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THE INFECTIVITY OF MYCOBACTERIA FOR CHORIOALLANTOIC MEMBRANES OF CHICK EMBRYOS[1]

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This article presents the results of inoculating 46 strains of acid-fast bacilli on the chorioallantoic membranes of chick embryos, to determine what value the procedure may have in throwing light upon the apparent virulence of these organisms. Emmart and Smith (*1*) have suggested that an estimate of the virulence of a given strain of tubercle bacilli may be determined by the extent of the lesions produced in this manner. Moore (*2*), using the chorioallantoic membranes for comparing strains of bacilli from human, bovine, avian, fish, and snake tuberculosis, states, "Certainly, virulence can be determined without difficulty."

MATERIALS

A. Twenty-four strains of human tubercle bacilli were isolated during the past few years from sputums of cases of tuberculosis in Alabama, Tennessee, and Virginia, which have been the subject of continuing epidemiologic studies by the Public Health Service. One strain, B–106, originated in Hawaii. One strain (TF) was obtained from an autopsy in Tennessee by Dr. T. H. Tomlinson. All these are culturally typical.

B. One strain (6–LC) was from the sputum of a case from Alabama, but is smooth or intermediate in cultural appearance. All the organisms in these two groups, 27 strains altogether, have been found to possess some degree of virulence for guinea pigs, and the term "virulence" as used in this article refers strictly to virulence for guinea pigs.[2]

C. Strain R–1, culturally of the human type, avirulent for guinea pigs.

[1] From the Pathology Laboratory and the Division of Infectious Diseases, National Institute of Health.

[2] Studies of the virulence of these strains will be the subject of a later report.

D. Two strains of avian tubercle bacilli, one obtained from the Phipps Institute, the other (C–1) from Dr. A. B. Crawford, Beltsville, Md.

E. *M. tuberculosis bovis*, Phipps Institute No. 523.

F. Two strains of mycobacteria, nonchromogenic, smegma type (*3*), B–102 and B–105.

G. Thirteen chromogenic strains:

1. Lleras Acosta's "lepra" bacillus, B–108.
2. From cases of leprosy, 2 strains, B–35, B–103 (*3*).
3. Four strains from sputums, from Dr. A. W. Bengston, Catawba Sanitarium, Va., V–43, V–78, V–106, V–136.
4. Five strains from sputum of cases in the Public Health Service series.
5. One strain from an autopsy in Tennessee by Dr. T. H. Tomlinson, TI–1B.

METHODS

Weighed and measured doses of bacilli grown on egg media and ground in a ball mill in 0.9 percent saline solution were used in all cases, and live bacillus plate counts, some of which failed for irrelevant reasons, were used to check viability and provide information as to the significance of the living status of the organism. Also for this purpose, duplicate 1.0 mg. doses of the same suspensions of many strains were used, after heating 30 minutes at 115° C. Subsequent culture of the autoclaved suspensions uniformly gave no growth.

Doses varying from 5.0 mg. to 0.01 mg. in 0.2 cc. saline were used. The doses of 1.0 and 0.01 mg. were adopted as standards as they were found to represent: (*a*) the minimum level which consistently produced large lesions in a majority of the membranes inoculated with virulent organisms, and (*b*) the level which still produced some lesions with the virulent organisms, but little or nothing with others.

The eggs were inoculated with a hypodermic needle through the shell membrane, after removing a small segment of shell and separating the membrane by suction over the air sac. The eggs were inoculated after 9 days' incubation and harvested 6 days later. A few comparative tests using 11- and 12-day eggs, or varying the period of the experiment from 5 to 9 days, indicated that the variations observed were not important. Technical failures and death of embryos for unknown reasons resulted in the discarding of 893, or 36 percent, of 2,472 eggs. The yield improved somewhat with practice, although it appeared that occasional or seasonally inferior batches of eggs contributed.

Of the 1,579 membranes harvested, 12 are omitted from the tables. Sections were made of all membranes showing grossly visible lesions, but it was not found profitable to section all membranes in some

groups; 1,346 of 1,567 were sectioned. Of these, 932 showed lesions. Thirteen membranes showed lesions obviously nontuberculous; 104 showed lesions of the ectoderm only, mostly distributed widely among membranes receiving 0.01 mg. doses; 815 showed mesodermal lesions containing acid-fast bacilli.

Moore, using a loop to inoculate the eggs through a larger window, observed only a small number in each series inoculated with human bacilli remaining alive, and usually death of the embryo within 5 days using avian bacilli. He probably used larger doses than were used here, but it is not possible from the present studies to show that inoculation of any of the mycobacteria used, in spite of the presence of large gross lesions, leads to the death of the embryo within 6 days after inoculation. Although there were some series with few survivals, there were others with high survival rates, and there was no essential difference between the rates with virulent, avirulent, or killed organisms where the dose was 1.0 mg. With the 5.0 mg. dose, the data are insufficient, but the lesions seen were barely more extensive than those at 1.0 mg.

ANATOMIC CHANGES

Emmart and Smith illustrated the characteristic lesions caused by human tubercle bacilli, conglomerate large tubercles, or, in addition, many small nodules or tubercles scattered over the membrane. Nearly all the organisms studied here produced nodules of varying size, with the human strains frequently conglomerate and large, measuring 1.0 cm. or more in diameter. Scattered small foci were also common, often in addition to a main large nodule, but only infrequently with larger doses constituted the sole lesions. With dead bacilli a main lesion with much edema was usually the principal change. Occasional groups of membranes (e.g., those inoculated with 130–RP) showed large edematous blebs on the under surface of the membranes.

There was much variation in size of the lesions in individual membranes in a given series receiving the same material, but with the virulent human strains at 1.0 mg. there were usually 40 to 50 percent of the membranes with large lesions. These large nodules had a pronounced tendency to occur at the juncture of large vessels. They did not project above the surface, but on the contrary bulged into the fluid beneath. Lesions other than these main lesions (in the mesoderm) were by no means uncommon, yet occasionally membranes were delicate and devoid of lesions except for the main one. Scattered foci of varying size rarely were so numerous as to be nearly confluent, and in some membranes there was a ring of foci at the juncture of the separated membrane with the shell. It seemed that the mechanical factors involved in the settling of the inoculated fluid determined in part the gross distribution of the lesions. Smaller lesions resulting from large doses were identical with those seen with the 0.01 mg. dose.

HISTOLOGIC CHANGES

The reactions of the ectoderm, proliferation of ectodermal cells, and appearance of mononuclear cells and granulocytes phagocytosing bacilli have been described by others. With the dose of 0.01 mg. of virulent organisms, it was often possible to observe the migration of bacilli through the ectoderm, to produce superficial mesodermal foci, after piling up in ectodermal cells. Groups of organisms in the ectoderm, suggesting small colonies infiltrated by exuding cells, were seen many times but too frequently with dead organisms to attach much importance to them. On the whole, the ectodermal changes appear unimportant compared with those of the mesoderm, and growth of bacilli on the ectoderm has not been shown to occur.

Moore described the histologic differences of the lesions produced by various types of tubercle bacilli, with which our findings are in general in agreement. The human organisms produce large mesodermal lesions which are essentially masses of tuberculous granulation tissue with widely scattered bacilli, mostly intracellular. The cellular reaction was not particularly heavy in view of the large numbers of bacilli which appear to be multiplying rapidly.

The avian and bovine strains, on the other hand, produced compact lesions in which nearly all of the bacilli are found intracellularly, filling and stuffing macrophages, even as they do in animals, with comparatively little other cellular response.

Marked differences in histologic character of the lesions produced by dead and by living organisms were observed. Although the response of the tissues was never as great as with living bacilli, the changes produced show that killed organisms may occasionally produce moderately extensive lesions. The response to dead bacilli is in many ways like that to the avian, except that the cellular response is minimal, and edematous fluid accounts for a good part of the lesion.

The character of the cells responding to avian bacilli has been delineated in detail by Canat and Opie (*4*) who found most of the added cells to be derived from or generated within the membrane itself. Cells with numerous acidophilic granules in their cytoplasm, which Emmart and Smith called eosinophiles, were found by Canat and Opie to be cells in various stages of development from hemocytoblasts into granulocytes, many of them being myeloblasts. These cells have been found in the present series frequently, but in most irregular fashion. They were seen almost regularly in considerable numbers in lesions caused by many of the chromogenic bacilli, to a lesser but still important degree in the dead bacillus and avian lesions, and inconsistently intermingled in groups with the histiocytes of the lesions caused by human type organisms.

The large nodular lesions, microscopically, are for the most part clusters of numerous small foci, which are not wholly discrete but may

fuse to show a solid lesion. Table 1 analyzes the distribution of foci in the 815 membranes with lesions of the mesoderm, irrespective of other factors.

TABLE 1.—*Type and extent of lesions*

Principal type of lesion	Total	Size of main lesion			
		Large	Medium	Small	None
Solid	82	52	24	6	0
Clusters	444	85	155	200	4
Scattered foci	278	1	20	72	185
Other	11	0	0	0	11
Total	815	138	199	278	200

Table 1 does not show that the "scattered foci" are for the most part the lesions of lesser doses, killed, or avirulent bacilli. Nor does it indicate that actually many of those in which the main lesion was a cluster of foci also had scattered foci.

Epithelioid cells were seen in 68 of 815 membranes. They were found in the lesions caused by strain 160–KD, an organism of high virulence for guinea pigs, although absent from lesions caused by other human strains except in trivial numbers or isolated instances. A majority of the 68 membranes showing epithelioid cells were scattered here and there among lesions caused by chromogenic bacilli, and those of slight animal virulence. Their occasional occurrence suggested that 6 days might not be sufficient time for full development, yet in a number of eggs with 9-day lesions caused by virulent bacilli, they were still not present. Canat and Opie's remark, "The lesion that is formed by proliferation of fibroblasts and accumulation of mononuclear phagocytes does not resemble a tubercle because it lacks the epithelioid cells that give the tubercle its characteristic form," applies to the present results, with few exceptions.

Giant cells were seen in 167 of 815 membranes showing mesodermal lesions. These appear to be of two types, one of which consists of foreign body type giant cells, which show beginning fusion of mononuclear cells and are ill-developed. Most are of the other type which Moore illustrated, and appear to be formed of ectodermal cells about invaginations, which not infrequently show mitotic figures.

