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February 24, 1966

SHIGELLA SURVEILLANCE

FOURTH QUARTER 1965

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Report No. 9
49 Participating States

PREFACE

This report summarizes data voluntarily reported from participating State, territorial, and city health departments. Much of the information is preliminary.

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TABLE OF CONTENTS

I Current Trends and Developments

Studies with important implications for the possible control of shigellosis in institutions and other confined groups were reported by Mel et al. in Bulletin WHO, 32:633-655, 1965. A live vaccine prepared from a streptomycin-dependent *Shigella flexneri 2a* strain was administered to 355 soldiers in an hyperendemic area. Five doses of about 10^{10} organisms were administered orally 5 minutes after treatment with sodium bicarbonate at 3-day intervals. Three hundred eighty-two unvaccinated soldiers served as controls. Bacteriological and clinical surveillance continued for about 4 months. Although the carrier rate was unaffected by the vaccine, there were no cases of dysentery due to *S. flexneri 2a* amongst vaccinated personnel as compared to an attack rate of 5.5 per cent in the unvaccinated control group - a statistically significant difference. In lower doses, a similar vaccine did not seem to confer protection.

In earlier studies, there was no evidence of reversion of the vaccine strain to streptomycin independence. Reactions were observed in only 1.4 per cent of volunteers, and these consisted of clinical exacerbations in heterotypic shigella carriers.

With regard to the use of such a vaccine for the control of institutional shigellosis, this data should be accepted with cautious restrain. Debilitated individuals frequently domiciled in institutions may react quite differently to a live attenuated strain as compared to the healthy young men who were subjects of these studies. In an institution, infections due to heterotypic strains will probably be more frequently encountered. One possible limitation of such a vaccine for institutional use may be the activation of these heterotypic infections as seen in this study. Quantitatively, the challenge encountered in institutionalized patients who may be coprophagic will often be greater than that experienced in this study. Duration of protection is still unknown. Yet, in spite of these unknowns, these findings are significant and heartening.

Control of institutional shigellosis is probably still far away. Corroboration of the findings of Mel et al. should have high priority. Other control measures should be studied. This gives an added purpose to shigella surveillance, as surveillance and control are so intimately interdigitated.

II Introduction

Fifty-two reporting centers are now participating in the Shigella Surveillance Program. These include 49 states as well as New York City, the District of Columbia, and the Virgin Islands. Subsequent surveillance reports will include all 50 states as California is now a participant.

III Summary

A total of 2,429 human shigella isolations were reported from the 52 reporting centers during the fourth quarter of 1965. This represents an 8.1 per cent increase over the 2,248 isolations reported during the third quarter of 1965 (same reporting centers), which was an increase of 48.4 per cent over the 1,515 isolations reported during the second quarter (49 reporting centers).

During October, November, and December, 66.7 per cent of shigella isolations were reported from children under 10 years of age, as compared with 69.5 per cent during the third quarter of 1965. No sex predilection for shigella was apparent during the fourth quarter of this year. A slight female predominance was reported during the previous quarter. As in the past, a predominance of males among the less than 5-year age groups was observed.

The most frequently isolated serotypes during the fourth quarter continue to be Shigella sonnei and Shigella flexneri 2a. Regional differences continue to follow the same pattern (see Figure 1 and Table I).

IV Reported Isolations

A. Human

1. General Incidence (17 states reporting since January 1964)

Seventeen states have been reporting shigella isolations since January 1964. As noted in previous reports, these isolations increased markedly in July and peaked in September 1964 (Figure 2). During the fourth quarter of 1965, a total of 1,106 isolations were reported from these 17 states, as compared with the total of 1,050 from the same states during the third quarter of the year, and 1,087 isolations for the fourth quarter, 1964. Therefore, the data indicate a decrease in the incidence of shigella isolations for 1965, although the seasonal pattern was similar for the 2 years.

The age and sex distribution (Table II - based on data reported from 52 centers) during the fourth quarter of 1965 demonstrated a pattern consistent with past experience. Almost 70 per cent of the isolations reported were from children under 10 years of age. Over 40 per cent were reported from children between the ages of 1 and 4 years. The high concentration of isolations among children is consistent with past experience. Another consistency was the fact that the number of isolations from children less than 10 years of age was greater among males than females. The reverse was true for persons over the age of 10 years.

2. Serotype Frequencies

During the fourth quarter of 1965, 18 serotypes were reported from 52 reporting centers, compared with 13 serotypes from the same centers during the previous quarter. The six most frequently reported serotypes were:

	Fourth Quarter 1965			Previous Quarter	
Rank	Serotype	Number	Per cent	Rank	Per cent
1	S. sonnei	912	37.4	1	32.4
2	S. flexneri 2	596	24.4	2	26.9
3	S. flexneri 3	247	10.1	3	12.0
4	S. flexneri 4	144	5.9	4	7.9
5	S. flexneri 6	135	5.5	5	3.8
6	S. flexneri 1	77	3.2	6	3.6

In previous quarters these six subgroups have been the six most common, and have accounted for over 85 per cent of all isolations. Shigella sonnei and Shigella flexneri 2 have always been the two most common. Positions three through six have been occupied by S. flexneri 1, 3, 4, and 6 in varying order. Members of the S. dysenteriae and S. boydii groups are rare, as is S. flexneri 5.

Table III shows the relative importance of the various serotypes, calculated on the basis of data compiled since the beginning of the Shigella Surveillance Program in October 1963. A total of 14,933 isolations has been reported during the 27-month period, 14,801 of which were typed at least as far as the main group (A, B, C, or D). In Table III the isolations in each of the unspecified categories have been distributed in their subgroups in the same proportions as the completely specified isolations of that group. These figures in Table III are called the "calculated number" and from these are derived a "calculated per cent" for each serotype. This probably gives a reasonably accurate approximation of the relative frequencies of at least the more common shigella serotypes in the United States. The six most

common serotypes determined by the outlined method over the 27-month period were:

Rank	Serotype	"Calculated Number"	"Calculated Per cent"
1	S. sonnei	5,590	37.0
2	S. flexneri 2a	3,779	25.5
3	S. flexneri 3a	1,462	9.9
4	S. flexneri 6	937	6.3
5	S. flexneri 4a	927	6.3
6	S. flexneri 2b	705	4.8

Once again, the six most common serotypes accounted for 90 per cent of all isolations, and these six serotypes were either S. sonnei or in the S. flexneri group.

