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MASS X-RAY SURVEY IN SAN ANTONIO [1]

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For many years San Antonio has had the questionable distinction of having the highest tuberculosis death rate of any large city in the United States. In 1941 San Antonio requested of the United States Public Health Service the loan of personnel and equipment to conduct a mass X-ray survey in that city. It was hoped that the citizens of San Antonio would be stimulated to constructive action if they knew the actual number of persons suffering from tuberculosis and jeopardizing the health of the entire city. Disease, like war, cannot be quarantined in one section; eventually it spreads to neighboring areas.

EQUIPMENT AND PERSONNEL

After considerable preparation and consultation with the San Antonio Health Department, the local medical society, and the Bexar County Tuberculosis Association, on May 12, 1942, the Public Health Service dispatched a 35-mm. photofluorographic unit to Texas. The fluorograph was a comparatively new type of X-ray machine, capable of X-raying over 100 persons an hour at a nominal cost. Personnel with the unit included a medical officer in charge, an X-ray technician, and a clerk.

QUARTERS OF THE SURVEY

The unit was housed in a building formerly used as a recreation center, an ample two-story stucco structure adapted for the survey by the installation of cubicles, desks, chairs, and a 220-volt electrical power supply. The survey was conducted in the heart of the West Side, among the Latin-American population, where it was estimated from rental statistics that the incidence of tuberculosis would be highest. A great deal of improvisation was necessary because of the lack of local resources for this type of work.

[1] From the Tuberculosis Control Division, Bureau of State Services.

PROCEDURE

At the beginning the X-ray survey was coordinated with a socio-economic survey, which had been made by Work Projects Administration enumerators, under the supervision of the nurses of the City Health Department prior to the arrival of the X-ray survey unit. Forms containing 78 headings covering the socioeconomic status of each member of the family were completed for approximately 4,000 families.

All examinations were done on a purely voluntary basis. However, it was soon found that personal delivery of X-ray appointment slips to individual families did not result in an adequate response. Although the machine was capable of X-raying 500 people a day it was seldom that over 200 presented themselves.

In order to broaden the scope of the survey and to give more individuals an opportunity to be X-rayed, it was decided to publicize the survey throughout the city and to throw it open to the general public. By the use of such publicity channels as radio, the press, speeches, circulars, and missionary work among various organizations, a much more satisfactory response was obtained, making it possible for large numbers of people to have the benefit of a chest X-ray while the machine was still in San Antonio.

MECHANICS OF THE SURVEY.

It was difficult to work out a satisfactory system of processing masses of people. The most important task was the attraction of adequate numbers of people to utilize the machine efficiently. Once the people entered the building they were interviewed and the necessary information concerning name, address, age, sex, color, occupation, and marital status was obtained; they were then assigned an identification number. Cubicles were available for undressing and gowning. The 35-mm. chest X-ray was taken on groups of 15 to 25 people. Very little difficulty arose in connection with the X-raying of both sexes and various racial groups in quick succession.

The films were processed and interpreted as soon as they were dry. Suspicious and positive cases were called back by the nursing staff or by post card. A large confirmatory 14 x 17-inch chest film was then taken, using the same X-ray apparatus. Positive cases were reported to the health department for follow-up. The patient was told to consult his private physician, and a report of the findings was sent to the physician. If there was no family physician, the patient was referred to a local clinic.

REPORTS OF CHEST X-RAY SURVEY

Chest X-ray examinations of 20,350 persons in San Antonio revealed that 993, or 4.9 percent, had reinfection tuberculosis, minimal,

moderately advanced, or far advanced. In addition, 200 persons, or 1.0 percent, were found to have cardiac abnormalities; 91, or 0.4 percent, had massive calcification; 258, or 1.3 percent, suspicious tuberculosis; 125, or 0.6 percent, fibrosis; and 102, or 0.5 percent, had other types of chest pathology.

Of the 20,350 persons examined, 12,920 were female and 7,430 were male. Among the former 4.7 percent had reinfection tuberculosis; among the males the percentage was 5.2.

Over 90 percent of the persons examined were of Latin-American extraction; only a small number were colored. Very small differences in the proportion of reinfection tuberculosis were observed between the Anglo-Americans and the Latin-Americans. Among the

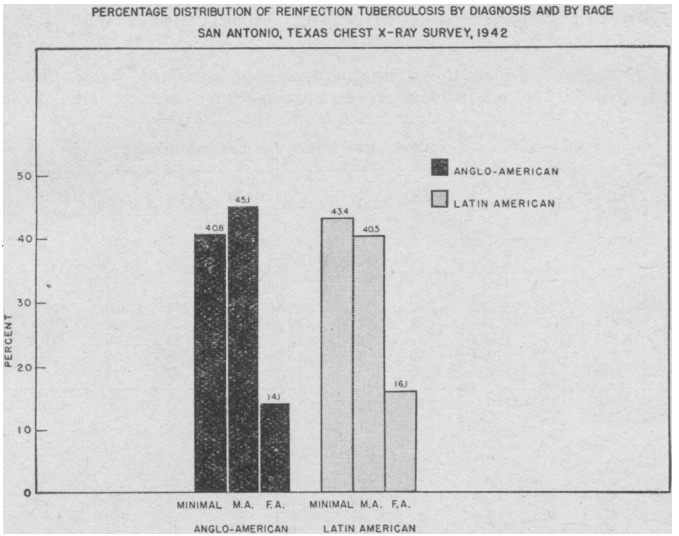

FIGURE 1.

1,277 Anglo-Americans, 71 cases of reinfection tuberculosis comprising 5.5 percent of the group, were found. Among 18,607 Latin-Americans, 914 cases were discovered, or 4.9 percent. The rates were higher among the males than among the females, both in the Latin-American and Anglo-American groups.

The true incidence of tuberculosis among Anglo-Americans in San Antonio is probably lower than the figure found in the group surveyed, because of the relatively small numbers involved, and because the few that presented themselves made a considerable effort to seek out the survey in the Latin-American quarter. It is thought that only those Anglo-Americans particularly conscious of the disease and perhaps personally in contact with a known case availed themselves of the opportunity for free X-ray examination.

Of the 993 cases of reinfection tuberculosis, 430, or 43.3 percent, were in the minimal stage; 405, or 40.8 percent, were moderately advanced; and 158, or 15.9 percent, were far advanced. There were relatively more moderately advanced and far-advanced cases among the males (63.4 percent) than among the females (52.5 percent). The proportion of cases of moderately advanced and far-advanced tuberculosis was also slightly higher among Anglo-Americans (59.2 percent) than among the Latin-Americans (56.6 percent). In other types of pathology, no significant differences were observed between Anglo-Americans and the Latin-Americans.

Table 1 presents the findings from reinfection tuberculosis by race and sex in broad age groups. The increase in percentage of reinfection tuberculosis is very marked with age; in the total group examined the percentage of reinfection tuberculosis was 1.2 percent

TABLE 1.—*Reinfection tuberculosis (minimal, healed minimal, moderately advanced, far-advanced) found in chest X-ray survey, San Antonio, Tex., 1942*

Age (years)	All races			Anglo-American			Latin-American			Colored		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Total examined												
Less than 20	8,307	3,735	4,572	282	147	135	7,854	3,474	4,380	171	114	57
20–44	8,474	2,358	6,116	623	177	446	7,652	2,125	5,527	199	56	143
45–64	2,874	1,011	1,863	301	122	179	2,492	853	1,639	81	36	45
65 and over	471	237	234	52	37	15	410	198	212	9	2	7
Age unknown	224	89	135	19	6	13	199	81	118	6	2	4
Total	20,350	7,430	12,920	1,277	489	788	18,607	6,731	11,876	466	210	256
Total reinfection												
Less than 20	101	35	66	5	2	3	96	33	63	-------	-------	-------
20–44	571	206	366	30	14	16	538	189	348	4	3	1
45–64	252	107	145	23	13	10	225	91	134	4	3	1
65 and over	63	33	30	12	7	5	51	26	25	-------	-------	-------
Age unknown	6	4	1	1	1	0	4	3	2	-------	-------	-------
Total	993	385	608	71	37	34	914	342	572	8	6	2
Percent reinfection												
All ages	4.9	5.2	4.7	5.5	7.6	4.3	4.9	5.1	4.8	1.7	2.9	0.8
Less than 20	1.2	0.9	1.4	1.8	1.4	2.2	1.2	0.9	1.4	-------	-------	-------
20–44	6.7	8.7	6.0	4.8	7.9	3.6	7.0	8.9	6.3	2.0	5.4	0.7
45–64	8.8	10.6	7.8	7.6	10.7	5.6	9.0	10.7	8.2	4.9	8.3	2.2
65 and over	13.4	13.9	12.8	-------	-------	-------	12.4	13.1	11.8	-------	-------	-------
Age unknown	2.7	4.5	0.7	-------	-------	-------	-------	-------	-------	-------	-------	-------

in the age group under 20, 6.7 percent for persons 20 to 44, and 8.8 percent among those 45 to 64. The increase with age was marked for both sexes, for the Anglo-Americans as well as the Latin-Americans.

