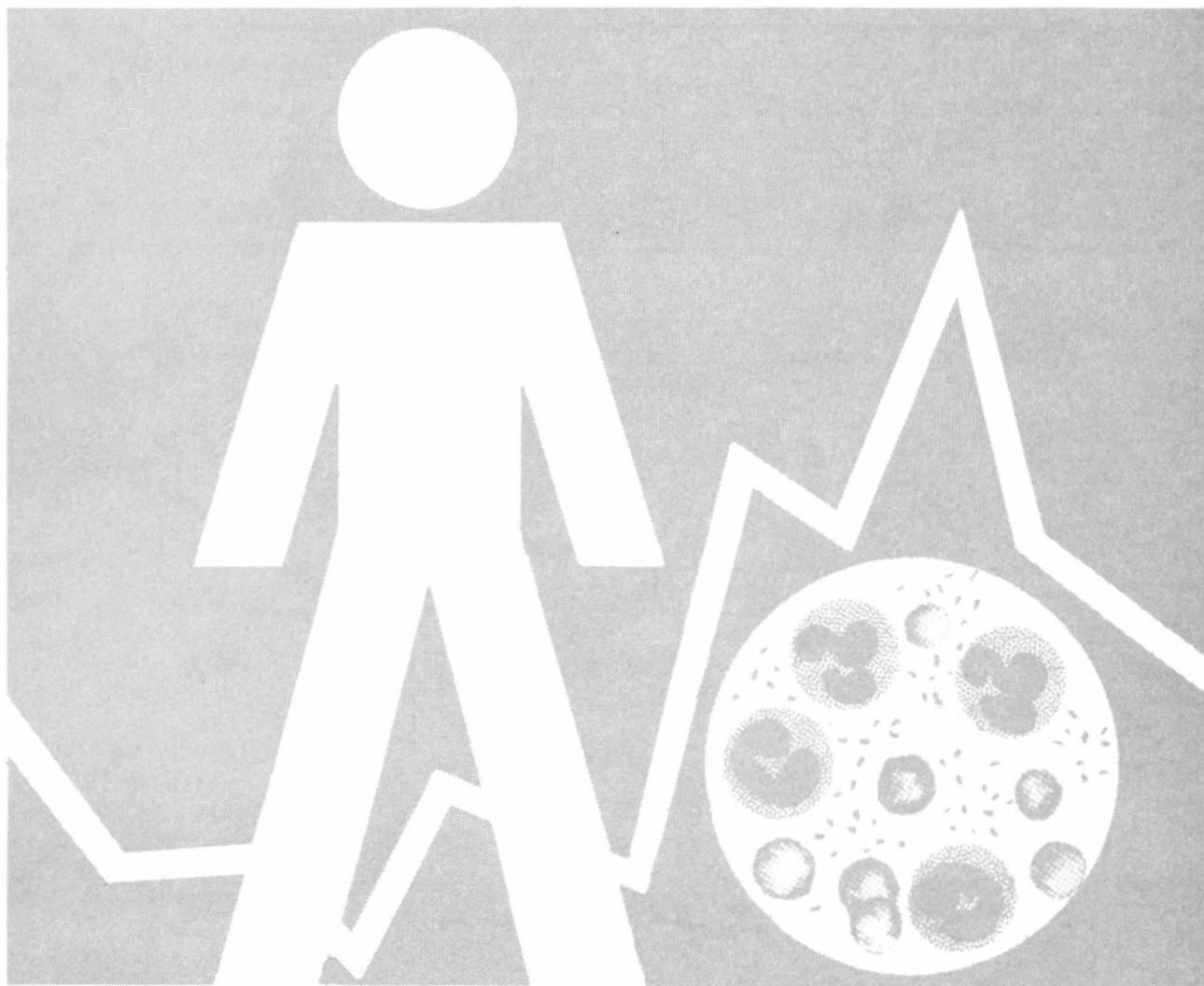


communicable disease center
SHIGELLA
surveillance

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for the
Second Quarter 1966

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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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I Summary of Current Trends

A total of 1,856 human shigella isolations were reported from the 53 reporting centers during the second quarter of 1966, representing an 11.6 percent decrease from the 2,099 isolations reported during the first quarter of 1966 (same reporting centers). The number of isolations reported during the first quarter of 1966 represented a 13.6 percent decrease from the total of 2,429 isolations reported during the fourth quarter of 1965.

During April, May, and June, 70.8 percent of shigella isolations were reported from children under 10 years of age, which compared with 70.7 percent during the first quarter of 1966. As in the first quarter, no sex predilection for shigella was apparent during this quarter. A predominance of males among the less than 5-year age group was observed.

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

II Reported Isolations

A. Human

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

Seventeen states have reported shigella isolations since January 1964. The seasonal pattern demonstrated in 1964 and 1965 has been followed during the first two quarters of 1966 (see Figure 2).

