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EDITORIAL

TUBERCULOSIS CONTROL: PAST AND FUTURE

Since the year 1882 when Koch announced the discovery of the tubercle bacillus, many advances have been made in the struggle to control and to eradicate tuberculosis from our population. A most important weapon in the fight was the X-ray, which Roentgen discovered in the fall of 1895. In the decades that have followed these great discoveries, leaders in the field of tuberculosis have developed new methods and organized programs which have made us realize that tuberculosis, for many years in decided retreat, can be destroyed as a plague of man.

In 1890 the tuberculosis death rate in the United States was 245 per 100,000 population. By 1904 it had declined to 200. In that year there were only 6 tuberculosis control programs in the country, and only 100 tuberculosis sanatoria and hospitals. Few of the 10,000 beds in these institutions could measure up to present-day minimum standards. There were no dependable means for the early diagnosis of the disease. When tuberculosis was discovered, it was far advanced and death soon followed. Little was done to isolate consumptives, as they were called, and people by the thousands were brought in close contact with virulent organisms. Because it was believed that "consumption" was an inherited disease, social stigma attached to it. Every year tuberculosis claimed the lives of thousands of children. Young men and women, who had arrived at that period in life when one is most productive, faced certain death when a diagnosis of tuberculosis was made. Because little was done to slaughter tuberculous cattle, bovine tuberculosis attacked man, and extra-

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pulmonary tuberculosis was widespread. In consequence, certain far-seeing men determined to organize their efforts toward the control of this dread disease. In 1904 the National Tuberculosis Association was organized, and in New York, Boston, Philadelphia, Chicago, Washington, and Cambridge, Mass., systematized control programs were inaugurated.

The next decade, the years between 1905 and 1915, was a time of significant advances in sanatorium treatment and health education. Although fresh-air therapy, high altitude, and even mountain climbing were regarded as efficacious in the treatment of tuberculosis, definite attempts were made to provide healthy environments for the tuberculous, and isolation was seen as necessary. This was also the period in which pneumothorax treatment was initiated, and many tuberculosis specialists emphasized rest as basic in the treatment of tuberculosis. Some actual treatment with tuberculin was undertaken, but soon was abandoned as unsatisfactory.

Between the years 1915 and 1925, the years of World War I and its aftermath, chest surgery, especially thoracoplasty, was tried and found useful. There was a decrease in use of open-air treatment and an increase in emphasis on hospital care. Early diagnosis was encouraged and preventoria were established for children in an attempt to build resistance against tuberculosis in those who had been subject to massive infection. Ancillary services in State health departments and the beginnings of control on a mass basis, especially with tuberculin tests, make this period the time when modern control measures began.

The epidemiological aspects of tuberculosis were particularly emphasized in the next decade, 1925 to 1935. Extensive examination of contacts was undertaken, and a more exact knowledge of morbidity and mortality was attained. Increasing emphasis was placed on early diagnosis, with the objective of discovering cases in early stages when they might be relatively easily arrested. Modern production methods made possible the wider distribution of X-ray equipment, and there followed an increased use of the X-ray for diagnostic purposes. Diagnosis by percussion and auscultation was at last regarded as inexact and became merely a concomitant of X-ray diagnosis. In Europe at this time Calmette and Guerin began experimenting with BCG vaccine with the aim of demonstrating that a limited immunity could be given to children in hazardous environments. Everywhere tuberculosis specialists used the pneumothorax treatment more selectively, and pneumonolysis and bronchoscopy came into their own.

It was in the decade between 1935 and 1945 that all control methods came to their highest peak of development. Mass radiography, with the development of the photofluorograph and the automatic photo-

timer; experiments in chemotherapy and antibiotics; greatly expanded research in epidemiology; health education; the development of an official national control program; and the expansion of control methods in industry, general hospitals, and the armed forces, marshalled the power of science and shaped the knowledge and understanding of men in the fight against tuberculosis. In surgery, the thoracoplasty operation was refined and used more selectively and pneumonectomy was introduced. Global war, with its severe dislocations and demands, challenged the ingenuity of medical science in this field, and all methods of control were carried to every corner of the world. In spite of the rigors of wartime, the death rate from tuberculosis in the United States in 1944 was down to 41.3 per 100,000 population.

Now in 1946 we must set up a basic pattern for the future. Expansion of all field services, research, adequate hospital and outpatient facilities, invalidity insurance for handicapped persons, especially tuberculous families, are fundamental in such a pattern. No future activity in tuberculosis control can be effective if we do not constantly advance our knowledge, provide adequate hospital beds, and see to it that the tuberculous are protected against disaster. Over a measured period of time the present decrease in mortality from this disease must continue and in the face of diminishing returns we must speed up and increase the force of our efforts. The future requires a balanced program, integrated action, and widespread information about tuberculosis as an individual and community problem.

In 1935, on the fiftieth anniversary of the establishment of the first American sanatorium, Dr. Wade Hampton Frost declared, "Eradication of tuberculosis is now an expectation sufficiently well grounded to justify shaping our tuberculosis control program toward this definite end. We have reached the stage at which the biological balance is against the survival of the tubercle bacillus and, as demonstrated by the steadily falling morbidity and mortality rates, each existing case has for some time been giving rise to less than one new case of the disease. If this balance can be maintained and the source of infection further reduced, the control of tuberculosis is within our grasp."

A LIGHT, COMPACT X-RAY GENERATOR OF HIGH EFFICIENCY FOR MASS RADIOGRAPHY OF THE CHEST [1]

By Russell H. Morgan, *Senior Surgeon (R)*, and Emmet G. Murphy, *Design Engineer, United States Public Health Service*

For some time there has been an increasing need in mass radiography of the chest for a small light-weight X-ray generator capable of operation from 110-v. domestic power lines. Such a generator would greatly facilitate mass chest surveys out in small communities and in rural areas where sources of power are often inadequate to operate most conventional generators. Furthermore, it would markedly simplify surveys conducted in industry where ease of transportation and handling is highly desirable.

The self-rectified type of X-ray generator has been frequently proposed for use where a light-weight unit is required. Although this type of generator may be made small and compact, it unfortunately possesses electrical characteristics which make it unusable when poor sources of power are encountered. The X-ray tube draws power only during one-half of the alternating current cycle; during the unused half of the cycle the voltage to which the cables connecting the generator and X-ray tube are subjected may exceed the tolerance limits by many kilovolts with resulting break-down of these components after a few exposures.

The condenser discharge type of X-ray generator often has been proposed where poor sources of electrical power prevail. If the unit, however, is to possess adequate capacity for the radiography of all individuals, it becomes unduly bulky. Furthermore, experience has shown that break-downs due to failure of cables and other components are not infrequent.

The best solution to the problem of operating mass radiographic equipment from domestic power lines has been the use of 200-milliamperage generators which are also designed to operate from 110-v. power sources at greatly reduced milliamperage (e. g., 30 milliamperage). These units are full-wave rectified and therefore do not have the inherent weakness of self-rectified generators. Furthermore, when operating at 30 milliamperes, they draw only 20 amperes from the 110-v. power line. This is not only less than the amperage usually tolerated by such lines, but also is within the range which may be supplied by the small 3-kw. motor-generator sets, which were made for Army field X-ray equipment and used where a source of electrical power was not available. The only disadvantage of operating an X-ray generator at 30 milliamperes is that exposure times will range between 1.5 and 3.0 seconds. Therefore, it will be difficult to maintain all individuals completely immobilized for such long periods of time. In addition, the generator, as previously pointed out, is relatively heavy.