TABLE 2.—*Giant cells*

Giant cells		Ectodermal invaginations	
		Present	Absent
Present	167	161	6
Absent	648	306	342

The frequency of the ectodermal invaginations, present in 467 of 815 membranes with lesions, results inevitably in their producing changes which contribute to the picture, even though they do not play an essential role. They occurred with all types of lesions, all doses, living and dead bacilli, and have been described in membranes receiving entirely different treatments. They are not necessarily an abnormality, occurring to a small degree in membranes that have been separated but not otherwise treated. In the membranes inoculated with acid-fast bacilli, the bacilli are often seen carried with the invaginations into the mesoderm, as the membrane thickens with the extravasation of edema fluid. There is much overlapping in table 3,

TABLE 3.—*Ectodermal invaginations*

Type of invaginations	Number
Without enclosed bacilli	169
With bacilli, but no cellular response	168
With bacilli, and with cellular response	186
With bacilli, with cellular response and necrosis	123

as many membranes showed more than one type of invagination. Invaginations which enclose pockets of bacilli commonly show no other cellular reaction, particularly with the chromogenic mycobacteria.

All stages of "necrosis" associated with the invaginations are seen. This begins with the infiltration of segmented leucocytes between the ectodermal cells of the invagination, which collect in increasing numbers in the center, distending the ring of ectodermal cells, which steadily multiply to continue as a layer about the necrotic center. There is no fibrous tissue or organization within the area, but the necrotizing process goes beyond the ectodermal wall into the mesoderm proper, so that the ectodermal cells originally present may be destroyed, although they are often preserved except around the largest areas of necrosis. That these areas of necrosis in the mesoderm are almost wholly dependent upon the invaginations is suggested in table 4.

TABLE 4.—*Membranes showing invaginations*

	Number of membranes	
	With invaginations	Without invaginations
Number of membranes	467	348
Number with necrosis	170	22
Percent	36.4	6.3

The designation of these areas as "caseation necrosis" by Emmart and Smith (*1*) and Moore (*2*) appears misleading in implying a similarity to the manner in which necrosis is produced in tubercules in animals and

man. Ulcerations of the ectodermal surface of large nodules result from the extension or communication of the necrotic areas to the surface. With the chromogenic strains, V–43 and V–78, broad shallow ulcers above a fibrous base were common, with mixtures of both acid-fast and nonacid-fast forms of bacilli in the debris.

In the mesodermal lesions, the close application of bacilli, or bacillus-containing cells, to small blood vessels is often striking, but organisms are seen within the endothelial cells of these vessels only rarely. The viscera of the embryos of the eggs inoculated with strain 14–TF were searched for tubercle bacilli, with the result that in those inoculated with 5.0 and 1.0 mg., 13 of 14 examined revealed bacilli, principally in the liver in portal areas and in endothelial or Kupffer cells, like those described by Canat and Opie following intravenous inoculation. The absence of a cellular response to the bacilli within the embryo is notable. Bacilli have been seen about vessels of the yolk in a number of odd instances when that tissue was examined, but in some of these there were also bacilli in the entodermal cells of the chorioallantois, showing that the needle rarely went through the membrane, probably the only circumstance which leads to the presence of bacilli in the entoderm.

The significance of the lesions of egg membranes is affected by the viability of the organisms. The live-organism counts and heat-killed controls show that the extensive large lesions produced by the highly virulent (for guinea pigs) human strains are dependent on living bacilli, which probably applies also to other organisms in all doses. It is nonetheless curious that the largest lesions produced by any of the heat-killed organisms were consistently caused by killed bacilli of the most highly virulent human type. The impression is gained, from comparison of "dead" and "live" lesions, that with the living virulent organisms extensive reproduction of bacilli has taken place, in sharp contrast to the chromogenic organisms, although these latter grow with great rapidity on simple artificial media.

In table 5 the character of the lesions, which is not always uniform for all eggs receiving the same inoculum, is called *human*, *avian*, or *dead* (on the basis of the general character as a whole), or "mixed" to indicate equally prominent but variable features. The virulent organisms are most consistent in producing uniform lesions of the "human" type, while the human tubercle bacilli of less than maximal virulence commonly produce some features of the "avian" or "dead" type. In lesions caused by the chromogenic bacilli, there are not infrequently areas which are indistinguishable from those caused by the human strains. It has not been found easy to classify the lesions in many membranes, perhaps because there are always present in the cultures, proportionate to their age, numbers of nonviable bacilli. The occurrence of "dead" foci among otherwise "human" type lesions may be

TABLE 5.— *Lesions produced in chorioallantoic membranes by mycobacteria*

A. 18 CULTURALLY TYPICAL STRAINS OF *M. tuberculosis hominis* OF PROVEN VIRULENCE FOR GUINEA PIGS

Strain number	Months between isolation and use	Number of subcultures	Age of subculture in days	Plate count viable organisms per mg.	Dose in mg.	Membranes		Lesions		Type of organism as judged from membranes	Degree of infectivity for membranes
						Number harvested	Number with lesions	Type	Extent		
TF	20	11	20	5,200,000	1.0	9	9	Human	+++	Human	+++
14-IF	27	19	23	4,200,000	5.0	4	4	do	+++	Human	+++
					1.0	21	21	do	+++		
					0.01	12	9	do	+		
16-TG	44				1.0	8	8	do	+++	Human	+++
					0.01	13	7	do	++		
					1.0 K	11	6	Dead	++		
18-JG	32	19	6	4,800,000	1.0	15	15	Human	+++	Human	+++
					0.01	11	5	do	+		
	33	3	708	0	1.0	20	11	Dead			
					0.01	14	0				
53-JLW	38	7	21	4,600,000	1.0	13	13	Human	+++	Human	+++
					0.01	22	20	do	++		
55-SA	31	14	22	2,700,000	1.0	13	13	Human	+++	Human	+++
					0.01	7	7	do	+		
	33	11	526	13,000	1.0	20	5	Dead	+		
					0.01	11	0				
56-JG	35	18	23	5,400,000	5.0	2	2	Human	+++	Human	+++
					1.0	3	3	do	+++		
					0.01	8	5	do	+++		
	37	19			1.0	18	18	do	+++		
112-HK	17	10	35	4,500,000	1.0	7	7	do	+++	Human	+++
					0.01	3	3	do	+		
	18	11	7	800,000	1.0	16	15	do	+++		
					0.01	14	10	do	+		
	19	2	515	63,000	1.0	5	0				
					0.5	3	0				
					0.01	3	0				
109-LXS	11	6	15	4,400,000	1.0	11	11	Human	+++	Human	+++
					0.01	15	0				
	19	11	27	3,400,000	1.0	9	9	Human	+++		
					0.01	11	9	do	+		
	20	2	496	30,000	1.0	18	5	Dead	MIN		
					0.01	13	0				
114-CI	19	10	18	1,700,000	1.0	6	6	Human	+++	Human	+++
					0.01	3	1	do	++		
					1.0 K	4	4	Dead	+		
30-RP	22				1.0	10	10	Human	++	Human	+
					0.1	4	4	Mixed	++		
					0.01	6	0				
132-RK	8	4	12	1,500,000	1.0	16	11	Human	++	Human	+
					0.1	5	3	ECT			
					0.01	9	3	Mixed	+		
137-JB	12	6	33	11,000,000	1.0	11	11	Human	+++	Human	+++
					0.01	11	9	do	+++		
160-KD	15	4	16	400,000	1.0	13	12	do	+++	Human	+++
					0.01	10	4	do	+		
					1.0 K	11	6	Dead	+		
166-MXS	11	5	61	1,300,000	1.0	7	7	Human	++	Human	+++
					0.01	9	8	do	++		
177-WXB	11	2	63	1,000,000	1.0	12	10	do	+++	Human	+++
					0.01	8	5	do	++		
					1.0 K	10	9	Dead	++		

TABLE 5.—*Lesions produced in chorioallantoic membranes by mycobacteria*—Con.

A. 18 CULTURALLY TYPICAL STRAINS OF *M. tuberculosis hominis* OF PROVEN VIRULENCE FOR GUINEA PIGS—continued.

Strain number	Months between isolation and use	Number of subcultures	Age of subculture in days	Plate count viable organisms per mg.	Dose in mg.	Membranes: Number harvested	Membranes: Number with lesions	Lesions: Type	Lesions: Extent	Type of organism as judged from membranes	Degree of infectivity for membranes
198-ARB	9	3	36	400,000	1.0	7	7	Human	++	Human	+
					0.01	8	4	do	+		
						9	5	Dead	+		
199-RB	7	3	43		1.0	9	9	Human	+++	Human	+++
					0.01	12	11	do	+++		
					1.0 K	10	6	Dead	+		

A. 8 CULTURALLY TYPICAL STRAINS OF *M. tuberculosis hominis*, OF INTERMEDIATE OR LOW VIRULENCE FOR GUINEA PIGS

34-CP					1.0	8	5	Human	++	Human	+
					0.01	12	4	Dead	+		
					1.0 K	15	7	do	++		
B-106	50		13		1.0	8	4	Human	+	Human	+
					0.01	12	3	?	MIN		
						6	5	Dead	+		
108-HB	16	3	15	800,000	1.0	7	6	do	MIN	AVIR	0
					0.1	1	0				
					0.01	1	0	Dead	MIN		
					1.0 K	5	4	do	MIN		
131-MJD	13	5	68	4,400,000	1.0	11	8	Human	++	Human	+
					0.01	8	2	do	+		
					1.0 K	14	2	Dead	MIN		
167-OXC	8	4	14	2,800,000	1.0	6	6	Mixed	++	Human	+
					0.01	5	4	ATYP	+		
					1.0 K	4	1	Dead	+		
171-CXG	12	2	45	400,000	1.0	7	6	Mixed	++	Human	+
					0.01	9	3	do	+		
					1.0 K	6	0				
178-JT	5	3	21	5,600,000	1.0	5	5	Human	+++	Human	+++
					0.01	11	7	do	++		
					1.0 K	9	7	Dead	++		
183-XLG	11	4	45	2,400,000	1.0	7	7	Human	+++	Human	+++
					0.01	10	9	do	+		
					1.0 K	9	5	Dead	+		

B. 1 CULTURALLY SMOOTH STRAIN OF *M. tuberculosis hominis*, OF LOW VIRULENCE FOR GUINEA PIGS

6-LC	36	21	9	1,000,000	1.0	4	4	Human	+++	Human	+++
					0.01	2	0				
					1.0 K	9	3	Dead	+		

C. 1 CULTURALLY TYPICAL STRAIN OF *M. tuberculosis hominis*, AVIRULENT FOR GUINEA PIGS

R-1	300+		29		1.0	11	9	Human	+++	Human	+++
					0.01	6	6	do	++		
					1.0 K	2	2	Dead	++		

TABLE 5.—*Lesions produced in chorioallantoic membranes by mycobacteria*—Con.