Pathologic conditions other than tuberculosis were found in 302 persons. This group formed an interesting byproduct of the survey. The pathology consisted of many types of heart disease, bronchiec-

TABLE 2.—*Reinfection tuberculosis found in chest X-ray survey, San Antonio, Tex., 1942*

	Total	Minimal	Percent	Mod. advanced	Percent	Far-advanced	Percent
All races	993	430	43.3	405	40.8	158	15.9
Male	385	141	36.6	176	45.7	68	17.7
Female	608	289	47.5	229	37.7	90	14.8
Anglo-American	71	29	40.8	32	45.1	10	14.1
Male	37	12	32.4	17	45.9	8	21.6
Female	34	17	50.0	15	44.1	2	5.9
Latin-American	914	397	43.4	370	40.5	147	16.1
Male	342	126	36.8	156	45.6	60	17.5
Female	572	271	47.4	214	37.4	87	15.2
Colored	8	4	----	3	----	1	----
Male	6	3	----	3	----	----	----
Female	2	1	----	----	----	1	----

TABLE 3.—*Pathology, other than tuberculosis, found in chest X-ray survey, San Antonio, Tex., 1942*

	Number examined	Cardiac	Percent	Calcification	Percent	Reserved	Percent	Fibrosis	Percent	Other Path.[1]	Percent
Total	20,350	200	1.0	91	0.4	258	1.3	125	0.6	102	0.5
Male	7,430	85	1.1	36	.5	82	1.1	36	.5	54	.7
Female	12,920	115	.9	55	.4	176	1.4	89	.7	48	.4
Anglo-American	1,277	21	1.6	7	.5	19	1.5	10	.8	12	.9
Male	489	11	2.2	5	1.0	8	1.6	4	.8	8	1.6
Female	788	10	1.3	2	.3	11	1.4	6	.8	4	.5
Latin American	18,607	166	.9	82	.4	235	1.3	112	.6	86	.5
Male	6,731	70	1.0	31	.5	72	1.1	32	.5	44	.7
Female	11,876	96	.8	51	.4	163	1.4	80	.7	42	.4
Colored	466	13	2.8	2	.4	4	.9	3	.6	4	.9
Male	210	4	1.9	----	----	2	1.0	----	----	2	1.0
Female	256	9	3.5	2	.8	2	.8	3	1.2	2	.8

[1] "Other pathology" includes pleurisy (old) and pleurisy with effusion, tumors, bronchiectasis, scoliosis, empyema, pneumonitis, rib anomalies, etc.

tasis, pneumonia, lung abscess, substernal thyroid, and tumors. One particularly noteworthy case of a dermoid cyst was found. The patient was a 36-year-old Latin-American woman who had no symptoms whatsoever. The small film revealed a tumor the size of a grapefruit close to the heart. After numerous studies and consultations with local physicians it was decided that the tumor would either become cancerous or be fatal from its very pressure. Thereupon she was hospitalized and operated upon by a local surgeon, the massive tumor delivered from her chest, and she was up and about within 2 weeks.

COMPARISON OF SURVEY WITH VITAL STATISTICS

Similar surveys with adequate clinical follow-up have revealed that approximately 30 percent (*1*, *2*, *3*, *4*) of the cases of reinfection tuberculosis discovered by X-ray examination were active and hence sources of spread of the disease in the community. The Latin-American population in San Antonio not only has a higher percentage of advanced cases of tuberculosis than is found in the country as a whole (57 percent moderate and far-advanced cases in San Antonio as against 38 percent moderate and far-advanced cases in the average survey) but there is good reason to believe from X-ray evidence that the percentage of active cases is at least 30 percent and probably much greater. It is estimated that 1.6 percent of the 18,607 Latin-Americans examined in San Antonio had active tuberculosis. Since 914 of the Latin-American group were found to have reinfection tuberculosis, at least one-third, or 305, can be considered active cases.

The total Latin-American population is estimated as 106,619 (1942 Health Department Report). Thus, the 18,607 Latin Americans examined in the survey represent over 15 percent of the estimated population and constitute a reasonably accurate representative sample. Applying the findings of the survey, it may be estimated that there are approximately 5,100 cases of reinfection tuberculosis among the Latin-American population of San Antonio, 1,700 of which are believed to be active. The active cases form the infectious reservoir from which new recruits are added to the ranks of those already suffering from tuberculosis.

In 1942, the survey year, 237 deaths occurred among Latin Americans in San Antonio. Thus, according to the estimated prevalence in the same year, there was 1 death for every 7 active cases, and 1 death for every 21 cases of reinfection tuberculosis.

In Cattaraugus County, N. Y. (*5*) extensive case finding revealed a ratio of 6 living cases of tuberculosis for each death from tuberculosis. The Framingham study found 9 cases per death (*6*). Various other approximations vary from 3 to 12 active cases for each death from tuberculosis (*7*). The discovery of 993 persons with reinfection tuberculosis within a period of 4 months, with the aid of the photofluorograph, opens new horizons in tuberculosis control. In this relatively short period over 15 percent of the Latin-American population was screened. Furthermore, almost one-half the cases were in the minimal stage and could be more quickly and easily treated than the advanced cases. When it is realized that 90 percent of persons admitted to sanatoria are in an advanced stage of tuberculosis and about 10 percent are in the minimal stage, the complete reversal of the stage of disease in routine case finding has deep significance. For the first time the doctor can take the initiative, and need

not wait until the patient presents himself at the office, only to find that it is too late.

THE CAUSE OF THE HIGH INCIDENCE OF TUBERCULOSIS AMONG LATIN AMERICANS

The recital of statistics merely defines the magnitude of the problem; it does not give the answer to the question of why there is so much tuberculosis in San Antonio. Neither does it give an insight into the meaning of the disease to the individual. The misery, the broken homes, the undernourished children, the pauperization of families that stem from this chronic ailment are all implicit in the foregoing figures. It would be futile to give specific examples of what happened to individual families, because they are legion and their tragedies are so varied.

The most obvious reason why 1 Latin American out of 20 was found to have tuberculosis is poverty. These people have been exploited as a source of cheap labor; they harvest the crops, shell the pecans, wash the clothes, and dig the ditches. For this they receive barely enough to keep body and soul together. In 1939, the housing authorities estimated that 45 percent of Latin-Americans earned less than $550 a year and that 75 percent earned less than $950 a year.

The natural corollaries of such conditions are cheap, congested, ramshackle houses, narrow, unpaved streets, few toilets, few water faucets, and a minimum of electricity.

Diets are monotonous, high in starch, low in protein, and lacking in milk, meat, fruits, and vegetables.

Under such conditions education is cursory. Many leave school before completing the grammar grades. The majority of young adults do not enter high school. These people are unable to purchase adequate medical care; community facilities and services are likewise inadequate for their enormous needs.

All these factors mean a low standard of living which undermines resistance and makes the Latin-American an easy mark for the tubercle bacillus. A vicious circle is established when the tuberculous Latin-American becomes poorer and sicker, spreading bacteria to his crowded family and numerous contacts, and pyramiding the poverty and disease among his people.

One of the reasons why San Antonio has been reluctant to attack the tuberculosis problem is the widespread belief that tuberculosis is purely an imported disease from other States and not indigenous to San Antonio. The "cure-seeker" theory stems from the practice of climato-therapy which was in vogue two decades ago. The widely advertised "City of Sunshine" did have an influx of wealthy and middle-class sufferers from tuberculosis, but in no sense of the word

did it become a mecca for health seekers. Now, however, modern medical practice hospitalizes and treats tuberculosis wherever it is found and the migration of tuberculous patients to San Antonio is negligible. As a matter of fact the opposite trend is being noticed. San Antonio has become a reservoir of tuberculosis which is feeding into neighboring States by means of the large number of Latin-American migratory workers.

Vital statistics obtained in 1940 by the United States Census Bureau show not only that residents of San Antonio are responsible for its high tuberculosis death rate, but that when the crude rates are corrected for residency more residents of San Antonio die elsewhere of tuberculosis than migrants from other cities and States die in San Antonio. Thus, in 1940, 312 deaths from pulmonary tuberculosis occurred in San Antonio. However, when the number of deaths among nonresidents is subtracted from 312 and the number of San Antonio residents who died of pulmonary tuberculosis elsewhere is added the total comes to 321.

FINANCIAL CAPACITY OF SAN ANTONIO

San Antonio is now in a position to make a material contribution toward the resolution of the tuberculosis problem. The war boom has particularly favored San Antonio by pouring in thousands of soldiers and civilians who vie with each other in spending Federal money. Surely it is not too much to ask of a city that it spend a relatively small fraction of its tax dollar to remedy a situation which makes it notorious among American cities.

The relief rolls have dwindled almost to the vanishing point and for many years the outstanding debt of San Antonio has been the lowest of the four largest cities in Texas. When calculated on a per capita basis the debt is roughly one-half that of Forth Worth, Dallas, and Houston. It is also interesting to note that the percent of the true value of property used for assessment is 40 percent (table 4).

TABLE 4.—*Comparison of indebtedness of 4 large cities in Texas* [1]

City	Population	Interest and sinking fund cash securities	Outstanding debt (bonded debt)	Per capita debt	Percent of true value used for assessment
San Antonio	253, 854	$1, 284, 000	$14, 079, 000	$55	40
Fort Worth	177, 662	821, 000	19, 605, 000	110	60
Dallas	294, 734	1, 665, 000	30, 299, 000	103	65
Houston	384, 513	3, 386, 000	36, 444, 000	95	40

[1] Source of material, Texas Almanac, 1941–42.

According to Spellman, (*8*) each case of tuberculosis costs the community $10,000 but this figure disregards the number of new

cases emanating from the original one. Delay in the application of vigorous tuberculosis control measures is unsound not only from a public health standpoint but financially as well.

TUBERCULOSIS COMPARED TO OTHER CAUSES OF DEATH IN SAN ANTONIO

Tuberculosis is the second leading cause of death in San Antonio for persons of all ages. One out of every ten deaths is from this disease. Heart disease, including coronary disease, is the chief cause of death, forming 15.2 percent of the total deaths.

RESIDENT DEATHS IN SAN ANTONIO BY SELECTED CAUSES [1]

Causes	*Deaths*	*Percent of total*
Heart disease (including coronary)	556	15.2
Tuberculosis (all forms)	369	10.1
Pneumonia	368	10.1
Cancer	310	8.5
Diarrhea (enteritis)	235	6.4
Accidents	212	6.0
Nephritis	209	6.0
Intracranial vascular accident	208	6.0
Premature births	122	3.3
Other causes	1,070	28.4
Total	3,659	100.0

[1] From U. S. Bureau of the Census, 1940.

