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REPORT NO. 23 June 15, 1970

national communicable disease center SHIGELLA surveillance

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U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE : PUBLIC HEALTH SERVICE HEALTH SERVICES AND MENTAL HEALTH ADMINISTRATION

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

For the first quarter of 1970, 1,621 isolations of shigella from humans were reported. This number represents a decrease of 1,294 (44.4 percent) from the 2,915 isolations in the fourth quarter of 1969 and a decrease of 183 (10.1 percent) from the 1,804 isolations in the first quarter of 1969 (Table I.)*

II. <u>Reported</u> Isolations

A. Human

la. General Incidence

For the first quarter of 1970, 60.5 percent of isolations were from children under 10 years of age (Table II); this is consistent with previous quarters. The highest attack rate was in the 1-4 age group.

1b. Shigellosis among Indians

One hundred fifteen cases of shigellosis were reported from the eight administrative areas of the Indian Health Service (IHS) to the NCDC (Figure 1). This number represents a decrease of 52 (31.1 percent) from the 167 cases for the fourth quarter of 1969 and a decrease of 14 (10.9 percent) from the 129 cases reported for the first quarter of 1969.



Indian Health				Total First	Attack Rate
Area	January	February	March	Quarter	per 100,000**
Abordoon	F	10	0	10	00 F
Aberdeen	2	12	2	19	33.5
Albuquerque	2	2	2	6	21.7
Alaska	-	-	1	1	2.0
Billings	2	1	1	4	16.3
Oklahoma City	1	5	2	8	10.9
Phoenix	5	3	5	13	25.0
Portland	4	0	0	4	18.0
Navajo	27	11	22	60	62.2
All areas	46	34	35	115	28.6

**Based on 1968 population estimates of Indians receiving health services from the Indian Health Service, U. S. Public Health Service.

*No laboratory reports were received trom California and the Virgin Islands; a summary of clinical cases reported to California is found on page 7.

2. Serotype Frequencies

Forty-eight of the 51 reporting centers participating in the Shigella Surveillance Program reported isolations of shigella. Eighteen different serotypes were reported (Table I). The six most frequently reported serotypes for the 3-month period were the following (Table III):

Rank	Serotype	Number Reported	Calculated Number*	Calculated Percent	Rank Last Quarter
1	S. sonnei	1,079	1,082	66.8	1
2	S. flexneri 2a	102	189	11.7	2
3	S. flexneri 3a	42	129	8.0	3
4	S. flexneri 6	52	60	3.7	4
5	S. flexneri 2b	28	52	3.2	5
6	S. flexneri 4a	16	39	2.4	6
	Subtotal	1,319	1,551	95.7	
	Total (all serotyr	pes) 1,621	1,620		

*from Table III

Table III is calculated from data compiled in the first quarter of 1970. This table shows the relative frequency of isolation of the various serotypes; the isolations in each of the unspecified categories are distributed in their subgroups in the same proportion as the completely specified isolations of that group. The resulting distribution in the table is called the "calculated number," and from this is derived a "calculated percent" for each serotype. These provide approximate indices of the relative frequencies of the more common shigella serotypes in the United States. <u>S. sonnei</u> now accounts for approximately two-thirds of all isolations. Table IV shows the distribution of shigella serotypes reported from mental institutions.

3. Geographical and Seasonal Observations

There were more reported isolations of <u>S</u>. <u>sonnei</u> than <u>S</u>. <u>flexneri</u> in every region of the United States except in the southwest region and in the state of Alaska, which had only 9 isolations of <u>S</u>. <u>flexneri</u> (Figure 2). The seasonal distribution is depicted in Figure 3. Figure 4 shows the number of reported isolations per million population by state for January-March 1970, utilizing population estimates for July 1, 1969. Approximately 8.0 isolations per million population were reported for the first quarter of 1970. Table V shows the residence of those patients from whom shigella was isolated.

Figure 2 PERCENTAGE S. flexneri AND S. sonnei OF TOTAL SHIGELLA ISOLATIONS REPORTED FROM INDICATED REGIONS UNITED STATES, JANUARY - MARCH 1970



Figure 3 REPORTED ISOLATIONS OF SHIGELLA IN THE UNITED STATES



* ADJUSTED TO 4-WEEK MONTH



Figure 4 ATTACK RATES OF SHIGELLOSIS BY STATE, JANUARY - MARCH 1970

B. Nonhuman

For the first quarter 1970, 58 nonhuman isolations of shigella were reported:

	Serotype	Number	Source	State
S.	dysenteriae unspecified	3	monkey	Maryland (USAMRIID)*
S.	dysenteriae 4	1	salad	Arkansas
S.	flexneri unspecified	2	monkey	Oregon
S.	flexneri 3	5	monkey	Hawaii
S.	flexneri 4b	36	monkey	Maryland (USAMRIID)
_		3	anima1	Louisiana
S.	boydii 3	1	animal	Louisiana
s.	boydii 13	1	monkey	Maryland (USAMRIID)
s.	sonnei	1	animal	Louisiana
_		1	monkey	Oklahoma
		4	monkey	Maryland (USAMRIID)