From these 17 states a total of 1,480 isolations were reported during the second quarter of 1966, as compared with 1,006 isolations from the same states during the first quarter of 1966.

The age and sex distribution of human isolates from all reporting centers during the second quarter of 1966 demonstrated a pattern which was consistent with past experience.

2. Serotype Frequencies

During the second quarter of 1966, 19 serotypes were reported from 53 reporting centers, compared with 22 serotypes from these same 53 reporting centers during the first quarter. The six most frequently reported serotypes were:

<u>Second Quarter 1966</u>				<u>Previous Quarter</u>	
Rank	Serotype	Number	Percent	Rank	Percent
1	<u>S. sonnei</u>	640	34.5	1	36.8
2	<u>S. flexneri 2</u>	464	25.0	2	31.2
3	<u>S. flexneri 3</u>	277	14.9	3	10.0
4	<u>S. flexneri 6</u>	128	6.9	5	4.0
5	<u>S. flexneri 4</u>	108	5.8	4	7.7
6	<u>S. flexneri 1</u>	48	2.6	6	3.6

In previous quarters these six subgroups have been the six most common and have accounted for over 85 percent of all isolations. Shigella sonnei and Shigella flexneri 2 have always been the two most common. Ranks 3 through 6 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 II 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 18,888 isolations have been reported during the 33-month period. In Table II 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 II are called the "calculated number," and from these are derived a "calculated percent" for each serotype. This provides an approximate index of the relative frequencies of the more common shigella serotypes in the United States. The six most common serotypes determined by the outlined method over the 33-month period were:

Rank	Serotype	"Calculated Number"	"Calculated Percent"
1	<u>S. sonnei</u>	7058	37.37
2	<u>S. flexneri 2a</u>	5032	26.64
3	<u>S. flexneri 3a</u>	1984	10.50
4	<u>S. flexneri 6</u>	1181	6.25
5	<u>S. flexneri 4a</u>	1151	6.09
6	<u>S. flexneri 2b</u>	757	4.01

As can be seen, the six most common serotypes have accounted for 90 percent of all isolations, and these six serotypes are 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 difference exists when comparing Northeast and Northwest. Data compiled during the second quarter of 1966 present no exception to this phenomenon (see Figure 1). In the 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 second quarter of 1966 was highest in the Southwest, 5.17, and lowest in the Northwest, 0.33, (see Figure 1).

Shigella flexneri has an apparent seasonal pattern and is reported more commonly from the southern states (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 1966 and 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.

Of the 1,856 isolations reported in the United States during the second quarter of 1966, 348 (18.8 percent) represented isolations from families with other members of the same family positive for shigella. This was slightly lower than the percentages reported during the previous two quarters (25.2 and 27.4, respectively).

B. Nonhuman

A total of 17 isolations of shigella was reported during the second quarter of 1966, as summarized in the table below:

<u>Serotype</u>	<u>Number of Isolations</u>	<u>Reporting Center</u>	<u>Source</u>
<u>S. boydii</u> 1	1	Mich.	Monkey
<u>S. flexneri</u> 1	2	Wisc.	Monkeys
<u>S. flexneri</u> 2	2	Ga.	Research sample
<u>S. flexneri</u> 2b	1	Texas	Lab stock culture
<u>S. flexneri</u> 3	7	Md. (3)	Monkeys
		Wisc. (1)	Monkey
		Fla. (3)	Monkey
<u>S. flexneri</u> 4a	1	Texas	Lab stock culture
Unknown	1	Wisc.	Monkey
<u>S. flexneri</u> (not typed)	2	Pa.	Monkeys
	17		

III Current Vaccine Research

In past issues of this surveillance report publications pertinent to the development of a live oral shigella vaccine have been reviewed. Recently, Formal et al. (J. Bact. 92:17-22, 1966) published their experience with an attenuated oral polyvalent vaccine in protecting monkeys against experimental shigellosis. Virulent strains of S. sonnei, S. flexneri 1b, and 3 were mated with strains of Escherichia coli. The resultant hybrids failed to cause dysentery when fed to monkeys, although they caused keratoconjunctivitis in the guinea pig eye, and they penetrated tissue culture cells. Two doses of a polyvalent oral vaccine composed of S. flexneri 1b, 2a, and 3 and S. sonnei I hybrid strains were fed to groups of monkeys at an interval of 4-7 days, and they, together with controls, were challenged 10 days after the last dose with one of the virulent parent dysentery strains. A highly significant degree of protection was afforded in all vaccinated groups with the exception of one group challenged with S. flexneri 6, a component not included in the vaccine. When animals were challenged with virulent S. flexneri 2a, 1 month after oral vaccination, they were also protected. These findings represent another encouraging step leading to the ultimate control of institutional shigellosis.

IV Current Investigations

Shigellosis Among Three Families in Ogden, Utah. From the Utah State Department of Health: Dr. G. D. Carlyle Thompson, Director of Public Health; Dr. R. W. Sherwood, Director, Preventive Medicine and Medical Facilities; and Dr. A. A. Jenkins, Director of Communicable Diseases; and the Enteric Diseases Unit, Bacterial Diseases Section, Epidemiology Branch, CDC.