It is suspected that many deaths reported as pneumonia or diarrhea actually are caused by the tubercle bacillus and would swell the total of deaths from tuberculosis considerably.

To find tuberculosis as the second leading cause of death in the country as a whole one must go back as far as the year 1910.

SUMMARY AND RECOMMENDATION

San Antonio has the highest tuberculosis death rate of any large city in the United States. This serious hazard to the well-being of the citizens of San Antonio is the second leading cause of death, exceeded only by heart disease.

A chest X-ray survey of over 20,350 residents, of whom almost 19,000 were Latin-American, revealed 993 persons, or 4.9 percent, with reinfection tuberculosis. Similar surveys in various sections of the country reveal that an average of approximately 1 percent of the population has reinfection tuberculosis.

An estimation is made that there are seven active cases for each death from tuberculosis among Latin-Americans.

Evidence is presented that the excessively high prevalence of tuberculosis among the Latin-American population exerts an un-

favorable influence on tuberculosis among Anglo-Americans in San Antonio.

Vital statistics indicate that tuberculosis among nonresidents plays an insignificant role in the high tuberculosis death rate.

If San Antonio earnestly wishes to cope with its problem the very first step should be to create an office of tuberculosis control in the city health department and to appoint a full-time competent physician as director.

The director should be a well-qualified professional person trained in public health and tuberculosis. It would aid considerably if he had the ability to work with all types of people in order to integrate the socioeconomic aspect of the program with medical care.

Naturally, such a project directed by a man of high caliber would entail the expenditure of adequate funds commensurate with the ability of the city to pay and to the necessity of eradicating a serious menace to the health of its people.

Once the office is established a permanent program of case finding, clinical care, sanatorium treatment, follow-up, and rehabilitation must be implemented in cooperation with all interested agencies.

Details of an effective program can be obtained by studying such systems as exist in certain of our large cities.

The presence, as revealed by a 4-month X-ray survey, of 993 tuberculous persons living and working in San Antonio, should furnish the necessary stimulus for a vigorous and sustained campaign against tuberculosis.

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REFERENCES

(1) Ehrlich, D. E., and others: Army X-ray examination for tuberculosis. Am. Rev. of Tuberc., 47: 113–120 (February 1943).
(2) Mikol, Edward X.: Report on New York State rejected selectees.
(3) Webster, Reginald: Pulmonary tuberculosis bacteriological examinations supplementing routine thoracic radiography in the Australian military forces. Med. J. Australia, 30: 61–67 (July 24, 1943).
(4) Anderson, Robert: Survey in Philadelphia. (Personal communications.)
(5) Milbank Memorial Fund quarterly. New York, Milbank Memorial Fund.
(6) Armstrong, Donald B., and others: Framingham Monograph, National Tuberculosis Assn., 1932.
(7) Chadwick, Henry D., and Pope, Alton S.: The Modern Attack on Tuberculosis. The Commonwealth Fund, New York, 1942.
(8) Spellman, Ramsay: The value of radiography in detecting tuberculosis in recruits. J. Am. Med. Assoc., 115: 1371–1378 (Oct. 19, 1940).

INACTIVATION OF MALARIAL PARASITES BY X-RAYS[1]

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The effects of X-rays on microorganisms have been studied by numerous workers (*1*, *2*, *3*). This paper is a report on the X-ray inactivation of *Plasmodium gallinaceum* Brumpt, 1935 (*4*, *5*), an avian malarial parasite which produces uniformly fatal infections in young chickens.

MATERIAL AND METHODS

Parasite.—The strain of *P. gallinaceum* used has been designated as 8A by the Committee on Terminology of Avian Malaria of the American Society of Parasitologists. It was obtained in November 1941 from the New York laboratories of the International Health Division of the Rockefeller Foundation and has been maintained in this laboratory by blood and sporozoite passage.

Avian host.—A single strain of White Rock chicks (*Gallus domesticus*) was used throughout this study. The birds were delivered to the laboratory when 1 day old and were inoculated within 9 days after arrival.

Preparation of sporozoite suspension.—*Aedes aegypti* mosquitoes were allowed to feed on infected chicks which showed gametocytes in their peripheral blood. After 12 to 14 days' incubation at 30° C. and 80 percent relative humidity the percentage of infected mosquitoes was estimated by sampling. Groups of infected mosquitoes were gently ground in a mixture of equal parts of chick serum and physiological saline. The coarse debris was removed by slow centrifugation and the final suspension diluted so that 0.1 cc. represented the sporozoites from one infected mosquito.

Preparation of trophozoite suspension.—Chicks with week-old, trophozoite-induced infections showing 20 to 50 percent of the red cells parasitized were used as donors. The infected blood was diluted with citrate-saline solution (2.5 percent sodium citrate and 0.85 percent sodium chloride) to give a suspension containing, unless otherwise specified, 16,000,000 parasitized red cells per 0.1 cc.

Inoculations.—Sporozoite suspensions and trophozoite suspensions were injected in 0.1-cc. amounts into the pectoral muscle and the right jugular vein, respectively.

Radiation procedures. In vitro.—Parasite suspensions were placed in closed plastic containers, 1.3 cm. deep and 2.5 cm. in diameter. Double-beam irradiation was applied under the following conditions: 200 kilovolts, 20 milliamperes, no filter, 20 cm. distance from the center of each target to the center of the container. The intensity of irradia-

[1] From the Division of Physiology, National Institute of Health. This paper was approved for publication Aug. 7, 1944, and scheduled for publication in PUBLIC HEALTH REPORTS in the issue of Sept. 1, 1944. Because of the subject matter the paper was withheld from publication at that time.

tion was 1,450 roentgens per minute as measured in air with a Victoreen instrument at the distance specified.

In vivo.—Experimental groups of chicks were exposed to single-beam roentgen radiation produced under the following conditions: 200 kilovolts, 20 milliamperes, 0.25 mm. copper and 1.06 mm. aluminum filters, and 40 cm. distance from the center of the target to the approximate center of the chicks. The intensity of radiation was 68 roentgens per minute as measured in air with a Victoreen instrument at the distance specified.

EXPERIMENTAL

Inactivation of sporozoites.—One-cc. amounts of the standard sporozoite suspension were exposed to various amounts of irradiation in closed plastic containers. Infectivity was tested by injecting intramuscularly 0.1 cc. of the irradiated suspension into 4-day-old chicks. Birds were considered to have developed infection if (*a*) parasites were found in their blood smears or (*b*) exo-erythrocytic forms (*6*) were found in the brain smears of those dying during the observation period. The results are presented in table 1 and suggest that the sporozoites were inactivated by 8,000 roentgens and above.

TABLE 1.—*Effect of X-rays on sporozoites*

Radiation applied to sporozoite suspension (roentgens)	Number of birds injected with sporozoite suspension	Number of birds developing infection in 32 days	Radiation applied to sporozoite suspension (roentgens)	Number of birds injected with sporozoite suspension	Number of birds developing infection in 32 days
None	5	[1] 5	8,000	5	0
2,000	5	4	10,000	5	0
6,000	6	2			

[1] All control birds died of infection by the fifteenth day.

Inactivation of trophozoites.—One and one-half-cc. amounts of a trophozoite suspension calculated to contain 16,000,000 parasitized red cells per 0.1 cc. were exposed to various amounts of irradiation in closed plastic containers. Infectivity was tested by intravenously injecting 0.1 cc. of the irradiated suspension into 8-day-old chicks, which were observed for infection as described in the preceding section. The results are presented in table 2 and suggest that the trophozoites were inactivated by 20,000 roentgens and above.

TABLE 2.—*Effect of X-rays on trophozoites*

Radiation applied to trophozoite suspension [1] (roentgens)	Number of birds injected with trophozoite suspension	Number of birds developing infection in 23 days	Radiation applied to trophozoite suspension [1] (roentgens)	Number of birds injected with trophozoite suspension	Number of birds developing infection in 23 days
None	10	[2] 10	20,000	8	0
2,500	9	9	40,000	10	0
10,000	6	6	80,000	10	0

[1] Due to the high intensities used, radiation values are approximate.
[2] All control birds died of infection by the sixteenth day.

That less than 10,000 roentgens may alter the infectivity of trophozoite suspensions is indicated by the lengthened prepatent periods and survival times shown in table 3 which summarizes a more detailed experiment.

TABLE 3.—*Effect of less than 10,000 roentgens on trophozoites*

Radiation applied to trophozoite suspension (roentgens)	Number of birds injected with trophozoite suspension [1]	Number of birds developing infection	Number of birds showing a positive smear on—		Average survival of infected birds (days)
			Third day	Fifth day	
None	10	10	10	10	12.1
1,000	10	10	10	10	12.5
2,000	10	10	9	10	13.4
4,000	10	[2]	1	9	15.2
6,000	10		0	3	17.8
8,000	9	9	0	0	18.2

[1] Chicks were 9 days old when injected.
[2] 1 bird of the group died from an intercurrent infection and was omitted from the table.

Irradiation of infected chicks.—In view of the reduced infectivity of trophozoites exposed to sublethal doses of X-ray, infected chicks were exposed to therapeutic radiation to determine if the outcome of the infection could be altered. Preliminary experiments showed that exposure to a single dose of more than 500 roentgens was fatal to 8-day-old chicks. Trophozoite- and sporozoite-induced infections were studied and a variety of irradiation schedules were tried. The results are shown in tables 4 and 5 and indicate that, under the conditions specified, a significant alteration in survival time was not produced by irradiation of the infected birds.

TABLE 4.—*Irradiation of sporozoite-infected chicks*

Number of chicks irradiated [1]	Dosage (roentgens)	Schedule of radiation [2] (days)	Average survival (days)
34	None		12.5
4	400	1	11.0
5	400	6	11.4
5	400	6, 8	11.8
5	200	2	12.2
3	100	6, 8, 9, 11	13.3
3	20	8, 9, 11	14.7
5	10	5, 6, 7	12.0
3	10	6, 8, 9, 11	12.3

[1] All chicks were 4 days old at time of injection and received 0.1 cc. of standard sporozoite suspension.
[2] Days of irradiation are expressed as days after inoculation which occurred on day 0.