D. 2 STRAINS OF *M. tuberculosis avis*

Strain number	Months between isolation and use	Number of subcultures	Age of subculture in days	Plate count viable organisms per mg.	Dose in mg.	Membranes: Number harvested	Membranes: Number with lesions	Lesions: Type	Lesions: Extent	Type of organism as judged from membranes	Degree of infectivity for membranes
Av. Phipps	------	------	13	----------	1.0	22	7	Avian	+	Avian	+
	------	------	11	5,100,000	1.0	16	13	do	++		
					0.01	16	8	do	+		
			29	4,300,000	1.0	16	13	do	++		
					0.01	12	5	do	+		
					1.0 K	15	13	do	+		
Av. C-1	26	18	18	----------	1.0	13	9	do	++	Avian	+
					0.01	3	3	do	+		
	28	20	35	50,000,000	1.0	8	6	do	++		
					0.01	4	0				

E. 1 STRAIN OF *M. tuberculosis bovis*

PH-523	------	------	19	1,400,000	1.0	15	12	Avian	++	Avian	+
					0.01	5	1	ECT			
			17	----------	1.0	4	1	ECT			

F. 2 STRAINS OF *M. smegmatis*

B-102	60	------	9	50,000,000	1.0	11	6	Dead	+	AVIR	0
					0.01	12	8	Mixed	MIN		
					1.0 K	8	3	Dead	MIN		
B-105	56	------	45	21,700,000	1.0	7	4	ATYP	++	AVIR	0
					0.01	2	1	Dead	+		
					1.0 K	3	3	Dead	+		
	56	------	16	37,500,000	1.0	6	5	Avian	+		
					0.01	7	0				
					1.0 K	7	5	Dead	+		

G. 13 STRAINS OF AVIRULENT CHROMOGENIC MYCOBACTERIA

B-108	60	------	9	56,000,000	1.0	7	5	Mixed	+	AVIR	?
					0.01	1	0				
					1.0 K	10	6	Dead	++		
B-35	100?	------	6	2,000,000	1.0	8	3	ECT		AVIR	0
					0.01	7	3	ECT			
					1.0 K	12	0				
B-103	60	------	------	----------	1.0	13	9	Mixed	+	AVIR	
					0.01	20	1	ECT	MIN		
					5.0 K	6	4	Dead	MIN		
					1.0 K	3	0				
V-43	36	11	------	----------	1.0	15	5	ATYP	++	ATYP	+
					0.01	6	0				
	38	16	23	3,400,000	1.0	6	6	Mixed	+++		
					0.01	10	1	do	MIN		
					1.0 K	8	8	Dead	MIN		
V-78	------	------	------	----------	2.0	6	0			ATYP	+
					1.0	11	4	ATYP	+		
	32	11	26	106,000,000	1.0	24	21	do	++		
	35	15	11	----------	1.0	2	2	do	+		
					0.01	15	0				
					1.0 K	7	1	ATYP	MIN		
V-106	36	11	38	----------	1.0	8	8	Human	+++	Human	+
					0.01	7	4	Mixed	+		
					1.0 K	5	5	do	++		

TABLE 5.—*Lesions produced in chorioallantoic membranes by mycobacteria*—Con.

G. 13 STRAINS OF AVIRULENT CHROMOGENIC MYCOBACTERIA—continued

Strain number NSNNNNN	Months between isolation and use	Number of subcultures	Age of subculture in days	Plate count viable organisms per mg.	Dose in mg.	Membranes		Lesions		Type of organism as judged from membranes	Degree of infectivity for membranes
						Number harvested	Number with lesions	Type	Extent		
V-136	40				1.0	7	6	ATYP	+++	ATYP	++
	36	11	36	3,300,000	1.0	8	6	do	++		
					0.01	10	1	Dead	MIN		
					1.0 K	4	4	do	+		
61-CNS-A	30	19	23	1,400,000	1.0	13	8	do	MIN	AVIR	0
					0.01	14	2	ECT			
					1.0 K	9	4	Dead	+		
	30	19	25		1.0	7	1	do	MIN		
					0.01	12	0				
					1.0 K	8	0				
82-MA	25	19	28	69,000,000	2.5	3	3	Avian	+++	Avian ?	+
					1.0	2	2	do	++		
					0.01	3	3	ECT			
	25	6	600		1.0	14	13	Dead	++		
					0.01	10	0				
					1.0 K	7	5	Dead	+		
	27	21	8	25,500,000	1.0	11	8	Mixed	++		
	27	22	6	54,000,000	1.0	13	12	do	++		
					0.01	11	2	Dead	+		
					1.0 K	6	6	do	MIN		
185-GD	7	4	28	135,000,000	1.0	12	11	Mixed	+	AVIR	0
					0.01	5	2	do	+		
					1.0 K	6	4	Dead	++		
211-MMK	5	4	15	12,900,000	1.0	11	5	do	+	AVIR	0
					0.01	6	0				
					1.0 K	5	5	Dead	+		
212-AGAW	½	1	17	15,700,000	1.0	14	14	Mixed	++	?	?
					0.01	8	4	Dead	MIN		
					1.0 K	5	3	do	MIN		
	1½	2	15	22,500,000	1.0	8	3	Mixed	+		
					1.0 K	8	4	Dead	+		
	3	3			1.0	8	5	Mixed	++		
					0.01	11	3	Human	+		
					1.0 K	7	3	do	MIN		
TI-IB	25	13	21	21,500,000	1.0	8	8	Mixed	++	?	+
					0.01	11	1	Dead	MIN		

ECT=Lesions in ectoderm only.
AVIR=Avirulent.
K=Heat killed.
MIN=Minimal.
ATYP=Atypical.

attributed to this source. Several aged cultures with few living bacilli produced lesions identical with those from killed organisms.

INFECTIVITY OF MYCOBACTERIA FOR EGG MEMBRANES COMPARED WITH INFECTIVITY OR VIRULENCE FOR GUINEA PIGS

A. *Human tubercle bacilli, virulent for guinea pigs.*—The human organisms of proven virulence for guinea pigs, as the tables show, produced lesions in the egg membranes which agreed fairly well with what is known of the virulence of these strains for guinea pigs. The accurate estimation of virulence of a given strain for guinea pigs is not easy, and for present purposes the organisms were divided into a

group of comparatively high virulence and another of intermediate to low virulence. In making this arrangement, the higher order of virulence was favored; any error lies in having assigned a higher order of virulence than was justified, although recognizing that in all probability there are many grades thereof. However, two of the virulent strains, one of which (198–ARB) is of a high order of virulence for guinea pigs, produced lesions in egg membranes of a distinctly lesser degree and character, and must be rated as being in apparent disagreement. Of the 8 strains of intermediate guinea pig virulence, the lesions in egg membranes were comparable in 5. Of the 3 exceptions, 1 (108–HB) is an organism of low virulence for guinea pigs, also producing some, but not extensive, lesions in rabbits, and the membranes inoculated with this strain showed practically identical lesions with either living or dead bacilli. Strain 6–LC, a smooth organism of low virulence for guinea pigs, produced good lesions in the membranes, like those of the highly virulent human type.

The agreement is in some ways good. Several of the strains of outspoken guinea pig virulence produced most of the largest lesions seen in egg membranes, and the impression was gained that with these strains of the highest order of guinea pig virulence, the egg membranes are reliable indicators, but that with decreasing infectivity for guinea pigs, it becomes increasingly difficult to judge from the lesions of the egg membranes what to expect of the organism elsewhere, although in a majority of strains there was apparent agreement.

Yet the question is thrown into bold relief by the experience with the strain R–1, which has an ancient and hoary history of avirulence for guinea pigs, confirmed by our own animals. On the basis of the egg membrane test, this organism would have to be classed with the organisms of high guinea pig virulence.

B. *Avian and bovine organisms.*—These strains produced lesions which were histologically distinct from those caused by the human organisms and the histologic character of the lesions would enable the distinction of these organisms as a group. It would not be possible to distinguish the bovine from the avian strains, and the question is raised whether with a larger experience there would be found human strains of low virulence which could not be distinguished, because several of the human strains of intermediate guinea pig virulence produced lesions in the chorioallantois in which there was something of the avian character.

C. The *chromogenic mycobacteria* in most cases produced lesions in the egg membranes, which would not be confused with those caused by the human strains of high virulence. Some (211–MMK, 185–GD, 61–CNS) produced lesions indistinguishable from those caused by the killed organisms, or lesions only in the ectoderm (B–35). Strains V–43 and V–78 produced atypical lesions, inconsistently extensive in

some membranes but absent from others, which did not suggest lesions caused by the other mycobacteria. Strain 82–MA (culturally similar to V–78) would be difficult to distinguish from an avian organism, judged by the lesions in the membranes. This strain dissociates into varying colonial types in vitro spontaneously and is like some organisms which French writers of the Calmette school consider avian tubercle bacilli. Strain V–106, on the basis of the lesions in the membranes, would have to be classified as *M. tuberculosis hominis*, which, from its cultural characteristics and lack of guinea pig virulence, it is not. The distinction of strains 212–AGAW and TI–IB from human tubercle bacilli of low or intermediate degrees of guinea pig virulence would hardly be possible on the basis of the lesions in membranes.

