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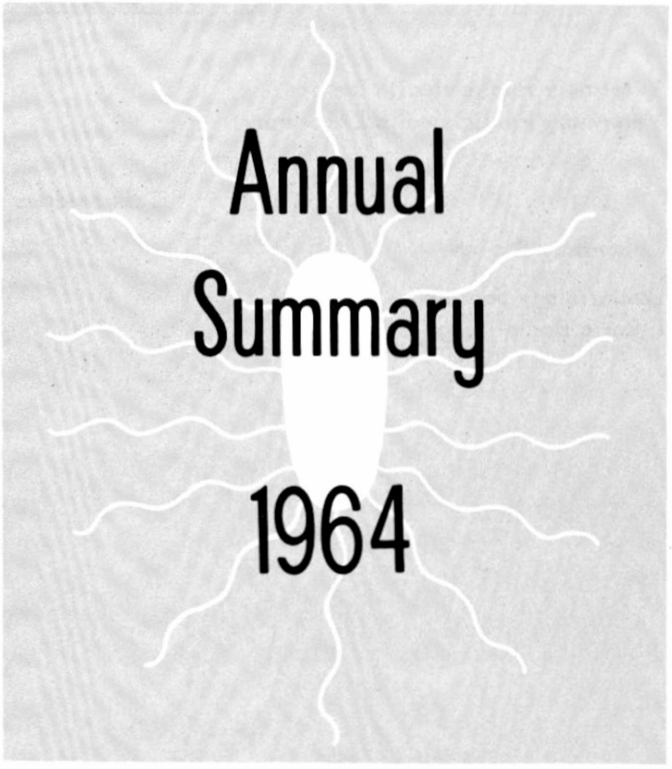
COMMUNICABLE DISEASE CENTER

SALMONELLA

SURVEILLANCE



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Salmonella Surveillance Report

Annual Summary - 1964

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Salmonella Surveillance

Annual Summary - 1964

I. INTRODUCTION

This report summarizes the results of the second year (December 28, 1963 - January 1, 1965) of the Salmonella Surveillance program jointly established by the Communicable Disease Center (CDC) and the Association of State and Territorial Epidemiologists and Laboratory Directors. The bulwark of the program is the weekly reporting of isolations of salmonellae submitted by all fifty states, the District of Columbia, the Salmonella Reference Center-Beth Israel Hospital, New York City, and the National Animal Disease Laboratory in Ames, Iowa.

II. MATERIALS AND METHODS

The data analyzed are derived from two sources; the Morbidity and Mortality Analysis Unit (1942-1962 Morbidity and Mortality Weekly Report (MMWR) Annual Supplements) and the Salmonella Surveillance Unit. The data from the first source (MMWR) include cases of salmonellosis diagnosed clinically and presumably confirmed bacteriologically. Reports are dichotomized into typhoid fever and salmonellosis exclusive of typhoid fever. Whether the cases are reported by onset of illness or date of culture is not known. The data collected by the Salmonella Surveillance Unit represent laboratory isolations of salmonellae, without distinction as to whether the isolate came from a clinical case or a carrier.

Human isolates are reported by name, age, sex, serotype, county of residence and whether or not the case was fatal. Nonhuman isolates are reported by source, serotype, and county of origin. Approximately sixty percent of these are reported from the National Animal Disease Laboratory, Ames, Iowa, and the remainder from State Reporting Centers.

Interpretations are limited by the bias inherent in the methods and materials used for analysis. For examples geographical prevalences of human isolates reflect "interest factors." Nonhuman data are most difficult to interpret because isolations are obtained from both ill and asymptomatic animals, multiple isolates may be reported from the same source, denominator data are unavailable, and diagnostic procedures differ among animal species (it is common practice to culture fowl tissue, whereas, other animals are frequently subjected to gross anatomical and histological examinations for disease).

Despite the limitations, certain observations are justified, and the data herein provide the ground work on which future collations may be made. An attempt has been made in this report to characterize the epidemiology of salmonellosis within the limits of the data obtained during the first and second year of operation of the Surveillance Program. The data must be confirmed, and the extent to which confirmation is afforded by surveillance in subsequent years is one measure of the success of the program.

III. SUMMARY

A total of 21,113 human isolations of salmonella were reported to the Salmonella Surveillance Unit during 1964. This represented an increase of 2,464 (13.2 percent) over 1963. The seasonal pattern demonstrated in 1964 was similar to 1963 with the peak occurring one month earlier in September rather than October.

Of the estimated 900 known serotypes, 139 were reported from humans during 1964; 15 (12.1 percent) more than in 1963. The ten most commonly reported serotypes

accounted for almost 75 percent of the 21,113 isolations. Salmonella typhi-murium and S. typhi-murium var. copenhagen were the most frequently recovered serotypes from both human and nonhuman sources. As was true in 1963, S. derby was the second most common isolate from humans and S. heidelberg was second most common among nonhuman sources. A close correlation was noted between the ten most frequently reported serotypes from humans and the ten most common from nonhuman sources.

Estimated attack rates of salmonellosis by state ranged from less than 1/100,000 in Nebraska, South Carolina and West Virginia to 74/100,000 in Hawaii. Several states had estimated attack rates higher than 20/100,000 including Alaska, Connecticut, Delaware, the District of Columbia, Hawaii, Louisiana, Massachusetts, New Mexico, and Utah. The estimated attack rate for the United States was 11/100,000.

Geographical variances in the reported isolations of some of the more common serotypes were noted when compared to the distribution of all salmonella isolations from humans by region of the country. For example; 69.5 percent of all S. derby recoveries were reported from the New England and Middle Atlantic regions as compared to 31.2 percent of all salmonella isolations. Other variances were noted among the more common serotypes as well as among some of the relatively rare serotypes.

Fifty-two general and family outbreaks were reported during 1964, involving an estimated minimum of 2,150 illnesses. Eleven of 38 of the epidemics, in which a suspect or proven source was incriminated, were attributed to eggs. Salmonella typhi-murium was responsible for the largest number of the 52 outbreaks; 11.

Slightly over fifty percent of the individuals reported as harboring salmonella were males. Although no sex predilection appeared generally, it was interesting to note that there was a preponderance of males in age groups less than 20 and females in age groups over 20. The pattern of estimated attack rates of salmonellosis by age group closely corresponded to the one computed for 1963 with the highest rates among infants and children less than 10 years of age.

Fifty-seven deaths connected with salmonella infections were reported during 1964 resulting in a death to "case" ratio of 0.27 percent as compared to 0.34 percent during 1963.

The family "case" to total "case" ration for salmonellae isolated was 21.4 percent; slightly higher than the 18.1 percent observed in 1963. A total of 5,461 recoveries of salmonella from nonhuman sources were reported during 1964 for an increase one percent over 1963.

More than half (52.1 percent) of the nonhuman recoveries were from chickens and turkeys, as was true in 1963. Other prevalent sources were cattle, 8.6 percent; swine, 8.0 percent; eggs and egg products, 9.2 percent; other human foods, 2.4 percent and animal feed, 4.3 percent.

Recoveries from eggs and egg products demonstrated an increase of 230 percent over the 152 recoveries reported during 1963. This was paralleled (among nonhuman sources) only by an increase of 271 percent in recoveries from cold-blooded vertebrates (primarily turtles) over the 35 isolates reported in 1963. The remainder of the nonhuman sources remained approximately the same in relative importance when compared to 1963.

IV. REPORTS OF ISOLATIONS FROM THE STATES

A. Human

Incidence

During 1964, a total of 21,113 human isolations of salmonella were reported to the Salmonella Surveillance Unit. When compared to the 1963 figure, the 1964 recoveries represented an increase of 2,464 (13.2 percent). It is believed that part of this increase reflects an increased incidence of human salmonellosis. Undoubtedly, interest factors played a role, but data compiled and reported in the MMWR also suggest that the problem of salmonellosis in the United States is expanding (Figure 1). Figure 1 also compares the increasing incidence of salmonellosis in the United States with the incidence of typhoid fever, which has been decreasing since 1942.

Seasonal Prevalence

The average number of isolations per week for 1963 and 1964 are portrayed in Figure 2. For comparison, an "expected" curve, based on a seasonal index of salmonellosis computed from MMWR monthly salmonellosis data and the mean weeks for the respective years, is depicted by the broken line. Figure 2 demonstrates that the incidence of salmonellosis in the United States has a seasonal pattern with the period of high incidence occurring in the summer and early autumn.

Serotype Frequency

A total of 139 different salmonella serotypes were recovered from humans during 1964, an increment of 15 (12.1 percent) over 1963. This number (139) accounted for approximately 15 percent of the estimated 900 known salmonella serotypes. Ten of the 900, or 1.1 percent, accounted for 15,721 (74.5 percent) of the 21,113 isolations reported during 1964.

The ten most commonly reported serotypes appear in Table II. Salmonella typhimurium and S. typhi-murium var. copenhagen were the most frequently reported during every month in 1964 and represented 5,862 (27.8 percent) of all isolations. Salmonella derby, the second most commonly reported serotype, accounted for 11.2 percent of all isolations. Prior to 1963, S. derby recoveries accounted for approximately two percent of all salmonella isolates reported. An interstate hospital-associated outbreak of salmonellosis during 1963 increased the percentage of S. derby recoveries to 8.6. While the percentage of S. derby isolations remained elevated in 1964, the majority of the recoveries were reported during the first part of the year and diminished to less than five percent by December. During 1964, S. infantis was the fourth most prevalent serotype reported and S. newport the fifth. These two types held opposite positions during 1963. The increase in the number of S. infantis isolations was the result of a large hospital-associated outbreak in Pennsylvania.

Table II also demonstrates the close correlation between human and nonhuman sources of salmonellae. Seven of the ten serotypes listed are common to both lists. These similarities, taking into consideration that the data are not wholly comparable, confirm the importance of the nonhuman reservoir of salmonella in the epidemiology of human salmonellosis.

Geographic Patterns

The geographic distribution of salmonella recoveries reported during 1964 appears in Figure 3. New York, with 2,575 isolates, reported the largest number followed by California, 2,072; Pennsylvania, 1,797; Massachusetts, 1,244; Florida, 1,025;

Illinois, 1,019; and Michigan, 982. All of these states showed an increase over 1963 in the number of recoveries reported with the exception of California, which had a decrease of 574 (21.7 percent). These seven states accounted for 50.7 percent of all isolations reported for the country while containing only 40.3 percent of the country's population within their boundaries[1]. The combined attack rate was estimated to be 14/100,000 as compared to 11/100,000 for the country as a whole.

Hawaii, as in 1963 reported the highest estimated attack rate with 74/100,000. Other states reporting estimated attack rates higher than 20/100,000 were Utah, 33/100,000; Alaska, 27/100,000; Massachusetts, 23/100,000; New Mexico, 22/100,000; and Connecticut, Delaware, the District of Columbia, and Louisiana, 21/100,000. During 1963, only three states had estimated attack rates higher than 20/100,000; Hawaii, Louisiana and Massachusetts. Utah experienced a large outbreak of salmonellosis attributed to S. heidelberg during 1964 which was responsible for 211 of its 323 recoveries and elevating the estimated attack rate from 11 to 33/100,000 population. Alaska's estimated attack rate was elevated by an outbreak due to S. anatum in that state. Salmonella derby recoveries accounted for 253 (44 percent) of all salmonella isolations in Connecticut, which resulted in the high estimated attack rate for 1964. Salmonella derby was also responsible for the high recovery rate in Delaware.

Table III demonstrates geographical variances among specific serotypes. By comparing the regional percentage distribution of the ten most common serotypes recovered from humans with the percentage distribution of all salmonellae (assumed to be the norm), certain variances may be seen. For example; 69.5 percent of all S. derby recoveries were reported from the New England and Middle Atlantic regions as compared to 31.2 percent for all salmonellae. An interstate hospital-associated outbreak attributed to that serotype was responsible for a similar divergence in 1963 and this extended into 1964. Another example of regional prevalence is S. heidelberg, which demonstrated an abnormally high concentration of isolates in the Pacific and Mountain Regions.Other noteworthy variances are the concentrations of S. infantis in the Middle Atlantic Region, S. newport in the South Atlantic and West South Central Regions, S. enteritidis in the New England, Middle Atlantic and East North Central Regions and S. saint-paul in the Middle Atlantic Region. Salmonella infantis was responsible for a large hospital-associated outbreak in Pennsylvania and S. saint-paul was the etiologic agent in a hospital-associated epidemic in New York.

Some infrequently reported serotypes, also have definite regional patterns. Salmonella indiana was reported 54 times; all but one of these were from states east of the Mississippi River. Salmonella loma-linda was reported on five occasions, all of which were from Pacific Coast states. That serotype has been reported exclusively from western states prior to 1964. Florida reported 38 of the 49 recoveries of S. miami. Only 2 of 23 S. weltevreden isolations were reported from the continental United States (Minnesota and Illinois). The remaining 21 were reported from Hawaii.

Outbreaks

During 1964, 52 general and family outbreaks were investigated and reported in the Salmonella Surveillance Reports. An estimated minimum of 2,150 illnesses were involved for an average of approximately 38 and a range of 2 to 500 per outbreak.

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[1]Bureau of the Census, U.S. Department of Commerce, "Estimates of the Population of the United States by Age, Color and Sex: July 1, 1964". October 21, 1964.