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The objections found in the various generators just described have been effectively overcome, it is believed, in the generator to be described in this paper. It is light in weight. The entire unit, including the control panel, transformer, cables, X-ray tube, photofluorographic automatic camera, automatic timer, and protective screen, weighs 600 pounds instead of the usual 1,200 to 2,000 pounds. The generator operates from conventional 110-v. power lines and draws between 25 and 30 amperes when the X-ray tube is operating at 90 kilovolts and 30 milliamperes. The exposure times under normal conditions

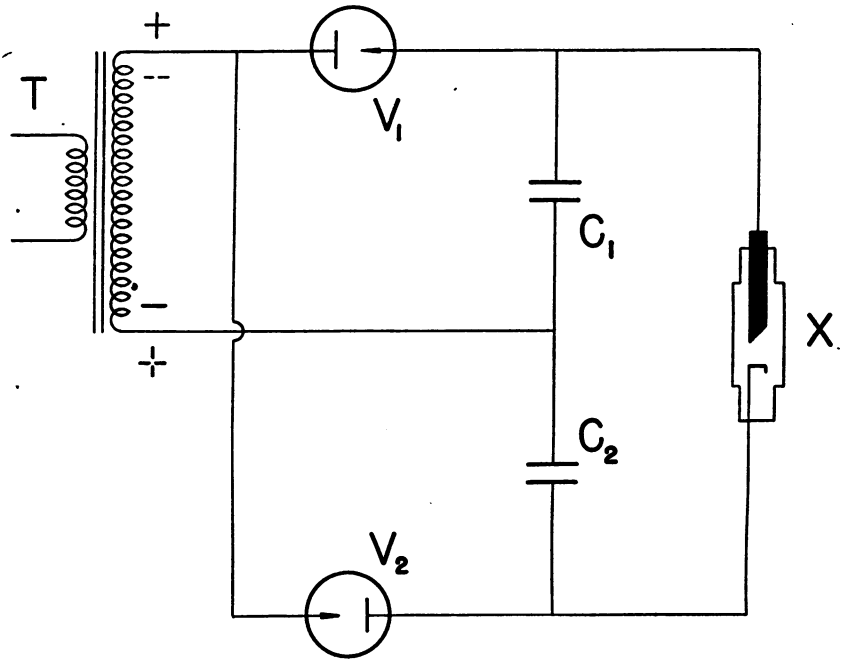

FIGURE 1.—Fundamental circuit arrangement of constant potential generator. *T*, high voltage transformer; V_1 and V_2 rectifier tubes; C_1 and C_2, condensers; *X*, X-ray tube.

range from 0.35 to 0.70 second. Furthermore, the efficiency of operation is 60 percent greater than the conventional generator and accordingly the X-ray tube remains proportionately cooler during normal schedules.

The generator is of the constant-voltage type in contradistinction to conventional pulsating generators; that is, the voltage applied to the roentgen tube remains essentially constant during the exposure and does not rise to a maximum and fall to zero during each $\frac{1}{120}$ second. The circuit employed is full-wave rectified and of the voltage-doubling type; the constant potential feature is provided by two 0.06-microfarad condensers, series connected and placed across the X-ray tube.

The fundamental circuit design is illustrated schematically in figure 1, where *T* is a high-voltage transformer capable of producing a

secondary voltage approximately one-half that desired on the X-ray tube; V_1 and V_2 are rectifier tubes; C_1 and C_2 are 0.06 microfarad condensers; and X is the X-ray tube. During the half cycle in which the polarity of the secondary winding of the transformer is that indicated by the solid symbols, the condenser (C_1) becomes charged to a potential equal to the peak voltage of the transformer. This charge is delivered to the condenser through the rectifier tube (V_1). During this half of the cycle, condenser (C_2) is isolated from the transformer

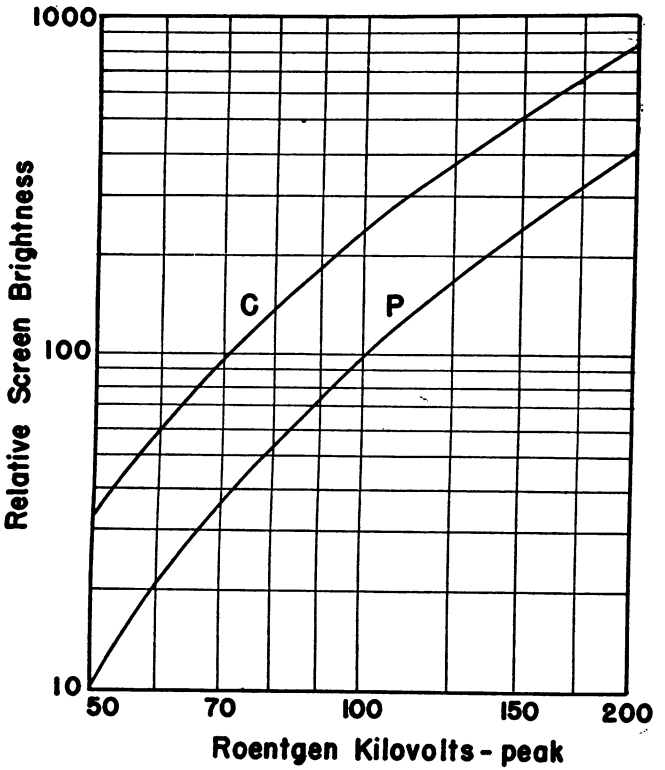

FIGURE 2.—Relative brightness of typical photofluorographic screen plotted as a function of the peak voltage applied to the X-ray tube. *C*, constant potential generator; *P*, conventional pulsating generator.

by the rectifier (V_2) which prevents any current flow as long as the polarity of the transformer is that indicated by the solid symbols. During the half cycle in which the transformer polarity is that indicated by the broken symbols, condenser (C_2) becomes charged to the peak voltage delivered by the transformer through the rectifier (V_2). Subsequently on alternating half cycles, first condenser (C_1) and then condenser (C_2) becomes charged to the peak voltage delivered by the transformer. Since the two condensers are series connected, the voltage applied to the X-ray tube to which they are connected is twice that delivered by the transformer. Thus the circuit is a voltage-doubling type. Furthermore, since the condensers lose to the X-ray tube only a small amount of their charge before they become re-

charged, the voltage applied to the X-ray tube is essentially constant. Indeed, at 30-milliampere operation the voltage drop during each half cycle is 7.5 kv. and at lower milliamperages is proportionately less. That is, the voltage, during each half cycle, instead of rising to a maximum and falling to zero volts, rises to a maximum and then falls only to 7.5 kv. below that maximum.

The advantages of this type of operation are graphically illustrated in figure 2 where the brightness of a conventional Patterson type "D" fluorescent screen is plotted as a function of the peak kilovoltage applied to the X-ray tube when *C*, the voltage, is constant and *P* is when the voltage is pulsating sinusoidally. The conditions under which the data presented in figure 2 were obtained included the operation of the roentgen tube at a fixed milliamperage and with a phantom of Masonite presdwood, 10 cm. in thickness placed in the roentgen beam. A conventional stationary grid was placed between the phantom and the photofluorographic screen. The thickness of phantom employed was that shown by Chamberlain (*1*) to be equivalent in absorption to that of an average individual's chest.

It is evident from figure 2 that at a given kilovoltage and milliamperage, a considerably greater brightness may be obtained from the photofluorographic screen when the X-ray tube potential is constant. Indeed at 90 kv. (peak) the brightness is 2.3 times greater than that obtained with a pulsating potential. This is largely responsible for the short exposure times which may be obtained with this generator in spite of the low milliamperages employed. The generator, at 30 milliamperes, produces as great a screen brightness as a conventional generator operating at 70 milliamperes.

The gain in screen brightness is not the only advantage of the constant potential generator. There is also a considerable increase in efficiency, with a corresponding decrease in the temperature assumed by the X-ray tube. In figure 3, the efficiency of a constant potential generator (*C*) and of a sinusoidally pulsating generator (*P*) are plotted as a function of the peak voltage applied to the X-ray tube. It is evident that a considerable gain in efficiency may be obtained by employing the former type of generator. This is an extremely desirable characteristic because, as is well known, conventional generators under normal operating schedules frequently cannot liberate the heat generated within the X-ray tube sufficiently fast to avoid failures and break-downs. The very sizable gain in efficiency provided by the constant potential generator effectively eliminated this difficulty.

The control panel and transformer unit of the X-ray generator are illustrated in figure 4. Both are mounted on a frame carriage with the transformer resting on the lower platform and the control panel on the upper. By means of the carriage the generator may be easily moved. The control panel weighs 50 pounds and the transformer 220 pounds.

The control unit includes an autotransformer for kilovoltage selection, an X-ray tube filament regulator, a photoelectric timer, an adjustable electronic timer, a time-delay circuit, a relay for supplying power to the rectifier tubes and a contactor for supplying power to the high-voltage transformer in the transformer unit.