In May 1966, Dr. G. D. Carlyle Thompson, Director of Public Health, Utah State Department of Health, invited the Communicable Disease Center to participate in an investigation of a Shigella sonnei outbreak which occurred during April and May in Ogden, Utah. The index case is thought to have been a 16-year-old girl who returned home from the State Industrial School after an episode of gastroenteritis. The shigella serotype isolated from her was the same as that found in 10 of the other 12 members of her family. All 12 had diarrhea and abdominal cramps, with or without fever, vomiting, or nausea.

Shigella sonnei of the same serotype was isolated from two siblings with diarrhea in another family; eight others in this second family of 10 had negative cultures. The children of both families frequently played together.

The mother and a child from a third family living near the first two families were found to have S. sonnei following a similar illness. Specific contact with the first two families was not established, although there was much intimate contact among members of this lower socioeconomic neighborhood.

Several interesting points arose from this investigation. 1. Despite close personal contact among all children in families one and two, there was very little disease in the second family. The home of this family was noted to be "immaculately clean" in contrast to the first home. 2. By colicine typing (method of Abbott and Shannon¹) the positive cultures from all three families were easily identified as serotype, S. sonnei, group D. Antibigrams confirmed the common identity of these strains. 3. In this study, xylose lysine deoxycholate (XLD) media² detected 40 percent more S. sonnei than did the simultaneously plated SS agar and MacConkey's media; Cary-Blair transport media was advantageous over buffered glycerol saline as a carrier medium³. 4. A full month after the initial isolations the majority (54.5 percent) of family members still had positive cultures for S. sonnei, suggesting asymptomatic continual reinfection or a carrier state.

V Reports from the States

- A. Shigella flexneri 2a Outbreak in an Elementary School. Reported by Ralph B. Berry, M.D., Chief, Branch of Epidemiology, Hawaii Department of Health.

On Monday, January 31, 1966, in an elementary school in Honolulu, an absentee rate of 33.7 percent was noted from a school population of 690 children. Of 245 children either absent or later sent home, 219 reported gastroenteritis. Six teachers and two of the four cafeteria employees were similarly ill. In the acute stage of the illness 11 cases were hospitalized. There were no deaths.

The striking epidemiological characteristic was the association of the ill group with one of two lunch lines, the "Waikiki" lunch line. Two hundred and one (201) of the ill persons ate in this line. There were 179 rectal swabs submitted from this group (one per child), and 151 of these grew S. flexneri 2a. Of these 151 children, 138 had been ill.

The second lunch line, the "Ewa" line, served an enrollment of 261, of whom only 13 were ill with gastrointestinal symptoms. Three of these thirteen harbored S. flexneri 2a. The incrimination of the Waikiki line is seen in the following table:

	<u>"Waikiki"</u>	<u>"Ewa"</u>
Pupils served	326	261
Number ill	201	13
Attack rate	61.7%	5%

Rectal swabs taken from all four cooks 2-3 days after they had eaten the school lunch grew S. flexneri.

1. Abbott, J. D., and Shannon, R.: A method for typing Shigella sonnei using colicine production as a marker. J. Clin. Path. 11:71, 1958.
2. Taylor, W. I., and Harris, B.: Isolation of shigellae. II Comparison of plating media and enrichment broths. Amer. J. Clin. Path. 44:476-479, 1965.
3. Cary, S. G., and Blair, E. B.: New transport medium for shipment of clinical specimens - I. Fecal specimens. J. Bact. 88:96, 1964.

No evidence was available that the school lunch for Friday, January 28, was served or prepared differently for the two lunch lines. The menu was the same. Cabbage, pineapple, banana, and mayonnaise salad served in both lines was mixed in a large bowl, using bare hands; then it was divided into two pots and served 2 hours later. There was a suspicion that the pot of salad prepared for the Waikiki line may not have been refrigerated.

All four cooks, including the two assisting in salad preparation, had positive rectal cultures, but all had eaten the school lunch. None of these food handlers gave a history of gastroenteritis prior to January 28. Their incubation periods were similar to that of the group. Household contacts of the food handlers were all negative for salmonella-shigella organisms. There was no evidence available to implicate other foods.

A follow-up rectal swab study was done. Twelve of 216 children (5.6 percent) had positive stool cultures after 5 weeks, 3 of 195 (1.5 percent) were positive after 6 weeks, and 7 of 192 (3.6 percent) were positive after 7 weeks. Only one child had two positive cultures. It was not known whether those who had positive cultures in this follow-up study had been treated earlier.

Summary: In an elementary school in Honolulu, an acute outbreak of Shigella flexneri 2a gastroenteritis occurred. Most of the sick children ate in one of two lunch serving lines. The vehicle of infection could not be determined although an unrefrigerated salad was suspected. Follow-up rectal swab cultures revealed low carrier rates, 5, 6, and 7 weeks after the epidemic.