*USAMRIID (U.S. Army Medical Research Institute of Infectious Diseases)

III. Current Investigations

Epidemic of Shiga Dysentery in El Salvador. Reported by Eduardo Navarro, M.D., Chief of Epidemiology and Roberto Masferrer, M.D., Chief, Central Laboratory, Ministry of Public Health and Social Assistance; Max Bloch, M.D., Chief, Central Laboratory, Rosales Hospital, San Salvador, El Salvador; and L. Barth Reller, M.D., Enteric Diseases Section, Bacterial Diseases Branch, Epidemiology Program, NCDC.

In mid-1969, a regional outbreak of bacillary dysentery in Guatemala and Honduras* extended into neighboring El Salvador. The etiologic agent was <u>Shigella</u> <u>dysenteriae</u> type 1. Figure 5 depicts dysentery morbidity in El Salvador for the 5 years before the current epidemic, both the average incidence by month and the upper limit of expected cases. In 1969 this pattern was markedly different, most strikingly so in the total number of reported cases.



Local confirmation of the etiology of this outbreak was limited to hospitals where the bacteriologic isolation of <u>S</u>. <u>dysenteriae</u> type 1 was possible. In 1968, the laboratory at the Rosales Municipal Hospital in San Salvador had only 9 isolations of this organism. In contrast there were 250 isolations in 1969. The increase began in August, accelerated in September, and continued through January 1970. The experience in San Juan de Dios Hospital in Santa Ana was similar. In retrospect, these laboratory isolations of <u>S</u>. <u>dysenteriae</u> 1 support the conclusion based on subsequent positive stool cultures from individual patients with clinical dysentery that the epidemic was caused by this organism. The antibiotic sensitivity patterns of isolations in El Salvador were identical to those determined on earlier cultures from Guatemala, viz., sensitive to ampicillin, nitrofurantoin, moderately sensitive to penicillin, and resistant to tetracycline, chloramphenicol, and sulfonamides.

^{*}See also Shigella Surveillance Report No. 22, April 13, 1970, page 5, III. Current Investigations, Epidemic of Shigellosis in Guatemala and page 10, V. Current Trends and Developments, Importation of Shiga's bacillus into the United States.

Of interest was the geographic progression of the epidemic (Figure 6). The outbreak in El Salvador followed that of its northern neighbor Guatemala by 3-6 months from overall peak activity in one country to the impending crest in the other. The first severely affected area was Department Chalatenango in July 1969. This department borders Honduras with which El Salvador had a border conflict in July 1969 erupting into a brief state of war. As a result tens of thousands of refugees streamed back into this department from which they later traveled to other areas of El Salvador. There were reports of rampant dysentery among refugees. In August 1969, there was a peak of dysentery cases in Department Ahuachapan, which borders Guatemala to the north and through which 2 of the 3 main roads from Guatemala pass. The initial peak of cases for most departments was in October. The departments farther south along the 2 main routes of commerce, the Pan American highway and the coastal road, were affected later with large numbers of reported cases. The Department San Miguel peaked in November, and La Union on the southeast border experienced a severe outbreak in January 1970 (Figure 6).





In 1969, Department La Paz reported the highest overall morbidity rate with 284 cases per 10,000 population. Department La Union was the last to be affected and reported the fewest cases, 34.9 per 10,000 in 1969.

The El Salvador mortality data for January 1970 alone listed 297 deaths and 9,216 cases for a death-to-case ratio of 3.2 percent. Before the disease was recognized as being caused by <u>S</u>. <u>dysenteriae</u> 1, case-fatality ratios as high as 35 percent were reported in hospitalized patients, particularly in young children and infants treated inappropriately with parenteral emetine.

Of necessity, age and sex specific information was gathered from hospital data. Infants under 1 year of age were at greatest risk of developing dysentery requiring hospitalization. The attack rates for older children and adults were remarkably similar. This is in great contrast to other diarrheal diseases and other serotypes

of shigella in which the attack rates decline abruptly after early childhood. Males were more often admitted to hospitals where the male to female ratio was approximately 1.4:1.

In summary, from mid-1969 through early 1970 El Salvador became involved in a regional epidemic of Shiga dysentery. The outbreak progressed from north to south along main routes of commerce and affected a widely susceptible population in all age groups. The high case-fatality ratios dropped markedly where the correct diagnosis was made and adequate antibiotic and fluid therapy were employed.