Inactivation of Plasmodium malariae *in vitro.*—Facilities were made available [3] to test the effect of radiation on the infectivity of blood parasitized by the United States Public Health Service strain of *P. malariae* (*8*). Ten cc. of venous blood were drawn into citrate-saline solution, mixed, and divided between two 25-cc. Erlenmeyer flasks,

[3] Grateful acknowledgment is extended to Dr. Winfred Overholser and his staff at St. Elizabeths Hospital, Washington, D. C., for their kind cooperation.

TABLE 5.—*Irradiation of trophozoite-infected chicks*

Number of chicks irradiated	Dosage (roentgens)	Schedule of radiation [1] (days)	Parasitized red cells in 0.1 cc. of inoculum	Average survival (days)
19	None		16,000,000	10.2
5	500	2	16,000,000	6.4
5	500	4	16,000,000	8.2
4	500	6	16,000,000	12.3
3	500	8	16,000,000	12.7
4	500	10	16,000,000	13.3
5	400	4, 5	16,000,000	9.0
5	200	4, 5	16,000,000	11.4
5	200	3, 4	16,000,000	10.6
5	100	3, 5, 7	16,000,000	13.2
3	50	4, 5, 7, 8, 9	16,000,000	14.0
5	50	1, 2, 3, 4, 5, 7	16,000,000	11.4
3	25	4, 5, 7, 8, 9	16,000,000	12.3
4	None		1,000,000	11.8
2	500	10	1,000,000	14.0
3	400	7, 9	1,000,000	11.0
5	200	7, 9	1,000,000	14.8
5	100	1	1,000,000	12.8
3	100	7, 9	1,000,000	12.7
2	10	7, 8, 9, 10	1,000,000	14.5

[1] Days of irradiation are expressed as days after inoculation, which occurred on day 0.

one of which was exposed to 5,000 roentgens.[3] The infected blood contained 2,700 parasitized red cells per cubic millimeter. Four cc. of blood were withdrawn from each flask and intravenously injected into a patient with central nervous system syphilis.

The patient receiving the unirradiated blood showed quartan parasites in his blood smear on the eighth day and developed typical quartan malaria which was terminated with atabrine after 13 paroxysms. The patient receiving the irradiated blood was carefully followed for 32 days and at no time were parasites seen in the blood smears. This patient was subsequently reinoculated with unirradiated infected blood and developed typical quartan malaria.

DISCUSSION

Zain (*7*) in 1943 reported the effect of small doses of X-ray on the endothelial forms (*6*) of *P. gallinaceum*. He found that exposure of slices of infected brain tissue to 200 roentgens did not inactivate the parasites, nor did exposure of 4- to 5-month-old infected cockerels to divided doses of X-ray totaling 700 roentgens reduce the extent of endothelial invasion. These negative results are consistent with the inactivating levels of X-ray reported here.

It is of interest to compare the X-ray sensitivity of the malarial parasites with that of an extracellular protozoan blood parasite. Halberstaedter (*9*) reported that a strain of *Trypanosoma gambiense* produced fatal infections in mice after exposure to 8,000 roentgens whereas after 12,000 roentgens no infections were produced. Thus, as measured by infectivity, the X-ray sensitivity is of the same

[3] The irradiation technique was that given under in vitro methods except that the distance from the targets to the flask was 8.5 cm. and 12.9 cm., respectively, and the intensity of irradiation was 1,725 roentgens per minute.

general order of magnitude (5,000 to 20,000 roentgens) for *T. gambiense*, the sexual and asexual forms of *P. gallinaceum*, and the asexual forms of *P. malariae*.

A variety of chemical and physical agents have been used to inactivate pathogenic microorganisms preceding their use in the preparation of vaccines. The results presented above suggest that X-rays may be so used to inactivate the sexual and asexual forms of malarial parasites.

The prolonged prepatent period and survival time of chicks inoculated with trophozoites exposed to sublethal amounts of irradiation (table 3) suggests (*a*) that all the parasites were equally reduced in virulence, or (*b*) that some of the parasites were totally inactivated leaving uninjured a smaller number to initiate the infection.

The latter explanation is in harmony with the frequently demonstrated variations in individual susceptibility among the organisms of a clone. *P. gallinaceum* infections, furthermore, are asynchronous so that all erythrocytic stages in the developmental cycle are present in the blood at one time. It is generally considered that a cell is most radio-sensitive when it is in the process of division (*10*). Possibly, then, a "sublethal" amount of irradiation selectively injures those parasites in the process of division at the time of irradiation.

Highly synchronous malarial infections, e. g., *P. cathemerium* in birds and *P. malariae* in man, may thus become of unique and fundamental biologic interest in that practically all the parasites present at any given time are at the same point in their developmental cycle and may exhibit in the course of that cycle one or more peaks in X-ray sensitivity.

CONCLUSIONS

Sexual and asexual forms of *P. gallincaceum* were inactivated by X-rays.

Trophozoites were inactivated by 20,000 roentgens but not by 10,000 roentgens; sporozoites were inactivated by 8,000 roentgens but not by 6,000 roentgens.

Trophozoite suspensions exposed to 2,000 to 8,000 roentgens produced infections characterized by lengthened prepatent periods and lengthened survival times.

Therapeutic irradiation of infected chicks had no significant effect on the outcome of the infection.

Human blood infected with *P. malariae* and exposed to 5,000 roentgens failed to produce an infection in a susceptible patient.

ACKNOWLEDGMENT

The authors gratefully acknowledge the interest and cooperation of Dr. P. S. Henshaw, Senior Radiobiologist, National Cancer Institute.

REFERENCES

(1) Duggar, B. L.: Biological effects of radiation. McGraw-Hill Book Co., Inc., New York, 1936.
(2) Scott, C. M.: Some quantitative aspects of the biological action of X- and γ-rays. Great Britain Med. Res. Council, Special Report Series, No. 223, London, 1937.
(3) Lorenz, K. P., and Henshaw, P. S.: Radiobiologic action and the killing effects of X-rays on *Achromobacter fischeri*. Radiology, **36**: 471–481 (1941).
(4) Beltran, E.: Estado actual de nuestros conocimientos acerca del *Plasmodium gallinaceum* Brumpt, 1935. Rev. Inst. Salub. y Enf. Trop., **2**: 95–113 (1941).
(5) ————: Adelantos recientes en el conocimiento del *Plasmodium gallinaceum* Brumpt, 1935. Ibid., **3**: 217–222 (1942).
(6) James, S. P., and Tate, P.: Exo-erythrocytic schizogony in *Plasmodium gallinaceum* Brumpt, 1935. Parasitology, **30**: 128–139 (1938).
(7) Zain, H., and Wolf, A.: Einfluss der Rontgen-Strahlen auf die Entwicklung der Endothelstadien der Vogelmalaria (*Plasmodium gallinaceum*). Dtsch. Tropenmed. Z., **47**: 68–71 (1943).
(8) Coatney, G. Robert, and Young, M. D.: The taxonomy of the human malaria parasites with notes on the principal American strains. Am. Assoc. Advancement Sci., Publication No. 15, pp. 19–24 (1941).
(9) Halberstaedter, L.: The effect of X-rays on trypanosomes. Brit. J. Radiology, **11**: 267–270 (1938).
(10) Colwell, H. A.: The Method of Action of Radium and X-rays on Living Tissue. Oxford University Press, New York, 1935.

AN OUTWARD OPENING, COMBINATION STORM AND SCREEN DOOR

By R. E. Dorer, *Public Health Engineer, United States Public Health Service*

It is an accepted fact among public health engineers that screen doors must open outward if they are to be effective. When a screen door opens inward the flies and mosquitoes which congregate on the screens are literally driven into the building. Once they get inside they are trapped. Outward-opening screen doors cannot be installed by conventional methods in barracks and public buildings where storm doors are also required, as the latter must also open outward to conform to fire regulations.

In order to meet the requirements of both fire regulations and good screening practice, a combination screen door and storm door has been developed. This is especially adaptable to barracks where storm doors are kept open at all times except during severe weather. It will be noted from the photographs and chart that the solution to the problem of having both doors opening out is a three-way hinge with one door hung on each of the free arms of the hinge. The two doors will swing either as a unit or separately.

This type of hinge is not now available commercially. However, it may be turned out in any shop or manufactured in quantity. The accompanying photographs and drawing of model will illustrate details of construction.

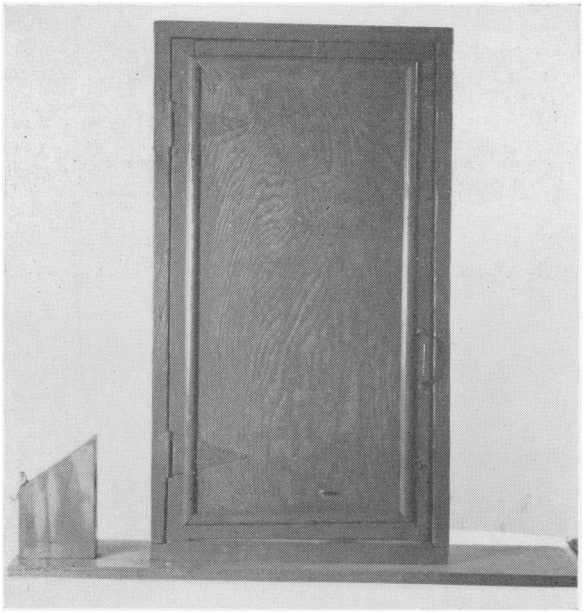


FIGURE 1.—Combination screen and storm door closed.