Eleven of thirty-eight of the epidemics, in which a suspect or proven source was incriminated, were attributed to eggs. Other sources included human carriers, 7: pet turtles, 4; cooked chicken, 3; homemade ice cream, cooked turkey, roast beef and infected calves, 2 each and 1 each related to a pet dog, raw shellfish (eaten by a group of merchant marines prior to entry into the United States.), a commercially prepared human dietary supplement, hamburger meat and potato salad. A source for the other 14 outbreaks was not determined.

California reported 14 of the 52 outbreaks. Other states reporting the results of investigations of outbreaks were Minnesota, 4; Michigan, New York, and Ohio, 3 each; Georgia, Illinois, Massachusetts, New Jersey and North Carolina, 2 each and Alabama, Arkansas, Connecticut, Florida, Hawaii, Iowa, Kansas, Nebraska, New Mexico, Ohio, Rhode Island, Tennessee, Texas, Utah and Washington, one reported outbreak each. The remaining states, the District of Columbia and the Virgin Islands reported none. It should be emphasized that these reports do not reflect the prevalence of outbreaks in these states nor do they account for but a fraction of the total number of outbreaks that undoubtedly occur.

The 52 outbreaks were attributed to 23 different serotypes. Two outbreaks were caused by infection with more than one serotype, one was ascribed to three different serotypes and the other to four. Table IV depicts the serotypes that were responsible for two or more outbreaks. For the purposes of tabulation, the cases which resulted from the outbreaks involving more than one serotype were divided equally among the respective types making the total number outbreaks 57 for this tabulation. Salmonella typhi-murium was the etiologic agent in 11 outbreaks which resulted in approximately 600 illnesses. All eight S. derby epidemics were small, localized and institutional.

Age and Sex Distribution

Of the 20,528 individuals for whom sex was indicated on reports during 1964, 10,343 (50.4 percent) were males and 10,185 (49.6 percent) were females (see Table V). Although generally there appears to be no sex predilection, it is interesting to note that for the age groups under 20 years there is a preponderance of males and the opposite is true for age groups over 20 years. The same distribution was seen in the 1963 summary data.

Age (years)	Male	Percent	Female	Percent	Total
Less than 20	4,500	54.6	3,747	45.4	8,247
20 and over	2,358	44.1	2,993	55.9	5,351
Total (including unknown & unspecified serotypes)	10,343	50.4	10,185	49.6	20,528

Of the 13,598 individuals reported by age during 1964, 8,247 (60.6 percent) were less than 20 years of age. Figure 4 demonstrates estimated attack rates by age group for 1964. The sex patterns correspond closely to those presented in the 1963 annual summary.

Among the ten most frequently reported serotypes, only two demonstrated age and sex distributions that differed substantially from the pattern exhibited by all salmonellae (Table V). The percentage of individuals harboring S. derby who were less than 20 years of age was 34.7 as compared to 60.6 for patients with salmonella in general. A similar difference was seen in persons with S. typhi, where only

29.6 percent were less than 20. Salmonella typhi isolations include a large number from older people who are chronic carriers, which may account for the difference.

Mortality

During 1964, 57 deaths associated with salmonella infections were reported. The death to "case" ratio was 0.27 percent, which was less than the 0.34 percent calculated for 1963. This is not a true reflection of the mortality rate due to salmonellosis in this country because (1) reporting officials do not always have access to information concerning the clinical courses of patients' illnesses and (2) it is probable that, in some cases, isolates are reported prior to death and the deaths are then not reported. Table II demonstrates the relative importance of the various serotypes associated with deaths during 1964. The most commonly involved serotype was S. derby, as was true in 1963.

Family "Case" to Total "Case" Ratio

Of the 21,113 persons reported as harboring salmonellae during 1964, 4,523 (21.4 percent) represented those who had other members of their families also positive for salmonella (Table VI). That rate was slightly higher than the one for 1963, which was 18.1 percent. The ratios for the ten most commonly reported serotypes also appear in Table VI. Although there was a substantial amount of variance from one serotype to the next, the only dramatic departure from the ratio for all salmonellae was S. derby with a ratio of 7.6 percent. The low family "case" to total "case" ratio for that serotype was felt to be related to the institutional focus of the organism.

Multiple Infections

A total of 174 persons were reported as being simultaneously infected with more than one serotype during 1964. Of those, 164 harbored two serotypes simultaneously and 10 were reported as having three. The serotypes most commonly reported as occurring in conjunction with one or more other types were S. typhi-murium, 50; S. manhattan, 31; S. derby, 28; S. anatum, 21; S. newport, 19; and S. heidelberg and S. montevideo, 17 each. With the exception of S. manhattan, all of the serotypes listed are commonly isolated from humans in the United States. The majority of the S. manhattan recoveries with another serotype were from Hawaii where that serotype was the second most common during 1964. No particular combination of serotypes was noteworthy.

Rare Serotypes

There were 52 serotypes reported which were classified as rare because they were reported from only one state or reporting center. Although representing 37.4 percent of the 139 reported types, they accounted for only 77 (0.4 percent) of the 21,113 isolations reported during 1964. Data and comments concerning these serotypes appear in Table VII.

B. Nonhuman

During 1964, 5,461 salmonella isolates from nonhuman sources were reported. This represents a one percent increase over the 5,389 isolations reported in 1963. The sources of these are depicted in figure 5. There were 3,016 (55.2 percent) isolations from poultry and wild fowl, 1,246 (22.8 percent) isolations from other domestic and wild animals, 503 (9.2 percent) isolations from eggs and egg products, 237 (4.3 percent) from animal feed, 132 (2.4 percent) from other human foods and 326 (6.2 percent) from other and unknown sources.

The geographic distribution of serotypes isolated from nonhuman sources appears in figure 6. Isolations were reported from all states except Hawaii, Nevada, New Mexico, North Dakota, and Rhode Island. In 1963, Nevada and Idaho were the only states reporting no salmonella isolations from nonhuman sources. Factors such as the number of diagnostic laboratories available within a state, individual research projects, surveillance of food items and the nature of the livestock population of a state add significantly to the bias of these data. For example, Louisiana reported 256 isolates in 1963 and 17 in 1964. This reduction is almost entirely due to completion of a research project by a single investigator. Similarly, the Southeastern States reporting relatively high numbers of isolates is due to the importance of the poultry industry in that section with its emphasis on isolation of salmonellae due to the pollorum disease eradication program. No conclusions can be validly drawn to the geographic distribution of individual serotypes with the exception of Salmonella dublin which continues to be restricted to the Farwestern States.

The ten most common salmonella serotypes isolated from nonhuman sources during 1964 are listed in Table II. These ten serotypes comprised 57.9 percent of the total nonhuman isolates. Seven of these serotypes were also listed among the ten most commonly isolated serotypes from human sources. This compares with six during 1963. The top five on the list (S. typhi-murium and S. typhi-murium var. copenhagen, S. heidelberg, S. infantis, S. anatum and S. montevideo) were the same as during 1963. Salmonella derby and S. chester were included in the ten most common during 1964 due to a near doubling in frequency of isolations over those reported in 1963. The rise in frequency of S. derby can be attributed to an investigation in a single state rather than a general increase for the country as a whole.

Sources

Domestic and Wild Fowl

During 1964, there were 3,016 (55.2 percent) isolations from poultry and wild fowl and 503 (9.2 percent) isolations from eggs and egg products. Comparable 1963 totals were 3,128 (58.1 percent) and 152 (2.8 percent)isolations respectively.

While total isolations of salmonellae from poultry and wild fowl have shown little fluctuation, the number of isolations from eggs and egg products has risen considerably. This rise can be accounted for by increased research interest in the salmonella contamination of eggs and to newly initiated surveillance programs of egg products such as the one being conducted by the State of Utah on frozen eggs. The six most common serotypes isolated from eggs and egg products were in order of decreasing frequency: S. oranienburg (13.9 percent), S. infantis (12.9 percent), S. heidelberg (12.5 percent, S. montevideo (11.7 percent), S. tennessee (9.3 percent) and S. thompson (7.8 percent). Of these neither S. oranienburg nor S. tennessee were among the ten most common serotypes isolated from fowl. Surprisingly, S. typhi-murium and S. typhi-murium var. copenhagen only accounted for 2.4 percent of the isolates from eggs and egg products while accounting for 18.4 percent of the isolates from poultry and wild fowl.

The five most commonly isolated serotypes from chickens and turkeys are shown in Table X. Serotypes reported for the first time to the Salmonella Surveillance Unit from this group include, S. cambridge from a turkey in Indiana, S. caracas from a wild bird in Maine, S. new-haw from a chicken in Mississippi and S. taksony from a turkey in California.

Domestic and Wild Animals

During 1964, there were 1,246 (22.8 percent) isolates reported from domestic and wild animals as compared to 1,550 (28.7 percent) reported during 1963. The

decline in reported isolates was 19.6 percent. This may be attributed in part to the restriction of cultures accepted for serotyping at the National Animal Disease Laboratory to those from ill animals and feeds.

The five most common serotypes isolated from swine, and cattle in 1964 are shown in Table X. Salmonella derby was the most commonly reported isolated from swine but of the 213 isolates reported, 121 were from an investigation in one state. Serotypes reported to this unit for the first time from domestic and wild animals include S. belem from a dog in Michigan, S. pensacola from swine in South Carolina, S. tallahassee from a cow in Florida, and S. zehlendorf from swine in Michigan.

Animal Feed and Feed Ingredients

During 1964, there were 237 (4.3 percent) salmonella isolations reported from animal feed and feed ingredients as compared to 279 (5.2 percent) isolations during 1963.

Isolates from this source reflect individual research efforts and, as a result, preclude valid conclusions as to relative prevalence of the various serotypes in feed. Forty-six different serotypes were reported including such rare serotypes as Salmonella duesseldorf from tankage in Indiana, S. lille from feed and tankage in Indiana and New Jersey, S. minneapolis from meat scraps and feed in Illinois and S. westhampton from meat scrap and bone meal and from poultry feed in Washington and Minnesota.

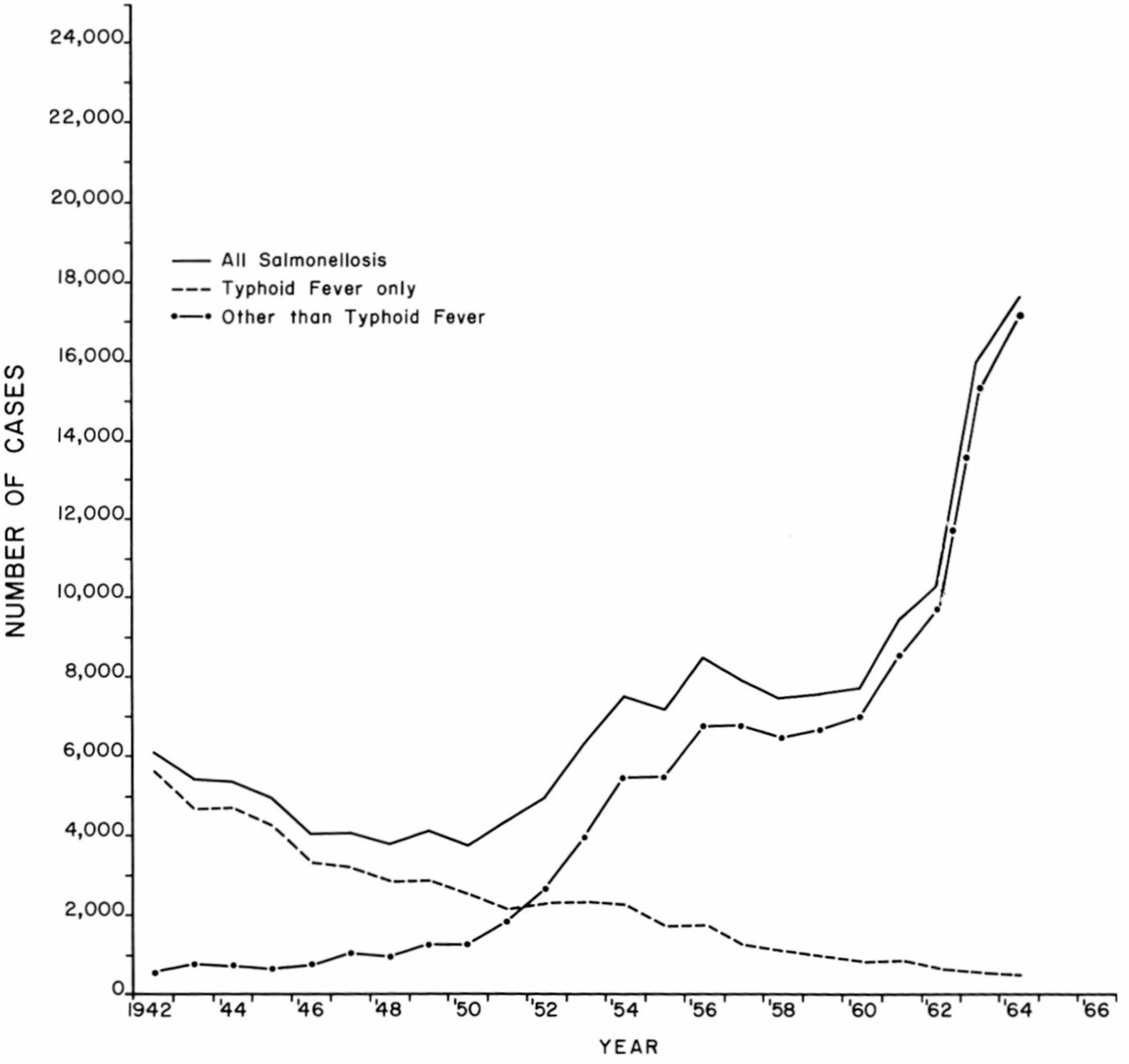
Miscellaneous

Cold blooded vertebrates, and in particular turtles, have been receiving increased attention as carriers of salmonellae. This is evidenced by the 130 isolations of salmonellae from cold blooded vertebrates reported during 1964 as opposed to 35 isolations reported in 1963. The foregoing totals do not include isolations from water in reptile containers. There were over ten documented examples of human salmonellosis due to handling of contaminated turtles during 1964.