The control panel includes a kilovoltage selector switch, an X-ray tube filament control, a combined line volt and kilovolt meter, an X-ray tube filament current meter and a milliammeter for measuring the current passing through the X-ray tube. Also included are switches which may be used to select the small or large focal spots of the X-ray tube, to place in operation the automatic camera of the photofluorograph if desired, to select either the line voltage or kilo-

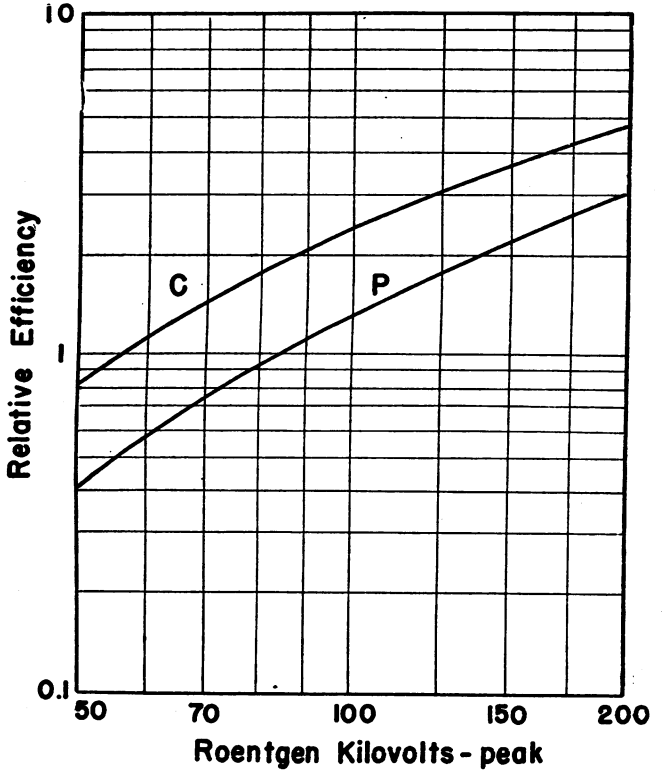

FIGURE 3.—Relative efficiency (screen brightness divided by power output) of *C*, a constant potential generator, and *P*, a conventional pulsating generator, plotted as a function of the peak voltage applied to the X-ray tube.

voltage scales of the voltmeter and to select the photoelectric or adjustable electronic timer. In addition to the foregoing, the dial of the electronic timer and the exposure switch are also mounted on the control panel.

The transformer unit includes a high-voltage transformer, two rectifier tubes, two rectifier tube filament transformers, two X-ray

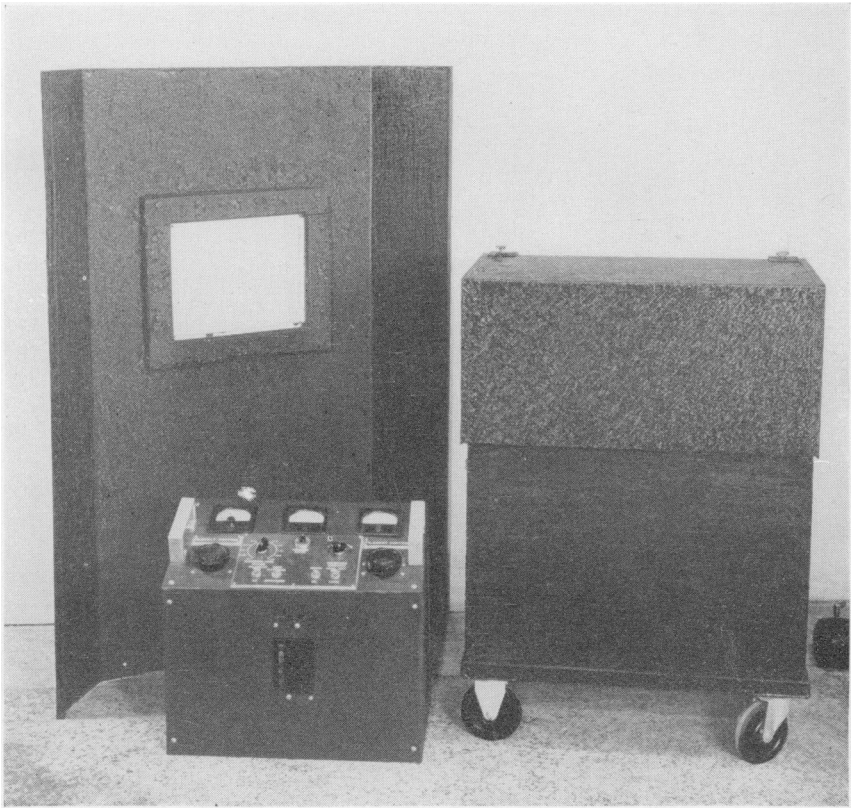

FIGURE 4.—Lightweight constant potential generator.

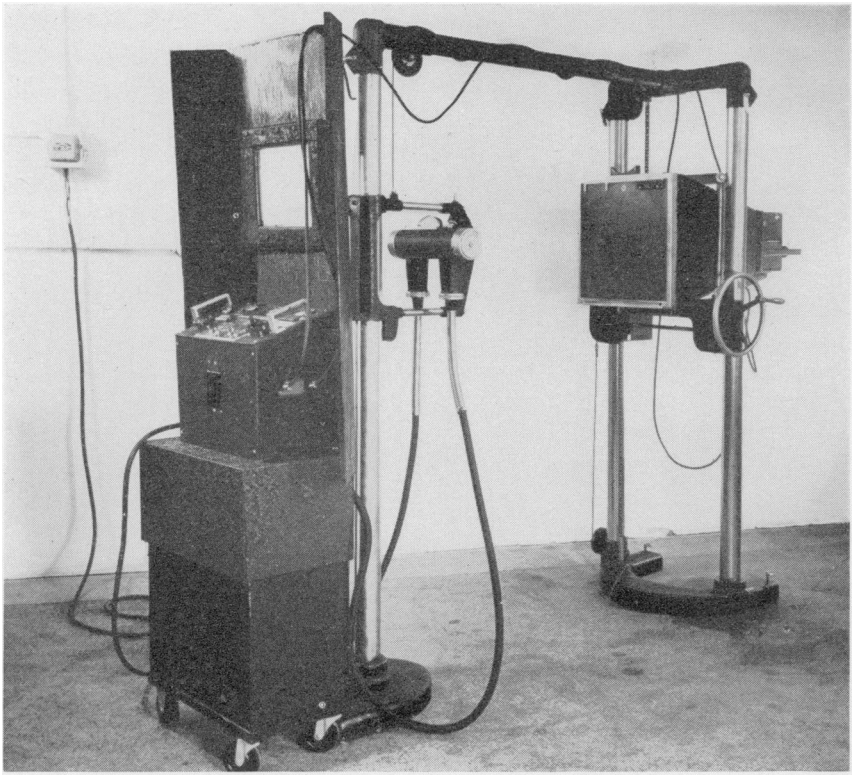

FIGURE 5.—Constant potential generator arranged with photofluorographic assembly.

tube filament transformers, and two 0.06-microfarad condensers. A schematic diagram of the entire generator including the control unit is shown in figure 6.