B. Fatal Case of Dysentery Due to Shigella flexneri 2. Reported by Dr. D. S. Fleming, Director, Division of Disease Prevention and Control, Minnesota Department of Health.

On March 30, 1966, a 16-month-old girl was admitted to the Itasca Memorial Hospital with a 5-day history of diarrhea, cough, and fever. Examination at the time of admission revealed a well developed, robust child appearing acutely ill with a temperature of 104-106°, intermittent cyanosis, recurrent twitching and convulsions, rales and rhonchi in both lung fields, and thick tenacious sputum. Chest x-ray showed "peribronchial inflammation and probably bronchopneumonia." Hemoglobin was 12.6, white cell count 16,600, of which 89 percent were lymphocytes, 6 percent segmented forms, and 1 percent "stabs." A stool culture grew Shigella flexneri 2; the cerebrospinal fluid was normal. Therapy included oxygen, intravenous fluids, sedation for convulsions, hydrocortisone sodium succinate (Solu-Cortef), oxytetracycline (terramycin), and blood transfusions. She was in the hospital a total of 3 days during which time she continued to have bloody diarrhea and vomiting; she died on the 3rd day.

Postmortem examination revealed a diffuse superficial necrotizing enterocolitis, moderate pulmonary congestion, and cerebral edema. Blood cultures taken 12 hours after death grew out E. coli. Shigella flexneri 2 isolates were obtained from three cousins within 2 weeks of the child's death. All four became ill after visiting the same grandparents. No other common source was documented; the home of the grandparents was not investigated.

A cough with rales and rhonchi were present in all four cases. In one child, there were no gastrointestinal symptoms; shigella was found incidentally.

Summary: Shigella flexneri 2 was isolated from four cousins from three families. The first child, age 1½, died after an 8-day course. Respiratory symptoms and signs were present in all four cases. The source of infection could not be determined.

- C. Family Outbreaks of Shigellosis. Reported by Dr. Norman J. Rose, Chief, Bureau of Epidemiology, Illinois Department of Public Health; Dr. Samuel L. Andelman, Commissioner of Health, Chicago, Illinois; Dr. Arthur E. Sulek, Commissioner of Health, Rockford, Illinois.

Three apparently unrelated family outbreaks of shigellosis were reported from Illinois. In one, S. flexneri 3a was isolated from six individuals who suffered from dysentery; in another, S. sonnei was isolated from five individuals who had gastroenteritis; and in the third family, S. sonnei was isolated from three of five individuals who became ill. Unsanitary living conditions were found in each of the homes. The sources of infection were unknown.

TABLE I
SHIGELLA SEROTYPES ISOLATED FROM HUMANS
SECOND QUARTER, 1966

SERO TYPE	NORTHEAST																	NORTHWEST										North Total										
	Conn.	Del.	D. C.	Ill.	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
A. <i>S. dysenteriae</i> Unspecified																																						
1				1						2														3														3
2																																						
3																																						
4																																						
5																																						
6																																						
7																																						
8																																						
9																																						
10																																						
3373-50 variant R																																						
Total	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	3	
B. <i>S. flexneri</i> Unspecified			2		1	5			2			6		1	6	34			2	2	7		68	2							5	8		1		16	84	
1 unspecified												1											1													1		
1a				3																			3	1		3									4	7		
1b	2																						2													2		
2 unspecified																	12						42												6	48		
2a																							26	2			1								5	31		
2b	2			19					19	3	7	2							1				3	1		2									1	4		
3 unspecified				28					28	2						1	2						61	1									3	4		8	69	
3a				3						1													5												1	6		
3b																								1											1	1		
3c										1													1													1		
4 unspecified				1						1	10						7						17											1		21		
4a																							2	1		1								2		4		
4b																																						
5										1													1													1		
6			1					3		1													4	2												1		
variant X																																						
variant Y																																						
variant R																																						
Total	4	-	2	55	1	5	-	50	2	17	16	9	-	2	6	34	20	3	2	-	2	-	7	237	9	2	1	8	-	-	-	5	8	4	13	-	50	287
C. <i>S. boydii</i> Unspecified															1								1														1	
1																																						
2																																						
3																																						
4																											1									1	1	
5																																						
6																																						
7																																						
8																																						
9																																						
10																																						
11																																						
12																																						
13																																						
14																																						
15																																						
3615-53																																						
2710-54																																						
1621-54																																						
2044-54 variant R																																						
Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	1	2	
D. <i>S. sonnei</i>	2	1	3	35	3	1	2	-	22	3	24	28	7	1	1	24	74	8	28	1	-	-	2	270	22	2	2	-	1	-	-	23	-	25	78	-	153	423
Untypable											2												2													2		
Unknown																							2													2		
Total	6	1	5	91	4	6	2	-	72	5	45	44	16	1	3	31	108	28	31	3	-	2	11	515	31	4	4	8	1	-	-	28	8	29	91	-	204	719