One of these was due to a rare serotype, S. brandenburg, which was implicated in a family outbreak in North Carolina (SSR#34). Rare serotypes isolated from or in association with reptiles during 1964 included S. adelaide, S. blukwa, S. brandenburg, S. hagenbeck, S. oslo, S. uganda, S. wandsbek and S. wassenaar.

Figure 1

REPORTED INCIDENCE OF HUMAN SALMONELLOSIS
UNITED STATES, 1942-1964



Source: MMWR Annual Supplements, 1951, 1954, and 1964

TABLE I

SALMONELLA SEROTYPES ISOLATED FROM HUMANS DURING 1964

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
adelaide										2		1	3	1					1
alachua									1	1			2						
albany										1			1						
amager																			
anatum				8		4	12	13	5	7	4	12	41	2	6	6	18		32
bareilly	1			4		8	13	2	3	4		5	14	5		4	2		11
berta				2			2	2	2	4			8	4	1	1	1		7
binza				8			8							1		1	1		3
blockley	4		3	31	2	7	47	16	7	9	20	21	73	12	24	44	27	11	118
bovis-morbificans				1			1												
bradford											1		1						
braenderup				13		5	18		3	2	2	7	14	3	1	9	2	5	20
brandenburg																			
bredeney				1		4	5	11	22	20	6	9	68		1	9	8	2	20
california								3					3	2		1			3
carrau																	1		1
cerro						1	1									1			1
chester				6		2	8			2	5	7	14			5	7	6	18
cholerae-suis									1	3		1	5	4					4
cholerae-suis v kun											1		1			2	3		5
concord																			
cubana				2			2	3	2	2		7	14	2	1	1	11	7	22
derby	7	4	3	261	15	253	543	172	191	185	98	452	1,098	107	3	126	45	37	318
duesseldorf												1	1						
eastborne									1	1			2						
enteritidis	2		1	90	1	41	135	101	28	57	11	79	276	66	29	45	43	11	194
essen								1					1						
florida																			
gaminara						1	1												
give						1	1		2	2	1	2	7	2	3	3	1	1	10
grumpensis																	2		2
hartford									1	1			2			2			2
heidelberg	2		3	120	4	24	153	48	34	65	41	72	260	57	19	76	76	55	283
indiana						1	1	1	3	9		18	31	2	4	2	5		12
infantis	1		1	51	2	35	90	42	24	37	16	520	639	45	28	61	51	23	208
irumu																			
java				1	5	13	19	22			3	1	26			20	8	21	49
javiana				8			8	4			1	7	12	12		2	1		15
johannesburg								1					1						
kentucky								1		1		1	3				1	1	2
litchfield			1	1			2	5	3	4	1		13	1		14	1		16
livingstone									1				1						
loma-linda																			
manchester																			
manhattan				4			4	5		3		5	13	3		9	1	1	14
meleagridis									1			2	3	1		9			10
miami										1	3	1	5				1		1
minnesota																2		1	3
mission																			
mississippi																	1		1
montevideo	2		2	13	1	9	27	30	15	21	14	58	138	25	3	23	23	7	81
muenchen				5		2	7	2	5	7	2	14	30	10	2	4	7	3	26
muenster																	1		1
new-brunswick																1			1
newington						1	1	6	2	1		8	17			1	1		2
newport				39	2	14	55	18	14	15	10	41	98	20	11	32	29	12	104
norwich																			
ohio																		1	1
oranienburg	4			17	2	8	31	25	13	18	7	21	84	9	5	37	21	10	82
orion				1			1												
oslo									1				1						
panama				5		6	11	10		19	3	4	36	5	4	14	5	10	38
paratyphi A									1				1			1			1
paratyphi B				39			39	3	8	1	3	22	37	15	2	2	11		30
pensacola				3			3	1					1		1				1
poona						2	2		1	2		1	4	2		5	2	1	10
reading								4	1		4		9	3		1	3	1	8
richmond																			
rubislaw						1	1												
saint-paul				27	1	10	38	48	56	72	16	30	222	8	9	21	38	11	87
san-diego				3			3	11	5	6		2	24	11		3	5	6	25
schwarzengrund			1	3			4	2	3	3	1	6	15	2		3	4		9
senftenberg									5	1		2	8	2		39	1	1	42
siegburg										1			1				1		1
simsbury																			
stanley								3	1		1		5						
tallahassee											1		1						
tennessee			1	13	1	6	21	7	1	11	7	7	33	15	11	19	55	13	113
thomasville																2			2
thompson				22	3	5	30	27	17	18	8	23	93	24		28	29	5	86
typhi	1	1		4	12	6	24	13	30		7	11	61	33	8	32	19	2	94
typhi-murium	14	3	14	369	22	97	519	290	139	325	96	302	1,152	215	47	266	367	130	1,025
typhi-murium v cop	5			65			70				26	13	39				31		31
urbana	1			1		2	4	2			1	1	4	1		5		2	8
virchow																			
weltevreden																1			1
worthington				1		1	2	3	1	3			7	5		5	7		17
Untypable Group A									2				2						
Untypable Group B		19			1	2	22	2			1		3	1		10	2	4	17
Untypable Group C-1		1			3		4	3		1	1		5	1		2	1		4
Untypable Group C-2					1		1												
Untypable Group D		5			1		6								1				1
Untypable Group E																			
Untypable Group G																			
Untypable Group H																			
Untypable Group O																			
untypable																			
unknown		8		1	1		10			4			4		2	5		17	24
TOTAL	44	41	30	1,243	80	572	2,010	963	656	952	423	1,797	4,791	739	226	1,017	981	418	3,381

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)
BY SEROTYPE AND REPORTING CENTER

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
																1	1	adelaide
		2					2									1	1	alachua
		1					1											albany
1	1	2		1		3	8	4	5		5		1		16	27	58	amager
																		anatum
1		3					4	1	2		3		1		3	4	14	bareilly
1							1		4		7		1			1	13	berta
											4						4	binza
10		4	1			5	20		5	1	7		5		13	27	58	blockley
																		bovis-morbificans
		1					1											bradford
5		3		1		1	10	1	6		1		4		2	3	17	braenderup
													3				3	brandenburg
5						3	8		1		2					14	17	bredeney
4	2	3					9		1				3			1	5	california
																1	1	carrau
								1							4		5	cerro
2		1					3		6		5		1		3	1	16	chester
										1					3		4	cholerae-suis
1		1					2				5		3		5	7	20	cholerae-suis v kun
																		concord
						2	2								2	4	6	cubana
6		8				2	16	43	43	6	13	1	9		14	13	142	derby
																1	1	duesseldorf
																		eastborne
32	2	12				4	50	8	9	6	16		2		11	21	73	enteritidis
																		essen
																3	3	florida
																		gaminara
		1					1				5					7	12	give
																		grumpensis
		1					1	1								3	4	hartford
22	8	7	7	1		9	54	3	30	6	12		32	1	48	41	173	heidelberg
									2				5		1		8	indiana
65	2	34	7			10	118	2	12	2	17		27		32	47	139	infantis
		2					2						1				1	irumu
6	3	4					13	2	2		7		1		8	10	30	java
		2				4	6	1			3		1		36	66	107	javiana
																		johannesburg
1		2					3											kentucky
7							7		1						6	9	16	litchfield
									2							4	6	livingstone
																		loma-linda
											1						1	manchester
	15					1	16		7		2		1		3	1	14	manhattan
1							1		1				1		2	1	5	meleagridis
													1		3	38	42	miami
									2								2	minnesota
		1					1									1	1	mission
															13	1	14	mississippi
4		4	1	1			10	4	14		13	1	5		18	35	90	montevideo
5	1	3				6	15		5	1	3		5		13	33	60	muenchen
													2			2	4	muenster
															1		1	new-brunswick
															1	4	5	newington
12	1	6	3			16	38	1	13	3	8		16		80	108	229	newport
		1					1				1				1	2	4	norwich
																		ohio
19	8	6		1		33	67		4	2	22		10		21	59	118	oranienburg
		1					1									1	1	orion
											1						1	oslo
10	2			4			16	1	3		10				1	1	16	panama
																		paratyphi A
2		2	1				5	1	1	1	7	1	1			2	14	paratyphi B
											1		1		1		3	pensacola
						4	4									5	5	poona
				1			1				4						4	reading
						1	1											richmond
															1	1	2	rubislaw
30		3	2				35	2	16	1	8		14		34	29	104	saint-paul
1		1					2	2	4						2	7	15	san-diego
1						1	2		1	1			2		1	24	28	schwarzengrund
													4			12	17	senftenberg
																		siegburg
		1				1									1		1	simsbury
																2	2	stanley
																2	2	tallahassee
29	3		1				33	2	10	4	9		2		2	38	67	tennessee
																1	1	thomasville
1	4	7	2	2		5	21		17	1	6	3	4		8	38	77	thompson
	3	32		1	1	7	44		7	3	24	5	51	2	27	50	169	typhi
113	24	92	47	23	6	149	454	15	117	22	159	4	93	1	216	203	830	typhi-murium
	1	1	2				4	3					1				4	typhi-murium v cop
															1	1	2	urbana
								2	1								3	virchow
1							1											weltevreden
									3		3				1	1	8	worthington
										2							2	Untypable Group A
1	7				2		10		1	60		1		6		2	70	Untypable Group B
			1				1	2		9							11	Untypable Group C-1
1		1			1		3			6				2			8	Untypable Group C-2
										13				1			14	Untypable Group D
								1		2							3	Untypable Group E
																1	1	Untypable Group G
																		Untypable Group H
															1		1	Untypable Group O
3	2		2	2			9			16			1	6		1	24	Untypable
																		unknown
403	89	256	77	38	10	266	1,139	103	358	169	394	16	315	19	660	1,024	3,058	TOTAL

TABLE I (Continued)

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
adelaide																			
alachua																			
albany							2			2									
amager							8	1		9									
anatum	1		1		2	1	48	1	11	61				1		1			2
bareilly	5	1	1		7	3	7		5	15									
berta		2			2		8		1	9									
binza							6		1	7									
blockley		4	4		8	1	21	4	18	44								4	4
bovis-morbificans							1			1									
bradford																			
braenderup							3		4	7									
brandenburg														1					1
bredeney	1		1		2		9		4	13	1			4		4	4		13
california									1	1						1	1		2
carrau							1			1									
cerro																			
chester		3			3						1			2					3
cholerae-suis	1				1														
cholerae-suis v kun							2		1	3									
concord									1	1				1					1
cubana		1			1				5	5				1		6			7
derby	1	15	6	1	23	6	25	2	8	41	2			11		1	1		15
duesseldorf									2	2									
eastborne																			
enteritidis	6			1	7		15	3	6	24				5			12		17
essen														5					5
florida									5	5									
gaminara							2			2									
give			2		2	1	20		5	26						2			2
grumpensis																			
hartford			1		1		1			1									
heidelberg	6	16	9	7	38	3	28	2	29	62	2	9		49		19	211	2	292
indiana							1			1									
infantis	1	4	2		7	7	18	7	26	58	4	5	1	17		11	8		46
irumu														2					2
java		1	1		2	5	29	2		36	5					1	3		9
javiana		6	7	1	14	13	42	2	35	92							1		1
johannesburg																			
kentucky							2	3	1	6									
litchfield									6	6	3								3
livingstone						1	3			4									
loma-linda																			
manchester									2	2									
manhattan		1			1	1	9		4	14						1			1
meleagridis							1		1	2									
miami							1			1									
minnesota			1		1		1		3	4									
mission																			
mississippi			2		2	3	13	1	4	21									
montevideo	5	24	2	1	32	7	39	13	15	74	1			8		4	5		18
muenchen		1	3		4		8	2	54	64	2	1		4		8	5		20
muenster							1			1									
new-brunswick																			
newington		3			3									37					37
newport	3	29	8	11	51	25	84	5	105	219		4		14		37	2	1	58
norwich						1	4	1	1	7									
ohio																			
oranienburg	1	10	1	2	14	3	8	12	42	65	4			7	1	11			23
orion																			
oslo																1			1
panama		2	1		3	1	7		18	26				1		2			3
paratyphi A																		1	1
paratyphi B	2				2			2	22	24	2			7		2			11
pensacola			1		1														
poona		2			2		1	1	8	10						1			1
reading	1				1				1	1									
richmond	1				1				1	1									
rubislaw				1	1		11		3	14									
saint-paul	8	5	3		16	6	11		5	22	3	2		5		4	8		22
san-diego	2				2		1	1	2	4				29	2		1		32
schwarzengrund		45	1		46		7		2	9	2			1		1	1		5
senftenberg			4	2	6		12	2	6	20									
siegburg																			
simsbury		1			1														
stanley																2			2
tallahassee																			
tennessee		5	5		10	1	6	1	15	23				5				1	6
thomasville																			
thompson	3	4	3	1	11	6	24	9	20	59				1			3		4
typhi	15	11	1		27	32	3	13	45	93	3		1		29	6	1		40
typhi-murium	16	52	19	13	100	44	136	47	151	378	16	23		92	4	34	47	7	223
typhi-murium v cop						4	39	1		44	7	1				6			14
urbana																	1		1
virchow																			
weltevreden																			
worthington									1	1									
Untypable Group A				1	1														
Untypable Group B	1	2	2	10	15	5		1		6					110	2	4		116
Untypable Group C-1				3	3			1		1					33				33
Untypable Group C-2				3	3	2	1		1	4		1			15	3			19
Untypable Group D	5				5										10				10
Untypable Group E	2			1	3										10				10
Untypable Group G								1		1									
Untypable Group H													1						1
Untypable Group O																			
untypable																			
unknown			1	3	4		1	1		2	1		1		6		4		12
TOTAL	87	250	93	62	492	182	732	141	707	1,762	59	46	4	310	220	172	323	16	1,150