IV. Reports from the States

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A. Shigellosis in California. Abstracted from California Morbidity: Reported Cases of Selected Notifiable Diseases (provisional). January-March 1970

Shigellosis	Cases Repo	rted by	Month	Total Shigellosis	Cases	Reported to Date
	1969	1968	1967	1969	1968	1967
January	92	115	158	92	115	158
February	87	96	112	179	211	270
March	111	116	93	290	327	363

First Quarter Totals

327 363

Β. Shigella dysenteriae type 1, California 1964-1970. Reported by Philip K. Condit, M.D., Chief, and Ronald Roberto, M.D., Medical Epidemiologist, General Epidemiology Section, Bureau of Communicable Disease, and Ronald M. Wood, Ph.D., Chief, and Catherine Powers, Chief Enteric Microbiologist, Microbial Diseases Laboratory, California State Health Department; Ichiro Kamei, M.D., Chief, Acute Communicable Disease Control Division, Los Angeles County Health Department; John H. Philip, M.D., Health Officer, Orange County Health Department; Edgar Wayburn, M.D., Epidemiologist, San Francisco City-County Health Department; and Mary H. Clark, M.D., Assistant Health Officer, Santa Clara County Health Department.

In 1969, nine isolations and in 1970, as of April 30, two isolations of Shigella dysenteriae type 1 (Shiga's bacillus) were confirmed at the Microbial Disease Laboratory of the California State Department of Health. This was a marked increase over the total of three isolations for the previous 5 years, 1964-1968 (Table 6). In view of the regional epidemic of dysentery due to this serotype reported in Central America, a retrospective survey of the 11 patients with S. dysenteriae type 1 in 1969 and 1970 was initiated to determine where these patients had been exposed.

Table 6

Kepor	Led cases of surgerrosts and 5. dy	senteriae type i	
	by Year, California, 1964-April	30, 1970	
Year	Cases of S. dysenteriae type 1	Cases of Shigellosis	
1964	1	1,741	
1965	0	1,617	
1966	1	1,659	
1967	0	1,726	
1968	1	1,748	
1969	9	1,943	
1970 (through			
April 30)	2	*	
*Not vet available			

Poported Cases of Chicollegia and C. durantenics tur

Of the ll cases, six were reported from Los Angeles, three from San Francisco, and one each from Santa Clara and Orange Counties. All ll patients had traveled outside of the United States during or just prior to their onset of illness. Seven had been in Mexico, two in Guatemala, one in El Salvador, and one in Afghanistan. Three of the seven travelers to Mexico had been in Acapulco, two in Mexico City, one near Guadalajara, and one had traveled only to Tijuana. Nine of the patients were tourists, while the travel status of two could not be determined. The patients were from 4 to 49 years of age, and six were over the age of 15 years. Eight were males and three were females.

Illness in these patients was characterized by an acute enterocolitis of moderate to marked severity and included abdominal cramps, bloody diarrhea, nausea, vomiting, and fever. Eight of the patients were hospitalized, one was treated as an outpatient, and information about the treatment of two was not available. Complications occurred in a 4-year-old girl who developed gross hematuria, oliguria, decreased platelets, and transient hypertension while undergoing treatment. This patient has recovered completely. There were no deaths.

No clinical secondary cases were recognized among families or intimate contacts of the eight patients who were available for questioning, although all contacts were not cultured. Five probable co-primary cases were found among family members who had traveled with the patient but who had not been hospitalized or cultured. All had developed onset of symptoms on the same day as the culture positive patients but had milder illnesses.

Editorial Comment: California's experience with <u>S</u>. <u>dysenteriae</u> type 1 reflects what has been reported for the rest of the United States during 1969-1970 (MMWR, Vol. 19, Nos. 7 and 17). Frequent introductions of these cases into the United States, particularly in the southwest border states, emphasize the need for continuing surveillance. Tracing the source of infection in one case as far north as Tijuana has especially important implications for public health workers in southern California. Physicians and laboratory workers should consider <u>S</u>. <u>dysenteriae</u> type 1 infection in the differential diagnosis of all cases of enterocolitis in tourists, migrant workers, and other visitors who have recently traveled in Mexico or Central America.

C. Shipboard Shigellosis, Norfolk, Virginia. Reported by Officers-in-Charge, USPHS Quarantine Stations, St. Croix, Virgin Islands, and Norfolk, Virginia; Epidemiology and Research Analysis Branch, Foreign Quarantine Program; George K. Morris, Ph.D., Chief, Salmonella-Shigella Unit, Epidemiological Services Laboratory Section, Joseph A. Donadio, M.D., Acting Chief, Foodborne Outbreaks Surveillance Unit, and Ignatius F. Setiady, M.D., AID Participant, Bacterial Diseases Branch, Epidemiology Program, NCDC.

On January 27, 1970, an outbreak of shigellosis occurred among officers and crew members of the Norwegian Supertanker, M/S Jarama while en route from Japan to Norfolk, Virginia, where she arrived on February 8. The vessel previously had made stops in Kuwait (December 16), Italy (January 16-19), Libya (January 20-22), and the Virgin Islands (February 2-5). Of a total of 42 persons aboard, 28 (67 percent) had an illness characterized by diarrhea (100 percent) with mucus (37 percent), fever (74 percent), abdominal cramps (52 percent), nausea (33 percent), and vomiting (26 percent). The mean duration of illness was 3.5 days with a range of from 1 to 10 days.