A regional difference has been found to exist in shigella isolations, with a significantly higher percentage of S. flexneri isolations in the South as compared to the North. No statistical difference exists when comparing Northeast and Northwest (see Figure 1). In southern states, S. flexneri have accounted for about three-fourths of all shigella isolations. The ratio of S. flexneri to S. sonnei isolations during the fourth quarter of 1965 was highest in the Southwest, 4.27, and lowest in the Northwest, 0.75, (see Figure 1).

Since S. flexneri has an apparent seasonal pattern and is reported more commonly from the southern states, the reported incidence of shigella isolations from the southern states demonstrates a seasonal pattern which is discernable by inspection of Figure 3. This was less conspicuous for northern states. Figure 3 was constructed on the basis of only 15 states. This was done so that 1965 data could be compared with 1964, when only 17 states were reporting. Of these 17, Alaska and Hawaii were excluded because they are not contiguous with the continental United States.

Interestingly, Chun (1964) showed that 91 per cent of 3,732 strains isolated in Korea in 1952-53 were S. flexneri followed by S. dysenteriae with 6.4 per cent. Shigella sonnei represented only 2.3 per cent. Of the various strains of S. flexneri, type 4 was the most frequent with 26.9 per cent. In 1961, the same author reported that nearly 80 per cent of isolates were identified as S. flexneri, 10.9 per cent S. dysenteriae, and S. sonnei 4.3 per cent. Shigella flexneri 2a became the most frequently isolated strain with over one-third of total strains isolated.

In European countries and in Japan, S. sonnei has recently become more predominant as compared to S. flexneri, which was most common in the 1950's (NaKaya, R. cited by Chun, D., 1964)*. Shigella dysenteriae has almost completely disappeared in those countries, as in the United States. It is possible that the greater frequency of S. sonnei seen in the more developed countries may reflect the greater degree of bacteriological competence and better reporting of the milder cases caused by this group as compared to other groups. In addition, it is likely that these milder cases may not come to the attention of physicians in countries where the physician-patient ratio is low.

Of the 2,249 isolations reported in the United States during the fourth quarter of 1965, 666 (27.4 per cent) represented isolations from families with other members of the same family positive for shigella. This was slightly higher than the percentages reported during the previous two quarters (26.8 and 22.5, respectively).

* Chun, D., A Review of Salmonella and Shigella in Korea. Endemic Diseases Bulletin of Nagasaki University, 6(3):125-138, September 1964.

B. Nonhuman

A total of 11 nonhuman isolations of shigella were reported during the fourth quarter of 1965, as summarized in the table below:

Serotype	Number of Isolations	Reporting Center	Source
S. flexneri	1	N. C.	"Ice balls"
S. flexneri 1a	1	Ill.	Monkey
S. flexneri 3	2	Texas	Monkeys
S. flexneri 4b	1	Ill.	Monkey
S. sonnei	6	Conn. (2)	Monkeys
		Ill. (1)	
		Wisc. (3)	
	11		

V Current Investigations

A. Shigella Contamination of Fowl Products. Reported by Dr. C. S. Mollohan, Chief, Division of Epidemiology, Dr. W. Michael Cross, EIS Officer, Colorado State Department of Health; Dr. Arnold F. Kaufmann, Dr. John R. Boring, Miss Zada Morrison, Dr. Eugene J. Gangarosa, and Dr. Philip S. Brachman, Epidemiology Branch, Communicable Disease Center.

Outbreaks of salmonellosis associated with contaminated egg products are common, but shigellosis has not had the same association. Therefore, a recent finding of shigella associated with fowl and fowl products was of considerable interest, and led to a field investigation in order to assess this unusual situation.

The Colorado State Department of Health noted the isolation of Shigella sonnei I from turkey droppings used as cattle feed in February 1965. Alerted by this finding, a survey of checked (cracked) eggs was conducted in Denver in which six pool samples were cultured. Three isolates of Shigella flexneri 2b were obtained from two pools of checked eggs from egg wholesalers and one from freshly broken liquid whole eggs from a grocery store. Additional studies during 1965 revealed six more isolates of S. sonnei I and two isolates of S. sonnei II from checked eggs, frozen whole eggs, and fresh whole liquid eggs. Cultures taken from a hennery revealed a S. sonnei I from water used to flush chicken cages and S. flexneri 6 from a drainage ditch leading from the hennery. A chicken feed mixture was positive for S. sonnei I and on another occasion S. flexneri 4a was found at the same hennery. A S. flexneri 3 was isolated from another chicken feed source. Thus, an awareness of the possible association of shigella with fowl and fowl products led to studies that resulted in 17 isolates representing six serotypes from various fowl associated sources, including products commercially available. There were no known cases of disease attributable to these sources.

On December 6 and 7, 1965, a hennery in Denver, Colorado, from which shigella isolates had been previously obtained on seven occasions, was visited by four members of Epidemiology Branch, Communicable Disease Center, for an intensive survey for shigella and possible sources of contamination.

The hennery consisted of eight large separate houses connected to a central work area. These houses contained three tiers of cages stacked upon each other. Upon arrival at the hennery, the birds were housed two to three per cage and were kept in the same cages until culled, approximately 1 year later. The environment of the houses was controlled with a temperature of 70°F the year-round, and provisions were made for air circulation. There was a constant draft throughout the hennery due to the ventilating fans. This, combined with feeding activities of the birds, produced a constant dust aerosol.

Birds were fed a feed mixture produced at the firm consisting of oyster shell flour, vitamin mineral mix, soybean meal, meat and bone meal, corn, milo (sorghum grain) alfalfa meal, dicalcium phosphate, salt, methionine, and occasional supplemental erythromycin. This was compounded in a centrally located mill and distributed by a closed auger system to feeding troughs in all the houses. The water was not chlorinated, and was obtained from deep wells. The same water was also piped to the chickens via a closed system to the water troughs.