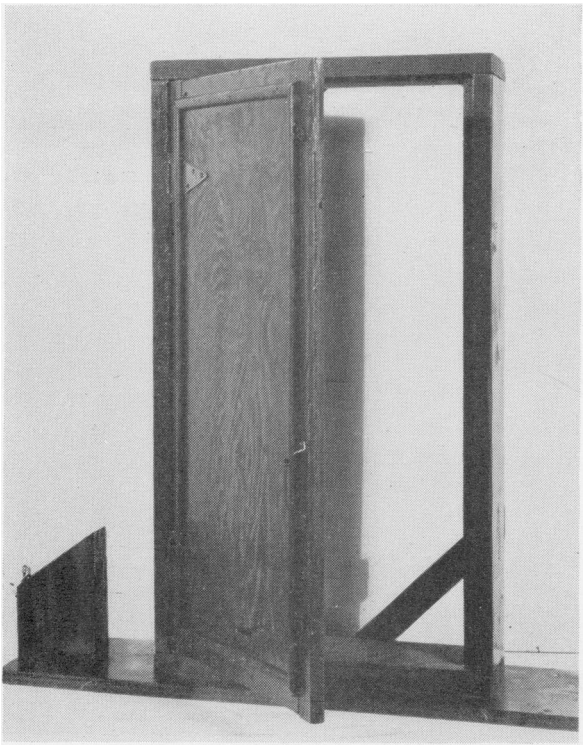


FIGURE 2.—Combination screen and storm door opening together as a unit.

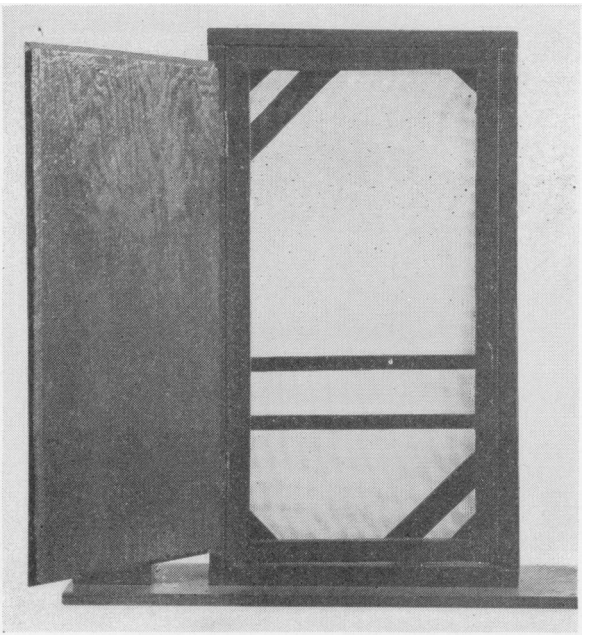


FIGURE 3.—Storm door hooked back as in good weather.

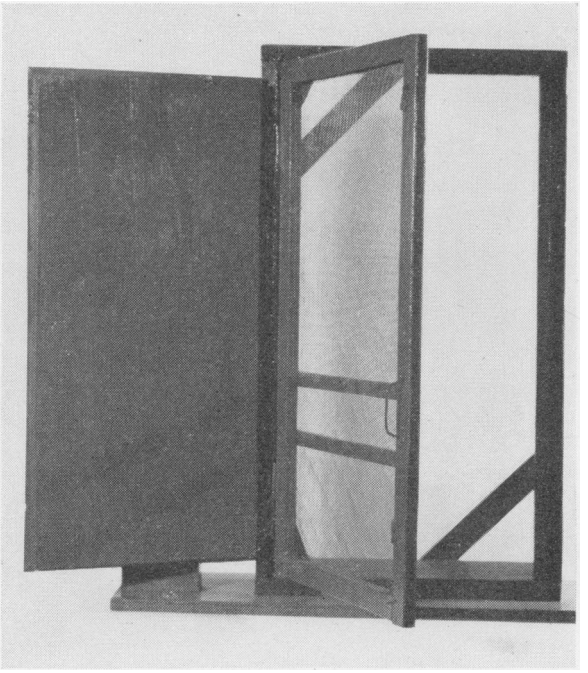
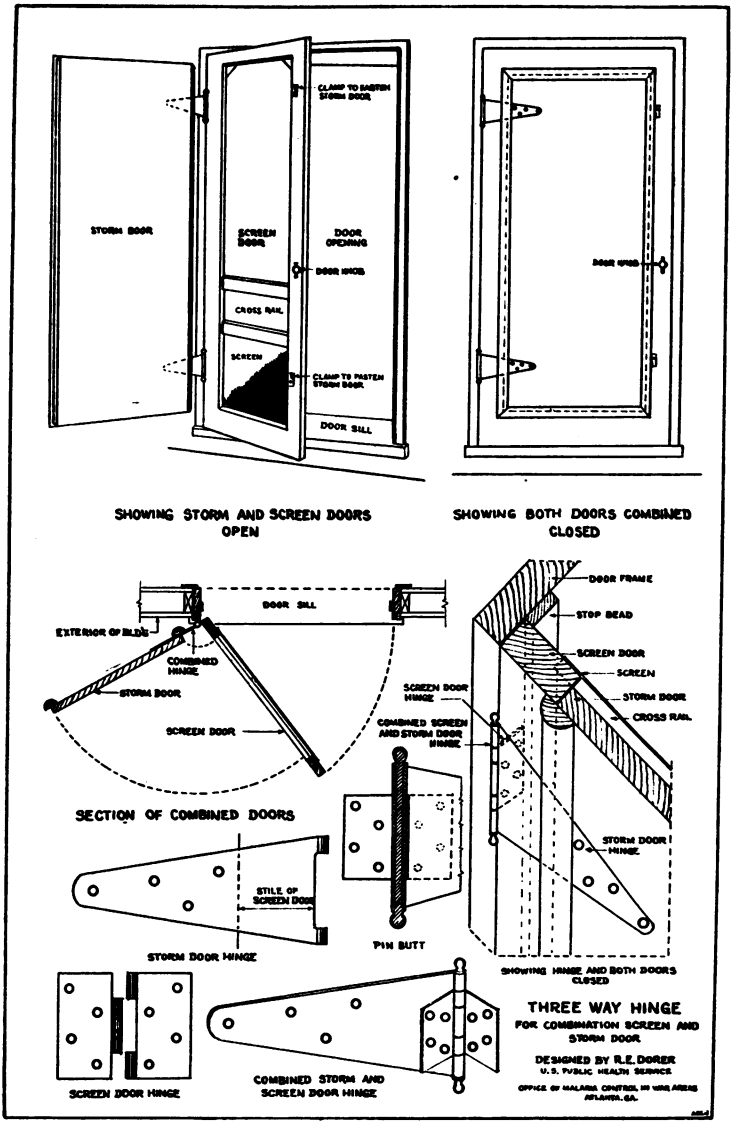


FIGURE 4.—Screen door opening outward. No interference from storm door.



DEATHS DURING WEEK ENDED JANUARY 6, 1945

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

	Week ended Jan. 6, 1945	Corresponding week, 1944
Data for 93 large cities of the United States:		
Total deaths	9,786	13,476
Average for 3 prior years	11,394	
Deaths under 1 year of age	592	722
Average for 3 prior years	718	
Data from industrial insurance companies:		
Policies in force	66,905,060	66,216,002
Number of death claims	10,568	13,706
Death claims per 1,000 policies in force, annual rate	8.2	10.8

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 JANUARY 13, 1945

Summary

The total of 251 reported cases of meningococcus meningitis, although below the totals of 645 and 309 for the corresponding weeks of the epidemic years of 1944 and 1943, respectively, is above the figure for the corresponding week of any other year since 1930. Of the cases reported currently, 107, or nearly 42 percent of the total, occurred in the 6 States reporting more than 10 cases each, as follows (last week's figures in parentheses): New York 25 (22), New Jersey 16 (19), Pennsylvania 20 (10), Ohio 14 (11), Texas 17 (9), California 15 (22). A total of 489 cases has been reported for the first 2 weeks of the year, as compared with 1,225 and 587 for the corresponding periods of 1944 and 1943, respectively, and a 5-year (1940–44) median of 113.

A total of 32 cases of poliomyelitis was reported, the same as for the corresponding week last year. Nine cases occurred in New York and no other State reported more than two cases. The median for the corresponding weeks of the past 5 years is 36. The cumulative total is 84, as compared with 66 for the first 2 weeks of last year.

The incidence of influenza declined. Of 4,132 reported cases, 3,207 occurred in the four States (Virginia, South Carolina, Alabama, and Texas) which reported 3,749 cases last week. For the first 2 weeks of the year, 8,719 cases have been reported, as compared with 192,355 and 8,182 for the corresponding respective periods of 1944 and 1943. The 5-year median is 12,516.

Of the total of 4,989 cases of scarlet fever reported for the week, more than for the corresponding week of any of the past 5 years, 2,150 occurred in the Middle Atlantic and East North Central areas. The total for the first 2 weeks of the year is 8,911, as compared with a 5-year median of 7,094.

Of the combined total of 2,093 cases of dysentery reported for the first 2 weeks of the year, 1,762 occurred in Texas. For the same period last year Texas reported 565 cases.

An aggregate of 9,912 deaths was recorded for the week in 93 large cities of the United States, as compared with 9,786 last week, 10,641 for the 3-year (1942–44) average, and 11,659 for the corresponding week last year. The cumulative total is 19,698, as compared with 25,135 for the first 2 weeks of 1944.