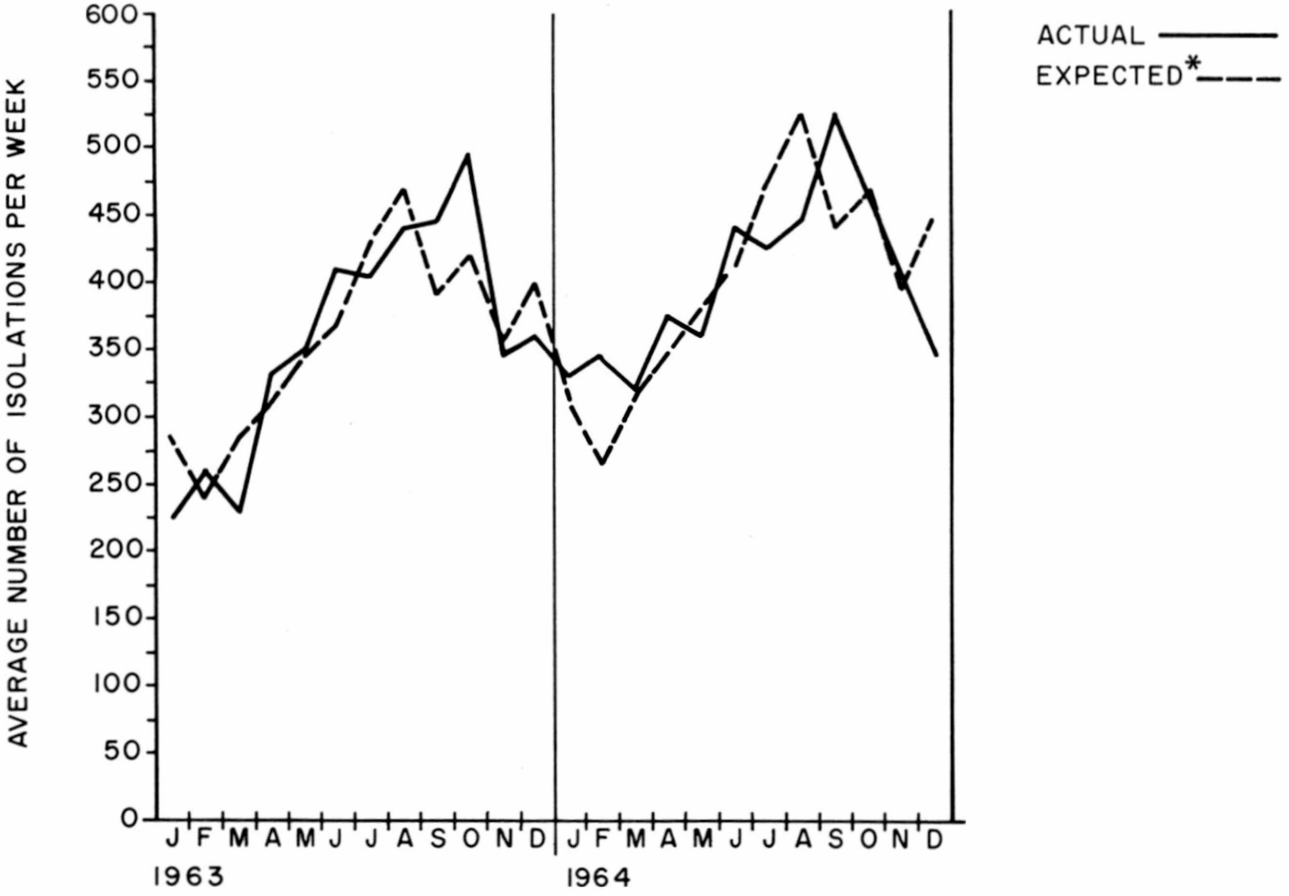
TABLE I (Continued)

REGION AND REPORTING CENTER													
PACIFIC						OTHER VI	1964 TOTAL	% OF 1964 TOTAL	1963 TOTAL	% OF 1963 TOTAL	NONHUMAN 1964 TOTAL	% OF NONHUMAN 1964 TOTAL	SEROTYPE
WASH	ORE	CAL	ALASKA	HAWAII	TOTAL								
		2			2		6				2		adelaide
		2			2		5		10		7		alachua
							6		3		5		albany
							10		39		3		amager
7		17	23	16	63		279	1.3	224	1.2	250	4.6	anatum
1		19		1	21		99		59		26		bareilly
		5		1	6		48		64		6		berta
							22		6		41		binza
1		50		4	55		427	2.0	360	1.9	114	2.1	blockley
		3		2	5		7		4				bovis-morbificans
							2						bradford
3		12		1	16		102		56		20		braenderup
							4		4		1		brandenburg
8		46		20	74		220	1.0	153		109	2.0	bredeney
		7		1	8		31		11		27		california
							3						carrau
		1		1	2		9		6		44		cerro
	7	3			10		75		190		181		chester
	1				1		15		20		32		cholerae-suis
							31		54		105	1.9	cholerae-suis v kun
							2						concord
1		3			4		63		40		32		cubana
6	6	105		47	164		2,360	11.2	1,610	8.6	213	3.9	derby
							4		3		1		duesseldorf
							2						eastborne
4	9	12			25		801	3.8	801	4.3	89		enteritidis
							6						essen
							8						florida
							3		3		1		gaminara
		7		11	18		79		65		38		give
				6	6		8		3		1		grumpensis
							11		16				hartford
41	25	302	7	27	402		1,717	8.1	1,533	8.2	483	8.8	heidelberg
							54		14		18		indiana
27	11	125	1	54	218		1,523	7.2	970	5.2	362	6.6	infantis
							5		78				irumu
7	1	36		3	47		231	1.1	175		5		java
		1			1		256	1.2	168		1		javiana
		1			1		2		2		5		johannesburg
		4		2	6		21		63		34		kentucky
	2	4			6		69		67		16		litchfield
		3		1	4		15		17		50		livingstone
	1	4			5		5		6				loma-linda
							3		2				manchester
3		31		70	104		181		192		47		manhattan
		2		25	27		48		82		47		meleagridis
							49		65		2		miami
		3			3		13		13		8		minnesota
							2		2				mission
		3			3		41		27				mississippi
6	4	26	4	14	54		524	2.5	490	2.6	215		montevideo
1		33	1		35		261	1.2	265	1.4	86		muenchen
1					1		7		5		2		muenster
		2			2		4		6		1		new-brunswick
2		3		1	6		71		47		39		newington
2	4	166		12	184		1,036	4.9	1,080	5.8	161	2.9	newport
							12		13				norwich
		3			3		4				12		ohio
4	5	46	6	5	66		550	2.6	539	2.9	149	2.7	oranienburg
							3		3		18		orion
		1		5	6		9		5		9		oslo
		6		34	40		189		141		27		panama
		4			4		7		8				paratyphi A
5	5	3			13		175		155		1		paratyphi B
							9		6		1		pensacola
		7			7		45		47		5		poona
5		7			12		36		46		12		reading
							3		5				richmond
							18		11		1		rubislaw
26	17	50		6	99		645	3.1	586	3.1	194	3.6	saint-paul
13	5	54		1	73		178		120		85		san-diego
2		26		9	37		155		147		106	1.9	schwarzengrund
		9		3	12		108		33		86		senftenberg
							2				5		siegburg
		3			3		6		6		9		simsbury
							9		13		8		stanley
							3		6		1		tallahassee
5	2	16		3	26		332		164		119		tennessee
							3		11		3		thomasville
13	2	22		3	40		421	2.0	321	1.7	133	2.4	thompson
6	22	123			151		703	3.3	706	3.8			typhi
195	70	617	4	89	975		5,656	26.8	5,435	29.1	942	17.2	typhi-murium
							206		173		153		typhi-murium v cop
1		5			6		25		31		10		urbana
1					1		4						virchow
				21	21		23		46				weltevreden
		3		10	13		48		34		61		worthington
		1			1		6		4				Untypable Group A
	6	8	3		17		276		280		9		Untypable Group B
	6		3		9		71		68		4		Untypable Group C-1
	1		1		2		40		43				Untypable Group C-2
	1				1		37		72				Untypable Group D
			14		14		30		15		1		Untypable Group E
							2						Untypable Group G
							1						Untypable Group H
		4			4		4		3		5		Untypable Group O
		1			1		2		15		3		untypable
4	1				5		94		73		4		unknown
401	214	2,062	67	509	3,253	-0-	*21,113		18,649		5,389		TOTAL

VI (Virgin Islands) *Includes 77 isolations of rare serotypes shown in Table VII

Figure 2.

REPORTED HUMAN ISOLATIONS OF SALMONELLAE IN THE UNITED STATES



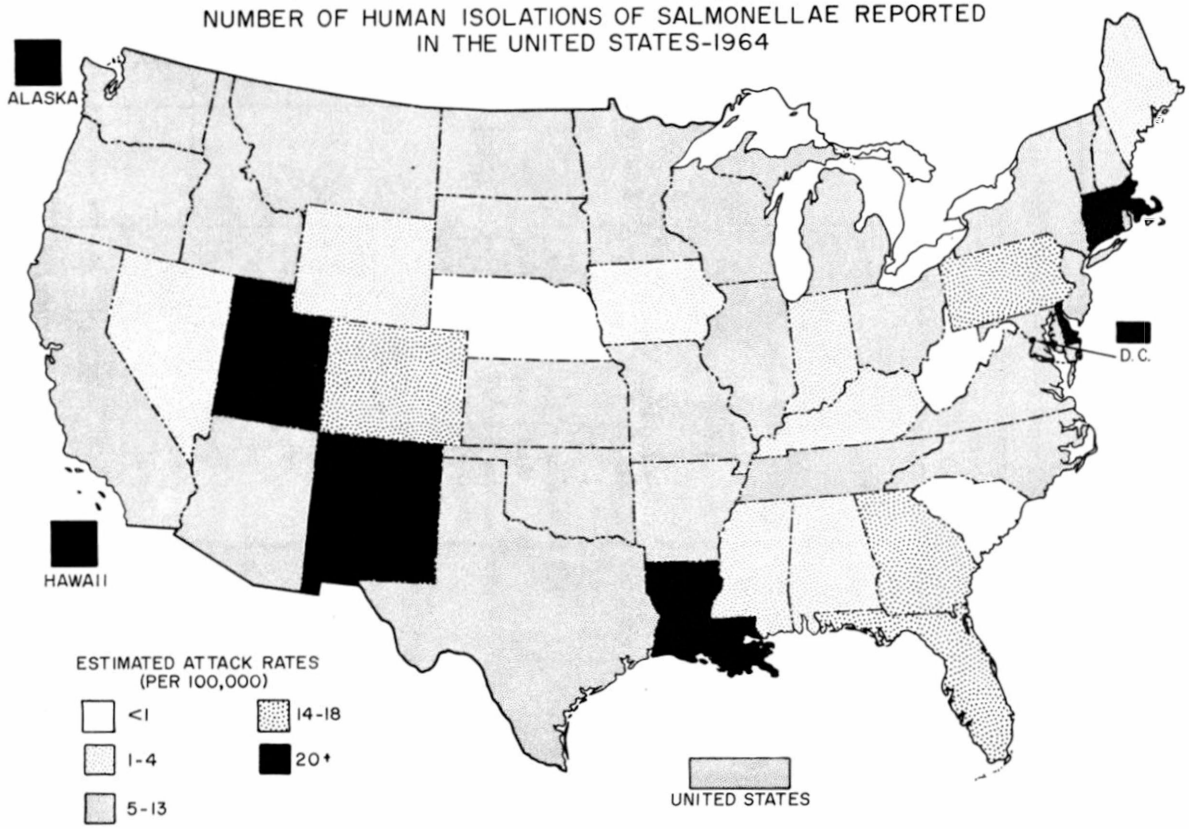
*Derived by application of a seasonal index for each month to the average months for 1963 and 1964. The index was computed from monthly reports of salmonellosis cases in the United States compiled by the Morbidity and Mortality Analysis Unit, C.D.C. 1951 - 1962 by the ratio to moving average method. See Frederick C. Mills, Statistical Methods, 3rd Ed. (New York: Henry Holt & Co., 1955), pp. 362-371.