The index patient was the chief steward, a food handler, who became ill on January 20, 1 day after the ship left Taranto, Italy. His date of onset suggested that he had acquired his illness while the ship was in port in Taranto. He had eaten a meal of raw shellfish and wine while there. While the chief steward did not handle food on January 21, he subsequently resumed his activities, routinely preparing dry milk and intermittently assisting the cook in preparation of salads and cold cuts. Since the chief steward was known to be excreting shigella organisms during his convalescence, it is likely that he was responsible for the cases beginning on January 27 (Figure 7). Included among those ill during the interval January 27-30 were two other food handlers, the cook and a kitchen assistant. Since those individuals continued to perform their duties and were shown to harbor shigellae during their convalescence, any one of them could have been responsible for the cases beginning on February 5. The contaminated vehicle aboard ship could not be determined by food specific attack rates, since while on the ship, nearly all seamen consumed the same foods. It appeared unlikely that foods served at breakfast time were the incriminated vehicles because several ill seamen never ate breakfast. One strict vegetarian, a crewman, became ill.

Three culture surveys (on February 10, 11, and 19) were performed on the entire crew; a total of 16 persons, 3 of whom were asymptomatic, had one or more isolations of <u>Shigella</u> <u>sonnei</u>. Positive cultures included those from the chief steward, cook, and kitchen assistant. Standard disk sensitivity studies showed the organism was sensitive to ampicillin, gentamicin, and naladixic acid, but resistant to tetracycline, streptomycin, sulfonamides, and chloramphenicol. Water and environmental samples from the kitchen and storerooms were negative for shigellae.

Serologic evaluation of the crew, using a hemagglutination test with control sera from merchant seamen from another Norwegian ship docked in Norfolk at the same time, was performed. Ten of the 28 ill seamen from the <u>Jarama</u> had elevated titers, while none of the remaining 14 well seamen or the 21 controls from the other ship had measurable titers.

The following control measures were suggested: (1) that antibiotic treatment be given to those persons shedding shigella organisms; (2) that culture-positive food handlers be removed from handling food until they became culture negative; and (3) that all practice strict personal hygiene.

Editorial Comment: In the 5-year period 1964-1968, 21 foodborne or waterborne outbreaks of shigellosis were reported to NCDC. (1) In those outbreaks in which the vehicle was identified, a salad was frequently the incriminated vehicle (64 percent). The next most commonly responsible vehicle was water (27 percent). In this recent outbreak, salad was served on January 22 and cold cuts almost daily for lunch. It is probable that one of these items was the contaminated vehicle, although water could not be excluded.

 Donadio JA, Gangarosa EJ: Foodborne Shigellosis. J Infect Dis 119(6):666-668, 1969.

Figure 7 27* CASES OF SHIGELLOSIS ABOARD M/S JARAMA, BY DATE OF ONSET, JANUARY 18 - FEBRUARY 11, 1970



*I CASE NOT SHOWN, DATE OF ONSET UNKOWN

V. Current Trends and Developments

Colicine Typing as an Epidemiological Tool in the Investigation of Outbreaks of Shigella. Reported by L. Barth Reller, M.D., Acting Chief, Shigella Surveillance Unit, Enteric Diseases Section, Bacterial Diseases Branch, Epidemiology Program, NCDC.

<u>Shigella sonnei</u> has become the most frequently isolated and reported subgroup of the genus <u>Shigella</u> in the United States (1). In 1969, 60.9 percent of all shigellae reported to the National Communicable Disease Center (NCDC) were <u>S</u>. <u>sonnei</u> versus 35.7 percent in 1964. As <u>S</u>. <u>sonnei</u> isolations have progressively increased there has been a corresponding decrease in the proportion of isolations of <u>S</u>. <u>flexneri</u>; <u>S</u>. <u>dysenteriae</u> and <u>S</u>. <u>boydii</u> have continued to be infrequently isolated. A review of reports documenting this trend earlier in the United Kingdom, Europe, and Japan appeared in the Shigella Surveillance Report (SSR) No. 18, pp. 7-10, March 3, 1969.

Unlike the other subgroups of <u>Shigella</u>, which can be further divided into a number of serotypes, subgroup D contains only <u>S</u>. <u>sonnei</u>. In 1958, Abbott and Shannon (2) published a technique of differentiating strains of this organism by their capacity to produce colicines which inhibit the growth of selected indicator or passive strains of other shigellae. Subsequently, Gillies modified the method and reported its usefulness as an epidemiological marker of S. sonnei (3).