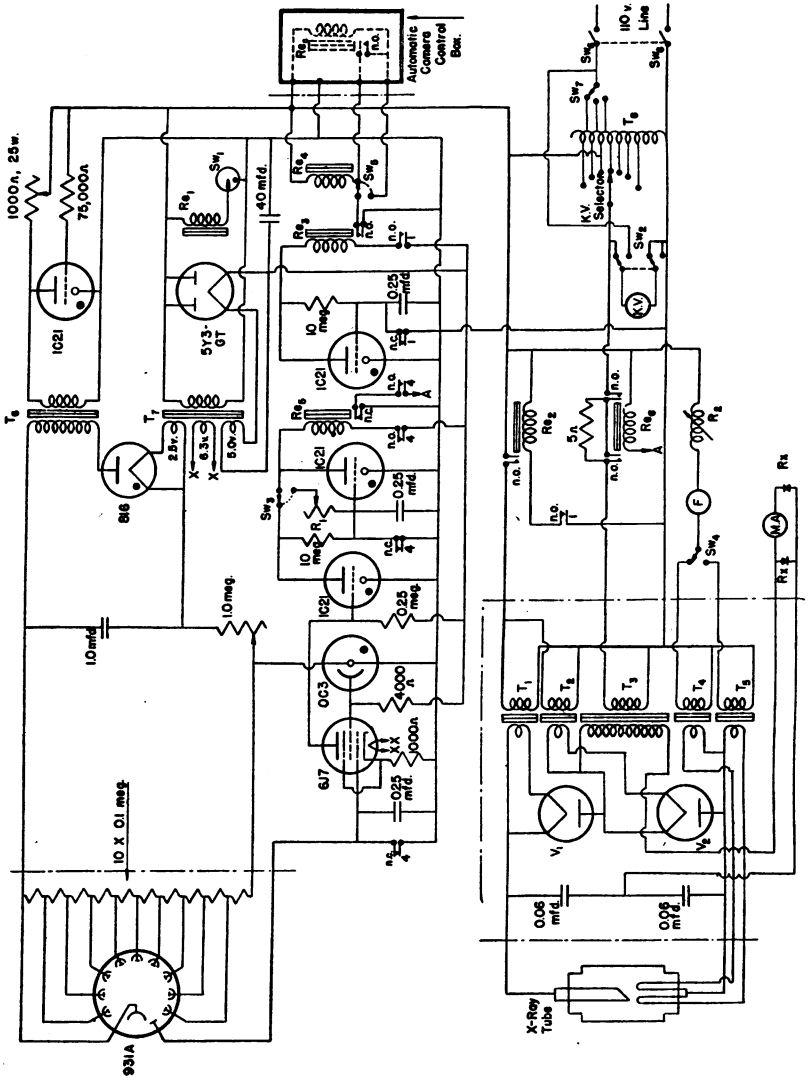

FIGURE 6.—Schematic circuit diagram of generator illustrated in figure 4. T_1 and T_2, to high-voltage valve tube filament transformers; T_3, high-voltage X-ray transformer; T_4 and T_5, X-ray tube filament transformers; T_6, automatic timer power transformer; T_7, automatic timer filament transformer; T_8, autotransformer; Sw_1, exposure switch; Sw_2, kilovoltage-line voltage-meter switch; Sw_3, automatic-manual timer switch; Sw_4, small-large focal spot switch; Sw_5, automatic camera switch; Sw_6, main on-off switch; Sw_7, line-voltage adjuster; Re_1—Re_6, relay field coils. Contacts of respective relays are numbered on drawing. Normally open contacts are labelled, n. o.; normally closed contacts are labelled, n. c.; R_1, manual timer resistors; R_2, X-ray tube filament current control; Rx, rectox rectifier unit; F, filament meter; $K.\ V.$, kilovolt meter; $M.\ A.$, milliammeter; V_1 and V_2, high voltage valve tubes.

The various components of the generator are so connected that the following series of events occurs when the unit is operated. When the line switch is turned on, the X-ray tube filament lights, and power is supplied to the photoelectric and electronic timers and to the time-delay circuit. The line voltage and approximate voltage that will be applied to the X-ray tube are also indicated on the voltmeter. When the exposure switch is closed, the relay supplying power to the filaments of the rectifier tubes in the transformer unit is closed and the time-delay circuit is energized. After a time delay of 1.5 seconds, the time-delay circuit closes a pair of contacts which causes the contactor to be energized and thereby power to be supplied to the high-voltage transformer and subsequently to the X-ray tube. After a time governed by the photoelectric or electronic timers, depending on which one is used, the contactor is de-energized and power to the X-ray tube terminated. When the exposure switch is opened, the filaments of the rectifier tubes turn off and the various time-delay and timer circuits are prepared for the next exposure. The rectifier tubes are purposely not heated until the exposure sequence is begun to avoid excessive heating of the oil within the transformer unit.

The circuit as shown in figure 6 includes a stationary anode rather than a rotating anode tube. The latter type may be easily substituted for the former but there is little reason to do so. When a stationary anode tube is operated at 30 milliamperes, a focal size of 2.3 mm. may be used even on exposures approaching 5 seconds. Such a focal size is well below the limit at which unsharpness due to the X-ray tube focus occurs for all types of photofluorography. The slightly smaller size which may be obtained with a rotating anode tube therefore would not improve the clarity of the photofluorograms. Furthermore, the stationary anode tube is considerably less expensive and lighter in weight than the rotating anode type. Thus, in this application it seems to be preferable.

The generator with its protective screen is illustrated in figure 5 with a conventional Westinghouse photofluorograph equipped with a Recordak type automatic camera. The tube screen distance has been reduced to 30 inches and the usual limiting cone on the X-ray tube has been supplanted by an equally effective diaphragm to permit more space between the tube and screen in which the technician can position his patients. The lead glass customarily located in the photofluorographic hood has been removed to lessen weight. This is well in accord with recent practice (*2*). The protective screen is constructed of sheet steel $\frac{1}{16}$ inch in thickness. It provides the technician sufficient protection for more than 1,000 exposures per day.

The tube-screen distance has been reduced to 30 inches to limit exposure times and to decrease the quantity of heat generated within the X-ray tube. This reduction in distance does not cause significant distortion of the photofluorographic images and shortens exposure times to approximately one half. Normally a conventional generator operating at 90 kv. (peak) and 30 milliamperes requires exposure times of 1.5 to 3.0 seconds under average photofluorographic conditions. The use of constant potential reduces this range to 0.65 to 1.3 seconds. Diminishing the tube-screen distance to 30 inches reduces it to 0.35 to 0.7 second or to a range approaching that of a conventional generator operating at normal capacity. As a result of these changes, the generator may be operated as quickly as photofluorographic schedules can be maintained without overheating the tube. Indeed, in a test run the generator was operated at a rate of 10 exposures per minute for a period of several thousand consecutive exposures with neither the X-ray tube or any other component becoming defective. Such an exposure rate is far greater than that which can be normally maintained and certainly indicates that heavy photofluorographic schedules can be followed without disastrous break-downs.

As stated previously this generator operates from 110-v. domestic power lines and when running at 30 milliamperes draws between 25 and 30 amperes from the line. Such an amperage may be readily obtained from most power lines and also from small 3-kw. motor-generator sets. When power lines are poor, the generator may be operated at 15 milliamperes without serious increase in exposure time (i. e., 0.7 to 1.4 sec.). The advantages of high efficiency and X-ray output are thus retained.

From the foregoing it appears that the constant potential generator supplies a distinct need in the field of photofluorography. Its light weight (270 lb.) makes it possible to produce a complete photofluorographic unit weighing approximately 600 pounds. Its high X-ray output permits operation from domestic power lines without the disadvantage of long exposure times. Finally its high efficiency permits operation even under the most rigorous photofluorographic conditions without the customary excessive heating of the X-ray tube.

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AN EVALUATION OF A CHEST X-RAY RESURVEY OF AN INDUSTRIAL PLANT [1]

By MORTON KRAMER,[2] GEORGE W. COMSTOCK,[3] and JOSEPH B. STOCKLEN[4]

Introduction

As the mass chest survey movement gains momentum there will undoubtedly be requests for resurveys. The question arises as to the value of this procedure in the tuberculosis control program.

The fundamental purpose of a mass chest survey is to discover cases of tuberculosis [5] not previously known to the health department by examining radiographically various segments of the population. To be of value, therefore, repeat surveys should be directed at those industries and groups in which there is reason to expect, at intervals, a significant number of new or unknown cases of tuberculosis. The selection of such groups will depend upon knowledge of several factors, among which are the interval since the first survey, labor or membership turnover within this period, the racial and economic characteristics of the group, the thoroughness of preplacement examinations, the hazard of silicosis, the incidence of tuberculosis in persons whose X-rays were previously reported as normal, and the completeness of case reporting in the area. Since the relative importance of each of these factors may vary greatly as between different industries and communities, it is clear that at the present time there can be no general rule regarding the frequency of resurveys. Nevertheless, the accumulated experience of many observers will be of value in singling out the population groups for which periodic mass X-ray examinations are indicated.

The purpose of the present paper is to report the results of two mass chest X-ray surveys done after an interval of 18 months in a large industrial concern in Cleveland, Ohio. It is hoped that the discussion of the comparative results of these two surveys will throw some light on the following questions:

(*a*) How much tuberculosis may be expected among persons reported to be nontuberculous in the first survey; and of this, how much was missed at the time, and how much apparently developed in the interval between surveys?

(*b*) What was the prevalence of tuberculosis among new employees, i. e., persons hired between surveys?

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[4] Controller of tuberculosis for the 6 health districts of Cuyahoga County.

[5] "Tuberculosis" as used in this paper denotes clinically significant tuberculosis, and includes all stages of reinfection-type tuberculosis, silico-tuberculosis, pleurisy with effusion, and noncalcified primary phase tuberculosis.

(*c*) How many cases of tuberculosis found in each survey were not previously known to the health department?

Type of Plant

The industrial plant studied is engaged in the manufacture of airplane and automobile parts and employs more than 6,000 persons. There is no known silicosis hazard. The factory was not a "war baby" and there has been relatively little change either in the physical set-up of the plant or personnel during the war years. The management is sincerely interested in the health of the employees, not only from humanitarian motives, but also because they know this interest pays tangible dividends. The preplacement examinations, although otherwise thorough, do not include chest X-rays unless the patient has signs or symptoms suggestive of intrathoracic disease. The wage scale is above the general average in this area and relatively few employees would be classified as unskilled.