TABLE I (Continued)
SHIGELLA SEROTYPES ISOLATED FROM HUMANS
SECOND QUARTER, 1966

SOUTHEAST										SOUTHWEST				OTHER					PREVIOUS QUARTER		1966 CUMULATIVE		SEROTYPE				
Ala.	Ark.	Fla.	Ga.	La.	Miss.	N. C.	S. C.	Tenn.	South-east Total	Ariz.	N. M.	Okla.	Texas	South-west Total	South Total	Alaska	Calif.	Hawaii	Virgin Islands	Other Total	Total	Percent Total		Total	Percent of Total	Total	Percent of Total
					4				4	2			1	3	7						7	.4	2	.1	9	.2	A. <i>S. dysenteriae</i> Unspecified
													3	3	3		2			2	8	.4	16	.8	24	.6	1
																3	3			3	3	.2	5	.2	8	.2	2
																											3
																											4
																											5
																											5
																											6
																											7
																											8
																											9
																											10
-	-	-	-	-	4	-	-	-	4	-	2	-	4	6	10	-	5	-	-	5	18	1.0	23	1.1	41	1.0	Total
5	17				2	7			31	1	4	12	1	18	49	9				9	142	7.6	123	5.9	265	6.7	B. <i>S. flexneri</i> Unspecified
		8	4					2	14												15	.8	17	.8	32	.8	1 unspecified
				1					1	3			2	5	6		6			6	19	1.0	24	1.1	43	1.1	1a
										4			2	6	6		6			6	14	.8	36	1.7	50	1.3	1b
2	25	34		1				21	83	11	11	3		15	98		105	55	1	147	7.9	205	9.8	352	8.9	2 unspecified	
1			14						15				62	73	88					160	279	15.0	426	20.3	705	17.8	2a
			8						8				12	12	20		14			14	38	2.0	26	1.2	64	1.6	2b
1	32	30						6	69	1	32	2		35	104		52	4		56	229	12.3	146	7.0	375	9.5	3 unspecified
									9				27	27	36						42	2.3	59	2.8	101	2.6	3a
													3	3	3						4	.2	4	.2	8	.2	3b
									1						1						2	.1	3	.1	5	.1	3c
	9	2		1				5	16		12	2		14	30					51	2.7	36	1.7	87	2.2	4 unspecified	
			4						4	5			27	32	36		16			16	56	3.0	56	2.7	112	2.8	4a
									1						1						1	.05	7	.3	8	.2	4b
	46		5	2				1	55	6	7		2	2	3		4			4	8	.4	11	.5	19	.5	5
													25	38	93		29			29	128	6.9	83	4.0	211	5.3	6
																											variant X
																											variant Y
5	21	120	75	39	3	7	-	37	307	32	66	19	163	280	587	9	232	59	1	301	1,175	63.3	1,262	60.1	2,437	61.6	Total
																											C. <i>S. boydii</i> Unspecified
										2				2	2						3	.2	2	.1	5	.1	
										1			1	2	2		1			1	1	.05	11	.5	19	.02	1
																	6			6	8	.4				.02	2
																											3
				1					1					1	1		1			1	2	.1	3	.1	5	.1	4
																				2		.1	1	.05	3	.1	5
																											6
																											7
																											8
																											9
																	2			2	2	.1	9	.4	11	.3	10
																							1	.05	1	.02	11
																											12
																											13
																							1	.05	1	.02	14
																											15
																											3610-53
																											2710-54
																											1621-54
																											2044-54
																											variant R
-	-	-	-	1	-	-	-	-	1	1	3	-	1	5	6	-	10	-	-	10	18	1.0	30	1.4	48	1.2	Total
1	-	39	29	10	-	20	-	9	108	3	5	3	43	54	162	1	47	7	-	55	640	34.4	773	36.8	1,413	35.7	D. <i>S. sonnei</i>
																											Untypable
													1	1	1												
6	21	159	104	50	3	31	-	46	420	36	76	23	211	346	766	10	294	66	1	371	1,856	.3	10	.5	13	.3	Unknown
																											Total

TABLE II

CUMULATIVE SHIGELLA SEROTYPE FREQUENCIES
Based on all Isolations Reported from Fourth Quarter 1963 Through
Second Quarter 1966