During 1968-1970, subcultures of isolations of <u>S. sonnei</u> from a series of 8 outbreaks of shigellosis, 7 of which have been described previously in the SSR, were obtained for colicine typing. The method used was that described by Dr. R. R. Gillies (2) who also kindly provided the indicator strains required and confirmed the results in a large sample of cultures. A synopsis of each outbreak and the results of colicine typing are presented below:

Outbreak 1 -- Ohio (SSR No. 18, pp.2-6, March 3, 1969)

In September and October 1968, a series of four separate common-source outbreaks of shigellosis were associated with the ingestion of food from a single caterer. Food histories implicated potato salad and chicken salad as vehicles of infection. Stool cultures from 29 patients and one foodhandler were positive for <u>S. sonnei</u>.

All 17 available cultures from individuals in each of the four epidemiologically related outbreaks were untypable, i.e., they did not produce colicines which inhibited any of the 15 indicator strains used.

Outbreak 2 -- Vermont (SSR No. 18, pp. 6-7, March 3, 1969)

During the months of September through November 1968, 92 persons in the lower socioeconomic area of a city were known to have developed dysentery. In most instances the first case in the involved family groups was a child under age 10, many of whom had the opportunity to play together. <u>Shigella sonnei</u> was cultured from the feces of 33 of the persons ill.

The 9 isolations tested all corresponded to Gillies' type 4 except for variability of reactions with 2 of the 15 indicator strains.

Outbreak 3 -- Oregon (SSR, No. 20, pp. 11-12, September 3, 1969)

In March and April 1969, 31 of 36 residents in a housing development became ill with acute febrile gastroenteritis. The epidemic curve was compatible with a common-source outbreak, and the epidemiologic investigation incriminated a well as the source of infection. Water from the well was cultured and grew S. sonnei and coliform organisms.

Eleven <u>S</u>. <u>sonnei</u> cultures were received; six were of a uniform type, 5 of these were from patients involved in the waterborne outbreak described and the other was from the well water incriminated. The other 5 cultures were of three different colicine types and were unrelated. Two were type 3A and these were obtained from sisters of one of the patients with shigellosis in another region of the state.

Outbreak 4 -- Texas

In May 1969, four children with febrile diarrhea in a private home for mentally retarded and physically handicapped children had <u>S</u>. <u>sonnei</u> isolated from their stools. Subsequently a total of 14 isolations of <u>S</u>. <u>sonnei</u> from children and 1 staff member at the home were obtained over a 3-month period.

All 14 cultures showed an identical pattern of inhibition of the indicator strains. However, this confirmed pattern does not correspond to that produced by any recognized strains.

Outbreak 5 -- Oregon (SSR, No. 21, pp. 6-7, December 5, 1969)

Between late July and mid-August 1969, 37 persons developed acute febrile gastroenteritis. <u>Shigella sonnei</u> was recovered from the stools of 15 patients. Eight family groups were affected and the index case in each of these families was a child between the ages of 2 and 6 years who had waded in a municipal pool, subsequently shown to be grossly contaminated with coliform organisms.

All 12 isolations from individuals epidemiologically associated with the wading pool were identical and, except for variable inhibition of indicator 9, correspond to Gillies' type 7.

Outbreak 6 -- New Jersey (SSR, No. 22, pp. 6-7, April 13, 1970)

Between September and November 1969, an outbreak of febrile diarrhea occurred in two of three wings of the pediatric nursery of a New Jersey school for the mentally retarded. Of the 164 children on the two involved wings, 107 became ill with shigellosis (65.2 percent).

Nine of 10 cultures tested inhibited none of the 15 indicator strains. The other was unclassifiable according to recognized patterns of inhibition.

Outbreak 7 -- New York (SSR, No. 22, pp.9-10, April 13, 1970)

In October and November 1969, an outbreak of shigellosis occurred in New York in an institution for homeless children. <u>Shigella sonnei</u> was isolated from the stools of 18 of 35 infants and toddlers (51 percent) and 2 of 25 student nurses (8 percent) who lived or worked on a single ward.

These 18 isolations were uniformly untypable except for one--a confirmed type 2. In reviewing the culture numbers with the referring laboratory, it was found that the individual from whom the culture was obtained was not related to the reported outbreak and resided in a different part of the city.

Outbreak 8 -- Foreign Vessel (see pp. 8-9 of this report)

The strain of <u>S</u>. <u>sonnei</u> from the index case (food handler) as well as the 17 other isolations all produced an identical pattern of inhibition. This pattern does not correspond to a type heretofore recognized.