Survey Procedure

The initial survey was carried out in November 1943. The photofluorograph equipment was adapted to the purpose and did not include a phototimer. Perforated 35-mm. film was used. The subjects were required to strip to the waist and don paper jackets. The race, sex, and age of each person examined were recorded, but because of a shortage of clerical help these variables could not be tabulated. On the second survey, made in May 1945, equipment designed for survey procedures was used with a Morgan-Hodges phototimer and Fairchild 70-mm. camera. The films were taken with the employees clothed, a procedure which has been found to be entirely satisfactory (*1*), (*2*). The race, sex, and age of each examinee were recorded on a mark-sense tabulating card and, in addition, each person was asked the following questions:

1. Were you employed here during the month of November 1943?
2. If so, were you examined on the survey at that time?

The medical officers and other survey personnel were entirely different for each survey. The physicians reading the miniature films did not know that their interpretations were to be used for comparative study.

Each survey had to be completed in a period of 2 weeks, since adequate space could be obtained only by using an area temporarily available during plant alterations. This is more rapid than is considered advisable, and made it necessary to read the miniature films more hurriedly than is the usual practice. This was particularly true of the second project where, because of illness in the survey team, the Medical Officer and two technicians (one a student in

training) were the only personnel available to take, process, and read the films.

On both occasions, 14″ x 17″ films were taken of all persons whose miniature films indicated the possibility of any significant abnormality.

Numbers of Persons Examined

The approximate number of employees on the average daily pay roll and the number and percent volunteering for examination in each of the two surveys were as follows:

	1943 survey	*1945 survey*
Average daily pay roll (persons)	6, 900	6, 400
Number examined	6, 287	5, 679
Percent examined	91. 1	88. 7

For the 1945 survey, 3,169, or 55.8 percent, were white males; 1,876, or 33.0 percent, white females; 492, or 8.7 percent, nonwhite males; and 142, or 2.5 percent, nonwhite females. Although no complete break-down of persons examined in 1943 by race and sex is available, a study of persons examined on both surveys indicates that the race and sex distribution of persons examined in 1943 did not differ significantly from that in 1945.

To determine how many of the persons X-rayed in 1945 were (*a*) employed and examined in November 1943, (*b*) employed but not examined in 1943, and (*c*) not employed in 1943, the answers to the employment questionnaire were tabulated (table 1).

TABLE 1.—*Employment and survey status in November 1943 of persons examined in 1945, by race and sex*

Employment and survey status (November 1943)	All races			White			Nonwhite		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
	Number								
Total examined 1945 survey	5, 679	3, 661	2, 018	5, 045	3, 169	1, 876	634	492	142
Status November 1943 unknown	219	128	91	181	99	82	38	29	9
Status November 1943 known	5, 460	3, 533	1, 927	4, 864	3, 070	1, 794	596	463	133
Employed and examined November 1943	3, 981	2, 783	1, 198	3, 683	2, 525	1, 158	298	258	40
Employed, not examined November 1943	195	113	82	165	92	73	30	21	9
Not employed November 1943	1, 284	637	647	1, 016	453	563	268	184	84
	Percent								
Total examined 1945 survey	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0
Status November 1943 unknown	3. 9	3. 5	4. 5	3. 6	3. 1	4. 4	6. 0	5. 9	6. 3
Status November 1943 known	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0
Employed and examined November 1943	72. 9	78. 8	62. 2	75. 7	82. 2	64. 5	50. 0	55. 7	30. 0
Employed, not examined November 1943	3. 6	3. 2	4. 2	3. 4	3. 0	4. 1	5. 0	4. 6	6. 8
Not employed November 1943	23. 5	18. 0	33. 6	20. 9	14. 8	31. 4	45. 0	39. 7	63. 2

Approximately 96 percent of the persons answered the questionnaire. On the basis of their answers, 73 percent of the persons examined in 1945 were also examined in 1943; 4 percent were employed in 1943 but not examined at that time; and 23 percent were hired after November 1943.

The race-sex group with the highest percentage of persons examined on both surveys was white males (82 percent), followed in order by white females (65 percent), Negro males (56 percent), and Negro females (30 percent).

Comparison of Results

A comparison of the number and precent of persons diagnosed as tuberculous at the conclusion of each survey is presented in table 2. The prevalence rate was 1.3 percent in the first survey, and 1.4 percent in the second, both slightly lower than the similarly determined rate of 1.6 percent in 102,000 mass X-ray examinations among the industrial population of Cuyahoga County (*3*). The distribution of cases by stage of disease is essentially the same as that reported on other mass surveys (*4*), with approximately two-thirds of the cases in the minimal stage.

TABLE 2.—*Distribution, by type of lesion, of cases of significant tuberculosis reported at the completion of surveys in November 1943 and in May 1945*

Type of lesion	Number		Percent	
	1943	1945	1943	1945
Total	83	78	100.0	100.0
Minimal	57	48	68.7	61.5
Moderately advanced	21	23	25.3	29.5
Far advanced	----	3	----	3.8
Stage unknown	2	1	2.4	1.3
Silico-tuberculosis	2	2	2.4	2.6
Pleurisy with effusion	1	----	1.2	----
Non-calcified primary	----	1	----	1.3

One of the first questions arising from the comparison of these surveys is, how many of the persons diagnosed as tuberculous in 1943 were still employed in 1945 and what was their 1945 survey diagnosis? To answer this, the names of the 83 cases discovered in 1943 were checked against the 1945 file of survey cards. Those that could not be located were checked in the plant employment office to determine whether they were still employed. The results of this search are as follows:

Status in 1945 survey of persons diagnosed as tuberculous on 1943 survey

	Number	Percent
Total	83	100.0
Not employed in 1945	21	25.3
Employed in 1945	62	74.7
Diagnosed as tuberculous in 1945	32	38.5
Diagnosed as nontuberculous in 1945	16	19.3
Not examined in 1945	14	16.9

Of the 21 persons diagnosed as tuberculous on the 1943 survey, but not employed in 1945, 14 were minimal cases, 5 moderately advanced, and 2 cases reinfection type tuberculosis, stage unknown. Their status at the time of the second survey was as follows:

(*a*) *Minimal cases.*—Six have been attending the clinic regularly for follow-up examinations and their disease has remained stable. The others have not reported for examination since the survey, but it is known that none has been hospitalized in either of the two tuberculosis sanatoria of this county.

(*b*) *Moderately advanced cases.*—Two hospitalized within 3 months after the first survey were still in the sanatorium at the time of the resurvey; two have been attending the clinic regularly for periodic X-ray examinations and one is under the care of a private physician.

(*c*) *Cases of reinfection tuberculosis, stage unknown.*—One is under clinic supervision; the only information on the other is an examination from a plant survey done in September 1944, which revealed no change from his diagnosis of November 1943.

A review of the films of the 16 persons diagnosed as tuberculous in 1943 and nontuberculous in 1945 revealed that, on the 1945 survey reading, lesions were missed in nine persons (eight minimal and one moderately advanced); in another the minimal lesion was presumably hidden behind the clavicle on the 1945 film. In the remaining six the diagnosis of tuberculosis in 1943 was in error. A description of the films of each case is given in appendix A.

To determine the 1943 status of the 78 cases of tuberculosis found in the 1945 survey, the names of these persons were checked against the 1943 survey records with the following results:

Status on 1943 survey of persons diagnosed as tuberculous on 1945 survey

	Number	Percent
Total	78	100.0
Not employed in 1943	17	21.8
Employed in 1943	61	78.2
Diagnosed as tuberculous in 1943	32	41.0
Diagnosed as nontuberculous in 1943	28	35.9
Not examined in 1943	1	1.3

In table 3 there is presented a comparison of the 1943 and the 1945 survey readings for the 32 persons diagnosed as tuberculous on both surveys.

TABLE 3.—*Comparison of 1945 film interpretations with those of 1943 for persons diagnosed as tuberculous on both surveys*

1945 reading	Total	1943 reading		
		Minimal	Moderately advanced	Far advanced
Total	32	22	10	
Minimal	18	18		
Moderately advanced	11	4	7	
Far advanced	1		1	
Silico-tuberculosis	2		2	

In 25 cases (18 minimal and 7 moderately advanced) there was no difference between the two survey readings. In six instances, although there was no change in the lesions, the 1945 survey diagnosis differed from that of 1943 because of difference in interpretation; 4 cases of moderately advanced tuberculosis in 1945 were called minimal in 1943, and 2 cases of silico-tuberculosis in 1945 were called moderately advanced tuberculosis in 1943. The one person with far advanced tuberculosis in 1945 actually developed progressive disease between surveys.