	<u>Number Reported</u>	<u>*Calculated Number</u>	<u>*Calculated Percent</u>	<u>Rank</u>
A. <u>S. dysenteriae</u>				
1	1	1	0.01	21
2	53	75	0.40	13
3	18	25	0.13	14
4				
5				
6	1	1	0.01	21
unspecified	29			
B. <u>S. flexneri</u>				
1a	205	445	2.36	7
1b	159	345	1.83	8
1 unspecified	290			
2a	1868	5032	26.64	2
2b	281	757	4.01	6
2 unspecified	2645			
3a	319	1984	10.50	3
3b	30	187	0.99	10
3c	48	298	1.58	9
3 unspecified	1647			
4a	463	1151	6.09	5
4b	34	84	0.44	12
4 unspecified	526			
5	62	75	0.40	13
6	978	1181	6.25	4
variant y	17	21	0.11	15
unspecified	1898			
C. <u>S. boydii</u>				
1	2	3	0.02	19
2	69	113	0.60	11
3				
4	9	15	0.08	17
5	3	5	0.03	18
6	1	2	0.01	20
7	1	2	0.01	20
8	1	2	0.01	20
9	1	2	0.01	20
10	11	18	0.10	16
11	1	2	0.01	20
12	1	2	0.01	20
14	1	2	0.01	20
unspecified	64			
D. <u>S. sonnei</u>	7003	7058	37.37	1
Untypable	4			
Unknown	144			
Total	18,888	18,888		

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

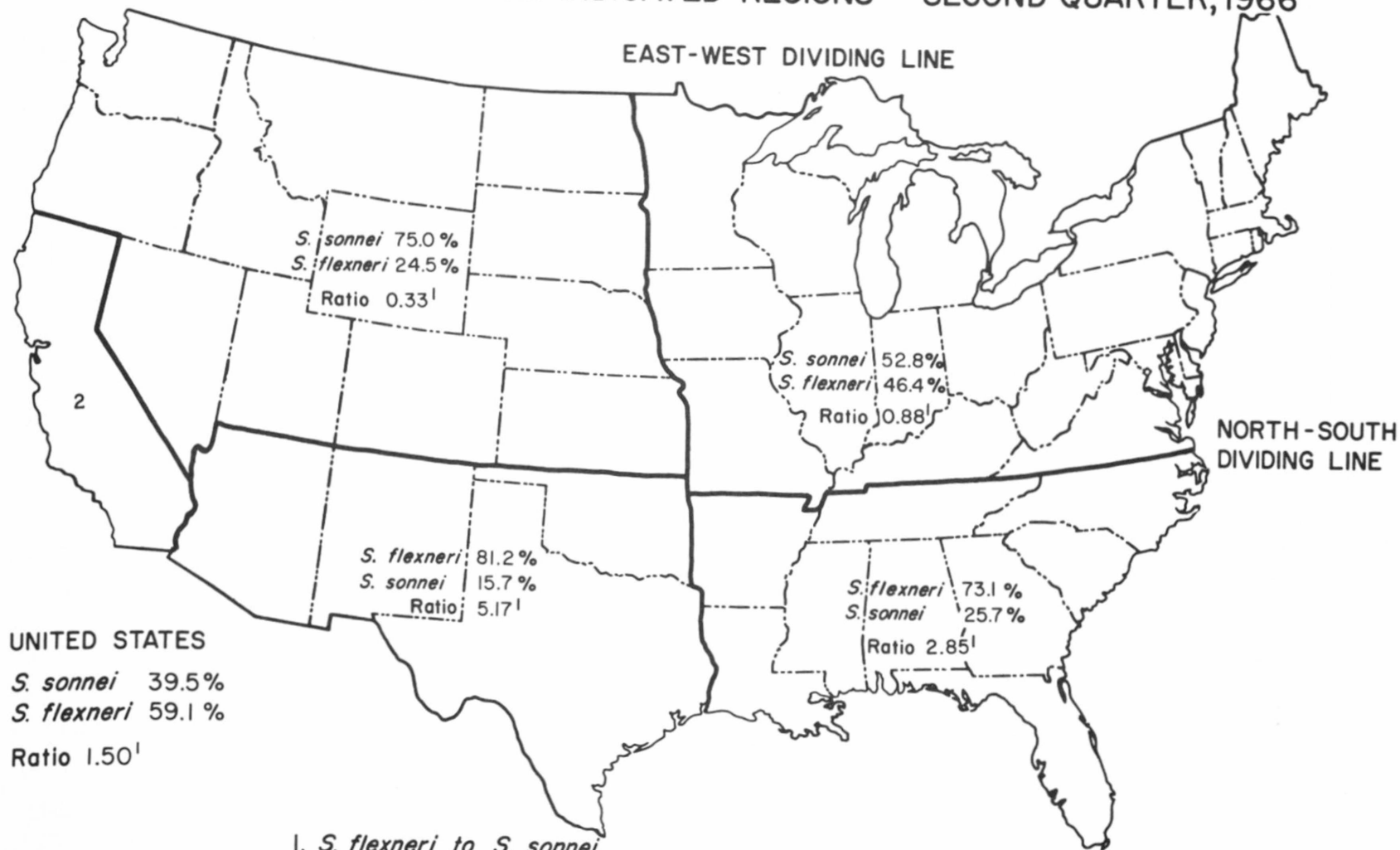
TABLE III

Age and Sex Distribution of Individuals Reported as Harboring
Shigella in the United States During the Second Quarter of 1966