Discussion

Cultures in all eight outbreaks reported in this study demonstrated uniformity of type, and cultures unrelated epidemiologically were found to exhibit different patterns. Furthermore, in outbreak 2 (Vermont) although a common-source could not be identified, the uniformity of typed cultures substantiated the spread of a single strain from person-to-person throughout the neighborhood. Corroborative evidence linking the index case, who was also a food handler, to subsequent cases aboard the ship in outbreak 8 was afforded by finding identical patterns of inhibition. In outbreak 1, laboratory support was provided for the hypothesis that a food handler contaminated a salad which served as a vehicle resulting in four separate but related outbreaks when all cultures were uniformly untypable. The fact that no indicator strains are inhibited by test organisms limits but does not vitiate the usefulness of the technique. It does illustrate the necessity to develop additional indicator strains. Furthermore, it would be of interest to know the relative frequency of different colicine types of S. sonnei isolated in the United States. In this regard, the finding of inhibition patterns in outbreaks 4 and 8 previously reported by Gillies (3) suggests that the distribution of colicine types in widely separated geographical areas may be quite different. Clarification of these questions must await an accumulation of experience with colicine typing of S. sonnei cultures in the United States.

Editorial Note: The Epidemiologic Services Laboratory, NCDC, now offers colicine typing as a regular service in all outbreaks due to <u>S</u>. <u>sonnei</u>. Those interested in availing themselves of this and other epidemiologic services should contact NCDC through their state epidemiologists. A list of state epidemiologists is given on the last page.

Reller LB, Gangarosa EJ, Brachman PS: Shigellosis in the United States: Five-Year Review of Nationwide Surveillance, 1964 - 1968. Amer J Epidem 91(2):161-169, 1970.

⁽²⁾ Abbott JD, Shannon R: A method of typing <u>Shigella sonnei</u> using colicine production as a marker. J Clin Path 11:71-77, 1958.

⁽³⁾ Gillies RR: Colicine production as an epidemiological marker of <u>Shigella</u> <u>sonnei</u>. J Hyg (Camb) 62:1-9, 1964.

TABLE I SHIGELLA SEROTYPES ISOLATED FROM HUMANS FIRST QUARTER 1970

	NORTHEAST NORTHWEST																																						
SEROTYPE	CONN	DEL	DC	ורר	IND	IOWA	KΥ	ME	MD	MASS	MICH	MINN	MO	IZ	rz	NY-A	NY-C	оню	PA	RI	νT	VA	W. V A	WISC	NORTHEAST TOTAL	сого	IDAHO	KANS	MONT	NEB	NEV	ND	ORE	SD	UTAH	WASH	WYO	NORTHWEST TOTAL	NORTH TOTAL
A.S.dysenteriae Unspecified 1 2 3				2						1															0 2 2 0								1		2			3 0 0 0	3 2 2 0
Total	0	0	0	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	1	0	2	0	0	3	7
B.S.flexneri Unspecified 1 Unspecified 1A 1B 2 Unspecified 2A 2B 3 Unspecified 3A 3B 3C 4 Unspecified 4A 4B 5 6	1	1		4 12 9 111 1	3		1		1 6 1 2	1	4 1 1 2	2	1		1	4	24	1 5 9	1		1			3	355 1 5 1 10 23 12 1 2 1 2 1 0 1 1 1 8	3	5	1	1 1 9 4			2	2	2	1	1 2 1 1		111 1 2 0 2 16 0 6 0 0 0 0 1 4 0 0 7	46 2 7 1 10 37 10 29 12 1 2 2 4 1 1 25
Total	1	1	0	44	3	0	2	0	10	2	8	3	3	0	8	4	24	15	7	0	1	0	0	4	140	3	5	6	16	0	0	4	2	2	6	6	0	50	190
C.S.boydii 1 2 4	1																	1							1 0 1													0	1 0 1
Total	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
D.S.sonnei	10		15	63	14	25	4		14	91	26	99	28	35	21	14	27	21	17	3	2	3	6	77	615	12	1	11			11	2	3		7	13		60	675
Unknown			1		T							1													2													0	2
TOTAL	12	1	16	110	17	25	6	0	24	94	34	103	31	35	29	18	51	37	24	3	3	3	6	81	763	15	6	17	16	0	11	6	6	2	15	19	0	113	876