It was possible to locate the 1943 films of 25 of the 28 persons diagnosed as tuberculous in 1945 and nontuberculous in 1943. A review of these films showed that 5 persons had apparently developed minimal tuberculosis since November 1943. In three other persons, bony structures completely obscured the areas where minimal disease was seen to exist in 1945, but since all of these lesions are now fibrocalcific in character, they presumably were present in 1943. This is borne out by the fact that one of these cases was known to the health department prior to 1943. These 3 probably would not have been missed had a phototimer been available to give optimum exposure to the earlier films. In the remaining 17 cases the lesions were present but missed by the reader of the 1943 survey films (12 minimal, 4 moderately advanced, 1 noncalcified primary). Two of the moderately advanced cases showed evidence of spread in this 18-month period and 1 minimal had retrogressed somewhat. A description of the films of these cases is given in appendix B.

From the above discussion, it is evident that a partial correction can be made of the findings of each survey. This may be done by subtracting from the number of cases found at the conclusion of each survey (83 in 1943; 78 in 1945), the number of persons diagnosed erroneously as tuberculous (6 in 1943; 0 in 1945), and adding the

number of persons whose tuberculous lesions were missed (20 in 1943; 10 in 1945). Accordingly, the adjusted number of cases in 1943 is 97 (83−6+20) and in 1945 is 88 (78−0+10). The corrected prevalence rates are 1.5 percent for both years. These adjustments do not alter singificantly the distribution of cases by stage of disease, increasing the minimals to 70.0 percent of the 1943 total and to 64.8 percent of the 1945 total.

TABLE 4.—*Correction of results of surveys held in November 1943 and May 1945 for "missed" cases of tuberculosis and changed diagnoses*

Type of lesion	Survey, November 1943				Survey, May 1945		
	Number with specified diagnosis at completion of survey (1)	Number diagnosed tuberculous in 1945 but missed in 1943 (2)	Number with diagnosis changed to nontuberculous as result of 1945 survey (3)	Corrected number of cases (4)=(1)+(2)−(3)	Number with specified diagnosis at completion of survey (5)	Number diagnosed tuberculous in 1943 but missed in 1945 (6)	Corrected number of cases (7)=(5)+(6)
Minimal	57	15	4	68	48	9	57
Moderately advanced	21	4	1	24	23	1	24
Far advanced					3		3
Stage unknown	2			2	1		1
Silico-tuberculosis	2		1	1	2		2
Pleurisy with effusion	1			1			
Noncalcified primary		1		1	1		1
Total	83	20	6	97	78	10	88

Prevalence of Tuberculosis Among New Employees

Another point of importance on a resurvey is how much tuberculosis exists among new employees, i. e., persons hired between surveys. The number of new employees was 1,284, or 24 percent of the total persons examined in 1945. Among these, 17 cases of tuberculosis were found, a rate of 1.3 percent. This is not appreciably different from the prevalence of tuberculosis in the general industrial population of this country. The distribution by stage of disease varied considerably from that found generally; 8, or 47 percent, were minimal; 6, or 35 percent, moderately advanced; 2, or 12 percent, far advanced; and 1, or 6 percent, stage unknown. However, the numbers are too small for this variation to be statistically significant.

Number of Cases Previously Known to the Health Department

As mentioned earlier, the primary function of a survey is to discover cases of tuberculosis hitherto unknown. Routinely, therefore, all cases diagnosed on surveys are checked against the registers of the six health districts of this county to determine how many were previously known to the health departments.

Of the 97 cases on the 1943 survey, 19 (20 percent) were previously known, while of the 88 cases on that of 1945 the corresponding number was 53 (60 percent). Of the 1945 cases, 70 were in persons examined on both projects, 17 in new employees, and 1 in the group employed in 1943 but not examined until 1945. In the first group, 34 were known to the health departments as a result of the 1943 survey, 14 by reports from other sources received prior to November 1943, and 1 by an induction station report in March 1944. Among the cases in new employees, 4, or 24 percent, were already on the health department register.

Discussion and Summary

This comparison of two surveys of a plant with a relatively stable population, done at an interval of 18 months, has afforded an unusual opportunity to obtain information on several points of value to persons conducting mass surveys.

The first point of importance is that an appreciable proportion of cases of tuberculosis was missed in the routine reading of survey films. By comparing X-rays of persons diagnosed as tuberculous on the 1945 survey with those taken in 1943, it was found that of 97 cases that should have been detected in 1943, 20 or 20.6 percent were missed (1 noncalcified primary, 15 minimal, 4 moderately advanced). Similarly, by checking the films of persons diagnosed as tuberculous in 1943 against those of 1945, it was found that of 88 persons who should have been diagnosed as tuberculous on the 1945 survey, 10 or 11.4 percent were missed (9 minimal, 1 moderately advanced).[6]

Important factors in the erroneous diagnoses of 1943 are believed to be the eyestrain and fatigue involved in reading perforated 35-mm. films with the viewing equipment then available, and the lack of phototiming. These factors did not play a significant part in the 1945 project. On both surveys over 3,000 films were read per week, a rate more rapid than deemed advisable. However, a study (*5*) currently being made by the Tuberculosis Control Division of the United States Public Health Service indicates that the inter-individual variation in reading all types of chest X-ray films is so great, even when the readers are accepted experts in this field, that the miniature technique or speed of examination may not be as important in missed diagnoses as was once thought.

Nevertheless, the fact that some cases are missed should not make one lose sight of the broader benefits of mass surveys. The broad coverage of the industrial population has revealed many cases which certainly would have remained undetected for variable periods of time.

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[6] It should be noted that none of these cases would have come to our attention if this comparative study had not been made, since none of them had developed any symptoms.

There is some evidence in this study that with improved equipment and technique, the percentage of erroneous diagnoses can be lowered appreciably.

Another point of considerable interest is that this study has provided some measure of the incidence of tuberculosis in a group of individuals determined to be nontuberculous by chest X-rays on a given date. Of the 3,981 persons examined on both surveys, 55 are now known to have had tuberculosis in 1943, and 3,926 to have been nontuberculous. In the following 18-month period, 5 or 0.13 percent of this latter group developed reinfection tuberculosis, all in the minimal stage.[7] This corresponds to an annual incidence rate of 0.89 per 1,000. Such a low incidence would indicate that a resurvey at an interval of 18 months of persons previously known to be nontuberculous is of little value as a case-finding procedure.

The prevalence of significant tuberculosis among persons employed after November 1943, did not differ from that found in the general industrial population. These results would seem to indicate that once the tuberculosis status of the employees of a plant has been determined by a mass survey, it would be of value to require routine preplacement examinations of all persons subsequently employed. In this instance, such a procedure would have afforded earlier diagnosis for new employees with tuberculosis and would have given more adequate protection to other persons in the plant since two of the cases in the newly employed group had open tuberculosis and have been hospitalized.

The index of the efficacy of a mass survey as a case-finding instrument is the proportion of cases discovered that were previously unknown to the health department. This method can be used to evaluate the case finding of each survey.

In 1943, 80 percent of the detected cases were unknown, while in 1945 the corresponding figure was 40 percent, only half as high as on the first project. This difference is due almost entirely to the fact that 34 of the cases from the 1945 survey had already been brought to the attention of the health department by the first survey. It is of further interest to note that if preplacement chest X-rays had been required of all persons employed after May 1943, only 22 or 25 percent of the 88 cases on the 1945 survey would have come to the attention of the health authorities for the first time.

The preceding discussion has been limited to an evaluation of resurveys on the basis of case finding. However, there are other factors which are not so readily measured but which undoubtedly are of considerable importance.

[7] None of these cases had any known exposure to tuberculosis within the 5-year period preceding the May 1945 survey. The mother of one (case 814, white male, 43 years) gave a history of tuberculosis, arrested in 1931. However, a recent X-ray of her chest showed no evidence of pulmonary tuberculosis.

The first of these is that interest is stimulated in an industrial hygiene program by providing a valuable health service to employees. Evidence of this is provided by recent statements from plant personnel showing a desire for periodic chest X-ray examination. Not only do the individuals feel such examinations are beneficial to themselves, but they also take the attitude that new employees who have not been X-rayed may be a potential menace to their health.

Following the second survey there were quite a few instances of persons receiving normal reports who took advantage of the facilities of their local health departments (described in a folder enclosed with their reports) to have their families X-rayed. This, and other expressions of approval received both at the clinic and at the plant, indicate that these surveys have brought to the attention of the people of the community the fact that their health department is doing something tangible for their benefit.

After the discussion of the results of these examinations with the plant management, the advisability of a third project was broached. It was realized that in the light of the present study, such a survey in the future would not yield many new cases of tuberculosis. In spite of this, management had indicated that requests from employees might make it advisable that this be done at some time within the next 2 years. Hence, in planning a resurvey a balance must be struck between its limitation as a case-finding activity, and the value attached to this procedure as a demonstration in health education.