<u>Age (years)</u>	<u>Male</u>	<u>Female</u>	<u>Unknown</u>	<u>Total</u>	<u>Percent</u>	<u>Cumulative Percent</u>
Under 1	76	47	1	124	12.0	12.0
1-4	198	190	1	389	37.8	49.8
5-9	108	108		216	21.0	70.8
10-19	66	59	1	126	12.2	83.0
20-29	36	43	1	80	7.8	90.8
30-39	19	26		45	4.4	95.2
40-49	13	8		21	2.0	97.2
50-59	7	8		15	1.5	98.7
60-69	3	3		6	0.6	99.3
70-79	2	2		4	0.4	99.7
80+	2	2		4	0.4	100.1
Child (unspec.)	8	5	1	14		
Adult (unspec.)	6	11		17		
Unknown	231	221	343	795		
Total	775	733	348	1856		
Percent of Total	51.4	48.6				

Figure 1

PERCENTAGE *S. flexneri* and *S. sonnei* OF TOTAL SHIGELLA ISOLATIONS REPORTED FROM INDICATED REGIONS - SECOND QUARTER, 1966

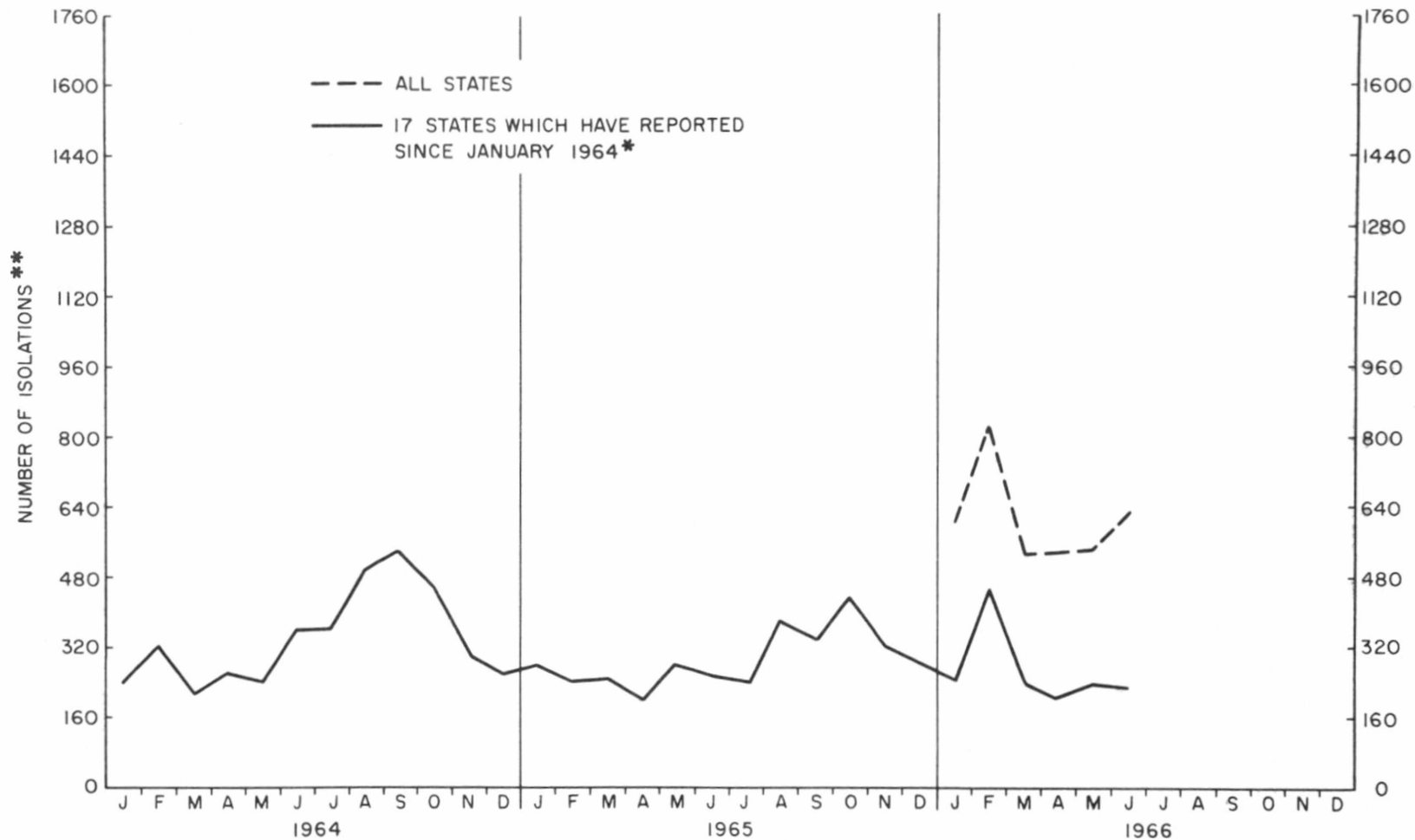


1. *S. flexneri* to *S. sonnei*.