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			so	UT	ΗE	AST					sou	тн	WES	т			0.	тне	R				PREV	/IOUS RTER	
ALA	ARK	FLA	GA	LA	MISS	NC	sc	TENN	SOUTHEAST TOTAL	ARIZ	WN	OKL	TEX	SOUTHWEST TOTAL	SOUTH TOTAL	ALASKA	CALIF	HAWAII	VIRGIN ISLANDS	отнек тотас	TOTAL	PERCENT OF TOTAL	TOTAL	PERCENT OF TOTAL	SEROTYPE
																									A.S.dysenteriae
									0					0	0					0	3	0.2	1	0.0	Unspecified
									0					0	0					0	2	0.1	2	0.1	1
			1			1			2					0	2					0	4	0.2	4	0.1	2
									0				2	2	2					0	2	0.1	3	0.1	3
0	0	0	1	0	0	1	0	0	2	0	0	0	2	2	4	0	0	0	0	0	11	0.7	10	0.3	Total
																									B.S.flexneri
9		1			6				16	1			1	2	18					0	64	3.9	139	4.8	Unspecified
		3	2						5		2			2	7					0	9	0.6	17	0.6	1 Unspecified
									0					0	0	2				2	9	0.6	19	0.7	1A
				1					1				2	2	3					0	4	0.2	7	0.2	1B
	1	13	25		1	3		8	51		20			20	71					0	81	5.0	90	3.1	2 Unspecified
				2					2	7		1	49	57	59			6		6	102	6.3	200	6.9	2A
				3					3	1			9	10	13	5				5	28	1.7	51	1.7	2B
		1	17			2		17	37	1	16			17	54					0	83	5.1	87	3.0	3 Unspecified
	1			11					12	9			9	18	30					0	42	2.6	99	3.4	3A
									0	1			2	3	3					0	4	0.2	7	0.2	3B
		1							1					0	1					0	3	0.2	7	0.2	3C
		2	3					2	7		10			10	17					0	19	1.2	10	0.3	4 Unspecified
	1	1							2				9	9	11			1		1	16	1.0	42	1.4	4A
									0					0	0					0	1	0.1	4	0.1	4B
									0	1			1	2	2					0	3	0.2	7	0.2	5
		1	1					5	7	4	4	1	9	18	25	2				2	52	3.2	102	3.5	6
9	3	23	48	17	7	5	0	32	144	25	52	2	91	170	314	9	0	7	0	16	520	32.1	889	30.5	Total
																									C.S.boydii
									0	1				1	1					0	2	0.1	0	-	1
								1	1		1		1	2	3					0	3	0.2	12	0.4	2
									0					0	0					0	1	0.1	4	0.1	4
0	0	0	0	0	0	0	0	1	1	1	1	0	1	3	4	0	0	0	0	0	6	0.4	21	0.7	Total
10	1	48	88	7	1	13	31	22	221	5	50	8	53	116	337			67		67	1,079	66.6	1,981	68.0	D.S.sonnei
		1					1		2				1	1	3					0	5	0.3	14	0.5	Unknown
19	4	72	137	24	8	19	32	55	370	31	103	10	148	292	662	9	0	74	0	83	1,621		2,915		TOTAL

TABLE I (CONTINUED) SHIGELLA SEROTYPES ISOLATED FROM HUMANS FIRST QUARTER 1970

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Table II

Age (Years)	Male	Female	Unknown	Total	Percent	Cumulative Percent	Number of Reported Isolations/ Million Population*
< 1	42	34		76	7.0	7.0	21.7
1 - 4	159	165	1	325	30.1	37.1	22.5
5 - 9	108	145		253	23.4	60.5	12.2
10 - 19	72	115		187	17.3	77.8	4.8
20 - 29	29	84		113	10.5	88.3	3.9
30 - 39	21	24		45	4.2	92.5	2.0
40 - 49	13	17		30	2.8	95.3	1.2
50 - 59	10	8		18	1.7	97.0	0.9
60 - 69	11	6		17	1.6	98.6	1.1
70 - 79	7	4		11	1.0	99.6	1.2
80 +	2	3		5	.5	100.1	1.4
Subtotal	474	605	1	1,080			
Child (unspec)	3	1		4			
Adult (unspec)	3	2		5			
Unknown	241	248	43	532			
Total	721	856	44	1,621			
Percent	45.7	54.3					

Age and Sex Distribution of Individuals Infected with Shigella in the United States, First Quarter, 1970

*Based on provisional data from Population Estimates, Series P25, No. 428 (August 19, 1969) and No. 441 (March 19, 1970).