Eggs were gathered by hand and placed on plastic flats. They were then transferred to the egg washing machine located in the central work area. They were washed in an egg washing machine after removal of the visibly cracked eggs. The eggs were first washed with a solution containing a detergent and a quaternary ammonium compound. The temperature of the water was approximately 100°F. It was recirculated, and as a result, it was soon grossly dirty due to feed and feces washed from the eggs. Wash water was rinsed off the eggs with a spray of chlorinated (25-40 ppm) water at 100°F. The strength of chlorination fluctuated greatly. After leaving the rinse, eggs were dried by passing under a series of fans. The final step consisted of a light spray of mineral oil on eggs. Eggs which remained dirty or found cracked were removed, and the remainder packed in cases for wholesale packaging.

The retained, cracked, dirty, and undersize eggs were processed on the premises in a single closed room. Eggs were broken by hand by one employee with no attempt to separate white and yolk. Egg shells and extraneous materials were strained out by a sieve before the eggs were dumped in one of two holding vats. From these vats, the eggs were put into large tin cans for freezing and subsequent sale. The cleaning of the holding vats was incomplete as evidenced by dried egg residue remaining in cracks at the completion of operations.

Wastes of the plant were drained to a large lagoon approximately 1/4 mile from the plant. No further treatment was made of the sewage.

Bacteriologic samples were obtained as follows: each feed ingredient was sampled separately, as well as the finished meal. In addition, scrapings from inside the mixer and a grinder were obtained. These were inoculated into heart infusion broth. After 12 hours incubation at 37°C, these cultures were streaked on MacConkey's and SS agar.

Cloacal swabs were obtained from 200 of approximately 180,000 hens. These hens were selected at random from each of seven of the eight houses. The swabs were inoculated directly onto SS and MacConkey agar plates, and then placed in selenite broth. Plates and broth were held at ambient temperature for transportation to the CDC, at which time they were incubated 12 hours at 37°C. Selenite broth cultures were then streaked to SS and MacConkey agar plates.

A case of 30 dozen cracked eggs collected at random was obtained. These were divided into 15 pools of 24 eggs each. Aliquots of shell and contents were placed into three liters of heart infusion broth. Heart infusion broth was incubated 12 hours and then streaked to SS and MacConkey's agar. In addition, one milliliter of each broth culture was transferred to 10 ml. of selenite broth for 12 additional hours of incubation. This was then streaked to SS and MacConkey's. Samples of liquid whole eggs and samples of wash and rinse water obtained at the plant were handled similarly.

Samples of water were obtained from a tap, the end of which was flamed before collection of samples. These samples, collected on two consecutive days and consisting of one liter each, were filtered through a millipore filter. The filter pad was cut in half; one half was placed in 10 ml. of selenite broth and the other half in 10 ml. heart infusion broth. These were held for 1 day at ambient temperature during transportation, and then incubated for 12 hours at 37°C. The broth cultures were streaked to SS and MacConkey's agar.

In an attempt to recover air-borne shigella, two SS plates were exposed in each of the houses for approximately 20 minutes. A few miscellaneous environmental cultures were obtained.

In spite of the fact that shigella had been isolated from this hennery on seven previous occasions, none of the 288 cultures obtained from these various sources revealed any shigella in this detailed study. Rectal swabs from employees were not obtained as there was considerable resistance to this, but the finding of multiple serotypes over a 1-year period makes it unlikely that a single human carrier is responsible. It is planned to maintain surveillance of eggs and feed at this location and to resample at such time as further shigella isolates are made. At that time, another attempt will be made to obtain rectal swabs from employees.

B. Shigella Contamination of Imported Plastic "Ice Balls."

In anticipation of festivities associated with the year-end holidays, plastic novelty items from Hong Kong used for cooling liquid drinks appeared on the market in large quantities. These were known as "Ice Balls," "Ice Kools," or "Pink Elephants," and they assumed various sizes and shapes. Late in October, a housewife in Wisconsin sent five "Ice Balls" to the State laboratory because they were noted to leak. The Wisconsin State Laboratory of Hygiene reported bacterial counts in excess of 1×10^5 organisms per milliliter of fluid contained within these items. Examinations in various laboratories, including those of the CDC, have confirmed gross contamination of these products with various strains of nonpathogenic and pathogenic bacteria. Mecklenburg County (North Carolina) Health Department and the Colorado State Department of Public Health reported the isolation of Shigella flexneri 3, and the Texas State Department of Health Laboratories reported the isolation of S. sonnei from these items.

To date, human disease has not been confirmed as a result of contact with any of these items. Sales have been discontinued in many communities under the authority of local health departments. We would welcome additional reports of isolation of shigella organisms or of possible human illness related to these items.

VI Reports from States

A. Family Outbreak of Dysentery Due to a Rare Serotype. Reported by Dr. George H. Agate, Director of Epidemiology, and Dr. Donald B. Coohon, Public Health Veterinarian, Michigan Department of Public Health.