Telegraphic morbidity reports from State health officers for the week ended Jan. 13, 1945, and comparison with corresponding week of 1944 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 1940–44	Week ended—		Median 1940–44	Week ended—		Median 1940–44	Week ended—		Median 1940–44
	Jan. 13, 1945	Jan. 15, 1944		Jan. 13, 1945	Jan. 15, 1944		Jan. 13, 1945	Jan. 15, 1944		Jan. 13, 1945	Jan. 15, 1944	
NEW ENGLAND												
Maine	4	1	0	------	28	28	4	110	73	0	3	2
New Hampshire	0	0	0	------	------	------	1	3	8	0	0	0
Vermont	0	0	0	------	28	------	8	4	14	1	0	0
Massachusetts	6	3	2	------	------	------	71	358	358	8	34	4
Rhode Island	0	2	2	76	13	------	7	154	40	0	4	1
Connecticut	1	5	0	2	158	4	61	37	146	4	17	2
MIDDLE ATLANTIC												
New York	7	9	17	[1] 1	[1] 28	[1] 22	52	873	852	25	89	5
New Jersey	3	2	3	12	85	26	18	640	331	16	32	2
Pennsylvania	16	10	14	5	28	------	47	776	1,463	20	41	9
EAST NORTH CENTRAL												
Ohio	8	12	12	9	4,212	88	25	1,824	84	14	47	1
Indiana	7	14	14	9	129	26	7	189	63	5	14	1
Illinois	4	5	12	2	67	36	37	298	176	9	27	4
Michigan [2]	15	3	7	------	61	15	19	1,091	384	9	22	2
Wisconsin	3	1	1	9	1,297	61	33	947	437	4	12	0
WEST NORTH CENTRAL												
Minnesota	8	2	4	------	3	3	5	760	177	2	11	0
Iowa	6	12	11	------	1,839	11	16	100	100	2	1	0
Missouri	5	1	5	6	40	18	7	43	43	5	25	2
North Dakota	18	3	0	------	301	46	5	337	11	1	1	0
South Dakota	0	2	2	------	------	------	2	114	9	3	1	0
Nebraska	11	1	1	31	60	------	21	6	10	1	1	1
Kansas	4	3	4	2	844	99	19	65	141	4	7	0
SOUTH ATLANTIC												
Delaware	0	1	0	------	------	------	17	13	2	1	1	0
Maryland [2]	2	6	6	4	876	37	9	126	12	7	11	10
District of Columbia	0	0	1	1	62	10	11	31	8	3	1	1
Virginia	7	7	11	404	7,721	869	6	277	141	7	21	5
West Virginia	1	5	8	9	3,394	37	17	266	17	1	18	0
North Carolina	17	15	16	------	158	40	23	297	94	3	13	2
South Carolina	7	5	5	616	5,498	3,686	11	112	70	3	6	2
Georgia	10	9	9	50	1,634	1,634	21	192	26	1	14	0
Florida	13	5	4	4	116	28	17	32	11	10	10	0
EAST SOUTH CENTRAL												
Kentucky	4	8	10	47	1,927	21	9	152	152	3	18	2
Tennessee	9	2	5	52	913	184	88	179	74	4	21	4
Alabama	15	4	8	109	3,277	1,360	19	260	50	8	4	3
Mississippi [2]	12	3	9	------	------	------	------	------	------	5	8	1
WEST SOUTH CENTRAL												
Arkansas	9	6	11	107	2,420	638	17	51	51	3	0	0
Louisiana	9	5	5	6	6,430	32	18	24	20	5	17	1
Oklahoma	10	3	8	189	1,760	263	7	14	14	2	4	1
Texas	52	18	50	2,078	13,126	1,582	87	260	260	17	14	5
MOUNTAIN												
Montana	6	1	1	19	654	17	5	145	26	1	2	0
Idaho	3	0	0	1	2	3	5	12	12	1	0	0
Wyoming	0	0	0	28	334	36	1	21	9	2	0	0
Colorado	7	7	9	27	840	80	7	154	108	2	2	1
New Mexico	2	2	1	------	20	6	2	2	5	1	2	0
Arizona	1	0	2	166	541	242	7	39	39	1	2	2
Utah [2]	0	0	0	4	1,477	458	21	8	24	1	0	0
Nevada	0	0	0	------	138	------	5	2	2	0	1	0
PACIFIC												
Washington	4	12	7	------	45	5	32	102	102	9	16	2
Oregon	11	0	1	14	534	274	58	79	79	2	8	0
California	41	35	18	33	2,831	223	470	258	258	15	42	6
Total	378	250	330	4,132	65,649	12,516	1,455	11,837	8,266	251	645	68
2 weeks, 1945	739	518	702	8,719	192,355	22,146	2,434	21,996	16,407	489	1,225	113

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

Telegraphic morbidity reports from State health officers for the week ended Jan. 13, 1945, and comparison with corresponding week of 1944 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever[1]		
	Week ended—		Median 1940–44	Week ended—		Median 1940–44	Week ended—		Median 1940–44	Week ended—		Median 1940–44
	Jan. 13, 1945	Jan. 15, 1944		Jan. 13, 1945	Jan. 15, 1944		Jan. 13, 1945	Jan. 15, 1944		Jan. 13, 1945	Jan. 15, 1944	
NEW ENGLAND												
Maine	0	0	0	66	21	21	0	0	0	3	0	0
New Hampshire	0	0	0	5	9	9	0	0	0	0	0	0
Vermont	0	0	0	2	3	5	0	0	0	0	0	0
Massachusetts	1	3	0	403	241	241	0	0	0	1	0	0
Rhode Island	0	0	0	27	12	12	0	0	0	0	1	0
Connecticut	1	0	0	82	57	57	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	9	2	3	551	400	399	0	0	0	3	1	4
New Jersey	0	2	1	154	106	106	0	0	0	1	0	1
Pennsylvania	0	0	0	301	272	272	0	0	0	1	0	2
EAST NORTH CENTRAL												
Ohio	1	1	1	265	246	267	0	0	0	1	4	4
Indiana	1	3	0	120	89	101	1	0	4	0	5	2
Illinois	0	1	1	350	257	257	0	0	0	0	1	3
Michigan[2]	1	0	1	268	111	173	0	0	0	2	0	0
Wisconsin	0	0	1	141	185	141	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	1	1	1	56	108	92	0	0	1	1	0	1
Iowa	0	0	1	81	77	63	0	1	2	0	0	1
Missouri	0	1	1	101	76	82	0	1	1	0	2	1
North Dakota	2	0	0	23	22	15	0	1	0	0	0	0
South Dakota	0	0	0	32	43	23	1	0	0	0	0	0
Nebraska	0	1	0	148	33	38	0	0	0	0	0	0
Kansas	0	0	0	143	75	92	1	2	1	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	7	1	13	0	0	0	0	0	0
Maryland[2]	2	1	0	151	97	66	0	0	0	0	0	1
District of Columbia	0	0	0	46	60	22	0	0	0	0	0	0
Virginia	0	0	0	90	53	53	0	0	0	1	1	2
West Virginia	0	1	1	60	53	53	0	0	0	0	0	1
North Carolina	0	0	0	80	54	54	0	0	0	3	1	2
South Carolina	0	0	0	12	17	17	0	1	1	2	1	1
Georgia	0	0	1	29	13	24	0	1	0	4	0	4
Florida	1	0	0	14	8	7	0	0	0	2	6	0
EAST SOUTH CENTRAL												
Kentucky	0	0	2	36	70	70	0	1	0	0	14	1
Tennessee	1	0	0	83	57	58	1	0	0	1	2	1
Alabama	1	0	1	28	12	26	1	0	0	0	0	1
Mississippi[2]	1	0	0	37	7	10	0	0	0	2	0	1
WEST SOUTH CENTRAL												
Arkansas	0	1	1	16	2	10	0	0	0	0	2	2
Louisiana	0	1	0	21	6	8	0	0	0	4	5	5
Oklahoma	0	2	0	30	18	33	2	1	1	0	1	2
Texas	1	1	1	152	62	59	0	0	0	7	0	4
MOUNTAIN												
Montana	0	0	0	21	54	42	0	0	0	0	0	0
Idaho	0	0	0	57	28	14	1	0	0	1	0	0
Wyoming	0	1	0	12	5	5	0	0	0	0	1	0
Colorado	1	1	0	76	31	31	0	0	0	1	0	1
New Mexico	2	0	0	51	8	7	1	0	0	2	0	0
Arizona	1	0	0	25	18	7	0	0	0	3	5	2
Utah[2]	0	0	0	67	151	26	0	0	0	0	0	0
Nevada	0	0	0	3	0	0	0	0	0	0	0	0
PACIFIC												
Washington	1	2	0	82	225	38	0	1	0	1	1	1
Oregon	1	4	0	49	63	22	0	0	1	1	1	1
California	2	2	4	335	244	161	0	6	0	1	4	3
Total	32	32	36	4,989	3,860	3,637	9	16	39	49	59	70
2 weeks, 1945	84	66	73	8,911	7,324	7,094	20	24	81	81	117	154

[1] Period ended earlier than Saturday.

[2] Including paratyphoid fever cases reported separately, as follows: New York, 2; Maine, 1; Massachusetts, 1; Ohio, 1; Minnesota, 1; Georgia, 2; Texas, 1; Colorado, 1; Washington, 1.

Telegraphic morbidity reports from State health officers for the week ended Jan. 13, 1945, and comparison with corresponding week of 1944 and 5-year median—Con.