DISCUSSION

The brief period of 6 days used to produce the lesions, the immaturity of the "animal" at the time of inoculation, the rapid spread of some bacilli without injuring the embryo, and the exceptions noted, all combine to suggest that, as far as the eggs are concerned, it is not a matter of virulence of the organism, but some other inherent factor, not easy to define except vaguely as an invasive ability or property of the bacilli. The avian strains on a basis of "virulence" might have been expected to show some predilection for growing on or in a medium possessing an avian character. Yet the two strains tested, while producing distinct histologic characteristics, invaded the membranes to a slighter degree than some human strains of intermediate guinea pig virulence. The exceptions make it impossible to believe that, in spite of much general agreement, this procedure is a direct measure of virulence of mycobacteria. The mycobacteria are here free to multiply, invade, and produce lesions in an animal tissue, to a large degree unembarrassed by the complex mechanism of tissue and humoral response, that is, to exhibit some native invasive property. It is not remarkable to see this invasiveness paralleling animal virulence in many instances, but it seems more important to recognize that the growth in chorioallantoic membrane of the egg is a separate phenomenon, more than a cultural characteristic but not a virulence test, which throws light on the character of some strains or species of mycobacteria. A number of the strains subjected to repeated trials gave sufficiently similar results to indicate that the response of the chorioallantois to a given strain and dose thereof was constant.

SUMMARY AND CONCLUSIONS

The results of the implantation of measured doses of 46 strains or species of mycobacteria on the chorioallantoic membranes of chick embryos are given.

Organisms of the highest virulence for guinea pigs consistently produce extensive large characteristic lesions in the mesoderm of the chorioallantois, with rapid growth of the bacilli.

The character of the lesions differs according to the type of organism, the avian and bovine tubercle bacilli producing a lesion histologically distinct from those caused by human tubercle bacilli of the highest guinea pig virulence.

The chorioallantois of the chick embryo varies too greatly in its response to avirulent acid-fast bacilli to make the procedure by itself of value in the determination of the virulence of a given strain or species of organism.

The response of the chorioallantois is constant for a given strain or species of organism; variations are chiefly in degree in individual eggs, not in type or overall extent of the lesions produced.

Small doses of bacilli, .01 mg. or less, are by themselves inadequate to show characteristic changes in the membranes routinely.

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PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

September 10–October 7, 1944

The accompanying table (table 1) summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in the Public Health Reports under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4 weeks ended October 7, 1944, the number for the corresponding period in 1943, and the median number for the years 1939–43.

DISEASES ABOVE MEDIAN PREVALENCE

Meningococcus meningitis.—A total of 519 cases of meningococcus meningitis was reported during the 4 weeks ended October 7, as compared with 695 in 1943 and a 5-year median of 107 cases. For the country as a whole, as well as for each geographic section, the number of cases was considerably above the seasonal expectancy. The total

number of cases was 5 times the 5-year median, while in the various sections the increase ranged from 2 times the median in the South Atlantic section to almost 12 times the median in the Pacific section. Since there were 3 rather low years of this disease preceding 1943 the 1939–43 median falls within one of those low years. However, the 1934–38 median for the corresponding period was 212 cases and the 1929–33 median was 244 cases, both less than one-half of the current incidence.

TABLE 1.—*Number of reported cases of 9 communicable diseases in the United States during the 4-week period Sept. 10–Oct. 7, 1944, the number for the corresponding period in 1943, and the median number of cases reported for the corresponding period, 1939–43*

Division	Current period	1943	5-year median	Current period	1943	5-year median	Current period	1943	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	1,387	1,440	1,732	3,227	3,677	3,358	1,657	4,388	2,816
New England	17	25	25	16	18	9	170	417	304
Middle Atlantic	74	80	80	12	26	28	213	711	622
East North Central	119	143	143	79	111	222	284	1,465	519
West North Central	100	139	113	22	34	41	67	715	177
South Atlantic	310	485	697	968	1,013	936	124	296	151
East South Central	278	264	264	71	150	119	27	50	88
West South Central	287	178	290	1,828	1,950	1,369	127	124	124
Mountain	72	35	64	179	298	298	80	270	213
Pacific	130	91	85	52	77	101	565	340	359
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	519	696	107	4,451	3,032	2,239	4,803	6,232	5,165
New England	35	97	14	199	288	47	329	676	355
Middle Atlantic	112	169	29	2,030	304	304	663	905	816
East North Central	120	144	19	906	811	378	1,169	1,513	1,439
West North Central	43	42	9	313	430	270	528	752	534
South Atlantic	50	73	25	528	64	78	770	1,056	790
East South Central	28	44	11	195	27	41	385	377	456
West South Central	31	24	9	54	228	65	195	152	181
Mountain	17	19	5	59	274	71	201	251	172
Pacific	83	84	7	167	606	125	563	550	375
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [2]		
United States	10	17	21	591	647	1,216	6,822	10,045	10,726
New England	0	0	0	34	39	31	523	886	886
Middle Atlantic	0	0	0	80	110	155	1,277	1,953	2,806
East North Central	7	8	8	62	85	142	1,632	2,898	3,009
West North Central	0	3	5	33	30	83	409	544	574
South Atlantic	2	1	1	118	133	273	1,108	1,348	1,160
East South Central	1	0	4	87	79	167	406	413	436
West South Central	0	4	4	114	90	234	655	594	509
Mountain	0	0	2	28	51	60	358	492	478
Pacific	0	1	2	35	30	49	454	917	917

[1] Mississippi and New York excluded; New York City included.
[2] Mississippi excluded.

Poliomyelitis.—The number of cases of poliomyelitis dropped from 5,971 during the preceding 4 weeks to 4,451 during the current period. Compared with preceding years the incidence was the highest since 1931, when 4,122 cases were reported for this period. The number of cases was 1.5 times the 1943 figure and almost 2 times the 1939–43

median. The incidence was higher than the 5-year median in all sections except the West South Central and Mountain. While the Mountain and Pacific regions have shown only the normal seasonal increase, the number of cases in California rose from 42 for the preceding 4-week period to 75 for the current period, and in Arizona from 4 cases for the preceding 4-week period to 15 for the current period.

TABLE 2.—*Number of cases of poliomyelitis reported in each geographic area during 1944, 1943, and 1941* [1]

Division	Total Jan. 1–Oct. 14	August		September					October			
		19	26	2	9	16	23	30	7	14	21	28
All regions:												
1944	16,141	1,260	1,529	1,683	1,499	1,439	1,159	976	877	710	----	----
1943	10,319	747	872	956	906	1,020	818	679	515	495	438	363
1941	7,586	611	624	586	595	596	592	456	429	312	294	285
New England:												
1944	634	54	74	75	64	49	71	38	41	38	----	----
1943	724	62	62	77	63	91	85	84	28	52	33	20
1941	342	21	40	27	48	37	33	33	25	18	18	9
Middle Atlantic:												
1944	7,037	601	756	895	761	674	505	470	381	320	----	----
1943	779	46	57	72	83	91	83	67	63	50	46	36
1941	1,853	173	163	169	213	210	210	160	146	97	88	101
East North Central:												
1944	2,762	215	271	321	255	329	236	174	167	142	----	----
1943	2,018	144	241	249	273	288	207	171	145	101	102	75
1941	1,109	82	102	71	93	96	117	72	84	46	46	47
West North Central:												
1944	928	67	104	77	112	76	85	73	79	64	----	----
1943	1,372	118	131	183	138	148	114	88	80	67	38	36
1941	379	17	32	38	28	37	32	19	29	22	22	10
South Atlantic:												
1944	2,506	195	214	208	188	169	149	114	96	88	----	----
1943	205	7	10	8	10	23	14	18	9	9	6	5
1941	1,745	139	133	115	80	79	81	74	61	57	38	41
East South Central:												
1944	1,011	53	56	48	57	59	53	43	40	20	----	----
1943	209	29	20	14	12	7	6	10	4	6	3	9
1941	1,522	147	121	132	86	93	83	62	50	47	50	52
West South Central:												
1944	422	16	11	14	17	14	13	14	13	7	----	----
1943	1,782	104	117	81	90	89	67	49	23	38	28	27
1941	227	11	13	8	12	9	12	12	12	9	16	10
Mountain:												
1944	181	12	16	12	15	18	21	12	∞	5	----	----
1943	774	43	47	123	93	92	85	46	51	36	38	33
1941	107	2	9	11	13	8	5	4	3	3	4	7
Pacific:												
1944	660	47	27	33	30	51	26	38	52	26	----	----
1943	2,428	194	187	149	144	191	157	146	112	136	144	122
1941	302	19	11	15	22	27	19	20	19	10	16	8

[1] Similar tables with earlier data appeared in Public Health Reports for August 4, 1944, page 1024, and September 1, 1944, page 1143.

Table 2 shows the number of reported cases during current weeks of 1944 with data for corresponding weeks of 1943 and 1941. In the 41 weeks since the beginning of 1944 there have been 16,141 cases of poliomyelitis reported as compared with 10,319 and 7,586 in the corresponding weeks of 1943 and 1941, respectively. In 1942 the number of cases reported for the corresponding period was 2,614. While the cases have fluctuated considerably during the current 4 weeks, it is apparent that the disease reached its peak in practically all sections of the country during either August or September; the highest incidence

of this disease normally occurs during those months. During the week ended October 14 (the latest data available) there was a further decline in the number of cases in all sections of the country.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—The number of cases (1,387) of diphtheria reported for the 4 weeks ended October 7 was slightly below the number reported for the corresponding period in 1943 and about 80 percent of the 1939–43 median incidence. In the Atlantic Coast, North Central, and West South Central sections the incidence was below the seasonal expectancy, but the East South Central, Mountain, and Pacific regions all reported excesses over the preceding 5-year median; the largest excess was reported from the Pacific region.

Influenza.—The number of cases of influenza rose from approximately 2,200 during the 4 weeks ended September 9 to 3,227 during the current 4-week period. The incidence was, however, about 10 percent below that reported during the corresponding period in 1943, and was slightly below the 1939–43 median. A slight increase over the normal seasonal incidence was reported from the South Atlantic section and in the West South Central section the number of cases (1,828) was 1.3 times the median, but in other sections the incidence was relatively low.

Measles.—For the 4 weeks ended October 7 there were 1,657 cases of measles reported, as compared with 4,388 in 1943 and a preceding 5-year median of 2,816 cases. In the Pacific section the number of cases was about 45 percent above the normal seasonal expectancy and in the West South Central section the incidence was about normal, but all other sections reported a relatively low number of cases.

Scarlet fever.—The number of cases of scarlet fever rose from 2,746 during the preceding 4 weeks to 4,803 during the current 4-week period. An increase of this disease is normally expected at this season of the year, but the rate of increase during the current period was considerably below that of the corresponding period in preceding years. For the country as a whole the number of cases was less than 80 percent of the number reported in 1943 and about 90 percent of the preceding 5-year median. Of the nine geographic sections, six reported less than the seasonal expectancy and three sections reported an excess over the 1939–43 median; the largest excess was reported from the Pacific section.