Table II.—*The ten most common salmonella serotypes isolated from human and non-human specimens in the United States, 1964*

Rank	Human			Non-human			Associated with deaths (human)		
	Serotype	Number	Percent	Serotype	Number	Percent	Serotype	Number	Percent
1	*typhi-murium* & *typhi-murium* var. *copenhagen*	5,862	*27.8*	*typhi-murium* & *typhi-murium* var. *copenhagen*	1,095	*20.1*	*derby*	19	33.3
2	*derby*	2,360	*11.2*	*heidelberg*	483	*8.8*	*typhi-murium*	16	*28.1*
3	*heidelberg*	1,717	*8.1*	*infantis*	362	*6.6*	*enteritidis*	7	*12.3*
4	*infantis*	1,523	*7.2*	*anatum*	250	*4.6*	*infantis*, *muenchen* & *paratyphi* B	(2 ea.) 6	
5	*newport*	1,036	*4.9*	*montevideo*	215	*3.9*	*bredeney*, *cholerae-suis* var. *kunzendorf*, *grumpensis*, *heidelberg*, *montevideo*, *newport*, *typhi*, untypable (group C_1) untypable (group H)	(1 ea.) 9	
6	*enteritidis*	801	*3.8*	*derby*	213	*3.9*			
7	*typhi*	703	*3.3*	*pullorum*	203	*3.7*			
8	*saint-paul*	645	*3.1*	*saint-paul*	194	*3.6*			
9	*oranienburg*	550	*2.6*	*chester*	181	*3.3*			
10	*montevideo*	524	*2.5*	*newport*	161	*2.9*			
	Total	15,721	*74.5*	Total	3,357	*61.5*	Total	57	*100.0*
	Total (all serotypes)	21,113	.....	Total (all serotypes)	5,461	.....	Total (all serotypes)	57	.....

Figure 3.

ESTIMATED ATTACK RATES OF SALMONELLOSIS AND NUMBER OF HUMAN ISOLATIONS OF SALMONELLAE REPORTED IN THE UNITED STATES-1964



STATE	Number of Isolations		STATE	Number of Isolations	
Alabama	93	(−)	Montana	59	(+)
Alaska	67	(+)	Nebraska	10	(−)
Arizona	174	(+)	Nevada	16	(+)
Arkansas	182	(+)	New Hampshire	41	(+)
California	2,072	(−)	New Jersey	423	(+)
Colorado	313	(−)	New Mexico	220	(+)
Connecticut	572	(+)	New York	2,575	(+)
Delaware	103	(+)	North Carolina	318	(−)
Dist. of Col.	169	(+)	North Dakota	77	(+)
Florida	1,025	(+)	Ohio	739	(+)
Georgia	667	(+)	Oklahoma	144	(+)
Hawaii	516	(+)	Oregon	214	(+)
Idaho	47	(−)	Pennsylvania	1,797	(+)
Illinois	1,019	(+)	Rhode Island	80	(−)
Indiana	227	(+)	South Carolina	19	(+)
Iowa	89	(0)	South Dakota	39	(+)
Kansas	268	(−)	Tennessee	250	(+)
Kentucky	87	(+)	Texas	716	(+)
Louisiana	741	(−)	Utah	16	(+)
Maine	44	(−)	Vermont	30	(−)
Maryland	358	(+)	Virginia	400	(+)
Massachusetts	1,244	(+)	Washington	401	(−)
Michigan	982	(+)	West Virginia	16	(−)
Minnesota	256	(+)	Wisconsin	419	(+)
Mississippi	65	(+)	Wyoming	4	(0)
Missouri	256	(+)	TOTALS	21,113	(+13.2%)

(+) Increase over 1963 (−) Decrease from 1963 (0) No change from 1963

Table III.—*Percentage distribution of the ten most common salmonella serotypes from humans by region of the United States, 1964*

Serotype	Region*																Total
	New England		Middle Atlantic		East N. Central		West N. Central		South Atlantic		East S. Central		West S. Central		Mountain		Pacific		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
All salmonellae...	2,011	*9.5*	4,795	*22.7*	3,386	*16.0*	1,142	*5.4*	3,075	*14.6*	495	*2.3*	1,783	*8.4*	1,156	*5.5*	3,270	*15.5*	21,113
typhi-murium & *typhi-murium* var. *copenhagen*	589	*10.0*	1,191	*20.3*	1,056	*18.0*	458	*7.8*	834	*14.2*	100	*1.7*	422	*7.2*	237	*4.0*	975	*16.6*	5,862
derby.....	543	*23.0*	1,098	*46.5*	318	*13.5*	16	*0.7*	142	*6.0*	23	*1.0*	41	*1.7*	15	*0.6*	164	*6.9*	2,360
heidelberg	153	*8.9*	260	*15.1*	283	*16.5*	54	*3.2*	173	*10.1*	38	*2.2*	62	*3.6*	292	*17.0*	402	*23.4*	1,717
infantis.....	90	*5.9*	639	*41.9*	208	*13.7*	118	*7.7*	139	*9.1*	7	*0.5*	58	*3.8*	46	*3.0*	218	*14.3*	1,523
newport.....	55	*5.3*	98	*9.5*	104	*10.0*	38	*3.7*	229	*22.1*	51	*4.9*	219	*21.1*	58	*5.6*	184	*17.8*	1,036
enteritidis	135	*16.9*	276	*34.5*	194	*24.2*	50	*6.2*	73	*9.1*	7	*0.9*	24	*3.0*	17	*2.1*	25	*3.1*	801
typhi.....	24	*3.4*	61	*8.7*	94	*13.4*	44	*6.3*	169	*24.0*	27	*3.8*	93	*13.2*	40	*5.7*	151	*21.5*	703
saint-paul	38	*5.9*	222	*34.4*	87	*13.5*	35	*5.4*	104	*16.1*	16	*2.5*	22	*3.4*	22	*3.4*	99	*15.3*	645
oranienburg	31	*5.6*	84	*15.3*	82	*14.9*	67	*12.2*	118	*21.5*	14	*2.5*	65	*11.8*	23	*4.2*	66	*12.0*	550
montevideo.....	27	*5.2*	138	*26.3*	81	*15.5*	10	*1.9*	90	*17.2*	32	*6.1*	74	*14.1*	18	*3.4*	54	*10.3*	524

*See Table I.

Table IV.—*Salmonella serotypes responsible for two or more reported outbreaks of illness in the United States* [1]

Serotype	Number of outbreaks [2]			Approximate number ill	
	Family	General	Total	Total	Per outbreak
typhi-murium	5	6	11	600	55
derby	0	8	8	48	6
typhi	2	4	6	59	10
heidelberg	1	3	4	826	206
montevideo	0	3	3	166	55
newport	1	2	3	30	10
bareilly	0	2	2	19	10
bredeney	1	1	2	10	5
javiana	1	1	2	128	64
panama	2	0	2	18	9
tennessee	0	2	2	32	16
Total [3]	19	38	57	2,150	38

[1]Includes outbreaks reported in the Salmonella Surveillance Reports during 1964 only.
[2]Outbreaks: Family – involving members of only one household.
General– involving members of more than one household.
[3]Includes serotypes involved in only one outbreak.

Table V.—*Age and sex distribution of 20,528 individuals reported as harboring salmonellae in the United States, 1964*

Age (years)	Male	Female	Total	Percent	Cumulative Percent
Under 1	1,174	965	2,139	*15.7*	*15.7*
1–4	1,712	1,425	3,137	*23.1*	*38.8*
5–9	854	654	1,508	*11.1*	*49.9*
10–19	760	703	1,463	*10.7*	*60.6*
20–29	500	704	1,204	*8.9*	*69.5*
30–39	412	531	943	*6.9*	*76.4*
40–49	337	471	808	*6.0*	*82.4*
50–59	422	474	896	*6.6*	*89.0*
60–69	332	380	712	*5.2*	*94.2*
70–79	245	277	522	*3.8*	*98.0*
80+	110	156	266	*2.0*	*100.0*
Child (unspec.)	71	48	119		
Adult (unspec.)	124	233	357		
Unknown	3,290	3,164	6,454		
Total	10,343	10,185	20,528		
Total percents	50.4	49.6			

Figure 4

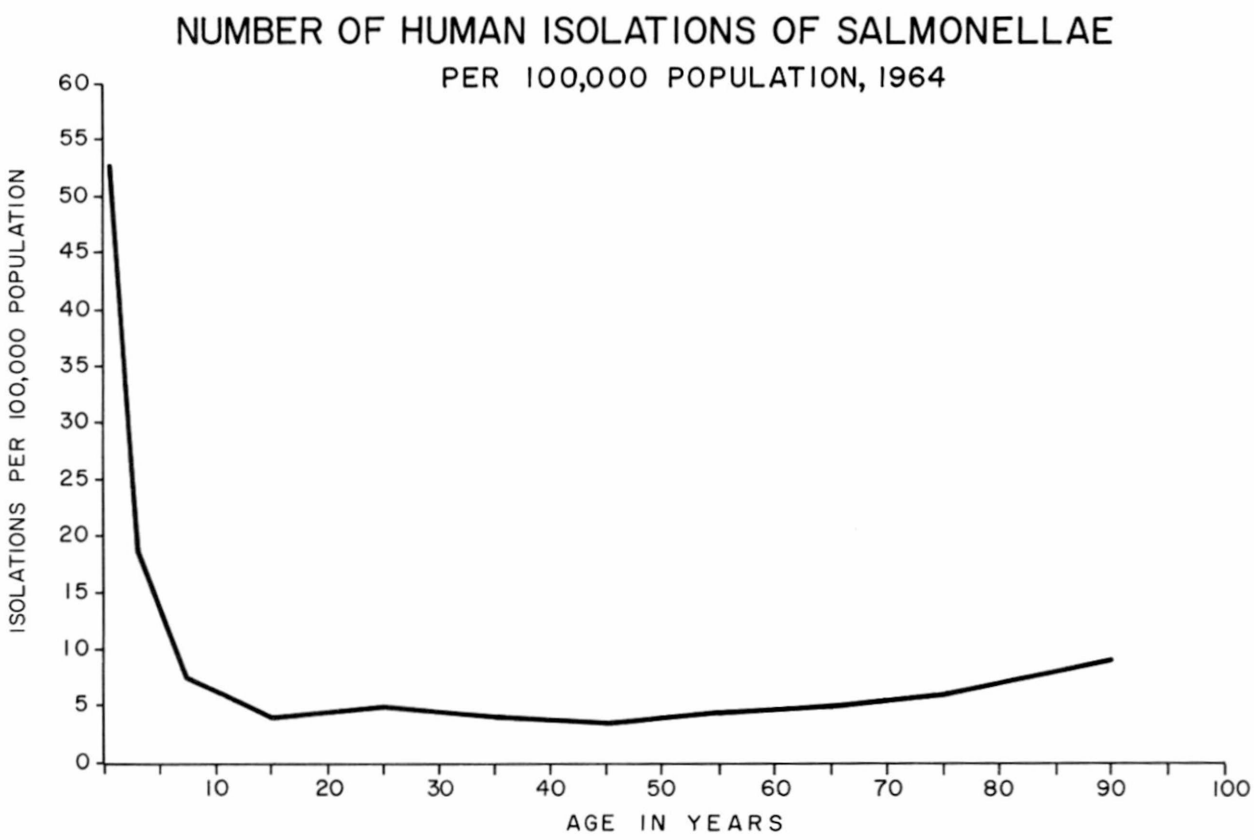


Table VI.—*The frequency of multiple isolations of salmonellae within families in the United States, 1964*

Serotype	Total no. of isolations	Isolations from individuals with one or more members of family also positive	
		Number	Percent
All salmonellae	21,113	4,523	*21.4*
typhi-murium & *typhi-murium* var. *copenhagen*	5,862	1,524	*26.0*
derby	2,360	179	*7.6*
heidelberg	1,717	492	*28.7*
infantis	1,523	349	*22.9*
newport	1,036	215	*20.8*
enteritidis	801	156	*19.5*
typhi	698	110	*15.8*
saint-paul	645	157	*24.3*
oranienburg	550	149	*27.1*
montevideo	523	106	*20.3*

Table VII.—*Rare salmonella serotypes recovered from humans in the United States, 1964**

Serotype	1964			Total 1963**	Comment
	Center	Month	Number		
S. aberdeen	NY-BI	September	1	0	Previous human isolates in CALIF & FLA.
S. abony	NY-C	January	1	1	1963 isolate also from NY; one previous human isolate in GA; isolated from water in COLO.
S. amsterdam	COLO	April	1	0	First isolated from human feces in the Netherlands; this represents first isolate reported to this unit.
S. ardwick	ILL	April	1	0	Very rarely reported anywhere in the world.
S. arechavaleta	OKLA	June	1	0	Three non-human isolates in 1963 associated with swine.
S. atlanta	GA	April,May,June,July	5	11	All 1963 isolates also from GA.
S. birkenhead	HAI	August	1	0	Has been reported previously from HAI from humans and wild rats.
S. blegdam	SD	December	1	0	A wild opossum was possibly the vehicle of infection; caused serious and sometimes fatal disease in Australian soldiers in New Guinea.
S. bonariensis	KANS	September	1	1	1963 human isolate in FLA; non-human isolate from laboratory rat in TEX.
S. brancaster	IND	July	1	0	Originally isolated from shellfish (Mussels).
S. bristol	TEX	August	1	0	Uncommonly reported.
S. cambridge	ILL	January	1	2	A non-human isolate in 1964 from a turkey in IND.
S. caracas	TEX	September	1	0	A non-human isolate in 1964 from a wild bird in ME.
S. colorado	HAI	January, June	2	3	Reported from HAI and FLA in 1963.
S. coquilhatville	HAI	November	3	0	Represents a family incident for which the source could not be ascertained; first isolated from human cases of enteritis in the Belgian Congo.
S. decatur	OKLA	August	2	3	Has been reported from GA and OKLA only.
S. denver	CALIF	April	1	0	First isolated from irrigation water in COLO; single isolates have been reported from most sections of the country.
S. dublin	CALIF	September,October November	3	2	Includes one fatal case with raw milk as vehicle of infection.
S. emek	CALIF	July	1	0	Second most common serotype in Israel in 1962.
S. fayed	VA	November,December	3	3	Two of the 1963 isolates from VA also; the third isolate was from FLA.
S. galiema	COLO	April	1	0	Isolated in Central Africa from a human.
S. gallinarum	MISS	July,September	3	0	All 1963-64 non-human isolates from fowl.
S. gatuni	FLA	January	1	1	1963 isolate from MINN; first isolated in the Panama Canal Zone in 1945.
S. georgia	KANS	October	1	2	1963 isolates from ARK and NY.
S. goettingen	NC	July	1	0	Has been reported as a cause of false positive reactors in pullorum testing of hens in Argentina.
S. halle	MASS	June	1	0	Recovered from an infant in a hospital; first time reported to this unit.
S. halmstad	MICH	April	1	0	First isolated from imported meat flour in Sweden.