Acknowledgments

This study was made possible by the unusual interest and cooperation of Mr. J. J. Elwood and his staff at Thompson Products, Inc. We are also greatly indebted to the Anti-tuberculosis League of Cleveland and Cuyahoga County, both for financial aid and for assistance with the health education aspects of these surveys.

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Appendix A

Comparative study of films of persons diagnosed as tuberculous in November 1943 and nontuberculous in May 1945

CASES MISSED IN 1945

1945 film No.	1943 reading	1945 reading	Findings on review of both films
329	Minimal tuberculosis	Normal	Both films show infiltration in left apex and first interspace. No change.
433	do	do	Both films show infiltration in left second interspace. No change.
750	do	do	Lesion present in both films. No change.
780	do	do	Lesion present in both films. No change. Lesion obscured by ribs in 1945 film.
1287	do	do	Lesion present in both films. No change.
1960	do	do	Lesion present in both films. No change. Lesion obscured somewhat by neck muscles in 1945 film.
2751	do	do	Lesion present in both films. No change.
4287	do	do	Do.
4820	do	do	Fibrotic strand obscured by clavicle in 1945 film.
236	Moderately advanced tuberculosis.	do	Lesion present in both films. No change.
794	Minimal tuberculosis	Pleurisy, inactive	Rounded density in left fourth interspace. Later films and fluoroscopy showed this to be a patch of pleural thickening.
1639	do	Emphysematous blebs, both apices.	Small rarefactions, both apices, with infiltration. Sputa negative. Probable localized emphysema.
1997	Suspected silicosis infection.	Silicosis	No evidence of coalescence of nodules, other signs of infection.
2040	Minimal tuberculosis	Calcified	Typical primary complex with calcified nodule in left second interspace and associated with calcified node in left upper hilum.
2228	Moderately advanced tuberculosis.	Marked emphysema	Mottled markings throughout both lung fields. Sputa negative. Probable generalized emphysema.
2816	Minimal tuberculosis	Emphysematous blebs, both apices.	Small rarefactions, both apices, with no infiltration. Sputa negative. Probable localized emphysema.

Appendix B

Comparative study of films of persons diagnosed as nontuberculous in November 1943 and tuberculous in May 1945

NEW CASES

1943 film No.	1943 reading	1945 reading	Findings on review of both films
425	Normal	Minimal tuberculosis	1943 film normal; 1945 film shows fibrocalcific minimal disease.
525	do	do	Do.
814	do	do	1943 film normal; 1945 film shows soft minimal disease. Hospitalized after 1 month's observation.
3863	do	do	1943 film normal; 1945 films show apparently inactive minimal disease.
3941	Calcified primary	do	1943 film shows calcified Ghon complex. 1945 film shows soft infiltration peripheral to area where Ghon tubercle was seen in 1943. Only a linear scar can be seen in 1945 where Ghon tubercle was seen in 1943.

Comparative study of films of persons diagnosed as nontuberculous in November 1943 and tuberculous in May 1945—Continued

POSSIBLE NEW CASES, BUT PROBABLY MISSED IN 1943

1943 film No.	1943 reading	1945 reading	Findings on review of both films
478	Normal	Minimal tuberculosis	1943 film is slightly underexposed. This is sufficient to obscure fibrocalcific inactive disease found in 1945.
2539	do	do	In 1943 left clavicle completely covers area where fibrocalcific disease was seen in 1945.

CASES MISSED IN 1943

4499	Normal	Moderately advanced tuberculosis.	1943 film shows minimal lesion. In 1945 there has been some spread on the contralateral side.
5793	do	do	Lesion was present on 1943 film; slightly larger in 1945. Patient hospitalized in 1945.
3847	do	Minimal tuberculosis	1945 film shows slight retrogression disease as compared to 1943 film.
3776	Calcification	Noncalcified primary	1945 film shows noncalcified parenchymal component and slightly calcified hilar node. In 1943 film, parenchymal component appears slightly harder.
386	Normal	Minimal tuberculosis	1945 film shows fibrocalcific strand, apparently obscured by clavicle in 1943 film. Known to health department as case of tuberculosis prior to 1943 survey.
2206	do	do	Lesion is present in 1943 film; 1945 film shows no change.
2342	do	do	Do.
2766	Calcification	do	Both films show fibrocalcific infiltration in left mid-lung field.
2969	Normal	do	Lesion is present in 1943 film; 1945 film shows no change.
3359	do	do	Do.
3822	Calicified primary	do	Both films show fibrocalcific disease in right apex, in addition to a calcified primary complex in right third interspace.
4067	Normal	do	Round lesion seen faintly in both films, obscured somewhat by ribs in 1943 film.
4327	Inactive pleurisy	do	Very slight infiltration in right first interspace in both films. Pleural changes not evident in 1945.
4973	Normal	do	Lesion is present in 1943 film; 1945 film shows no change.
5607	do	do	Lesion is present in 1943 film; 1945 film shows no change. Case known to health department prior to 1943 survey.
?	do	do	1943 film could not be located. However, clinic film of Jan. 25, 1944, shows minimal tuberculosis, fibrocalcific in nature, which has shown no change to the present time.
1436	Cervical rib	Moderately advanced tuberculosis.	Fibrocalcific disease seen in both films. Known to health department prior to 1943 survey.
5644	Normal	do	Fibrocalcific disease seen in both films. No change. Known to health department prior to 1943 survey.

MINIATURE PHOTOFLUOROGRAPHY OF THE CLOTHED SUBJECT [1]

By IRA LEWIS, *Surgeon (R), United States Public Health Service*[2]

The practical advantages in time saved, confusion avoided, and efficiency gained from the examination of clothed subjects in mass X-ray procedures are obvious and desirable,[3] provided, of course, that such practice produces a quality of result equal to that which has been realized by the conventional examination of unclothed subjects.

Radiologists of the Tuberculosis Control Division, United States Public Health Service, have interpreted, in the course of their duties throughout the country, tens of thousands of miniature films of clothed subjects. Such experience permits the persistent belief that clothing causes no diagnostic loss through obscuration. Moreover, since controlled tests to demonstrate the analogous quality of product of the two procedures had never, to our knowledge, been performed, there could be no certainty that some significant lesions did not escape the scrutiny of the observer.

This paper, therefore, is a consequence of a study which was designed to test the practicability of X-ray examination of clothed subjects by comparing films of clothed subjects with films of the same subjects unclothed. The latter were used as the standard against which the former were compared, and, at the outset, an attempt was made to determine the percentage of error present in the films of clothed subjects. That no such percentage was derivable at the conclusion of the study is emphatic indication of the significance of the ensuing observations.

Because examining thousands of persons twice, first clothed, then unclothed, or the contrary, would have been an unwieldy and interminable procedure, an economical method,[4] equivalent in kind and consequence to dual examination, was planned in advance and subsequently followed. A photofluorographic installation was utilized, and all persons who presented themselves for examination were stripped to the waist. Those persons whose miniature films exhibited shadows suggestive of minimal tuberculosis were advised to return for reexamination by means of 14″ x 17″ films. Upon the return of these positive minimals, another miniature film was also taken, this time with the subject clothed. The second miniature film could then be compared with the first miniature film, and the 14″ x 17″ film served as a basis for a final evaluation of all analogical judgments. This method made it unnecessary to examine large numbers of normals, both clothed and unclothed.

[1] From the Tuberculosis Control Division.

[2] Medical Officer in Charge, Radiology Section.

[3] Comstock, G. W.: Faster Mass Surveys. Nat. Tuberc. Assoc., Bull. (February 1946).

[4] This method was suggested by Dr. Russell Morgan, Associate Professor of Roentgenology, University of Chicago.

When the persons who had positive films returned for re-examination and were prepared for their second miniature films, they retained their normal attire but were instructed to detach all removable metallic objects from their upper garments. However, it was observed later that all manner of opaque and semi-opaque objects, such as spectacles, fountain pens, pencils, and costume jewelry, were projected as well-defined shadows on the film. Fortunately, these objects obscured no lesion. Because such large numbers of opaque materials were present in the films, this study is unusual in that no small lesion was obscured. To be sure, when there is any question about the size of the opaque object, the film on which it appears should be retaken. Most buttons are on the mid-line and do not interfere with diagnosis in the pulmonary parenchyma, and projected shadows of other opaque objects can be recognized for what they are, after brief experience in reading such films, and misinterpretation can be avoided. In this study the fabrics worn by the subjects were not of sufficient density to obscure, to any appreciable extent, the lung fields. It is possible that synthetic fabrics, which in time will be used with increasing frequency, may prove to be additional obscuring factors, and a study of them will be necessary.