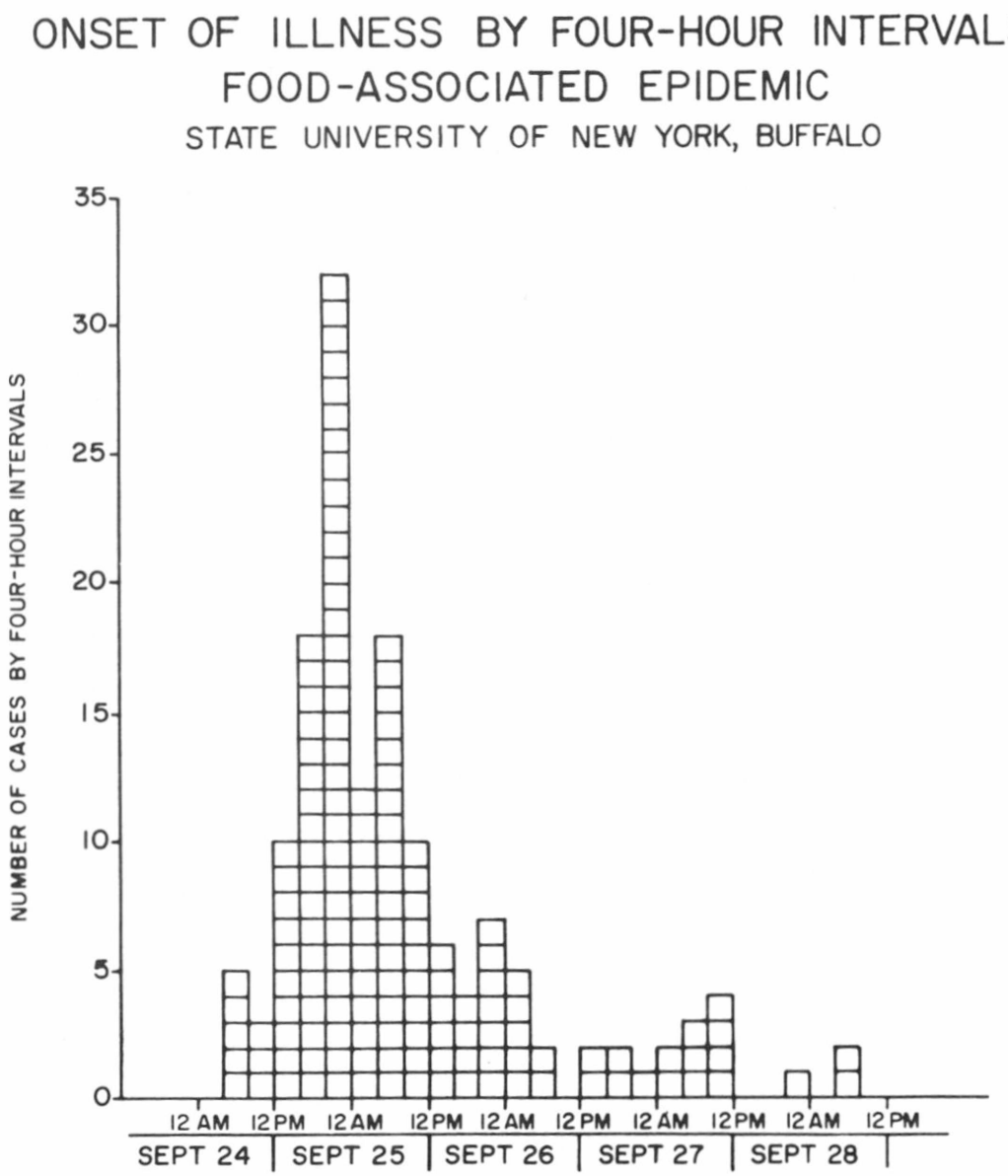
A family outbreak of dysentery due to the rare serotype Shigella dysenteriae 3, was reported by the Michigan Department of Public Health. The father was ill with diarrhea for 1 day during a 5-week visit in Lebanon. He returned to his home in this country on September 17, 1965. On October 1, he became ill with symptoms of vomiting, followed by diarrhea, containing blood and pus. Two of his children, ages 16 months and 2 years, also became ill on the same day. The organism was cultured from all three. Cultures from seven other family members were negative. Although her stool cultures were negative, the mother had an episode described as a "gallbladder" attack 9 days after the others became ill. No other illnesses associated with this organism were reported from the same state at the time of this outbreak. This family outbreak could have been caused by a strain carried into this country from abroad by the father.

B. Common Source Epidemic of Shigellosis Associated with Pharyngitis. Reported by Dr. William E. Mosher, Commissioner, Erie County Health Department; Dr. William R. Elsea, Deputy Commissioner, Erie County Health Department; Dr. Victoria Markellin, Director, Communicable Disease Control, Erie County Health Department, New York; and Dr. Richard G. Lennon, EIS Officer.

A common source epidemic of febrile pharyngitis and diarrhea involving over 250 college students and cafeteria employees was reported by the Erie County Health Department, Buffalo, New York. A preliminary report appeared in the Morbidity and Mortality Weekly Report, Volume 14, No. 41, 1965. Two pathogens, beta hemolytic streptococci and Shigella flexneri, appear to have been principally responsible.

The outbreak was reported on Sunday, September 26, to the Health Department by the Student Health Service of the State University of New York. Immediate epidemiological investigation of the first 69 cases indicated a probable common source epidemic related to meals consumed at one university cafeteria. Food histories pointed to shrimp salad served at the noon meal on Friday, September 24, as the responsible vehicle.

The initial cases began late in the day on September 24, the peak in the epidemic occurring on the following day as indicated in the epidemic curve below.



Scattered cases continued to occur through September 28. In all, 193 students required care in the infirmary and about two-thirds of 123 cafeteria employees who had also eaten the shrimp salad became ill about the same time with sore throats and diarrhea.

The predominant symptoms were sore throat, fever, diarrhea, headache, prostration, and nausea or vomiting. Sore throat and headache were most frequent among the earlier cases and diarrhea was more prominent among those affected later.

Of the first 69 cases, all among students, 93 per cent had sore throats, 65 per cent had fever and 42 per cent, diarrhea. Blood counts carried out on the first group of 20 students admitted to the infirmary showed that over half had leucocytosis of more than 15,000 with a shift to the left. Thirty-one of 45 throat swabs from students with pharyngitis yielded beta hemolytic streptococci. Shigella flexneri was isolated from 27 of 46 specimens from students with diarrhea. From three students with diarrhea, three different strains of salmonella were isolated. All students who were not ill and others known to have consumed the suspect meal were given prophylactic oral penicillin.

The salad was prepared from frozen shrimp thawed in warm water the night before it was served. The next morning, September 24, without prior cooking, the shrimp was mixed by hand with salad dressing and celery. It was then put in a large refrigerated vat until it was served at the noon meal, when some 390 servings were distributed. On each of the following 2 days, an additional 80 servings were made of the same salad. The same brand of frozen shrimp used at the University cafeteria was also served at about the same time in two other cafeterias without associated illness.

The same shrimp salad was examined in three laboratories. At the Erie County Laboratory, bacteriological examination yielded isolates of fecal streptococci and coagulase positive staphylococci. The New York State Division of Laboratories and Research isolated fecal streptococci, a strain of Proteus, "coliform" organisms and other Gram-negative rods but no enteric pathogens. At the Milk and Food Research Laboratory of the Robert E. Taft Sanitary Engineering Center, PHS, DHEW, Escherichia coli, other coliforms, and Salmonella minneapolis were isolated but no S. flexneri were found.

