich	Feb	NC	1
pomona	Apr-Aug	Mich	2
poona	Jan	Tenn(1)	
	Mar	Calif(3)	
	Mar	Mass(3)	
	Jul	Ark(1)	
	Jul	Minn(1)	
	Aug	Mich(1)	
	Sept	Wash(1)	
	Oct	Kan(2)	13
rubislaw	Apr	Mont(1)	
	Jul-Aug	Kan(4)	5
ruiru	Apr	Md(1)	
	Aug	Dela(1)	2
simsbury	Jul	Ark(1)	
	Jul	Fla(2)	
	Jul	Iowa(1)	4
stockholm	Oct	Ohio	1
taksony	Aug	Dela	1
tallahassee	Jan	Fla	1
tuindorp	Oct	Minn	4
typhi-suis	Feb	Calif	1
urbana	Mar	Fla(2)	
	May	Conn(1)	
	Jun	NY-A(1)	
	Jul	Wisc(1)	
	Sept	Ohio(2)	
	Oct	Kan(22)	29
wassenaur	Apr	Ill(1)	
	Aug	Mich(1)	
	Oct	Kan(2)	4
weltevreden	Oct	Calif	1
westerstede	Jan	Miss	2
westhampton	Feb	Mass(1)	
	Jun	La(1)	
	Jul	SC(1)	3
Total			131

TABLE VI

EFFECTIVENESS OF TYPHOID VACCINES K AND L IN VOLUNTEERS WHO RECEIVED TWO DOSES FOUR WEEKS APART

(After Cvjetanovic, Bull. WHO, 1965, 32, 29-36)

Country and years	Persons in the trials				Number of typhoid cases			Duration of Observation (years)	Effectiveness of vaccine* 95% confidence limits)	
	Age and composition	Vaccine groups K	L	Control	K	L	Control		K	L
Yugoslavia, 1960-63	2-50 years, mostly schoolchildren	5 028	5 068	5 039	16	37	75	3	79% (63-88%)	51% (26-68%)
British Guiana 1960-64	5-15 years, schoolchildren	24 046	23 431	24 241	6	26	99	3.5	94% (86-98%)	73% (58-83%)
Poland 1961-63	5-14 years, schoolchildren	81 534	---	83 734	4	--	31	2	87% (62-97%)	-----
USSR 1962-63	Schoolchildren and young adults	----	36 112	36 999	--	13	50	1.5	---	73% (50-87%)

Code K = acetone-inactivated vaccine.

Code L = phenol-inactivated vaccine.

* = vaccine effectiveness - $\frac{100\ (b-a)}{b}$

Where a = incidence rate in immunized group.

b = incidence rate in control group.

Figure I.

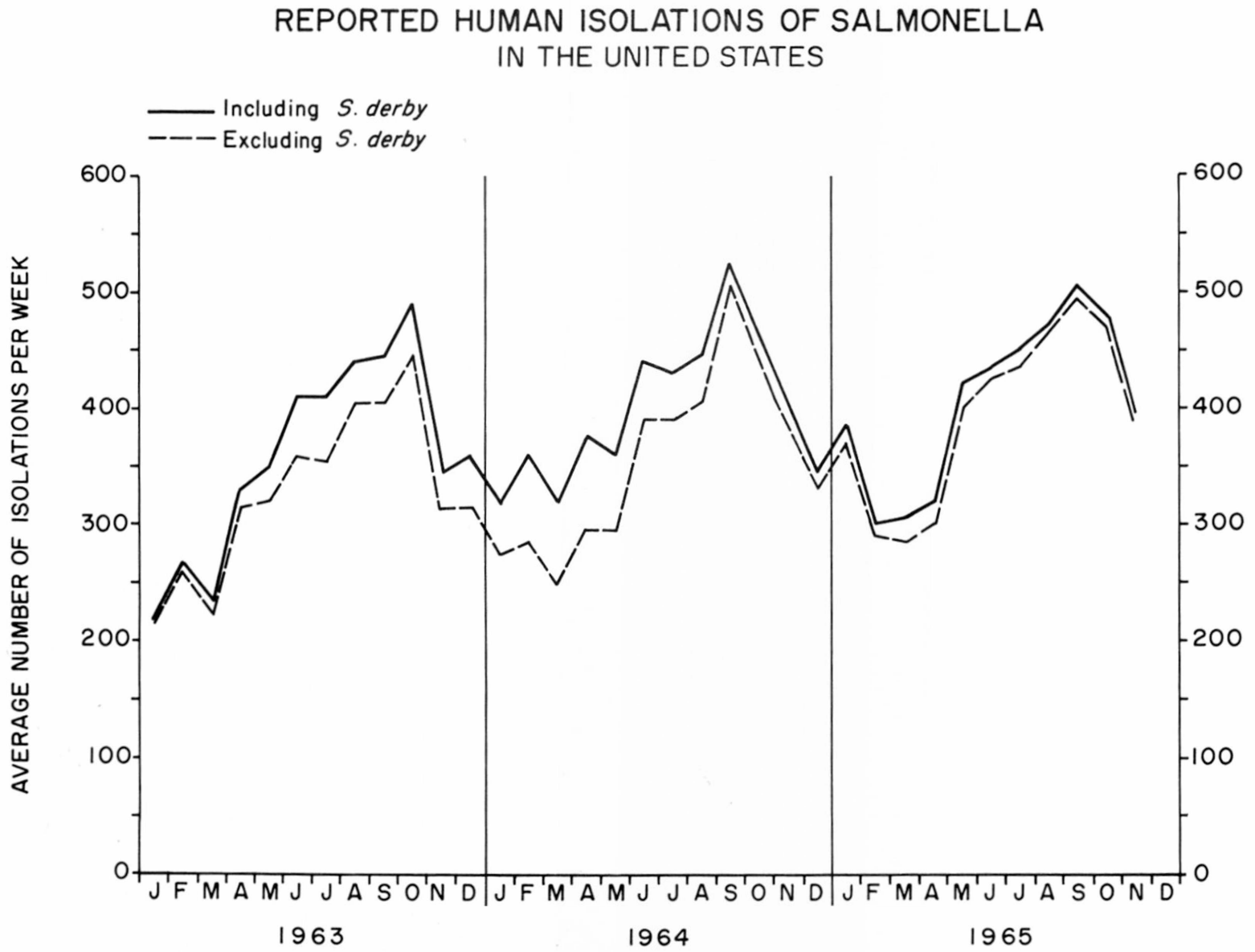
REPORTED HUMAN ISOLATIONS OF SALMONELLA
IN THE UNITED STATES
Including S. derby
Excluding S. derby
AVERAGE NUMBER OF ISOLATIONS PER WEEK
600
500
400
300
200
100
0
J F M A M J J A S O N D
1963
1964
1965