Division and State	Whooping cough			Week ended January 13, 1945								
	Week ended—		Median 1940–44	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	Jan. 13, 1945	Jan. 13, 1944			Amebic	Bacillary	Unspecified					
NEW ENGLAND												
Maine	34	8	34	0	0	0	0	0	0	0	0	0
New Hampshire	5	3	3	0	0	0	0	0	0	0	0	0
Vermont	48	6	32	0	0	0	0	0	0	0	0	0
Massachusetts	189	78	202	1	0	22	0	0	0	0	0	0
Rhode Island	18	2	16	0	0	0	0	0	0	0	0	0
Connecticut	101	16	92	0	0	0	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	232	185	487	0	0	5	0	0	0	0	1	0
New Jersey	92	70	164	0	4	0	0	0	0	0	0	0
Pennsylvania	173	100	373	0	0	0	0	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio	93	89	221	0	0	0	0	1	0	0	1	0
Indiana	7	23	35	0	1	0	0	0	0	0	2	0
Illinois	77	69	121	0	1	0	0	1	0	0	13	0
Michigan [2]	122	42	181	0	1	3	0	0	0	0	0	0
Wisconsin	74	80	101	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	32	38	66	0	1	1	0	0	0	0	0	0
Iowa	7	22	22	0	0	0	0	0	0	0	0	0
Missouri	11	13	22	0	0	0	0	0	0	0	1	0
North Dakota	4	13	13	0	0	0	0	0	0	0	0	0
South Dakota	6	0	2	0	0	0	0	0	0	0	0	0
Nebraska	12	3	2	0	0	0	0	0	0	0	0	0
Kansas	48	21	48	0	0	0	0	0	0	0	1	0
SOUTH ATLANTIC												
Delaware	3	0	3	0	0	0	0	0	0	0	0	0
Maryland [2]	77	18	84	0	0	0	0	0	0	0	0	0
District of Columbia	6	6	10	0	0	0	0	0	0	0	0	0
Virginia	39	48	48	0	0	0	34	0	0	0	0	1
West Virginia	25	62	31	0	0	0	0	0	0	0	0	1
North Carolina	77	68	85	0	2	0	0	0	0	0	0	10
South Carolina	52	64	64	0	0	8	0	0	0	0	0	5
Georgia	7	5	13	0	0	1	0	0	0	0	2	17
Florida	25	28	11	0	2	0	0	0	0	0	0	16
EAST SOUTH CENTRAL												
Kentucky	12	37	55	0	0	0	0	0	0	0	10	0
Tennessee	29	9	32	0	2	0	1	0	0	0	7	2
Alabama	22	4	13	0	6	0	0	0	0	0	0	6
Mississippi [2]	----	----	----	0	0	0	0	0	0	0	3	3
WEST SOUTH CENTRAL												
Arkansas	7	17	17	0	0	9	0	0	0	0	1	0
Louisiana	2	2	2	0	1	0	0	0	0	0	1	3
Oklahoma	11	5	6	0	0	0	0	0	0	0	0	0
Texas	174	145	145	0	16	561	86	1	0	0	0	20
MOUNTAIN												
Montana	17	6	6	0	0	0	0	0	0	0	0	0
Idaho	0	1	6	0	0	0	1	0	0	0	0	0
Wyoming	6	5	8	0	0	0	0	0	0	0	0	0
Colorado	35	23	23	0	0	0	0	0	0	0	0	0
New Mexico	3	2	10	0	0	0	4	0	0	0	0	0
Arizona	9	18	24	0	0	0	34	0	0	0	0	0
Utah [2]	5	8	32	0	0	0	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	33	49	49	0	0	0	0	0	0	0	0	0
Oregon	10	16	16	0	0	0	0	0	0	0	0	0
California	192	65	183	0	1	8	0	5	0	0	0	0
Total	2,263	1,592	3,864	1	38	618	160	8	0	0	43	84
Same week, 1944	1,502	----	----	1	40	337	75	12	0	0	13	58
Average 1942–44	3,237	----	----	0	23	182	49	10	0	40	20	[4] 55
2 weeks: 1945	4,108	----	----	2	47	1,572	474	13	1	0	82	169
1944	3,130	----	----	2	54	633	122	19	0	0	32	117
Average 1942–44	6,253	----	[4] 7,728	1	39	343	87	16	1	40	53	[4] 117

[2] Period ended earlier than Saturday.

[4] 5-year median, 1940–44.

WEEKLY REPORTS FROM CITIES

City reports for week ended Jan. 6, 1945

This table lists the reports from 85 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	1	0	0	0	5	1	6	0	0	2
New Hampshire:												
Concord	0	0	------	0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston	1	0	------	0	37	4	15	0	83	0	0	27
Fall River	0	0	------	0	0	0	4	0	4	0	0	1
Springfield	0	0	------	0	1	0	0	0	7	0	0	3
Worcester	0	0	------	0	1	0	7	0	18	0	0	15
Rhode Island:												
Providence	0	1	1	0	0	0	3	0	12	0	0	6
Connecticut:												
Bridgeport	0	0	------	0	0	0	1	0	6	0	0	1
Hartford	0	0	------	0	6	0	2	0	3	0	0	1
New Haven	0	0	------	0	0	0	3	0	3	0	0	15
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	1	0	1	3	0	1	0	0	1
New York	6	0	------	1	8	19	85	0	218	0	0	92
Rochester	0	0	------	0	9	0	1	0	1	0	0	15
Syracuse	0	0	------	0	0	0	2	0	10	0	0	6
New Jersey:												
Camden	0	0	1	1	0	0	6	0	3	0	0	0
Newark	0	0	------	0	0	4	5	0	21	0	0	4
Trenton	0	0	------	0	0	1	3	0	0	0	0	0
Pennsylvania:												
Philadelphia	3	0	3	2	3	5	17	0	58	0	0	26
Pittsburgh	1	0	1	0	0	3	20	0	26	0	1	8
Reading	0	0	------	0	2	0	0	0	1	0	0	0
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	------	0	1	3	12	0	11	0	0	3
Cleveland	0	0	2	1	3	4	18	0	47	0	0	13
Columbus	0	0	------	0	0	2	2	0	7	0	0	14
Indiana:												
Fort Wayne	0	0	------	0	0	0	3	0	3	0	0	0
Indianapolis	5	0	------	3	4	2	11	1	20	0	0	2
South Bend	1	0	------	0	0	0	0	0	5	0	0	0
Terre Haute	0	0	------	1	0	0	1	0	3	0	0	0
Illinois:												
Chicago	1	0	1	2	8	18	38	0	99	0	0	27
Springfield	0	0	------	0	2	0	4	0	2	0	0	0
Michigan:												
Detroit	5	0	------	1	4	2	8	0	68	0	1	14
Flint	0	0	------	0	1	0	4	0	4	0	0	0
Grand Rapids	0	0	------	0	2	0	1	0	3	0	0	1
Wisconsin:												
Kenosha	0	0	------	0	0	0	0	0	5	0	0	11
Milwaukee	0	0	------	0	4	3	2	0	23	0	0	8
Racine	0	0	------	0	3	1	0	0	2	0	0	1
Superior	0	0	------	0	0	0	0	0	1	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	0	0	1	0	2	0	0	0
Minneapolis	4	0	------	1	0	1	8	0	4	0	0	1
St. Paul	2	0	------	0	2	1	6	0	7	0	0	22
Missouri:												
Kansas City	3	0	------	2	0	1	11	0	13	0	0	0
St. Joseph	0	0	------	0	0	1	0	0	8	0	0	0
St. Louis	1	0	2	1	1	5	15	2	12	0	0	11
North Dakota:												
Fargo	0	0	------	0	0	0	1	0	1	0	0	0

City reports for week ended Jan. 6, 1945—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	8	0	------	0	0	0	2	0	14	0	0	0
Kansas:												
Topeka	3	0	------	0	1	0	4	0	6	0	0	0
Wichita	0	0	------	0	0	1	6	0	7	0	0	3
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	0	0	1	0	0	0	0	0
Maryland:												
Baltimore	1	0	3	3	1	3	16	0	29	0	0	62
Cumberland	0	0	------	0	0	0	0	0	0	0	0	0
District of Columbia:												
Washington	0	0	1	0	5	1	9	0	42	0	1	3
Virginia:												
Lynchburg	0	0	------	0	0	0	0	0	4	0	0	0
Richmond	0	0	------	0	0	1	3	0	11	0	0	0
Roanoke	0	0	------	0	2	0	0	0	1	0	0	0
West Virginia:												
Charleston	0	0	------	0	0	0	0	0	0	0	0	0
Wheeling	0	0	------	0	17	0	0	0	2	0	0	5
North Carolina:												
Raleigh	0	0	------	0	0	0	3	0	0	0	0	8
Wilmington	0	0	------	1	0	0	0	0	1	0	0	10
Winston-Salem	1	0	------	0	2	0	2	0	3	0	0	5
South Carolina:												
Charleston	0	0	59	0	0	0	5	0	2	0	0	0
Georgia:												
Atlanta	3	0	------	0	0	1	2	0	7	0	0	2
Brunswick	1	0	------	0	0	1	0	0	0	0	0	0
Savannah	0	0	5	0	0	0	1	0	1	0	0	0
Florida:												
Tampa	3	0	------	0	0	1	3	1	1	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	2	0	4	2	16	0	20	0	0	0	0	0
Nashville	0	0	------	0	0	0	1	0	4	0	0	1
Alabama:												
Birmingham	0	0	19	3	0	3	11	0	3	0	0	0
Mobile	0	0	1	2	0	0	2	0	1	0	0	0
WEST SOUTH CENTRAL												
Louisiana:												
New Orleans	0	0	2	1	6	0	6	0	11	0	0	0
Texas:												
Dallas	3	0	2	1	0	0	5	0	7	0	0	0
Galveston	0	0	------	0	0	0	3	0	0	0	0	0
Houston	0	0	------	0	1	1	8	0	3	0	0	0
San Antonio	4	0	2	1	0	0	6	0	3	0	0	0
MOUNTAIN												
Montana:												
Billings	1	0	------	0	0	0	1	0	0		0	0
Helena	0	0	------	0	0	0	0	0	0	0	0	0
Missoula	0	0	------	0	1	0	1	0	0	0	0	0
Idaho:												
Boise	3	0	------	0	0	0	1	0	0	0	0	0
Colorado:												
Denver	0	0	4	0	6	0	8	0	25	0	0	16
Pueblo	0	0	------	0	0	0	1	0	6	0	0	0
Utah:												
Salt Lake City	0	0	------	1	3	0	2	0	12	0	0	2

City reports for week ended Jan. 6, 1945—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	10	0	8	0	10	0	0	1
Spokane	1	0	------	0	2	0	4	0	5	0	0	4
Takoma	0	0	------	0	0	0	2	0	0	0	0	0
California:												
Los Angeles	9	0	9	3	19	5	6	0	54	0	1	7
Sacramento	0	0	------	0	2	0	3	0	0	0	0	10
San Francisco	1	0	2	1	31	0	13	1	16	0	0	6
Total	78	1	125	36	227	99	497	6	1,122	0	4	496
Corresponding week, 1944	43	------	6,541	419	2,290	------	1,182	------	1,066	0	3	292
Average, 1942–44	76	------	2,587	[1] 136	[2] 1,999	------	[1] 684	------	1,020	3	12	860

[1] 3-year average, 1942–44.
[2] 5-year median, 1940–44.