Smallpox.—Ten cases of smallpox were reported for the 4 weeks ended October 7, as compared with 17 cases in 1943 and a 5-year median of 21 cases. Of the 10 cases, Ohio reported 3, Indiana 4, and Virginia, West Virginia, and Tennessee 1 each. The current incidence and that during the preceding 4-week period, which was

also 10 cases, has been the lowest incidence on record for any 4-week period.

Typhoid and paratyphoid fever.—This disease was relatively low, 591 cases being reported for the current 4-week period, as compared with 647 for the corresponding period in 1943 and a 5-year median of 1,216 cases. The situation was favorable in all sections of the country. For the country as a whole the incidence was the lowest on record for this period.

Whooping cough.—Whooping cough incidence was below normal, the 6,822 cases reported during the current 4 weeks representing a decline from the 1939–43 median of approximately 20 percent. The West South Central section reported a slight increase over the 5-year median, but in all other sections the incidence was below the seasonal expectancy.

MORTALITY, ALL CAUSES

For the 4 weeks ended October 7 there were 32,138 deaths from all causes reported to the Bureau of the Census by 93 large cities. The average number of deaths reported for the corresponding period in 1941–43 was 32,155.

DEATHS DURING WEEK ENDED OCTOBER 7, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Oct. 7, 1944	Corresponding week, 1943
Data for 92 large cities of the United States:		
Total deaths	8,272	8,347
Average for 3 prior years	8,356	
Total deaths, first 40 weeks of year	358,525	366,068
Deaths under 1 year of age	648	614
Average for 3 prior years	606	
Deaths under 1 year of age, first 40 weeks of year	24,629	26,466
Data from industrial insurance companies:		
Policies in force	66,756,380	65,900,899
Number of death claims	11,581	10,543
Death claims per 1,000 policies in force, annual rate	9.1	8.3
Death claims per 1,000 policies, first 40 weeks of year, annual rate	10.1	9.7

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED OCTOBER 14, 1944

Summary

Continuing the downward trend for the sixth week, a total of 710 cases of poliomyelitis was reported, representing a decline of 19 percent from last week's total of 877 cases, which was, in turn, 10 percent below that for the next earlier week. The 5-year (1939–43) median for the week is 429, and the total for the corresponding week last year was 484. Decreases occurred in all of the 9 geographic divisions of the country, but increases occurred in 6 of the 15 States reporting more than 12 cases each. These apparent increases may be due to delayed reports, which do not show date of onset. The changes were as follows (last week's figures in parentheses): *Increases*—Massachusetts 27 (20), Pennsylvania 60 (54), Illinois 36 (33), Missouri 17 (10), District of Columbia 13 (5), West Virginia 14 (13); *decreases*—New York 234 (294), New Jersey 26 (33), Ohio 60 (73), Michigan 22 (23), Wisconsin 13 (26), Minnesota 25 (40), Iowa 14 (15), Maryland 16 (22), Virginia 21 (30).

The total for the year to date is 16,133, as compared with a 5-year median of 7,279 and 10,319 for the corresponding period last year—the latter figure being 83 percent of the year's total of 12,439.

A total of 155 cases of meningococcus meningitis was reported, as compared with 142 last week, a 5-year median of 34, and 240 for the corresponding week last year. States reporting more than 10 cases each are as follows (last week's figures in parentheses): New York 19 (12), Pennsylvania 12 (5), Michigan 12 (9), California 13 (16). The cumulative total to date is 14,153, as compared with 14,954 for the same period last year and a 5-year median of 1,645. Since the week ended March 4 the weekly totals have been continuously below the corresponding weekly figures for last year.

Although slight seasonal increases are recorded in the incidence of diphtheria, influenza, measles, and scarlet fever, the current reports of all of these diseases except influenza are below the corresponding 5-year medians. Due to the high incidence early in the year, the cumulative figures for influenza, measles, and scarlet fever are above the respective 5-year medians.

Deaths recorded for the week in 93 large cities of the United States totaled 8,412, as compared with 8,290 for the preceding week and a 3-year (1941–43) average of 8,272. The total to date is 368,221, as compared with 376,037 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended October 14, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	Oct. 14, 1944	Oct. 16, 1943		Oct. 14, 1944	Oct. 16, 1943		Oct. 14, 1944	Oct. 16, 1943		Oct. 14, 1944	Oct. 16, 1943	
NEW ENGLAND												
Maine	0	1	1	------	------	------	1	60	24	2	2	0
New Hampshire	0	0	0	------	------	------	0	4	4	0	1	0
Vermont	0	0	0	7	------	------	1	15	6	0	0	0
Massachusetts	4	5	3	------	------	------	40	74	74	5	15	2
Rhode Island	0	0	0	9	------	------	0	18	5	3	3	0
Connecticut	1	1	1	7	2	2	6	9	9	2	2	1
MIDDLE ATLANTIC												
New York	11	7	16	[1] 2	[1] 5	[1] 5	25	108	76	19	28	3
New Jersey	1	4	4	1	5	11	13	80	24	9	9	1
Pennsylvania	8	15	15	2	1	------	29	59	67	12	20	5
EAST NORTH CENTRAL												
Ohio	9	12	15	2	------	9	8	107	21	9	20	1
Indiana	5	9	9	3	5	5	5	49	11	1	4	1
Illinois	8	14	20	------	9	7	19	39	19	10	20	1
Michigan [2]	14	20	12	------	1	1	7	246	57	12	19	2
Wisconsin	0	3	3	9	17	25	43	195	53	2	4	1
WEST NORTH CENTRAL												
Minnesota	19	8	4	2	------	2	2	183	7	5	0	0
Iowa	1	4	3	------	------	------	2	8	8	4	1	0
Missouri	4	8	7	------	3	1	1	5	5	7	7	0
North Dakota	3	0	1	------	4	4	0	259	4	2	0	0
South Dakota	4	2	2	------	------	------	1	4	4	0	0	0
Nebraska	13	11	1	4	2	2	2	8	8	0	1	0
Kansas	2	1	2	------	2	3	13	5	6	1	0	1
SOUTH ATLANTIC												
Delaware	0	0	1	------	------	------	0	1	1	0	2	0
Maryland [2]	6	3	7	4	2	3	2	7	6	2	9	0
District of Columbia	0	0	2	------	------	------	0	1	1	1	1	0
Virginia	10	11	31	123	129	114	2	37	22	4	7	1
West Virginia	7	20	11	2	------	2	0	10	5	4	5	0
North Carolina	30	31	71	5	1	------	7	15	15	2	5	0
South Carolina	13	25	37	218	133	200	2	4	4	1	2	0
Georgia	22	25	39	12	13	14	5	13	7	2	3	1
Florida	6	8	8	1	11	1	4	6	1	2	3	1
EAST SOUTH CENTRAL												
Kentucky	6	13	16	------	------	2	2	19	12	0	5	2
Tennessee	13	10	23	4	11	8	0	6	11	3	7	1
Alabama	37	32	30	17	38	23	2	11	5	1	1	1
Mississippi [2]	27	17	17	------	------	------	------	------	------	1	3	0
WEST SOUTH CENTRAL												
Arkansas	10	6	16	32	17	16	1	6	5	0	0	0
Louisiana	25	7	14	1	4	3	1	1	1	1	1	1
Oklahoma	12	4	10	22	23	38	0	3	3	1	0	0
Texas	46	33	34	647	723	361	44	25	25	4	6	2
MOUNTAIN												
Montana	0	3	3	2	5	3	2	52	17	1	0	0
Idaho	0	0	0	3	------	1	1	0	3	0	0	0
Wyoming	1	0	0	2	3	1	1	6	6	0	1	0
Colorado	3	2	8	10	21	21	12	39	9	1	0	0
New Mexico	11	0	0	------	------	------	0	0	1	0	0	0
Arizona	2	10	1	20	63	47	0	13	13	0	1	0
Utah [2]	0	0	0	------	------	1	5	3	7	0	0	0
Nevada	0	0	0	------	2	------	1	0	0	0	0	0
PACIFIC												
Washington	8	3	0	------	------	------	8	9	9	4	2	0
Oregon	2	1	1	7	6	7	21	11	11	3	3	1
California	26	26	16	11	29	28	180	43	43	13	17	1
Total	430	415	517	1,191	1,290	995	521	1,876	980	156	240	34
41 weeks	9,245	9,865	10,697	344,741	88,361	155,313	594,891	546,291	471,849	14,154	14,954	1,645

[1] New York City only. [2] Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended October 14, 1944, and comparison with corresponding week of 1943 and 5-year median—Continued