Table VII.—*Rare salmonella serotypes recovered from humans in the United States, 1964**—Continued

Serotype	1964			Total 1963**	Comment
	Center	Month	Number		
S. hato	COLO	March	1	0	Previously reported from NC.
S. illinois	NC	December	1	7	All of 1963 human isolates from GA, reported from feed and animal by-products in 1963-64.
S. kottbus	NY-A	June	1	4	Isolated in MASS in 1963.
S. lexington	TEX	August	1	2	Non-human sources include chickens, turkeys, swine and feed.
S. lomita	LA	September	4	0	First isolated from a normal hen and a normal cat in TEX.
S. london	VA	February, June	3	1	Non-human isolates reported in this country are chickens, turkeys, and whole eggs.
S. luciana	ARIZ	January	1	0	Disease in mother and child traced to a carrier nurse in FLA during 1962.
S. madelia	WISC	February	1	1	Also isolated from a migrating bird involved in a "die-off" in FLA during 1964.
S. manila	NC	November	1	0	Isolated from a urinary tract infection in an elderly man.
S. michigan	CALIF	April, June	2	0	First isolated from a young alligator at necropsy in Detroit.
S. mishmar-haemek	CALIF	December	1	0	First isolated in Israel; vehicle of infection for this patient not determined.
S. new-haw	IDA	May	1	1	Reported from a chicken in MISS during 1964.
S. othmarschen	TEX	January	1	0	First time reported in the United States; uncommon world-wide.
S. pullorum	GA	March	1	1	A non-motile serotype; host-adapted to poultry.
S. redlands	GA	March	1	0	Cause of mild illness in child, who may have contracted infection (source undetermined) in TENN.
S. salinatis	CALIF	September	1	0	First isolated from rat feces in CALIF; majority of reported isolates are from CALIF.
S. saphra	TEX	September	1	5	1963 isolates from FLA, LA, TEX, and were all children under 5 years who were hospitalized.
S. shipley	NY-C	January	1	0	First time reported in the United States; has been isolated in Johannesburg, S. Africa.
S. sundsvall	ARIZ	February	1	2	1963 isolates from CALIF and TEX; has been reported from a dog in MICH.
S. taksony	CALIF	December	1	0	Has been isolated from turkeys in CALIF, MINN, and OREG.
S. travis	TEX	October, December	2	0	Originally isolated in TEX.
S. uganda	LA	September, October, November	5	0	Isolated in 1964 from turtles in KANS; caused small outbreak in KANS in 1960.
S. weslaco	TEX	July	1	1	First isolated from a cat in TEX.
S. westerstede	TEX	September	1	1	1963 isolate also from TEX.
S. westhampton	HAI	March	1	1	1963 isolate from FLA; has been isolated from meat scraps, bone meal, frozen eggs and poultry feed during 1964.

*Serotypes reported from only one center. Total (1964) 21,113 salmonellae isolations.
**Represents 18,649 isolations of salmonellae from humans during 1963.

TABLE VIII

SALMONELLA SEROTYPES ISOLATED FROM NONHUMAN SPECIMENS IN THE UNITED STATES DURING 1964 BY SOURCE

SEROTYPE	FOWL										ANIMALS																			
	DOMESTIC					WILD					FARM						PET			LABORATORY						WILD				
	chicken	turkey	pigeon	other, unknown & environment	Total	pheasant	quail	other & unknown	Total	unknown	Total Fowl	bovine	porcine	equine	ovine	other & environment	Total	dog	cat	Total	monkey	rat	mouse	guinea pig	other & unknown	Total	zoo	fur bearing	other	Total	unknown	Total Animals
adelaide																															
alachua		4			4						4	1					1	1		1											2
albany	3	2			5						5																				
amager	3				3						3																				
anatum	21	110	1		132			1	1		133	11	60	6			77	1	1	2	5	1			1	7	4		4	8		94
bareilly	4	3		2	9						9	1					1														1
belem																		1		1											1
berta	2	4			6						6																				
binza	8	11			19						19							4	5	9											9
blockley	47	34		1	82						82	1		1	1		3		1	1											4
blukwa																															
braenderup	7	3			10						10											3				3					3
brandenburg																															
bredeney	12	30			42	1			1	1	44	1	5				6														6
california	12	10			22						22																				
cambridge		1			1						1																				
caracas										1	1																				
cerro	4			5	9						9							3		3											
chester	10	155	1		166						166	2	2		1		5		1	1		2		1	1	4	1	1	1	3		13
cholerae-suis													30				30					1				1					31
cholerae-suis v kun	1	1			2						2	3	97	1			101	1		1										1	103
cubana	1	5		1	7		1		1		8	1					2	1	1	2		1				1					5
derby	6	38		1	45	1		1	2		47	2	135				137	2	1	3							2		2		142
dublin												44					44														44
duesseldorf																															
enteritidis	43	4			47	1			1		48	6	8				14	1		1	3		8	4	2	17		1		1		33
gallinarum	62	2		1	65	1			1	1	67																				
gaminara														1			1														1
give	9	21			30		1		1		31	2					2	1		1								1	1		4
grumpensis																															
hagenbeck																															
heidelberg	168	200	1	2	371					2	373	5	7	2			14	3		3	1				1	2		1	1		20
illinois																															
indiana	7	10			17						17																				
infantis	168	41		3	212	1			1	1	214	4	9	3		1	17	3	1	4			2		1	3					24
inverness																		1		1											1
java		1			1						1	1					1														1
javiana													1				1														1
johannesburg	1	1			2						2							1		1											1
kentucky	5	13		1	19		1		1		20			2			2														2
lille																															
litchfield	2	3			5						5		1		2		3														3
livingstone	9	10		1	20						20	1	10				11	1	1	2		2				2					15
madelia								1	1		1		1				1														1
manhattan	3	38			41						41	1		1			2											1	1		3
manila				2	2						2																				
meleagridis	20	10		1	31						31		1	2	1		4														4
miami																					1					1	1		1		2
minneapolis																															
minnesota	2	5			7						7																				
montevideo	119	9	2		130						130	2			2		4	1		1											5
muenchen	10	17			27	1			1		28	1	1				2	1		1				1		1					4
muenster	1	1			2						2																				
new-brunswick																						1				1					1
new-haw	1				1						1																				
newington	9	13		1	23		1		1		24		1				1	1		1							2		3	5		7
newport	10	38			48						48	46	3	3	4	1	57	1	3	4					1	1	3			3		65
ohio																															
oranienburg	2	11		3	16						16	1	4		1		6	3		3		4	1			5					14
orion		12			12		1		1		13																				
oslo																															
panama	1	17			18					2	20	1	1				2	2		2											4
paratyphi-B																															
pensacola													1				1														1
pomona																											2		2		2
poona		1			1						1																1		1		1
pullorum	187	1		3	191					1	192																				
reading	1	8			9						9			1			1														1
rubislaw													1				1														1
saint-paul	39	108		2	149		1		1		150	3	4	3	1		11	3		3			1			1		1		1		16
san-diego	2	70			72						72				1		1														1
schwarzengrund	20	57		1	78						78	2	4	1			7	3		3											10
senftenberg	14	20		3	37		1		1	3	41							2		2		2				2					4
siegburg																		1		1	1					1					2
simsbury	3	4			7		1		1		8																				
stanley		1			1						1										7					7					7
taksony		1			1						1																				
tallahassee												1					1														1
tennessee	12	25			37					1	38	2	1				3	1		1		4				4					8
thomasville	2				2						2																				
thompson	69	10		6	85					1	86	1	1				2				1			1	1	3					5
typhi-murium	164	191	22	25	402	4	2	14	20	7	429	314	28	44	11	4	401	12	5	17	10	1	5	7	3	26	7	5	3	15	3	462
typhi-murium v cop	76	30	17	2	125			1	1		126	7	10		1		18	1	1	2			1	2		3		2	2	4		27
typhi-suis													6				6														6
uganda																															
urbana																															
wandsbek																															
wassenaar																															
westhampton																															
worthington	20	19			39						39		4				4	4		4	1					1					9
zehlendorf								1	1		1																				
Untypable Group B	3	1			4						4	2		1			3	1		1											4
Untypable Group C-1																															
Untypable Group E																															
Untypable Group I																															
Untypable Group L																															
Untypable Group O	2	3			5						5																				
untypable																															
unknown																		1		1											1
TOTAL	1407	1438	44	67	2956	10	10	19	39	21	3016	470	437	72	26	7	1012	63	21	84	30	22	18	16	11	97	23	13	13	49	4	1,246

TABLE VIII (Continued)

BY SOURCE DURING 1964

HUMAN FOOD										ANIMAL FEED					Cold Blooded Vertibrates							Nonhuman Total	Percent of Total	1963 Total	Percent of 1963 Total	1964 Human Total	Percent of 1964 Human Total	SEROTYPE
whole egg	frozen egg	powdered egg	other egg products	poultry meat products	red meat products	commercially prepared food	other food	food unknown	Total	Bone meal/ meat scraps	tankage	animal protein	other & unknown	Total	turtle	snake	other	Total	water	other	unknown							
												1		1			2	2				2				6		adelaide
																						7		5		5		alachua
																						5		3		6		albany
																						3		9		10		amager
2	1	4	1	1					9	3	3	2	5	13					1			250	4.6	270	5.0	279	1.3	anatum
4	7								11	1				1					4			26		23		99		bareilly
																						1						belem
																						6		7		48		berta
										2	2	3	5	12							1	41		27		22		binza
2			3						5		1			1	16		2	18			4	114	2.1	125	2.3	427	2.0	blockley
																	1	1				1						blukwa
															6			6	1			20		6		102		braenderup
																			1			1				4		brandenburg
1							1		2	2	1		1	4	31			31	21		1	109	2.0	116	2.2	220	1.0	bredeney
										2			3	5								27		22		31		california
																						1						cambridge
																						1						caracas
14			9				1		24	1	3	1	2	7						1		44		25		9		cerro
										1				1					1			181		96		75		chester
										1				1								32				15		cholerae-suis
	1						1		2	3	4	6	3	16					1			105	1.9	139	2.6	31		cholerae-suis v kun
																						32		28		63		cubana
1			1						2	2	3	1	6	12	8	1		9		1		213	2.9	114	2.1	2,360	11.2	derby
																						44		45				dublin
											1			1								1				4		duesseldorf
		1	3						4				2	2		2		2				89		70		801	3.8	enteritidis
																						67		55				gallinarum
																						1		2		3		gaminara
											1		1	2							1	38		48		79		give
													1	1								1		4		8		grumpensis
																	1	1				1						hagenbeck
	58	2	3	4			1		68				6	6	13			13	1		2	483	8.8	365	6.8	1,717	8.1	heidelberg
										4	3		3	10								10		2				illinois
											1			1								18		27		54		indiana
27	32	3	3	6	10	12	1	3	97	2	2		2	6					1	1	19	362	6.6	347	6.4	1,523	7.2	infantis
																	1	1				2		2				inverness
															2			2	1			5		3		231	1.1	java
																						1		5		256	1.2	javiana
	1								1		1			1								5		4		2		johannesburg
3	2								5	3	1		2	6					1			34		29		21		kentucky
											1		1	2								2						lille
	1								1	6	3	1	3	13	6		1	7			1	16		22		69		litchfield
																					1	50		45		15		livingstone
																						2		4				madelia
1									1												2	47		32		181		manhattan
	2		6						8			1	1	2							2	47		18		48		manila
																						2		15		49		meleagridis
										1		1		2								2						miami
											1			1								8		9		13		minneapolis
																												minnesota
31	18	5	5	1		2	2		64	1	5		8	14			1	1		1		215	3.9	253	4.7	524	2.5	montevideo
13		1	1			36		1	52	1				1					1			86		74		261	1.2	muenchen
																						2		1		7		muenster
																						1		9		4		new-brunswick
																						1						new-haw
		1							1	2	1		4	7								39		64		71		newington
				1		1	2		4						9			9	35			161	2.9	203	3.8	1,036	4.9	newport
10									10		1		1	2								12		2		4		ohio
34	12	14	10			1		3	74	10	1	2	2	15	2	2	2	6	20	1	3	149	2.7	99		550	2.6	oranienburg
										4			1	5								18		11		3		orion
																			9			9				9		oslo
															2			2	1			27		12		189		panama
																			1			1		4		175		paratyphi-B
																						1				9		pensacola
																	1	1				3		1				ponona
																2		2	1			5		7		45		poona
2	1	1					1		5				1	1							5	203	3.7	195	3.6			pullorum
			2						2													12		46		36		reading
																						1		8		18		rubislaw
	21		1						22				1	1		1	1	2	3			194	3.6	206	3.8	645	3.1	saint-paul
2	7		1				2		12													85		69		178		san-diego
	1		1				1	1	4	3			2	3	8	2		2		1	3	106	1.9	191	3.5	155		schwarzengrund
1								1	2	5	13		5	5	28		1	1		5	5	86		39		108		senftenberg
2									2				1	1								5				2		siegburg
							1		1													9		6		6		simsbury
																						8		5		9		stanley
																						1						taksony
																						1				3		tallahassee
22	1	21	3	1		12	2		62	4	2			6					2	1	2	119		88		332		tennessee
	1								1													3		5		3		thomasville
14	19	1	4	1			1		40		1			1						1		133	2.4	90		421	2.0	thompson
9	3						14	1	27	1			6	7	1			1	11	1	4	942	17.2	1,065	19.8	5,656	26.8	typhi-murium
																						153		260	4.8	206		typhi-murium v cop
																						6		4				typhi-suis
																			1			1						uganda
			2						2			1		1	6			6	1			10		3		25		urbana
																	1	1				1						wandsbek
																			1			1						wassenaar
										1			1	2								2						westhampton
2	2	1	1						6	3	1	1		5						2		61		98		48		worthington
																						1						zehlendorf
				1			1		1							2		2				9				276		Untypable Group B
							1		2				1	1								4				71		Untypable Group C-1
																	1	1				1				30		Untypable Group E
																						1						Untypable Group I
												1		1								1						Untypable Group L
																					3	5				4		Untypable Group O
																						3		98		2		untypable
																						1		4		94		unknown
197	191	55	60	16	10	68	31	8	636	69	57	29	82	237	104	12	14	130	121	16	59	5,461		5,389		21,113		Total