Dysentery, amebic.—Cases: Detroit, 1.
Dysentery, bacillary.—Cases: New York, 10; Rochester, 2; Detroit, 3; Charleston, S. C., 3; Los Angeles, 6; San Francisco, 1.
Dysentery, unspecified.—Cases: San Antonio, 8; Sacramento, 1.
Leprosy.—Cases: Los Angeles, 1.
Tularemia.—Cases: Columbus, 1; Terre Haute, 1; Nashville, 1.
Typhus fever, endemic.—Cases: Lynchburg, 1; Atlanta, 4; Savannah, 2; Tampa, 1; Nashville, 3; Birmingham, 1; New Orleans, 4; Houston, 2; San Antonio, 1; Los Angeles, 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 85 cities in the preceding table (estimated population, 1943, 34,157,400)

	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	2.6	2.6	5.3	0.0	118	10.5	105.0	2.6	373	0.0	0.0	186
Middle Atlantic	4.6	0.0	2.3	2.3	10	15.3	65.7	0.0	157	0.0	0.5	70
East North Central	7.3	0.0	1.8	4.9	19	21.3	63.2	0.6	184	0.0	0.6	57
West North Central	41.8	0.0	4.0	8.0	8	19.9	107.4	4.0	147	0.0	0.0	74
South Atlantic	14.8	0.0	111.6	6.6	44	13.1	73.9	1.6	171	0.0	1.6	156
East South Central	11.8	0.0	141.6	41.3	94	17.7	200.7	0.0	47	0.0	0.0	6
West South Central	22.4	0.0	19.2	9.6	22	3.2	89.4	0.0	77	0.0	0.0	0
Mountain	33.3	0.0	33.3	8.3	83	0.0	116.5	0.0	358	0.0	0.0	150
Pacific	19.0	0.0	17.4	6.3	101	7.9	56.9	1.6	134	0.0	1.6	44
Total	11.9	0.2	19.1	5.5	35	15.2	76.1	0.9	172	0.0	0.6	76

PLAGUE INFECTION IN TACOMA, WASH.

Plague infection has been reported proved in pools of fleas from mice and rats, *R. norvegicus*, and in organs from mice taken on December 23, 1944, at the waterfront, Tacoma, Wash., as follows: A pool of 12 fleas from 9 mice, *Peromyscus* sp., spleens from 2 mice, *Microtus townsendi*, 21 fleas from 3 rats, 9 fleas from 9 rats, and 26 fleas from 52 rats.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—A rat found in District 13A, Maui Island, T. H., was proved positive for plague on December 26, 1944. This is the first plague infection reported on the Island of Maui since July 24, 1943.

Panama Canal Zone

Notifiable diseases—November 1944.—During the month of November 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	4		3		14		6		27	
Diphtheria	9				2				11	
Dysentery:										
Amebic	4		1		2		8		15	
Bacillary	3				1		6		10	
Malaria	9	1		1	45		46	3	[1] 100	5
Measles	1				1				2	
Mumps	1				8				9	
Paratyphoid fever	1		2		3		3		9	
Pneumonia		6		5	22	1		1	[2] 22	13
Poliomyelitis					1				1	
Relapsing fever							3		3	
Tuberculosis		24		2				9		35
Typhoid fever	1		1				2		4	
Whooping cough					1			1	[2] 1	1

[1] Includes 18 recurrent cases.
[2] Reported in the Canal Zone only.

Puerto Rico

Notifiable diseases—4 weeks ended December 30, 1944.—During the 4 weeks ended December 30, 1944, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Bilharziasis	2	Ophthalmia neonatorum	2
Chickenpox	9	Poliomyelitis	1
Diphtheria	37	Puerperal fever	3
Dysentery	7	Scarlet fever	1
Filariasis	3	Syphilis	627
Gonorrhea	604	Tetanus	5
Influenza	112	Tetanus, infantile	2
Leprosy	1	Tuberculosis (all forms)	598
Malaria	1,024	Typhoid fever	16
Measles	646	Typhus fever (murine)	2
Mumps	1	Whooping cough	91

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended December 23, 1944.—During the week ended December 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		10	12	221	496	39	70	70	46	964
Diphtheria	2	3	3	49	6	6				69
Dysentery:										
Bacillary				3						3
Unspecified					4					4
German measles				15	9		7	2	7	40
Influenza					38	2			2	42
Measles		1	1	150	78	29	153	8	26	446
Meningitis, meningococcus		2	1	1	1				1	6
Mumps				248	137	6	16	43	58	508
Poliomyelitis		1					1	1		3
Scarlet fever		8	9	127	95	15	13	37	7	311
Tuberculosis (all forms)		3		136	31	18	30	3	46	267
Typhoid and paratyphoid fever				10		1				11
Undulant fever				1						1
Venereal diseases:										
Gonorrhea		23	7	47	157	25	20	33		312
Syphilis		7	7	104	66	7	13	10		214
Other forms				1						1
Whooping cough		4		167	75	7	2	20	13	288

CUBA

Habana—Communicable diseases—4 weeks ended December 9, 1944.—During the 4 weeks ended December 9, 1944, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	1		Tuberculosis	2	2
Diphtheria	27	2	Typhoid fever	26	2
Malaria	1				

GERMANY

Infectious diseases—Week ended October 7, 1944, and period January 1 to September 30, 1944—Comparative.—The following numbers of cases of certain infectious diseases were reported in Germany [1] for

[1] Although not stated in the report, it is assumed that the figures are for the old German Reich.

the week ended October 7, 1944, and for the period January 1 to September 30, 1944, compared with the corresponding period of 1943:

Disease	Week ended Oct. 7, 1944	Jan. 1–Sept. 30, 1944	Corresponding period 1943
Anthrax		11	28
Cerebrospinal meningitis	28	2,307	2,105
Diphtheria	6,106	198,255	190,664
Dysentery, infectious	381	5,271	5,917
Inflammation of the brain	5	523	440
Malaria	21	636	590
Poliomyelitis	117	1,647	1,950
Psittacosis		16	16
Ptomaine poisoning	4	1,522	1,457
Scarlet fever	5,286	219,036	283,718
Trachoma	94	5,407	5,034
Tuberculosis (all forms)	2,108	112,617	114,968
Typhoid fever	548	8,045	13,070
Typhus fever	98	2,369	4,043
Undulant fever	4	111	132
Weil's disease		23	79
Whooping cough	1,373	54,213	103,868

PANAMA

Vital statistics—Year 1943.—During the year 1943, deaths from certain causes with rates per 100,000 estimated population were reported in the Republic of Panama as follows:

Cause	Number	Rate per 100,000 population	Cause	Number	Rate per 100,000 population
All causes	8,248	1,371.9	Malaria	632	105.1
Accidental deaths	354	58.9	Measles	5	.8
Appendicitis	32	5.3	Meningococcus meningitis	5	.8
Beriberi	8	1.3	Nephritis, acute and chronic	208	34.6
Cancer and other malignant tumors	239	39.8	Paratyphoid fever	1	.2
Cirrhosis of the liver	47	7.8	Pellagra	6	1.0
Diabetes mellitus	31	5.2	Pneumonia (all forms)	860	143.0
Diarrhea and enteritis	259	43.1	Recurrent fever	1	.2
Diphtheria	26	4.3	Rheumatic fever	41	6.8
Dysentery	76	12.6	Scarlet fever	1	.2
Erysipelas	5	.8	Suicide	43	7.2
Heart diseases	534	88.8	Syphilis	121	20.1
Homicide	32	5.3	Tetanus	188	31.3
Hookworm disease	12	2.0	Tuberculosis (all forms)	716	119.1
Influenza	4	.7	Tuberculosis (respiratory)	665	110.6
Leprosy	5	.8	Typhoid fever	10	1.7
			Whooping cough	300	49.9

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Madagascar.—For the period December 1–10, 1944, 2 cases of plague were reported in Madagascar.

Smallpox

British East Africa—Uganda.—For the week ended December 9, 1944, 83 cases of smallpox were reported in Uganda, British East Africa.

Rhodesia, Northern.—For the week ended December 2, 1944, 48 cases of smallpox were reported in Northern Rhodesia.

Turkey.—For the week ended January 6, 1945, 23 cases of smallpox were reported in Turkey.

Venezuela.—During the month of December 1944, 123 cases of smallpox with 6 deaths were reported in Venezuela. These figures include the 74 cases of smallpox previously reported.

Typhus Fever

Greece.—Typhus fever was reported in Greece as follows: For the month of August 1944, 55 cases; for the month of September 1944, 30 cases.

Guatemala.—For the period December 1–20, 1944, 83 cases of typhus fever with 9 deaths were reported in Guatemala. Departments reporting the highest incidence are: San Marcos 22 cases, 4 deaths; Quezaltenango 18 cases, 2 deaths; Alta Verapaz 18 cases; El Quiche 8 cases.

Turkey.—For the week ended January 6, 1945, 83 cases of typhus fever were reported in Turkey.

Venezuela.—For the month of December 1944, 8 cases of typhus fever were reported in Venezuela.

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