The Erie County Laboratory and the Food and Drug Administration examined 16 and 23 packages respectively of the same brand shrimp and found no enteric pathogens, but enterococci and Gram-positive aerobic cocci were found. Frozen shrimp from the same source was examined by the Food Microbiology Section, Robert E. Taft Sanitary Engineering Center, and was found to contain fecal streptococci and coagulase-positive staphylococci.

The same product was incriminated in a salmonella food-borne outbreak in New York State involving the teaching staff of a private school on Friday, October 15, 1965. Eighteen of twenty-four teachers who consumed the shrimp salad developed abdominal distress and diarrhea (personal communication).

From two specimens of mayonnaise from the kitchen where the shrimp salad was prepared, fecal streptococci and "coliform" organisms were cultured. Celery from the same source used in the preparation of the salad grew enterococci. It was determined that the temperature just beneath the surface layer of the incriminated shrimp salad was 65°F or higher while refrigerated.

The cafeteria was closed for complete disinfection and all food handlers were prohibited from returning to work until two successive rectal swabs negative for shigella had been obtained. One hundred twenty-six food handlers were cultured, 110 of whom had two successive negative stool examinations. However, 15 (12 per cent) of them harbored S. flexneri.

In a study of the efficacy of the drug Ampicillin, 30 students with diarrhea were treated for 6 weeks, after which three still harbored S. flexneri.

In summary, gross contamination of imported shrimp, prepared as a salad, resulted in an explosive outbreak of pharyngitis followed by diarrhea. Beta hemolytic streptococci were isolated from the throats of the victims and S. flexneri was found in half of those with diarrhea; these organisms could not be recovered from the shrimp salad although there was abundant evidence of fecal contamination. It is not surprising that the more fragile shigella would not survive under these circumstances. The evidence suggests that the shrimp salad was the vehicle for both diarrhea and pharyngitis. Exactly how the shrimp became contaminated could not be ascertained. The simultaneous occurrence of these two epidemic diseases attributable to one vehicle is certainly unusual and interesting.

C. Common Source Epidemic of Shigellosis Attributed to Macaroni Salad and/or Rice. Reported by R. B. Berry, M.D., Chief, Branch of Epidemiology, Hawaii Department of Health.

A common source food-borne epidemic of Shigella flexneri 2a occurred on the Island of Oahu, during the first week of October 1965, and involved 20 of 21 individuals in six unrelated families. These 20 individuals, who ranged in age from 1½ to 59 years, developed symptoms of fever, abdominal pain, diarrhea and prostration 35 to 47 hours after a meal taken at a "lunch wagon" on October 2. Cultures of stool specimens from 10 of these individuals grew S. flexneri 2a. Of the various food items consumed by the affected individuals, all could be excluded as possible vehicles except macaroni salad and rice, which were consumed by all 20. Either or both of these two food items could have been the responsible vehicle.

On October 5, the owner of the lunch wagon and his wife experienced fever and diarrhea. Both were involved in food preparation of the suspect meal. Shigella flexneri 2a was isolated from a rectal swab from the owner but not from his wife or two other food handlers who were asymptomatic. It is not known whether the owner was responsible for the contamination or a victim of it.

Bacteriological examination on October 5, of utensils and cooking surfaces from the lunch wagon failed to reveal shigella but Salmonella typhi-murium and S. anatum were recovered from a stainless steel work table and a sawing machine blade respectively.

TABLE I
SHIGELLA SEROTYPES ISOLATED FROM HUMANS
FOURTH QUARTER, 1965

Serotype	NORTHEAST																												NORTHWEST																		SOUTHEAST														
	Conn.	Del.	D.C.	Ill.	Ind.	Iowa	Ky.	Me.	Md.	Mass.	Mich.	Minn.	Mo.	N.H.	N.J.	N. Y. State	N.Y. City	Ohio	Pa.	R.I.	Vt.	Va.	W. Va	Wisc.	North-east Total	Colo.	Idaho	Kans.	Mont.	Nebr.	Nev.	N.D.	Ore.	S.D.	Utah	Wash.	Wyo.	North-west Total	North Total	Ala.	Ark.	Fla.	Ga.	La.	Miss.	N.C.	S.C.	Tenn.	South-east Total
A. S. dysenteriae 1																												1									1	1																										
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Total				3							1	1	1					1							7				1									1	8																										
B. S. flexneri 1a				1																					1	1		10									11	12	2				2																		4
1b																										8											8	8																										
1 unspecified									1									2							3														3			3		16		1			3	23														
2a	1			42								4			1										48	11		4	8		1	6	9				39	87	28			11	20					59														
2b																										1			2							3	3	2				4					6														
2 unspecified									31			14	11	1				8							65									4	4		8	73	1	30		80		1			40	152														
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unspecified			111		2	5	7			3		1		1	52	45						14	8	150		5		2			7	4	6	1	1	26	176	11	1			13	25				50														
Total	3	1	111	75	2	5	7		66	3	54	26	2	2	52	45	22					14	8	398	47	5	7	24		1	6	16	4	10	7	1	128	526	11	51	47	158	54	15	25		67	428														
C. S. boydii 1										1															1													1																										
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1615-53																																																																		
2710-54																																																																		
1621-54																																																																		
2044-54																																																																		
variant R																																																																		
unspecified													1						1						2	1	1											2	4																										
Total										1			1						1						3	1	1											2	5	1			3	1				1	6														
D. S. sonnei	11		10	64	14		3	1	3	80	10	44	20	10	2	2	37	46	14	40		1	1	1	18	432	30	22	4	15		1	46		13	39		170	602	5	7	35	65	34	2	10		37	195														
untypable																																																																		
unknown			7				2																	4	13												13		1			1						2														
Total	14	1	128	142	16	10	8	3	146	14	99	47	14	2	4	89	91	37	41	1	1	15	1	30	853	78	28	12	39	1	7	62	4	23	46	1	301	1,154	17	59	82	226	89	17	35		105	631														