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [3]		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	Oct. 14, 1944	Oct. 16, 1943		Oct. 14, 1944	Oct. 16, 1943		Oct. 14, 1944	Oct. 16, 1943		Oct. 14, 1944	Oct. 16, 1943	
NEW ENGLAND												
Maine	0	0	1	14	16	6	0	0	0	1	2	2
New Hampshire	2	1	1	1	1	2	0	0	0	0	0	0
Vermont	2	4	1	4	6	7	0	0	0	0	1	0
Massachusetts	27	19	4	87	141	92	0	0	0	3	3	3
Rhode Island	1	12	1	7	4	3	0	0	0	0	0	0
Connecticut	7	16	4	24	24	18	0	0	0	7	0	0
MIDDLE ATLANTIC												
New York	234	35	35	126	183	124	0	0	0	5	11	14
New Jersey	26	6	9	25	35	39	0	0	0	4	0	3
Pennsylvania	60	9	13	113	110	110	0	0	0	8	5	13
EAST NORTH CENTRAL												
Ohio	60	7	7	129	189	137	1	0	0	3	5	7
Indiana	11	1	5	32	57	50	0	0	1	7	5	4
Illinois	36	57	25	70	129	129	0	3	0	1	2	17
Michigan [2]	22	24	31	77	75	75	0	1	0	2	3	4
Wisconsin	13	12	9	34	110	89	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	25	7	19	37	68	57	0	0	0	0	1	0
Iowa	14	18	12	29	72	45	0	0	0	1	1	2
Missouri	17	4	2	14	35	35	0	0	0	0	3	7
North Dakota	2	1	1	8	6	11	0	0	0	0	0	0
South Dakota	2	0	1	6	13	13	0	0	0	1	0	0
Nebraska	1	6	6	33	24	16	0	2	0	0	0	1
Kansas	3	31	11	57	62	62	0	0	0	0	1	2
SOUTH ATLANTIC												
Delaware	6	0	0	0	4	7	0	0	0	0	0	0
Maryland [2]	16	2	2	43	24	26	0	0	0	1	5	5
District of Columbia	13	0	0	4	17	11	0	0	0	0	0	1
Virginia	21	5	5	42	34	38	0	0	0	3	9	9
West Virginia	14	0	2	51	84	42	0	0	0	2	9	5
North Carolina	10	1	2	62	138	113	0	0	0	5	6	6
South Carolina	0	0	2	4	15	15	0	0	0	0	2	3
Georgia	5	1	1	8	40	42	0	0	0	12	3	8
Florida	3	0	0	8	9	6	0	0	0	4	1	1
EAST SOUTH CENTRAL												
Kentucky	12	4	6	34	63	62	0	0	0	3	5	14
Tennessee	7	0	3	51	57	53	0	1	0	2	4	12
Alabama	0	1	3	16	21	32	0	0	0	1	1	3
Mississippi [2]	1	1	1	10	19	17	0	1	0	2	1	2
WEST SOUTH CENTRAL												
Arkansas	3	0	1	5	7	13	0	0	1	3	0	7
Louisiana	0	1	3	7	10	10	0	0	0	4	3	8
Oklahoma	0	11	2	13	17	17	0	0	0	0	11	5
Texas	4	21	8	35	32	32	0	0	0	5	9	16
MOUNTAIN												
Montana	0	0	0	10	19	12	0	1	0	1	0	0
Idaho	1	0	0	12	17	12	0	0	0	0	0	0
Wyoming	0	3	1	10	3	4	1	0	0	0	1	1
Colorado	3	15	1	20	25	18	1	0	0	1	1	1
New Mexico	1	0	0	3	5	5	0	0	0	1	1	3
Arizona	0	0	1	2	7	4	0	0	0	1	2	1
Utah [2]	0	10	3	8	10	10	0	0	0	0	0	0
Nevada	0	2	0	0	2	0	0	0	0	0	0	0
PACIFIC												
Washington	8	28	6	38	53	28	0	0	0	0	1	2
Oregon	8	32	5	28	31	7	0	0	0	1	1	1
California	10	76	14	114	133	87	0	0	0	7	3	6
Total	711	484	429	1,565	2,256	1,981	3	9	10	102	122	236
41 weeks	16,134	10,319	7,279	156,063	108,609	108,609	324	644	1,221	4,577	4,618	7,014

[2] Period ended earlier than Saturday.

[3] Including paratyphoid fever cases reported separately as follows: Massachusetts, 3; New York, 1; Ohio, 1; Georgia, 8; Texas, 1; California, 1.

Telegraphic morbidity reports from State health officers for the week ended October 14, 1944, and comparison with corresponding week of 1943 and 5-year median—Continued

Division and State	Whooping cough			Week ended October 14, 1944								
	Week ended—		Median 1939–43	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	Oct. 14, 1944	Oct. 16, 1943			Amebic	Bacillary	Unspecified					
NEW ENGLAND												
Maine	16	18	8	0	0	0	0	0	0	0	0	0
New Hampshire	0	0	0	0	0	0	0	0	0	0	0	0
Vermont	10	8	12	0	0	0	0	0	0	0	0	0
Massachusetts	45	61	99	0	0	11	0	0	0	0	0	0
Rhode Island	15	41	19	0	0	0	0	0	0	0	0	0
Connecticut	12	22	65	0	0	3	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	136	207	281	1	4	35	0	0	0	0	0	0
New Jersey	44	92	89	0	0	1	0	1	0	0	0	0
Pennsylvania	108	171	239	1	0	0	0	1	0	0	0	0
EAST NORTH CENTRAL												
Ohio	90	159	176	0	0	0	0	0	0	0	0	0
Indiana	13	12	12	0	0	0	0	0	0	0	0	0
Illinois	47	150	173	0	2	1	0	0	0	0	2	0
Michigan [2]	69	167	210	0	2	8	0	0	0	0	0	0
Wisconsin	66	151	139	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	29	48	48	0	5	0	0	0	0	0	0	0
Iowa	1	40	12	0	0	0	0	0	0	0	0	0
Missouri	12	20	16	0	0	0	1	0	0	0	0	0
North Dakota	6	35	13	0	0	0	7	1	0	0	0	0
South Dakota	6	12	5	0	0	0	0	1	0	0	0	0
Nebraska	0	16	5	0	0	0	0	0	0	0	0	0
Kansas	22	36	29	0	0	0	0	1	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	3	0	0	0	0	0	0	0	0	0
Maryland [2]	73	49	49	0	0	0	1	1	0	0	0	0
District of Columbia	4	9	9	0	0	0	0	0	0	0	0	0
Virginia	14	59	29	0	0	0	191	0	0	0	1	1
West Virginia	7	11	17	0	0	0	0	0	0	1	0	0
North Carolina	80	150	65	0	1	3	0	0	0	0	0	3
South Carolina	37	25	19	0	0	5	0	0	0	0	0	4
Georgia	100	17	10	0	1	6	0	0	0	0	0	35
Florida	4	23	5	0	0	0	1	0	0	0	0	14
EAST SOUTH CENTRAL												
Kentucky	6	54	45	0	0	0	0	0	0	1	0	0
Tennessee	12	52	34	0	0	0	4	1	0	0	0	2
Alabama	8	6	12	0	0	0	0	0	0	0	0	25
Mississippi [2]	----	----	----	0	0	0	0	0	0	0	1	5
WEST SOUTH CENTRAL												
Arkansas	37	9	18	0	5	10	0	0	0	0	0	1
Louisiana	0	1	2	0	0	0	0	0	1	0	1	2
Oklahoma	13	1	3	0	0	0	0	0	0	0	0	0
Texas	99	96	90	0	37	499	9	5	0	0	0	44
MOUNTAIN												
Montana	17	18	8	0	0	0	0	0	0	0	1	0
Idaho	0	0	1	0	0	0	0	0	0	0	0	0
Wyoming	2	8	4	0	0	0	0	0	0	0	0	0
Colorado	9	37	19	0	0	1	0	0	0	0	2	0
New Mexico	3	21	20	0	0	1	0	0	0	0	0	0
Arizona	3	8	7	0	0	0	15	0	0	0	0	0
Utah [2]	5	22	22	0	0	0	0	0	0	0	1	0
Nevada	2	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	17	67	15	0	0	1	0	0	0	0	0	0
Oregon	7	26	16	0	0	0	0	0	0	0	0	0
California	67	122	175	0	4	14	0	6	0	0	0	1
Total	1,373	2,357	2,600	2	61	599	229	18	1	2	9	137
Same week 1943	2,357	----	----	1	32	269	107	6	1	1	11	150
Same week 1942	2,614	----	----	1	47	526	124	12	0	2	7	104
41 weeks 1944	76,482	----	----	37	1,429	18,291	7,267	543	24	439	459	4,044
41 weeks 1943	152,322	----	----	51	1,707	13,406	6,467	569	22	419	677	3,349
41 weeks 1942	144,350	----	[4] 145,873	68	968	10,351	5,729	457	38	[4] 440	737	[4] 2,248

[2] Period ended earlier than Saturday.

[4] 5-year median 1939–43.

WEEKLY REPORTS FROM CITIES

City reports for week ended Oct. 7, 1944

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	0	4	0	0	3	0	0	0
New Hampshire:												
Concord	0	0	------	0	0	0	1	0	0	0	0	0
Massachusetts:												
Boston	0	0	------	0	22	0	10	11	26	0	0	17
Fall River	0	0	------	0	0	0	0	0	2	0	0	1
Springfield	0	0	------	0	0	1	1	0	0	0	0	0
Rhode Island:												
Providence	0	0	1	1	0	0	2	0	1	0	0	14
Connecticut:												
Bridgeport	0	0	------	0	0	0	0	0	1	0	0	0
Hartford	0	0	------	0	0	1	0	0	1	0	0	3
New Haven	0	0	------	0	0	0	0	0	2	0	0	11
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	1	0	0	1	17	2	0	0	0
New York	11	3	1	0	1	6	44	104	46	0	5	84
Rochester	0	0	------	0	4	0	1	24	1	0	0	3
Syracuse	0	0	------	0	0	0	2	0	2	0	0	10
New Jersey:												
Camden	0	0	------	0	0	2	0	1	2	0	0	0
Newark	0	0	1	0	1	1	5	0	2	0	0	10
Trenton	0	0	1	0	0	0	2	1	1	0	0	0
Pennsylvania:												
Philadelphia	3	0	1	0	1	2	9	9	17	0	5	25
Pittsburgh	0	0	1	1	1	1	16	3	12	0	1	4
Reading	0	0	------	0	0	0	0	0	1	0	0	0
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	3	0	------	0	0	3	5	13	10	0	0	10
Cleveland	0	0	------	0	2	4	9	10	14	0	0	20
Columbus	0	0	------	0	0	0	1	1	5	0	0	9
Indiana:												
Fort Wayne	0	0	------	0	0	0	2	1	0	0	2	0
Indianapolis	3	0	------	0	0	1	3	1	3	0	0	0
South Bend	0	0	------	0	0	0	0	0	1	0	0	0
Terre Haute	0	0	------	0	0	0	1	0	1	0	0	0
Illinois:												
Chicago	2	0	2	1	9	4	17	5	26	0	0	13
Michigan:												
Detroit	7	0	------	0	2	5	6	19	16	0	0	17
Flint	1	0	------	0	0	0	3	1	3	0	0	0
Grand Rapids	0	0	------	0	0	0	0	0	6	0	1	3
Wisconsin:												
Kenosha	0	0	------	0	0	0	0	1	0	0	0	9
Milwaukee	0	0	------	0	0	2	1	0	8	0	0	14
Racine	0	0	------	0	0	0	0	0	4	0	0	2
Superior	0	0	------	0	1	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	1	0	0	0	2	0	0	3
Minneapolis	6	0	------	0	1	1	3	13	7	0	0	6
St. Paul	0	0	------	0	0	0	1	5	6	0	0	5
Missouri:												
Kansas City	0	0	------	0	0	2	9	0	6	0	0	0
St. Joseph	0	0	------	0	0	0	0	0	0	0	0	0
St. Louis	0	0	2	0	0	2	9	4	5	0	0	4
North Dakota:												
Fargo	0	0	------	0	0	0	1	3	1	0	0	0