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Table III

Relative Frequencies of Shigella Serotypes Reported, First Quarter, 1970

Serotype	Number Reported	Calculated Number*	Calculated Percent	Rank
S. dysenteriae				
Unspecified	3			
1	2	3	.19	12
2	4	6	.37	11
3	2	3	.19	12
S. flexneri				
Unspecified	64			
1 unspecified	9			_
la	9	17	1.05	7
1b	4	8	.49	10
2 unspecified	81	100		
2a	102	189	11.67	2
2b	28	52	3.21	5
3 unspecified	83	100	7 07	2
3a	42	129	7.96	3
3D	4	12	.74	8
JC /	3	9	.00	9
4 unspecified	19	20	2 41	6
4a 4b	10	29	12	12
4D 5	1	2	.12	12
5	52	60	3 70	12
0	52	00	5.70	4
S. boydii				
Unspecified				
1	2	2	.12	13
2	3	3	.19	12
4	1	1	.06	14
<u>S. sonnei</u>	1,079	1,082	66.79	1
Unknown	5			
Total	1,621	1,620		
	Serotype S. dysenteriae Unspecified 1 2 3 S. flexneri Unspecified 1 unspecified 1a 1b 2 unspecified 2a 2b 3 unspecified 3a 3b 3c 4 unspecified 4a 4b 5 6 S. boydii Unspecified 1 2 4 S. sonnei Unknown Total	SerotypeNumber ReportedS. dysenteriaeUnspecified124324324325. flexneriUnspecified641 unspecified91a91b42 unspecified812a1022b2b3a43c3a4164b1536525. boydiiUnspecified123415. sonnei1,079Unknown5Total1,621	Number Reported Calculated Number* S. dysenteriae 1 Unspecified 3 1 2 2 3 2 4 3 2 3 2 4 6 3 2 4 6 3 2 S. flexneri 1 Unspecified 64 1 unspecified 9 1a 9 1b 4 2 unspecified 81 2a 102 1b 4 2a 129 3b 4 3a 42 3c 3 36 52 3 3 6 52 5. boydii Unspecified 1 1 2 2 3 3 3 6 52 60 </td <td>Number Reported Calculated Number* Calculated Percent S. dysenteriae 3 19 Unspecified 3 19 2 4 6 37 3 2 3 19 S. flexneri 10 10 19 S. flexneri 10 10 10 Unspecified 64 105 10 1a 9 17 1.05 1b 4 8 .49 2 unspecified 81 .49 2a 102 189 11.67 2b 28 52 3.21 3 unspecified 83 .42 129 3a 42 129 .74 3c 3 9 .56 4 unspecified 19 .12 .12 4a 16 39 2.41 4b 1 2 .12 5 3 3 .19</td>	Number Reported Calculated Number* Calculated Percent S. dysenteriae 3 19 Unspecified 3 19 2 4 6 37 3 2 3 19 S. flexneri 10 10 19 S. flexneri 10 10 10 Unspecified 64 105 10 1a 9 17 1.05 1b 4 8 .49 2 unspecified 81 .49 2a 102 189 11.67 2b 28 52 3.21 3 unspecified 83 .42 129 3a 42 129 .74 3c 3 9 .56 4 unspecified 19 .12 .12 4a 16 39 2.41 4b 1 2 .12 5 3 3 .19

*Calculated number is derived by distributing the unspecified isolations in each group to their subgroups in the same proportion as the distribution of the specified isolations of that group.

Table IV

Shigella Serotypes from Mental Institutions Number of Isolations by State, First Quarter 1970

State	lysenteriae 2	flexneri unspecified	flexneri la	flexneri 2 unspecified	flexneri 2a	flexneri 2b	flexneri 3 unspecified	flexneri 3c	flexneri 6	sonnei I	sonnei II	TOTAL	
Alabama	0	1	0	0	0	0	0	0	0	0	0	1	_
Florida	0	0	0	8	0	0	0	0	1	4	0	13	
Georgia	0	0	0	3	0	0	0	0	0	0	0	3	
Hawaii	0	0	0	0	0	0	0	0	0	14	0	14	
Illinois	1	0	1	0	4	4	0	0	3	3	0	16	
Iowa	0	0	0	0	0	0	0	0	0	9	0	9	
Kansas	0	0	1	0	0	0	0	0	0	0	0	1	
Maryland	0	0	0	0	0	0	0	0	1	0	0	1	
Massachusetts	0	0	0	0	0	0	0	0	0	16	0	16	
Michigan	0	0	0	0	0	0	3	0	0	4	0	7	
Minnesota	0	0	0	0	1	0	0	0	0	10	4	15	
Nevada	0	0	0	0	0	0	0	0	0	8	0	8	
New Hampshire	0	0	0	0	0	0	0	0	0	22	0	22	
New Jersey	0	1	0	0	0	0	0	1	0	12	0	14	
New York	0	19	0	0	0	0	0	0	0	0	0	19	
North Carolina	0	0	0	1	0	0	0	0	0	0	0	1	
South Carolina	0	0	0	0	0	0	0	0	0	31	0	31	
Wisconsin	0	0	0	0	0	0	0	0	0	23	0	23	
TOTAL	1	21	2	12	5	4	3	1	5	156	4	214	

Table V

Sources of Reported Isolations of Shigella By Residence at Time of Onset First Quarter 1970

Source	Jan	Feb	Mar	Total	Percent of Subtotal	Percent of Total
Mental Institutions	51	62	65	214	18	
Indian Reservations	6	17	6	29	2	
Other Residencies	354	264	283	947	80	
Subtotal	411	343	354	1,190		73
Residencies Unknown	182	145	97	431		27
Total	593	488	451	1,621		

STATE EPIDEMIOLOGISTS AND STATE LABORATORY DIRECTORS

Key to all disease surveillance activities are the physicians who serve as State epidemiologists. They are responsible for collecting, interpreting, and transmitting data and epidemiological information from their individual States; their contributions to this report are gratefully acknowledged. In addition, valuable contributions are made by State Laboratory Directors; we are indebted to them for their valuable support.

STATE

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