2. CALIFORNIA IS EXCLUDED BECAUSE IT OVERLAPS TWO REGIONS.

Figure 2.

REPORTED ISOLATIONS OF SHIGELLA IN THE UNITED STATES



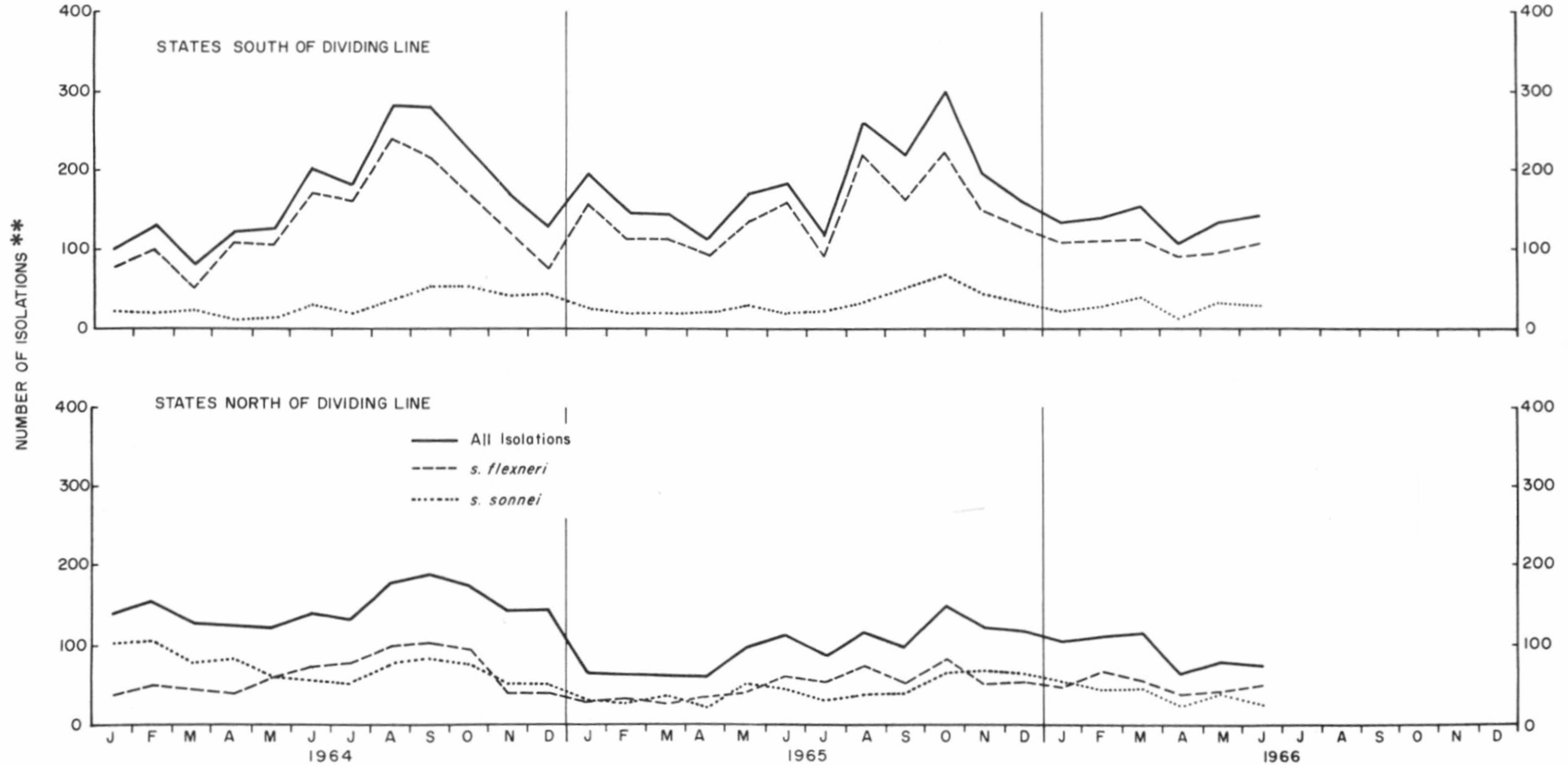
*ALASKA, ARIZONA, HAWAII, ILLINOIS, KANSAS, MARYLAND, NEW JERSEY, NEW MEXICO, NORTH CAROLINA, NORTH DAKOTA, OHIO, OKLAHOMA, OREGON, SOUTH DAKOTA, TENNESSEE, TEXAS AND VERMONT.

**ADJUSTED TO FOUR-WEEK MONTHS.

Figure 3.

SEASONAL DISTRIBUTION OF SHIGELLA ISOLATIONS BY SEROTYPE AND REGION

15 STATES WHICH HAVE REPORTED SINCE JANUARY 1964*



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

** ADJUSTED TO 4-WEEK MONTHS.