TABLE I (Continued)
SHIGELLA SEROTYPES ISOLATED FROM HUMANS
FOURTH QUARTER, 1965

SOUTHWEST						OTHER						PREVIOUS QUARTER		1965 CDC		1965 CUMULATIVE		
Ariz.	N.M.	Okla.	Texas	South-west Total	South Total	Alaska	Hawaii	Virgin Islands	Other Total	Total	Percent of Total	Total	Percent of Total	Total	Percent of Total	Total	Percent of Total	Serotype
										1	0.04					1	0.01	A. S. dysenteriae 1
										4	0.2	1	0.04	17	2.1	11	0.1	2
										3	0.1			2	0.3	7	0.1	3
																		4
																		5
																		6
																		7
																		8
																		9
																		10
																		3373-50
																		3341-55
	1			1	1					1	0.04	5	0.2			12	0.2	variant R unspecified
	1			1	1					9	0.4	6	0.3	19	2.4	31	0.4	Total
																		B. S. flexneri
7				7	11					23	0.9	43	1.9	136	17.1	126	1.6	1a
9			5	14	14					22	0.9	15	0.7	51	6.4	22	0.9	1b
	6			6	29					32	1.3	23	1.0			102	1.3	1 unspecified
20			87	107	166		61		61	314	13.0	235	10.5	196	24.7	804	10.1	2a
5			14	19	25					28	1.2	27	1.2	68	8.6	130	1.6	2b
	29			29	181					254	10.5	342	15.2			1,032	13.0	2 unspecified
			37	37	62					63	2.6	39	1.7	63	7.9	157	2.0	3a
			9	9	9					9	0.4	6	0.3			19	0.2	3b
					2	3			3	7	0.3	6	0.3	21	2.6	29	0.4	3c
	34			34	77		11		11	168	6.9	219	9.7			636	8.0	3 unspecified
28			40	68	79		1		1	93	3.8	107	4.8	56	7.0	278	3.5	4a
					2					4	0.2					14	0.2	4b
	23			23	34					47	1.9	69	3.1			219	2.8	4 unspecified
5				5	6					11	0.5	9	0.4	3	.4	30	0.4	5
12	20		16	48	87					135	5.6	86	3.8	36	4.6	359	4.5	6
														11	1.4	15	0.2	variant X
																		variant Y
																		variant R
	2	32		34	84	1			1	261	10.7	261	11.6	6	.8	871	11.0	unspecified
86	114	32	208	440	868	4	73		77	1,471	60.6	1,487	65.7	647	81.4	4,893	61.6	Total
										1	0.04			5	.6	1	0.01	C. S. boydii 1
			1	1	6					6	0.2	6	0.3	9	1.1	30	0.4	2
																		3
					1					1	0.04			1	.1	1	0.01	4
																		5
																1	0.01	6
												1	0.04	4	.5	1	0.01	7
																		8
																		9
														1	.1			10
														3	.4			11
												1	0.04	1	.1	1	0.01	12
																		13
																		14
																		15
																		3615-53
																		2710-54
																		1621-54
																		2044-54
1	8	1		10	10					14	0.6	6	0.3			30	0.4	variant R unspecified
1	8	1	1	11	17					22	0.9	14	0.6	24	3.0	65	0.8	Total
6	26	20	51	103	298		12		12	912	37.6	728	32.4	105	13.2	2,878	36.2	D. S. sonnei
																1	0.01	untypable
					2					15	0.6	13	0.6			76	1.0	unknown
93	149	53	260	555	1,186	4	85	-0-	89	2,429		2,248		795		7,944		Total

TABLE II

CUMULATIVE SHIGELLA SEROTYPE FREQUENCIES
Based on all Isolations Reported from Fourth Quarter 1963 Through Fourth Quarter 1965

	Number Reported	*Calculated Number	*Calculated Per cent	Rank
A. S. dysenteriae				
1	1	1	0.01	19
2	29	43	0.3	14
3	10	16	0.1	16
4				
5				
6	1	1	0.01	19
unspecified	20			
B. S. flexneri				
1a	162	386	2.6	7
1b	109	260	1.8	9
1 unspecified	258			
2a	1163	3779	25.5	2
2b	217	705	4.8	6
2 unspecified	2293			
3a	218	1462	9.9	3
3b	22	148	1.0	10
3c	43	288	1.9	8
3 unspecified	1272			
4a	351	927	6.3	5
4b	26	69	0.5	12
4 unspecified	439			
5	43	52	0.4	13
6	767	936	6.3	4
variant y	17	21	0.1	15
unspecified	1633			
C. S. boydii				
1	1	2	0.01	18
2	50	101	0.7	11
3				
4	4	8	0.07	17
5				
6	1	2	0.01	18
7				
8	1	2	0.01	18
9				
10				
11				
12	1	2	0.01	18
unspecified	59			
D. S. sonnei	5590	5590	37.0	1
Untypable	1			
Unknown	131			
Total	14,933	14,801		

* Calculated Number and Per cent are derived by applying the unspecified isolations in each group to that group in the same proportion as the known isolations of that group.

TABLE III

Age and Sex Distribution of 2321 Isolations of Shigella
Reported for Fourth Quarter 1965

Age (years)	Male	Female	Total	Per cent	Cumulative Per cent
Under 1	79	58	137	9.2	9.2
1-4	289	260	549	36.8	46.0
5-9	167	148	315	21.1	67.1
10-19	104	107	211	14.1	81.2
20-29	45	94	139	9.3	90.5
30-39	19	35	54	3.6	94.1
40-49	14	14	28	1.9	96.0
50-59	12	15	27	1.8	97.8
60-69	9	12	21	1.4	99.2
70-79	2	9	11	0.7	99.9
80+	4	5	9	0.6	100.5
Unknown	411	409	820		
Total	1155	1166	2321		
Per cent of Total	49.8	50.2			