TABLE I

SALMONELLA SEROTYPES ISOLATED FROM HUMANS DURING NOVEMBER 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
alachua					1		1												
anatum								1		1			2			2	2		4
bareilly																			
berta									1				1						
binza																			
blockley				1			1	1	1	1		3	6	1		2			3
braenderup				1		2	3	1					1			1	1		2
bredeney																1			1
california																			
cambridge																			
cerro																1			1
champaign											1		1						
chester																	4		4
cholerae-suis v kun																			
clifton																			
cubana									2				2	2					2
derby				1			1	1				4	5	2		2	1		5
enteritidis	1			5		3	9	6	1	3		7	17	1	1	4	4	1	11
gatuni																			
give								1					1						
hartford																			
hato																			
heidelberg				5			5	2	1	2	2	8	15	2		6	11	1	20
indiana												4	4			1			1
infantis	1			4		3	8	3	1		2		6	9	2	8	1	3	23
inverness																			
java						1	1	1			1		2			2			2
javiana	1						1												
johannesburg																			
kentucky									1	1			2		1				1
litchfield				1			1	1					1						
livingstone														1		2			3
manhattan								3		1			4	3		1			4
miami																			
mission																			
mississippi																			
montevideo				2			2	3		1	2	2	8	1		1			2
muenchen				2			2			1			1					1	1
muenster											1		1						
new-brunswick																		1	1
newington																	1		1
newport			1	3		1	5	4	2	3		3	12	3		3	4	3	13
norwich																			
nyborg										1			1						
ohio																			
oranienburg				1		1	2			4		4	8	1			1	1	3
panama								1					1					1	1
paratyphi A										1			1						
paratyphi B											1	1	2		1	3			4
poona																			
portland										1			1						
reading																			
rubislaw																			
saint-paul				5			5	1	1	1			3		2	4	1		7
san-diego																		1	1
schwarzengrund																			
senftenberg								1		1	1		3						
siegburg								1					1						
stanley										1			1						
takoradi									2				2						
tallahassee																			
tennessee						1	1	2					2						
thompson						3	3	5			2		7	1		1	2		4
typhi						4	4	2				3	5	3	1	1			5
typhi-murium	1		1	55	4	9	70	47	11	18	10	29	115	21	8	15	8	13	65
typhi-murium v cop	1			1		2	4				2		2				3		3
urbana														2					2
weltevreden																			
westerstede																			
westhampton																			
worthington																			
untypable group B		7		1			8							1					1
untypable group C_1																			
untypable group C_2																			
untypable group D		1			3		4												
untypable group E																			
untypable group L																			
unknown		3					3												
Total	5	11	2	88	8	30	144	88	24	42	25	68	247	54	16	61	44	26	201

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 ststes which are assigned to the respective states although reported by N.Y.-B.I. Beth Israel reported a total of 84 isolations for October.

**Includes October late reports.