City reports for week ended Oct. 7, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	0	0	------	0	1	1	5	1	5	0	0	0
Kansas:												
Topeka	0	0	------	0	1	0	0	0	1	0	0	1
Wichita	0	0	------	0	0	0	1	0	1	0	0	1
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	0	0	0	0	0	0	0	0
Maryland:												
Baltimore	9	0	------	0	0	4	6	8	8	0	0	63
Cumberland	0	0	------	0	0	0	1	0	0	0	0	0
Frederick	0	0	------	0	0	0	0	0	0	0	0	0
District of Columbia:												
Washington	0	0	2	0	1	0	1	5	5	0	0	1
Virginia:												
Lynchburg	0	0	------	0	0	0	0	2	3	0	0	0
Richmond	0	0	------	0	0	1	1	1	1	0	0	1
Roanoke	0	0	------	0	0	0	2	2	0	0	0	0
West Virginia:												
Charleston	0	0	------	0	0	0	0	0	4	0	0	0
Wheeling	0	0	------	0	0	0	1	0	2	0	0	0
North Carolina:												
Raleigh	0	0	------	0	1	0	2	1	0	0	0	3
Wilmington	1	0	------	0	0	0	3	0	2	0	0	1
Winston-Salem	0	0	------	0	1	0	0	0	4	0	0	1
South Carolina:												
Charleston	0	0	5	0	0	0	1	0	1	0	1	0
Georgia:												
Atlanta	0	0	6	0	0	0	2	1	0	0	0	0
Brunswick	0	0	------	0	1	0	0	0	1	0	0	0
Savannah	0	0	1	1	0	0	0	0	1	0	0	0
Florida:												
Tampa	0	0	------	0	0	0	3	0	0	0	2	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	2	0	------	0	4	0	3	1	1	0	1	2
Nashville	0	0	------	1	0	1	1	0	3	0	0	0
Alabama:												
Birmingham	1	0	------	0	0	0	1	0	3	0	0	0
Mobile	2	0	------	2	0	0	1	0	2	0	0	0
WEST SOUTH CENTRAL												
Arkansas::												
Little Rock	1	0	3	0	0	0	3	0	1	0	0	0
Louisiana:												
New Orleans	4	0	1	------	0	1	8	0	1	0	2	0
Shreveport	1	0	------	0	0	0	0	0	0	0	2	0
Texas:												
Dallas	6	0	------	0	1	0	2	0	0	0	0	0
Galveston	1	0	------	0	0	0	1	0	0	0	0	0
Houston	0	0	1	0	0	0	5	4	1	0	1	14
San Antonio	0	0	2	1	1	0	3	2	2	0	0	0
MOUNTAIN												
Montana:												
Billings	0	0	------	0	0	0	1	0	0	0	0	1
Great Falls	0	0	------	0	0	0	1	0	1	0	0	0
Helena	0	0	------	0	0	0	0	0	0	0	0	2
Missoula	0	0	------	0	0	0	1	0	0	0	0	0
Idaho:												
Boise	0	0	------	0	0	1	0	0	0	0	0	0
Colorado:												
Denver	5	0	------	0	1	1	4	3	3	0	0	4
Pueblo	0	0	------	0	1	0	0	0	2	0	0	0
Utah:												
Salt Lake City	0	0	------	1	1	0	0	0	4	0	0	0

City reports for week ended Oct. 7, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	1	0	------	0	3	0	2	2	0	0	0	1
Spokane	0	0	------	0	2	1	1	1	3	0	0	0
Tacoma	0	0	------	0	1	0	0	0	1	0	0	0
California:												
Los Angeles	4	0	2	0	3	1	5	4	18	0	0	1
Sacramento	0	1	1	0	2	0	0	0	1	0	0	16
San Francisco	1	0	1	0	13	1	2	0	12	0	0	2
Total	75	4	35	10	85	55	239	285	344	0	23	412
Corresponding week, 1943	48	------	24	14	316	------	281	------	148	0	18	653
Average, 1939–43	74	------	50	[1] 12	[2] 205	------	[1] 265	------	409	1	33	938

[1] 3-year average, 1941–43.
[2] 5-year median, 1939–43.

Dysentery, amebic.—Cases: Boston, 1; New Haven, 1; Chicago, 3; Charleston, S. C., 1.
Dysentery, bacillary.—Cases: Fall River, 6; Buffalo, 2; New York, 7; Rochester, 2; Syracuse, 1; Detroit, 1; Charleston, S. C., 4; Atlanta, 1; Los Angeles, 5.
Dysentery, unspecified.—Cases: Richmond, 1.
Rocky Mountain spotted fever.—Cases: Pittsburgh, 1.
Tularemia.—Cases: Shreveport, 1.
Typhus fever, endemic.—Cases: Charleston, S. C., 8; Tampa, 1; Nashville, 2; Mobile, 8; Little Rock, 1; New Orleans, 9; Dallas, 1; Houston, 5; San Antonio, 8.

Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (estimated population, 1943, 34,132,500)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	0.0	0.0	2.9	2.9	64	17.3	40.4	31.8	104	0.0	0.0	133
Middle Atlantic	6.5	1.4	2.3	0.9	4	5.6	37.0	73.6	40	0.0	5.1	63
East North Central	9.8	0.0	1.2	0.6	9	11.7	29.4	31.9	59	0.0	1.8	59
West North Central	11.9	0.0	4.0	0.0	8	11.9	57.7	51.7	68	0.0	0.0	40
South Atlantic	16.3	0.0	22.9	1.6	7	8.2	37.6	32.7	52	0.0	4.9	114
East South Central	29.5	0.0	------	17.7	24	5.9	35.4	5.9	53	0 0	5.9	12
West South Central	37.3	0.0	20.1	2.9	6	2.9	63.1	17.2	14	0.0	14.3	40
Mountain	39.7	0.0	------	7.9	24	15.9	55.6	23.8	79	0.0	0.0	56
Pacific	9.5	1.6	6.3	0.0	38	4.7	15.8	11.1	55	0.0	0.0	32
Total	11.5	0.6	5.4	1.5	13	8.4	36.6	43.7	53	0.0	3.5	63

PLAGUE INFECTION IN KERN COUNTY, CALIF.

Plague infection has been reported proved in a pool of 200 fleas from 31 ground squirrels, *C. beecheyi*, collected September 22 on a ranch 7 miles north of California Institution for Women, Bear Valley, Kern County, Calif.

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—August 1944.—During the month of August 1944, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	12				6		1		19	
Diphtheria	9	0			1		5		15	1
Dysentery:										
Amebic			1				8	1	9	1
Bacillary	2				1		3		6	
Leprosy							1		1	
Malaria [1]	15		5		106		88	5	214	5
Measles	1				3				4	
Mumps	2		1		11		1		15	
Paratyphoid fever	3				2		4		9	
Pneumonia		7		3	23	1		4	[2] 23	15
Poliomyelitis					1		2	1	3	1
Scarlet fever							1		1	
Tuberculosis		23		3	3	1		10	[2] 3	37
Typhoid fever			1				3		4	

[1] 36 recurrent cases.

[2] In the Canal Zone only.

Puerto Rico

Notifiable diseases—4 weeks ended October 7, 1944.—During the 4 weeks ended October 7, 1944, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	20	Ophthalmia neonatorum	2
Diphtheria	35	Puerperal fever	1
Dysentery	14	Ringworm	1
Filariasis	32	Syphilis	535
German measles	67	Tetanus	5
Gonorrhea	396	Tetanus, infantile	1
Influenza	125	Tuberculosis (all forms)	720
Leprosy	2	Typhoid fever	32
Lymphogranuloma inguinale	1	Typhus fever (endemic)	7
Malaria	893	Whooping cough	345
Measles	703		

Virgin Islands of the United States

Notifiable diseases—July–September 1944.—During the months of July, August, and September 1944, cases of certain notifiable diseases were reported in the Virgin Islands as follows:

Disease	July	August	September	Disease	July	August	September
Cerebrospinal meningitis		1		Pellagra			1
Chickenpox	1		2	Schistosomiasis		2	
Dysentery, amebic		1		Syphilis	18	40	20
Filariasis	10	8	8	Trachoma		2	
Gonorrhea	9	11	8	Tuberculosis	3	1	1
Hookworm disease	3	7	4	Typhoid fever			2
Mumps		1		Typhus fever	4	13	

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended September 23, 1944.—During the week ended September 23, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		24	1	20	43	7	3	5	21	124
Diphtheria	2	1	3	21	4	1	2			34
Dysentery, bacillary				2	3				16	21
Encephalitis, infectious							1	1	1	3
German measles				4	8	1		3	8	24
Influenza					11				5	16
Measles				18	7	7	5	10	6	53
Meningitis, meningococcus				4	6					10
Mumps		3		11	39	1		18	13	85
Poliomyelitis			3	4	21	7		4		39
Scarlet fever		11	10	3	70	13	4	5	18	134
Tuberculosis (all forms)		1		132	44	14	19		35	245
Typhoid and paratyphoid fever			1	28	4			3	2	38
Undulant fever					3	1			3	7
Whooping cough		16		156	53	10	26	12	29	302

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER *

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January–July 1944	August 1944	September 1944—week ended—				
				2	9	16	23	30
ASIA								
Ceylon	C	2						
India	C	126,005	29,182					
Calcutta	C	2,863	224	31	35			
Chittagong	C	63						
Madras	C	36			1			
Negapatam	C	17						
Vizagapatam	C	23	246					

* It was found necessary to omit this table in the preceding issue of the Public Health Reports. It is published monthly and in the future it will again appear in the last issue of each month.