TABLE IX

SALMONELLA SEROTYPES ISOLATED FROM NONHUMAN SPECIMENS DURING 1964

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
adelaide																	2		2
alachua				2			2									1			1
albany																			
amager																			
anatum				3			3	1	2		2	1	6	5	16	13	6	4	44
bareilly				1			1				5		5	3	1				4
balem																	1		1
berta																			
binza				1			1				5		5		4	7	3		14
blockley				2		1	3							2	3	1		8	14
blukwa																	1		1
braenderup				2			2					1	1						
brandenburg																			
bredeney											1		1	1	6	1			8
california				1			1								4	1	3		8
cambridge															1				1
caracas	1						1												
cerro											1		1	21	3	5			29
chester															21	1	1	70	93
cholerae-suis														9	10				19
cholerae-suis v kun				1			1							6	22			1	29
cubana	1			3			4							2	3	8	1		14
derby				9			9					5	5	1	5	6	2	5	19
dublin																			
duesseldorf															1				1
enteritidis				1			1		2			1	3	3	36	5	2	4	50
gallinarum											6	5	11				1		1
gaminara															1				1
give														1	2			1	4
grumpensis																	1		1
hagenbeck																			
heidelberg				11		8	19		2		1	1	4	1	6	5		6	18
illinois															2				2
indiana															8	6			14
infantis				2			2		3			1	4	23	78	11	1	3	116
inverness																	1		1
java																			
javiana																			
johannesburg															1				1
kentucky				1			1				1		1	1				1	2
lille											1		1		1				1
litchfield	1						1												
livingstone														2	3	2	1		8
madelia																			
manhattan				1			1									1			1
manilla																			
meleagridis											15		15		2	1	1	7	11
miami																	1		1
minneapolis																2			2
minnesota														1					1
montevideo				6			6		1				1	39	5	6	2		52
muenchen		1					1							18	4	1			23
muenster																			
new-brunswick																			
new-haw																			
newington				10			10					1	1	1	2		5		8
newport				1			1					1	1	1	4		16	3	24
ohio														12					12
oranienburg								1	1		3	1	6	36	15	15	6	1	73
orion																	1	1	2
oslo																			
panama											1		1	4		3		1	8
paratyphi B												1	1						
pensacola																			
pomona																	3		3
poona																	2		2
pullorum		1	1	1			3				3	5	8	5	26		3	8	42
reading															1	2			3
rubislaw																			
saint-paul									1		9		10	1	13		3	37	54
san-diego														5	3	2	1	1	12
schwarzengrund															15	2	4	1	22
senftenberg	1						1				6		6	2	3	13	1	10	29
siegburg											1		1			3			3
simsbury																			
stanley											1		1				3		3
taksony																			
tallahassee																			
tennessee									2			1	3	20	25	14		4	63
thomasville																			
thompson				1			1					6	6	20	18	4		5	47
typhi-murium				14		6	20	1	3		2	10	16	23	91	9	59	44	226
typhi-murium v cop				2			2				2	7	9	1	36		4	8	49
typhi-suis				4			4											1	1
uganda																			
urbana														2		1			3
wandsbek																	1		1
wassenaar																			
westhampton																			
worthington														3	8	4	1	8	24
zehlendorf																	1		1
Untypable Group B						1	1												
Untypable Group C-1																	2		2
Untypable Group E														1					1
Untypable Group I																	1		1
Untypable Group L																1			1
Untypable Group O																			
untypable																			
unknown																			
TOTAL	4	2	1	80	-0-	16	103	3	17	-0-	66	48	134	276	509	157	148	242	1,333

New York (A-albany, BI-beth israel, C-city)

TABLE IX (Continued)
BY SEROTYPE AND REPORTING CENTER

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
																		adelaide
1							1											alachua
									3								3	albany
															1	1	2	amager
5	2	4				1	12		55		11		1	4	1	1	73	anatum
1		2				4	7								1		1	bareilly
																		belem
		1					1						2		2		4	berta
2		2					4		1								1	binza
2	1	5				18	26				2		1	3	3	1	10	blockley
																		blukwa
		3				5	8				3		3				6	braenderup
													1				1	brandenburg
12		1				51	64								2		2	bredeney
7							7						1		3	1	5	california
																		cambridge
																		caracas
1	1	2					4											cerro
45	1	9					55				2		2	1			5	chester
													1	2		5	8	cholerae-suis
1	2	3				1	7		1		8		13	27	1	2	52	cholerae-suis v kun
2		1					3				1		1				2	cubana
15					1	10	26		121					1		1	123	derby
																		dublin
																		duesseldorf
14		2					16		1		6				3		10	enteritidis
4	1						5	3					10	5	15		33	gallinarum
																		gaminara
1		1					2				4		2	5	1	1	13	give
																		grumpensis
																		hagenbeck
50		1				14	65			9	12		2	6	78	8	115	heidelbert
5	3						8											illinois
2		1					3						1				1	indiana
9	1	5				14	29		2		2		2	4	9	2	21	infantis
																1	1	inverness
1							1									1	1	java
																		javiana
		2					2											johannesburg
6	1	1					8		4				3			2	9	kentucky
																		lille
1				1		6	8							1			1	litchfield
3	3						6		6		3			1	2	1	13	livingstone
																2	2	madelia
1		1					2									1	1	manhattan
		2					2											manila
1						2	3							6			6	meleagridis
																1	1	miami
																		minneapolis
																		minnesota
3		1					4	2	5		2		9	16	40	4	78	montevideo
7		1				33	41						1	2	1	1	5	muenchen
1							1											muenster
											1						1	new-brunswick
																		new-haw
2		1					3		3						2	2	7	newington
21		1		1		38	61				1				2		3	newport
																		ohio
9	4	3				25	41				4						4	oranienburg
5							5											orion
						9	9											oslo
		1					1											panama
																		paratyphi B
														1			1	pensacola
																		pomona
						1	1											poona
4	5	9				1	19	1	2		24	1	30	7	8		73	pullorum
	4						4				1						1	reading
																		rubislaw
34	2	2				3	41		8		3	1	1	3	14		30	saint-paul
12		1			1		14								2		2	san-diego
13	2	6					23		1					1	3		5	schwarzengrund
16	2	3			3		24				4	2		5	2		13	senftenberg
																		siegburg
														2		1	3	simsbury
															1		1	stanley
																		taksony
																1	1	tallahassee
9	1	2				9	21							4	6		10	tennessee
															2		2	thomasville
2		13					15						1		4	1	6	thompson
89	10	28		2		23	152	1	6		27	1	10	4	18	15	82	typhi-murium
8	5	9					22		14				2	7	21	1	45	typhi-murium v cop
																		typhi-suis
						1	1											uganda
						6	6						1				1	urbana
																		wandsbek
						1	1											wassenaar
1							1											westhampton
10	1						11					1		2	3		6	worthington
																		zehlendorf
																		Untypable Group B
																		Untypable Group C-1
																		Untypable Group E
																		Untypable Group I
																		Untypable Group L
																		Untypable Group O
																		untypable
																1	1	unknown
438	52	130	-0-	4	7	276	907	7	233	9	121	6	101	120	251	59	907	TOTAL

TABLE IX (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
adelaide																			
alachua																			
albany	1				1				1	1									
amager						1				1									
anatum	6	1	1	1	9	2			38	40				2		1			3
bareilly			1		1												3		3
belem																			
berta																			
binza				5	5														
blockley			3	16	19	9		1	10	20	1								1
blukwa																			
braenderup				1	1	1				1									
brandenburg																			
bredeney			1		1		1		6	7				1		3	2		6
california				2	2	2			1	3									
cambridge																			
caracas																			
cerro			1	5	6	1				1									
chester	23				23												2		2
cholerae-suis		1			1				2	2				1					1
cholerae-suis v kun	3	7	4		14		1			1									
cubana									1	1							1		1
derby	2	1	1		4			4	6	10							1		1
dublin																	19		19
duesseldorf																			
enteritidis						1				1				1			5		6
gallinarum			2	3	5	8	2			10	1								1
gaminara																			
give			1	2	3				1	1							1		1
grumpensis																			
hagenbeck																			
heidelberg			11	4	15	9			13	22							60		60
illinois																			
indiana																			
infantis	1	2	9	2	14	9			3	12	2					1	45		48
inverness																			
java							2			2									
javiana							1			1									
johannesburg																	1		1
kentucky				2	2				1	1							2		2
lille																			
litchfield			1		1									2					2
livingstone	3			6	9	1				1							1		1
madelia																			
manhattan																			
manila																			
meleagridis				4	4				3	3							2		2
miami																			
minneapolis																			
minnesota			1	1	2				1	1									
montevideo		1	11	10	22	9				9							18		18
muenchen			1	2	3				11	11				1					1
muenster				1	1														
new-brunswick																			
new-haw				1	1														
newington	1	1	1	3	6														
newport	1	1	4	3	9	1			10	11			2	2		9			13
ohio																			
oranienburg				1	1	2			9	11							11		11
orion				1	1												2		2
oslo																			
panama									15	15									
paratyphi B																			
pensacola																			
pomona																			
poona																			
pullorum	1	1	7	13	22	17	2	1	3	23	4								4
reading																			
rubislaw			1		1														
saint-paul			2	1	3	2			4	6				1			24		25
san-diego			1		1				27	27				1			7		8
schwarzengrund		1	7	2	10	1	1	7		9						1	1		2
seftenberg	1			3	4												1		1
siegburg																			
simsbury		1			1														
stanley							1			1									
taksony																			
tallahassee																			
tennessee	6	3	1		10	2			1	3				1					1
thomasville																	1		1
thompson	2		1	4	7	12	1		5	18							19		19
typhi-murium	9	8	13	7	37	30	5	2	25	62	5	1	9	26		8	14		63
typhi-murium v cop		1	2	5	8	7			6	13						3	1		4
typhi-suis																			
uganda																			
urbana																			
wandsbek																			
wassenaar																			
westhampton																			
worthington				3	3	2				2							2		2
zehlendorf																			
Untypable Group B	1				1	1				1									
Untypable Group C-1						2				2									
Untypable Group E																			
Untypable Group I																			
Untypable Group L																			
Untypable Group O																			
untypable																			
unknown																			
TOTAL	61	30	89	114	294	132	17	15	203	367	13	1	11	39	-0-	26	246	-0-	336

TABLE IX (Continued)