Figure 1

PERCENTAGE *S. flexneri and S. sonnei* OF TOTAL SHIGELLA ISOLATIONS REPORTED FROM INDICATED REGIONS-FOURTH QUARTER, 1965

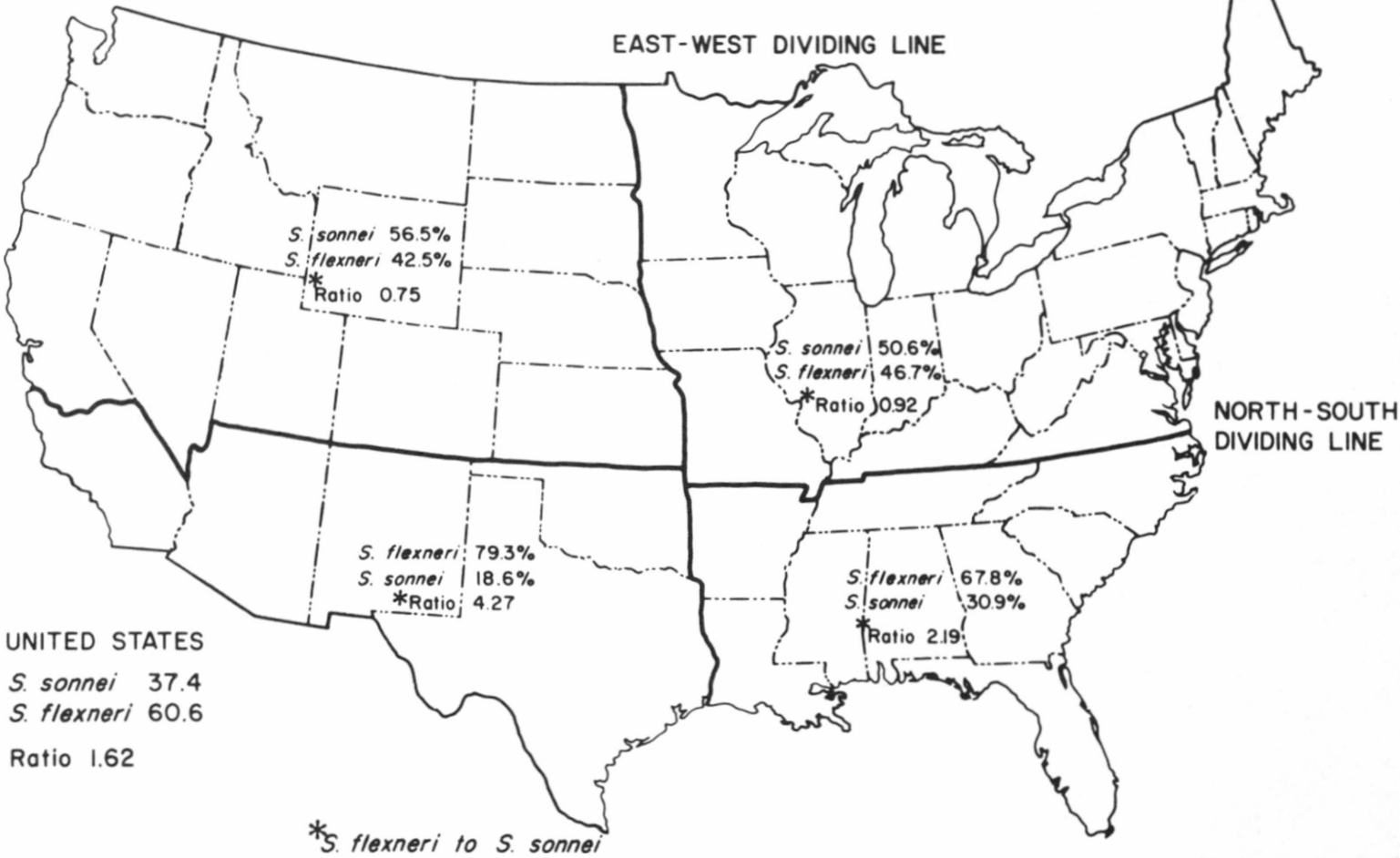
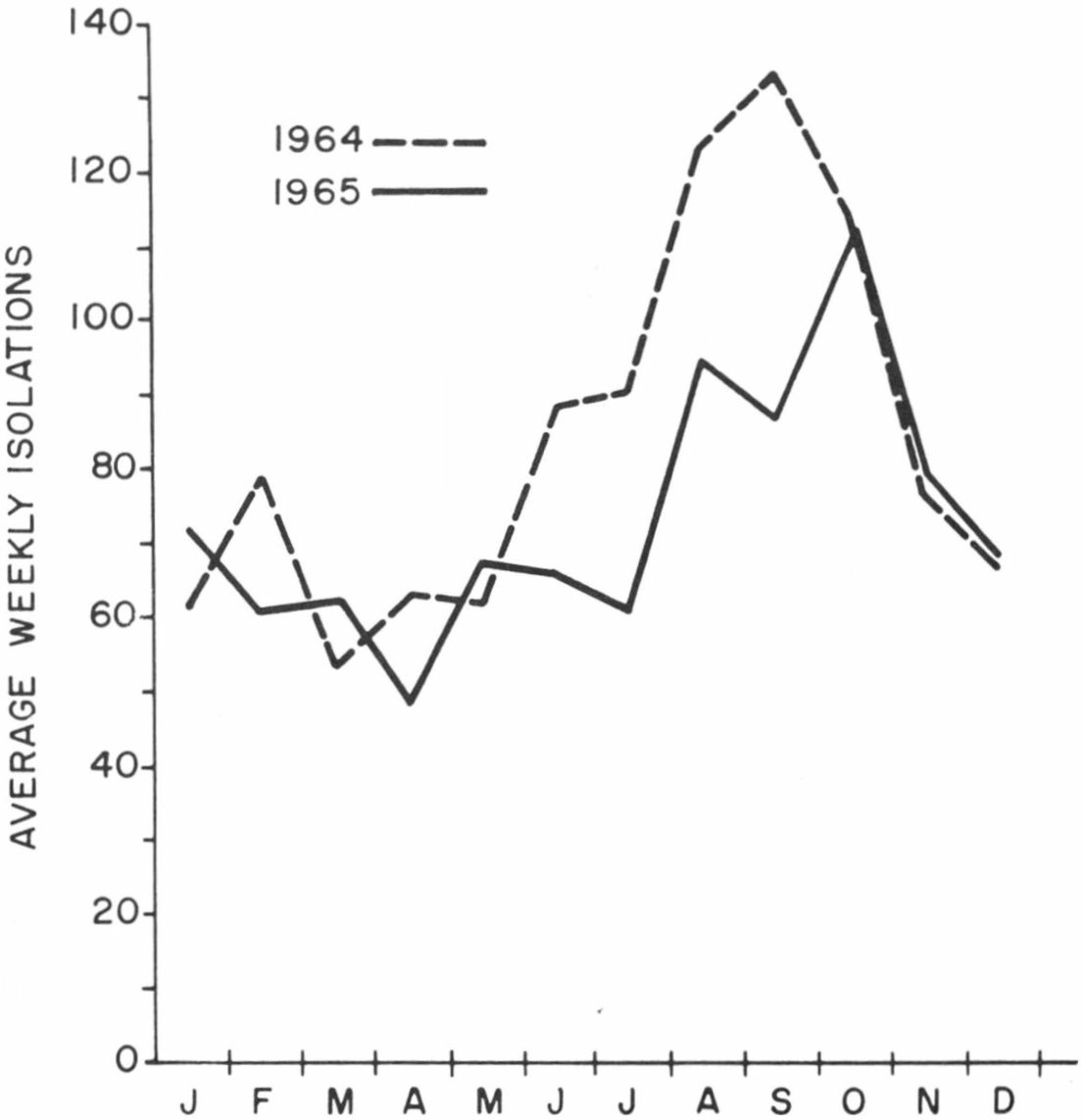