PLAGUE

[C indicates cases; D, deaths; P, present]

Place		January–July 1944	August 1944	September 1944—week ended— 2	9	16	23	30
AFRICA								
Algeria	C	2						[1] 29
Belgian Congo	C	4		1		2		5
Plague-infected rats		P						
British East Africa:								
Kenya	C	6						
Uganda	C	5						
Egypt	C	626	13		2			
Port Said	C	58	13		2			
Suez	C	157						
French West Africa: Dakar	C	145	163	38	38	35		
Madagascar	C	69	11					
Morocco (French)	C	77	62					
Rhodesia, northern	C	1						
Senegal	C	17	2					
Tunisia	C		1	P				
Union of South Africa	C	23						13
ASIA								
China:								
Chekiang Province	C						P	
Foochow	C	P						
Kiangsi Province	C		P				[2] 104	
India	C	6,862	357					
Indochina	C	57						
Palestine	C	4	16	3	4	3	9	
EUROPE								
Portugal: Azores	C	13	1	1	2	1	1	1
SOUTH AMERICA								
Bolivia:								
Chuquisaca Department	C	5						
Santa Cruz Department	C		5					
Tarija Department	C	9	3					
Brazil	C	94						
Ecuador:								
Chimborazo Province	C	4						
Loja Province	C	1	3					
Peru:								
Ancash Department	C	57						
Lambayeque Department	C	1						
Libertad Department	C	5						
Lima Department	C	17						
Piura Department	C	2						
OCEANIA								
Hawaii Territory:								
Hamakua District	D	[3] 5						
Plague-infected rats [4]		[5] 45	[6] 4					

[1] For the month of September 1944.
[2] From the beginning of the outbreak in August 1944.
[3] Includes 1 death from pneumonic plague.
[4] 53 fleas were also proved positive for plague on March 7, 1944.
[5] Includes 12 plague-infected mice.
[6] Also plague-infected tissue in a pool of 8 mice.

SMALLPOX

[C indicates cases; D, deaths; P, present]

Place		January–July 1944	August 1944	September 1944—week ended— 2	9	16	23	30
AFRICA								
Algeria	C	720	18					
Angola	C	29						
Basutoland	C	141						
Belgian Congo	C	1,277	108	98	56	28		
British East Africa:								
Kenya	C	2,877	87	19	14			
Mombasa	C	143						
Tanganyika	C	2,426	198					
Uganda	C	2,947	392	136	111	62		
Cameroon (French)	C	365						
Dahomey	C	66	19					
Egypt	C	10,722						
French Equatorial Africa	C	1,239	38					
French Guinea	C	862	18					
French West Africa	C	109	11					
Gambia	C	13						
Gold Coast	C	6						
Ivory Coast	C	403	11					
Mauritania	C	1	1					
Morocco (French)	C	648						
Mozambique	C	3						
Nigeria	C	3,311	208					
Niger Territory	C	550	4					
Senegal	C	162	22					
Sierra Leone	C	393						
Sudan (Anglo-Egyptian)	D	1						
Sudan (French)	C	1,883	11					
Tunisia	C	6						
Union of South Africa	C	276	76		36	19		
ASIA								
Arabia	C	[1] 9						
Ceylon	C	8						
China: Kunming (Yunnan Fu)	C	53						
India	C	216,018	6,925					
Indochina	C	1,557						
Iran	C	789						
Iraq	C	31			6			
Palestine	C	153	9	1		1	1	
Syria and Lebanon	C	176	3					
EUROPE								
France	C	1						
Gibraltar	C	P						
Great Britain	C	[2] 18						
Greece	C	321						
Italy	C	515	123	10	4	16	19	32
Portugal	C	30	1		1			
Spain	C	163	3					
Turkey	C	5,628						
NORTH AMERICA								
Dominican Republic	C	1						
Guatemala	C	7	1					
Honduras	C	9						
Mexico	C	2,021	277					
SOUTH AMERICA								
Bolivia	C	574	180					
Brazil	C	312	273	36	42			
Colombia	C	314	27	6	3	4	2	4
Ecuador	C	10	9					
Peru	C	218						
Lima	C	19						
Venezuela	C	235	79					

[1] Includes 4 imported cases.
[2] Includes 1 case imported from the Middle East.

TYPHUS FEVER

[C indicates cases]

Place		January–July 1944	August 1944	September 1944—week ended— 2	9	16	23	30
AFRICA								
Algeria	C	940	33					
Basutoland	C	95						
Belgian Congo	C	10	3	4	8	1		
British East Africa: Kenya	C	7						
Egypt	C	16,504	223					
French Guinea	C	2						
French West Africa: Dakar	C	28	8					
Gold Coast	C	5						
Morocco (French)	C	2,330						
Morocco (Spanish)	C	7	1					
Mozambique	C	2						
Nigeria	C	2						
Rhodesia, northern	C	62	13					
Sierra Leone	C	30						
Sudan (Anglo-Egyptian)	C	2			1			
Tunisia	C	612	24					
Union of South Africa	C	4,458						
ASIA								
Arabia: Western Aden Protectorate	C	[1] 15						
Ceylon	C	1						
China: Kunming (Yunnan Fu)	C	64	13	8	3	3	1	
India	C	6						
Indochina	C	1,004						
Iran	C	6,407						
Iraq	C	564	14					
Palestine	C	410	14	1	8	2	9	
Syria and Lebanon	C	427	1					
Trans-Jordan	C	37						
EUROPE								
Belgium	C	10						
Bulgaria	C	686						
France	C	11						
Germany	C	215						
Greece	C	294						
Hungary	C	3,113	112	33	21	11		
Irish Free State	C	7						
Italy	C	1	6					
Netherlands	C	8						
Norway	C	1						
Portugal	C	4					2	
Rumania	C	6,000						
Slovakia	C	332						
Spain	C	436	27					
Turkey	C	2,286						
Yugoslavia	C	6,977	457					
NORTH AMERICA [2]								
Costa Rica	C	2						
Dominican Republic	C	10						
Guatemala	C	1,545	158					
Jamaica	C	45	9		1	1		
Mexico	C	1,177	109					
Panama Canal Zone	C	1						
Puerto Rico (endemic)	C	129	31	5	1	3	1	1
Salvador	C	4						
Virgin Islands	C	6	13					
SOUTH AMERICA								
Bolivia	C	166	26					
Brazil	C	2	2					
Chile	C	341						
Colombia	C	268	17					
Curacao	C	2	2					
Ecuador	C	221	32					
Peru	C	571						
Venezuela	C	60	12					
OCEANIA								
Australia	C	142	10					
Hawaii Territory	C	42	5	6	3	4	4	

[1] A report dated Mar. 30, 1944, states that an estimated 800 deaths from typhus fever have been reported in Western Aden Protectorate, Arabia.

[2] Cases of typhus fever listed in this area are probably of endemic type.

YELLOW FEVER

[C indicates cases; D, deaths]

Place		January–July 1449	August 1944	September 1944—week ended—				
				2	9	16	23	30
AFRICA								
Belgian Congo:								
Babeyru	D	2						
Banzyville	C	2	[1] 11					
Bondo	D	1						
Leopoldville	C	1						
Gold Coast:								
Cape Coast	C		[1] 1					
Kintampo	C	[1] 1						
Northern Territories	C	1						
Sekondi	C		[1] 1					
Tamale	C	[1] 1						
Yendi	C	[1] 1						
Ivory Coast: Abidjan	C		1					
Portugese Guinea: Port Bintam	C	1						
EUROPE								
Portugal: Lisbon,[2]								
SOUTH AMERICA								
Bolivia:								
La Paz Department	C	1						
Santa Cruz Department	C	3						
Brazil:								
Acre Territory	D	1						
Matto Grosso State	D	3						
Para State	D	2						
Colombia:								
Boyaca Department	D	2						
Caldas Department	D	1						
Cundinamarca Department	D	1						
Santander Department	D	4						
Venezuela	C			3		3		

[1] Suspected.
[2] According to information dated Jan. 21, 1944, it is reported that a vessel which called at the islands of Sao Tome and Cape Verde arrived at Lisbon, Portugal, with cases of yellow fever on board.

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COURT DECISION ON PUBLIC HEALTH

Disposal of wastes—joint order by State board of health and State committee on water pollution.—(Wisconsin Supreme Court; *American Brass Co. et al.* v. *Wisconsin State Board of Health et al.*, 15 N.W.2d 27; decided June 19, 1944.) The plaintiffs, two brass companies, brought an action to review an order concerning the disposal of pollutional wastes from their plants. The order was a joint one by the Wisconsin State Board of Health and the Wisconsin State Committee on Water Pollution. The conclusion of the State supreme court was that there was no authority in the statutes for the two bodies to proceed jointly and the judgment of the lower court affirming the order was reversed and the cause remanded to the trial court to set aside and vacate the order. The reasons for the judgment of the appellate court were as follows:

(*a*) An administrative agency has only such powers as are expressly granted to it or necessarily implied and any power sought to

be exercised must be found within the four corners of the statute under which the agency proceeds.

(*b*) The power conferred upon the State board of health to have "general supervision and control over the waters of the State, drainage, water supply, water systems, sewage and refuse disposal, and the sanitary condition of streets, alleys, outhouses, and cesspools, in so far as their sanitary and physical condition affects health or comfort" was clearly a power to be exercised by the board for the purpose of promoting the health and comfort of the people.

(*c*) The State committee on water pollution had power to exercise general supervision over the administration and enforcement of all laws relating to pollution of the surface waters of the State and to issue general and special orders for controlling the pollution of surface waters.

(*d*) The evident legislative purpose in enacting the statute relating to the committee on water pollution was to create an administrative agency with special authority to deal with the pollution of surface waters and that committee was not authorized to do anything else and was not required to take into consideration matters of public health and comfort.

(*e*) The State board of health and the State committee on water pollution were two separate and distinct bodies exercising power over separate and distinct matters.

(*f*) The mere fact that the power conferred upon the committee on water pollution complemented to a certain extent the powers conferred upon the State board of health did not warrant or imply any authority for the board and the committee to act jointly.

(*g*) Administrative agencies exercising legislative or judicial power or both powers in combination must be held to act within the limits prescribed by the statute creating them and they have no general legislative or general judicial powers but only those specifically granted or necessarily implied.

(*h*) Where two bodies join, as in the instant case, no one is able to say which authority was exercised or whether the authority was exercised by one or the other or whether the powers would have been exercised at all if the proceeding had been separate instead of joint.

(*i*) The defendants' argument, based upon the theory that it was difficult to tell which body had jurisdiction and that the circumstances might be such that the public interest would be advanced if the powers were exercised jointly, was one to be addressed to the legislature and not to the court.

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