REGION AND REPORTING CENTER													
PACIFIC						OTHER VI	TOTAL	PERCENT OF TOTAL	1963 TOTAL	% OF 1963 TOTAL	1964 HUMAN TOTAL	% OF 1964 HUMAN TOTAL	SEROTYPE
WASH	ORE	CAL	ALASKA	HAWAII	TOTAL								
							2				6		adelaide
		2	1		3		7		5		5		alachua
							5		3		6		albany
							3		9		10		amager
3	1	56			60		250	4.6	270	5.0	279	1.3	anatum
		4			4		26		23		99		bareilly
							1						belem
		1			1		6		7		48		berta
		11			11		41		27		22		binza
4		17			21		114	2.1	125	2.3	427	2.0	blockley
							1						blukwa
		1			1		20		6		102		braenderup
							1				4		brandenburg
1	2	17			20		109	2.0	116	2.2	220	1.0	bredeney
		1			1		27		22		31		california
							1						cambridge
							1						caracas
			3		3		44		25		9		cerro
		3			3		181		96		75		chester
		1			1		32				15		cholerae-suis
		1			1		105	1.9	139	2.6	31		cholerae-suis v kunzendorf
		6	1		7		32		28		63		cubana
1		15			16		213	3.9	114	2.1	2,360	11.2	derby
		25			25		44		45				dublin
							1				4		duesseldorf
1		1			2		89		70		801	3.8	enteritidis
1					1		67		55				gallinarum
							1		2		3		gaminara
		13	1		14		38		48		79		give
							1		4		8		grumpensis
		1			1		1						hagenbeck
12	6	147			165		483	8.8	365	6.8	1,717	8.1	heidelberg
							10		2				illinois
							18		27		54		indiana
6	6	103	1		116		362	6.6	347	6.4	1,523	7.2	infantis
							2		2				inverness
		1			1		5		3		231	1.1	java
							1		5		256	1.2	javiana
			1		1		5		4		2		johannesburg
		8			8		34		29		21		kentucky
							2						lille
		3			3		16		22		69		litchfield
	1	11			12		50		45		15		livingstone
							4		4				madelia
	1	41			42		47		32		181		manhattan
							2		1				manila
		3			3		47		18		48		meleagridis
							2		15		49		miami
							2						minneapolis
		4			4		8		9		13		minnesota
4		21			25		215	3.9	253	4.7	524	2.5	montevideo
		1			1		86		74		261	1.2	muenchen
							2		1		7		muenster
							1		9		4		new-brunswick
							1						new-haw
		4			4		39		64		71		newington
	1	37			38		161	2.9	203	3.8	1,036	4.9	newport
							12		2		4		ohio
		1	1		2		149	2.7	99		550	2.6	oranienburg
		8			8		18		11		3		orion
							9				9		oslo
		2			2		27		12		189		panama
							1		4		175		paratyphi B
							1				9		pensacola
							3		1				pomona
		2			2		5		7		45		poona
3	1	5			9		203	3.7	195	3.6			pullorum
4					4		12		46		36		reading
							1		8		18		rubislaw
1	4	20			25		194	3.6	206	3.8	645	3.1	saint-paul
	3	18			21		85		69		178		san-diego
		34	1		35		106	1.9	191	3.5	155		schwarzengrund
		6	2		8		86		39		108		senftenberg
			1		1		5				2		siegburg
		5			5		9		6		6		simsbury
		2			2		8		5		9		stanley
		1			1		1						taksony
							1				3		tallahassee
		8			8		119		88		332		tennessee
							3		5		3		thomasville
1	1	12			14		133	2.4	90		421	2.0	thompson
14	27	243			284		942	17.2	1,065	19.8	5,656	26.8	typhi-murium
1					1		153		260	4.8	206		typhi-murium v copenhagen
		1			1		6		4				typhi-suis
							1						uganda
							10		3		25		urbana
							1						wandsbek
							1						wassenaar
1					1		2						westhampton
		9	4		13		61		98		48		worthington
							1						zehlendorf
	1	5			6		9				276		Untypable Group B
							4				71		Untypable Group C-1
							1				30		Untypable Group E
							1						Untypable Group I
							1						Untypable Group L
		5			5		5				4		Untypable Group O
		3			3		3		98		2		untypable
							1		4		94		unknown
58	55	950	17	-0-	1,080		5,461		5,389		21,113		TOTAL

(VI - Virgin Islands)

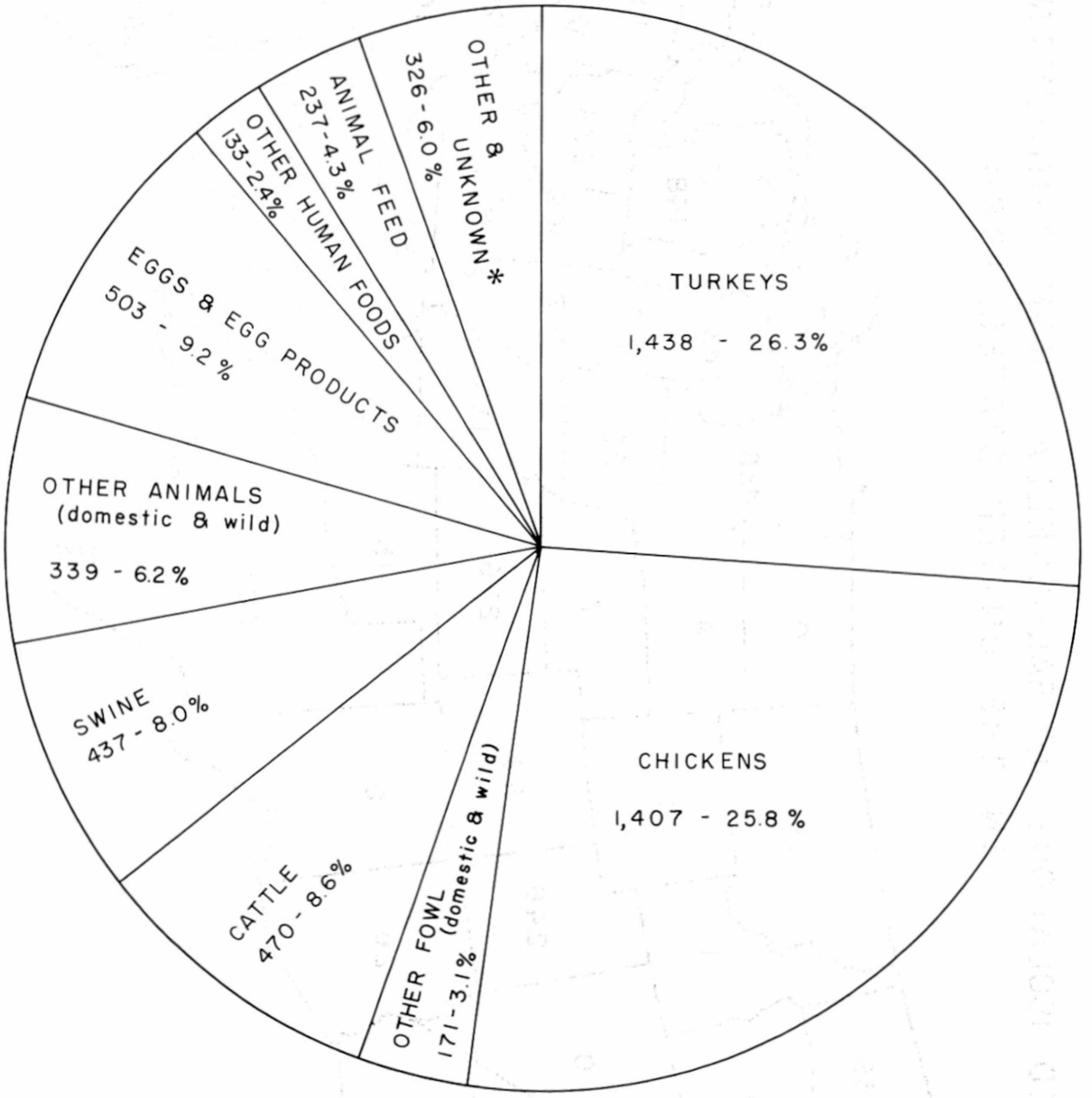
Table X.—*The five most common salmonella serotypes isolated from all domestic fowl and farm animals, chickens, turkeys, swine and cattle in the United States, 1964**

Serotype	All domestic fowl and farm animals		Chickens		Turkeys		Swine		Cattle	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
anatum	.....	.....	.....	.....	110	*7.7* (4)	60	*13.7* (3)	11	*2.3* (4)
chester	.....	.....	.....	.....	155	*10.8* (3)	.....	.....	.....	.....
cholerae-suis & *cholerae-suis* var. *kunzendorf.*	.....	.....	.....	.....	.....	.....	127	*29.1* (2)	.....	.....
derby	182	*4.6* (5)	.....	.....	.....	.....	135	*30.9* (1)	.....	.....
dublin	.....	.....	.....	.....	.....	.....	.....	.....	44	*9.4* (3)
enteritidis	.....	.....	.....	.....	.....	.....	.....	.....	6	*1.3* (5)
heidelberg	385	*9.7* (2)	168	*11.9* (3)	200	*14.0* (2)	.....	.....	.....	.....
infantis	239	*6.0* (3)	168	*11.9* (3)	.....	.....	.....	.....	.....	.....
livingstone	.....	.....	.....	.....	.....	.....	10	*2.3* (5)	.....	.....
montevideo	.....	.....	119	*8.4* (4)	.....	.....	.....	.....	.....	.....
newport	.....	.....	.....	.....	.....	.....	.....	.....	46	*9.8* (2)
pullorum	191	*4.8* (4)	187	*13.3* (2)	.....	.....	.....	.....	.....	.....
saint-paul	.....	.....	.....	.....	108	*7.6* (5)	.....	.....	.....	.....
typhi-murium & *typhi-murium* var. *copenhagen.*	803	*20.2* (1)	240	*17.0* (1)	221	*15.5* (1)	127	*29.1* (4)	321	*68.4* (1)
Total	1,800	*45.4*	882	*62.6*	794	*55.6*	370	*84.7*	428	*91.2*
Total (all serotypes)	3,968		1,407		1,438		437		470	

*Ranks shown in parentheses.

Figure 5

NUMBER AND PER CENT OF NONHUMAN SALMONELLA ISOLATIONS FROM THE INDICATED SOURCES IN THE UNITED STATES - 1964

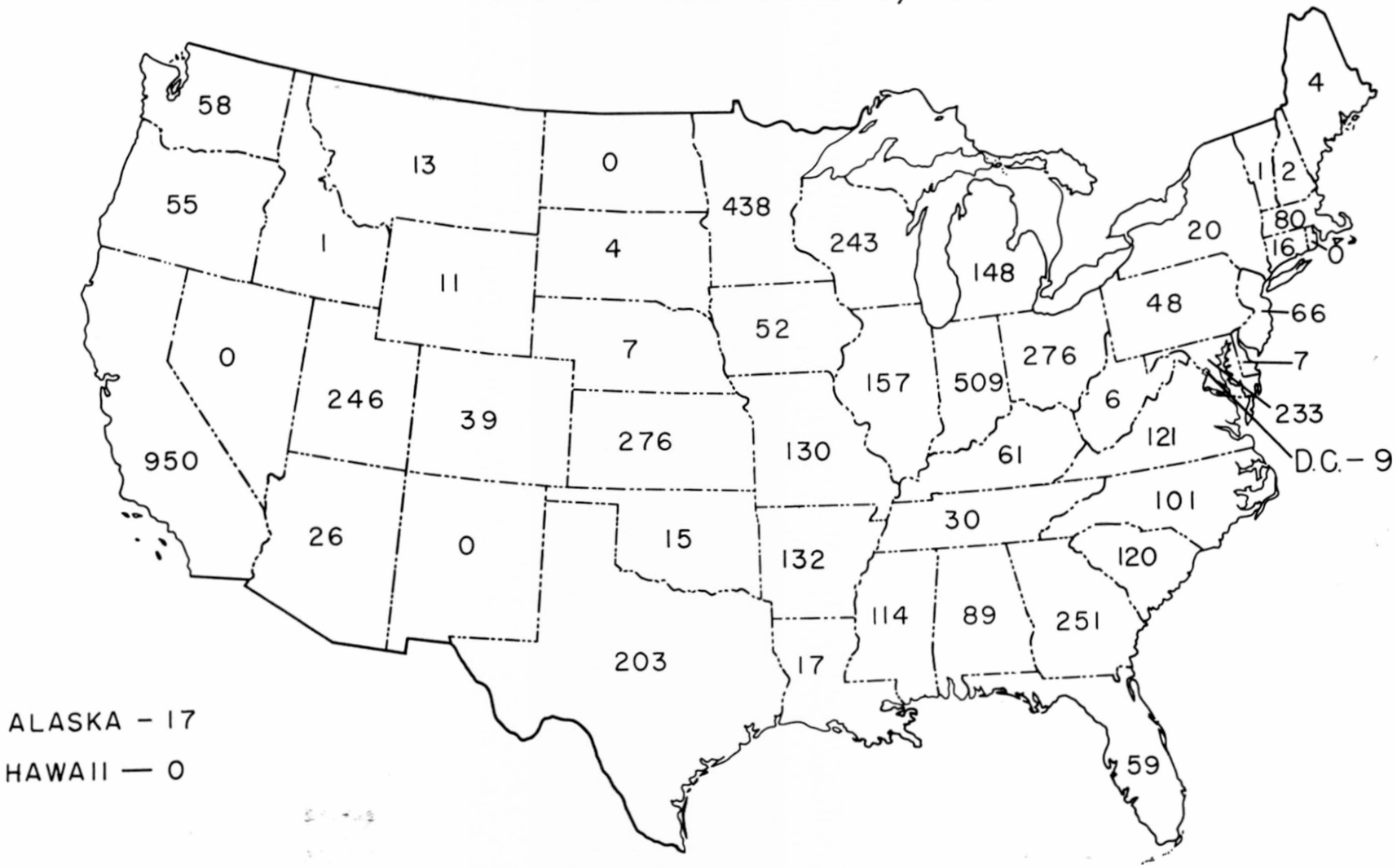


	no.	%
SALMONELLA ISOLATES FROM NON-HUMAN SPECIMENS (1964)	5,461	20.6
" " " HUMAN " "	21,113	79.4
" " " ALL " "	26,574	

* including reptiles & water

Figure 6

REPORTED ISOLATIONS OF SALMONELLA FROM NONHUMAN SOURCES IN THE UNITED STATES, 1964



UNITED STATES TOTAL, 1964 – 5,461