Figure 2

SEASONAL INCIDENCE OF REPORTED SHIGELLA ISOLATIONS

FOR 17 STATES* WHICH HAVE REPORTED SINCE JANUARY 1964

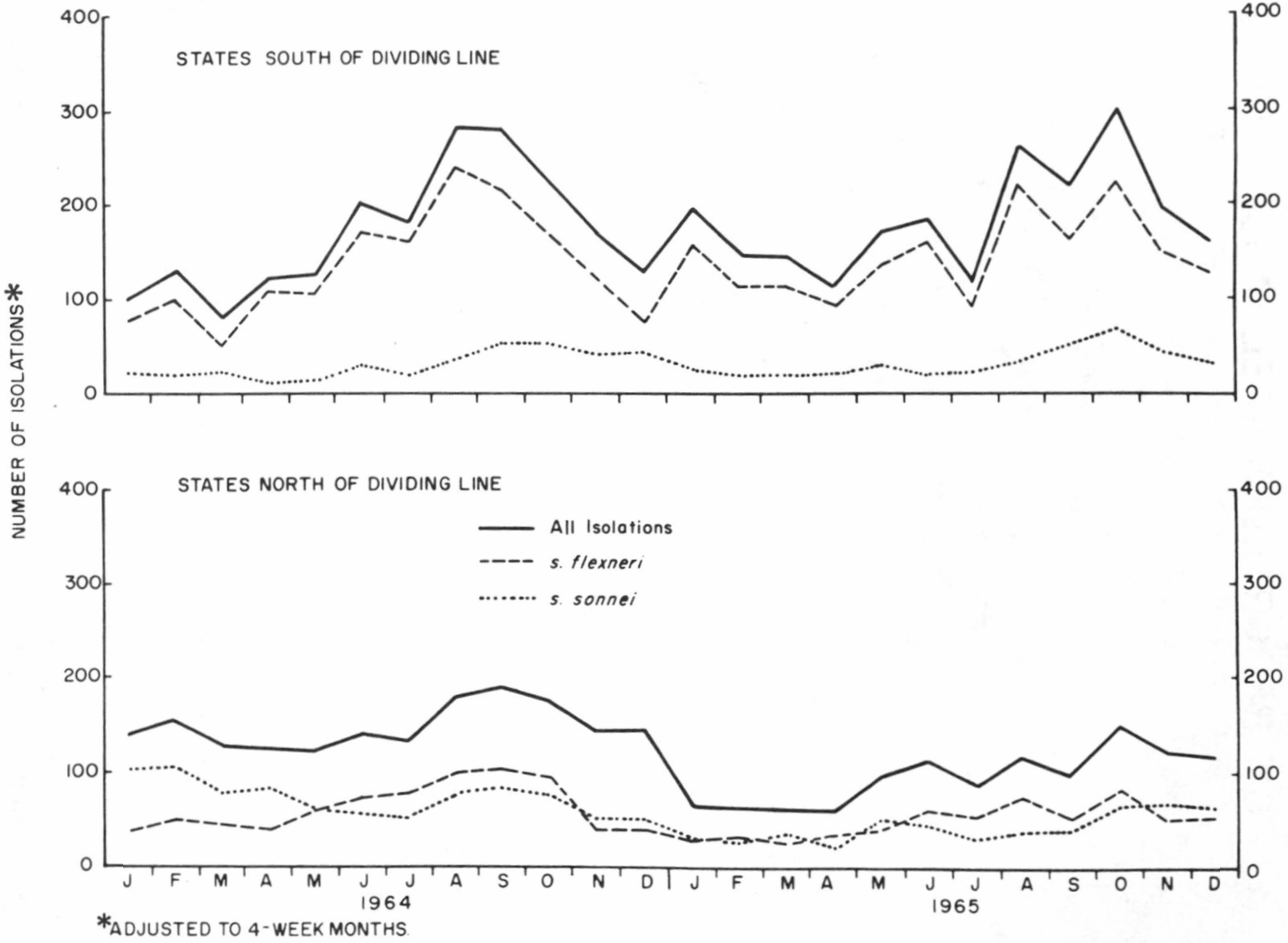


*ALASKA, ARIZONA, HAWAII, ILLINOIS, KANSAS, MARYLAND, NEW JERSEY, NEW MEXICO, NORTH CAROLINA, NORTH DAKOTA, OHIO, OKLAHOMA, OREGON, SOUTH DAKOTA, TENNESSEE, TEXAS, VERMONT.

Figure 3

SEASONAL DISTRIBUTION OF SHIGELLA ISOLATIONS BY SEROTYPE AND REGION

15 STATES WHICH HAVE REPORTED SINCE JANUARY 1964



*ADJUSTED TO 4-WEEK MONTHS