During the course of this study, 100 additional persons, selected at random, were examined, at first with clothes on, then with clothes off. This precaution was taken as a control device to prevent overscrutiny of any film of a clothed subject by the examiner whose pre-knowledge might incline him to study any given film of a clothed subject until he had perceived the lesion which he knew would be present. The group of 100 random subjects was included so that the test group could not be individually identified. This process was in operation for many months and, as a result, 69 patients whose films delineated shadows suggestive of minimal tuberculosis and many others who exhibited nontuberculous pathology were thus examined. Since 1.2 percent of the population shows X-ray evidence of tuberculosis (all stages) as discovered in mass X-ray surveys throughout the Nation, and since 70 percent of this group has characteristic minimal tuberculosis, the examination of 69 persons whose films exhibited X-ray evidence of minimal tuberculosis would produce results similar to those obtained from the examination of 8,200 persons at random.

At the conclusion of the processing of the films that gave evidence of minimal lesions and the controls, all the films were read by the author in a routine manner, without knowledge of whether the subjects had been clothed or unclothed when the films were taken. All positive diagnoses were tallied according to the location and extent of pathology. These tallies were tabulated and then checked against the original report which had been made when the subject had returned for his second film clothed. The identifying number of both films, clothed

and unclothed, had been entered on this original report and not seen until the films had been reviewed. Finally, each positive was checked individually against the original report, and the films of each person, both clothed and unclothed, were inspected simultaneously and qualitatively compared. It was apparent that the quality of the two types of films was similar.

The findings were as follows: Of 69 cases that exhibited shadows suggestive of minimal tuberculosis on films taken of unclothed patients, 66 were again reported on films taken of the same patients clothed. A restudy of the three instances of apparently inconsistent readings revealed, in one, a shadow which had been interpreted as a lesion in the film which had been taken when the patient was unclothed. This shadow proved to be an artifact which was not perceivable either on the 14″ x 17″ retake or on the second miniature film which had been taken when the patient was clothed. The other two films were underexposed on the miniature retakes of the clothed patients. Both exhibited apical lesions. No phototimer was available, and the technician had not estimated accurately the exposure factors. In consequence, the apices were poorly demonstrated.

It is significant that in this group of representative cases the wearing of clothing did not impair diagnostic efficiency. Precision in exposure techniques and processing would doubtless have prevented the occurrence of the three questionable films. The use of a phototimer would have eliminated exposure-technique difficulties.

It should be said that this method of examining clothed persons is recommended only for mass X-ray surveys. After detection of the lesion by survey methods, the identification of the pathology by the radiologist requires additional X-ray examination of the disrobed patient.

Conclusion

There is no objection to clothed persons in chest survey programs. Speed of operation is increased; less dressing-room space and personnel are required. This method, moreover, will appeal to women and will attract greater numbers of persons to photofluorographic installations with the resultant accelerated action toward the objective of mass surveys—the X-raying of every adult in the United States. Because of these many new examinees and because thousands of new cases of tuberculosis would be brought to medical attention, this method of X-raying clothed subjects, even if productive of a narrow margin of error, would be the procedure of choice. Furthermore, it is reasonable to assume that factors other than clothing, such as technical faults and subjective error inherent in film interpretation, might well introduce greater diagnostic deviation.

REHABILITATION [1]

"Rehabilitation should be considered as an essential part of the treatment of tuberculous persons." To put this bluntly: no scheme which undertakes the treatment and care of a tuberculous person can be considered to be effective until each and every patient is secured in an environment, a scheme of life, a way of living, call it what you may, where he or she can enjoy security, medical, economic, and sociological, upon which treatment depends in so many cases for a permanent result.

"This philosophy is no mere refinement of academic thinking," the Medical Research Council states without hesitation "the introduction of satisfactory arrangements for the industrial rehabilitation of the tuberculous is one of the most pressing needs for the control of this disease."

"The entry of a new ally into the combat is, I feel sure, an immediate response to the urgency of our needs. The Ministry of Labour's plans, and all those responsible for bringing them about, deserve the congratulations and thanks of everyone engaged in the combat against tuberculosis.

"The next step, and the first purpose of this discussion, is to adopt a set of practical proposals and urge both the Ministries of Labour and Health to make it possible for them to be put into successful practice. In other words, how can the Ministry of Labour and the Local Authority work best together for the end we have in view?

"First, the legislative measure which has brought the Ministry of Labour into the field of tuberculosis requires underlining and linking up with the Act which commits the care of the tuberculous to the Local Authority. The philosophy of the Medical Research Council should reach the local authorities through the statute books. If the wording of the act now requires accommodation and treatment to be available to tuberculous persons, it should now be expanded; for we require all responsible authorities to rehabilitate tuberculous persons.

"Secondly, such authority should be accompanied by an outline plan of how it can best be done; and this is what we are here to advise. The Medical Research Council's Report hinted that 'Industries might be set up in connection with certain of the larger well-equipped sanatoria.' These words contain the germ of successful action; but I wish they read as follows: 'Industries might be set up in connection and in close cooperation with not only the larger and better of our sanatoria, but with every single sanatorium in the country.' Every single treatment scheme in the country must be geared together, so that full active modern treatment is followed without break by trans-

[1] From a discussion by Peter Fraser in *Pathways in Aftercare*, National Association for the Prevention of Tuberculosis, Verbatim Report of Discussion held by the National Association for the Prevention of Tuberculosis at the London School of Hygiene, July 11, 1945, pp. 11–16.

fer to a rehabilitation unit which has available the necessary medical team for post treatment, after-care, and facilities for training and employment; and these rehabilitation units must in turn be linked with more powerful units where permanent employment and housing are available on the same level of medical care to the end.

"Groups of local authorities must merge their interests together, the Ministry of Labour has provided a focus upon which they can now converge with assurance. Therefore, the amendment of powers in the hands of local authorities should include not only the responsibility to rehabilitate but indicate the most successful method of doing so.

"Firstly, for every reason, allow their sanatorium superintendents and tuberculosis officers to merge together into regional teams. I have an idea that a higher level of modern treatment might then permeate the whole group; and much more important, such a group could evolve with much greater ease the exact figures of additional accommodation needed both for treatment beds and for rehabilitation accommodation. Agreement upon geographical siting could follow, and interregional cooperation set up to agree and merge together for the permanent employment centers. In all this, the medical teams can now rely not only upon the huge machine of the Ministry of Labour, but also of existing rehabilitation centres who are offering combined services in varying degrees and who only await the word to expand their schemes to meet the various needs of the country as a whole.

"For instance, Papworth alone is able to offer, this very day, employment facilities for a minimum of 500 more tuberculous persons. If the various groups of regions care to make use of these facilities, the necessary expansion of all forms of accommodation, both active treatment, rehabilitation, full employment and housing, will be the only halt between the indication and the reality. Enham can do the same, making a minimum of 1,000 more tuberculous persons over and above our present capacity. Other centers can no doubt do the same in varying degrees.

"Turning again to the most modern of our sources of stimulus, the Medical Research Council's Report, whose proposal should be studied with care. They have two suggestions: First, the setting aside of part of an existing factory with hostel, homes and a night sanatorium nearby for accommodation. Secondly, to take advantage of many small garage businesses which have been converted in this war into light engineering shops and use them as self-contained factories on the model of the Spero workshops.

"Now for the first suggestion: That part of an existing factory be set aside and a system of night sanatoria, hostels and homes be linked up with it. This is no novelty, those who have read that delightful

autobiography of Mr. Henry Ford will recall that there were usually a thousand tubercular employees on the company's pay roll, in a specially constructed shed, working on salvage. That was twenty-five years ago. In California today, at one of the Boeing Flying Fortress plants the graduated employment of the ex-patient has been part of the company's wartime labour policy. There are, therefore, leaders in this field. But for general use I am doubtful of complete success. Quite recently an association of companies published a report indicating the use to which various machines could be put. Each standard machine was listed and those most suited for various categories of disablement indicated; some could be operated by amputated leg cases, some amputated arms, some blind, and so on. At the very bottom of the list there was a little note to this effect: 'some opportunities for tuberculous persons also, such as gate keepers, groundsmen, etc.' Yes, at the bottom of the list comes the tuberculous. The report would have been of no further interest if I had not noticed that every single machine in that list has been installed in one or other of the Papworth workshops, and operated by ex-patients with great success for many years.

"The lesson to be learnt is, I think, that tuberculosis presents to the employer the greatest difficulty of all forms of disablement. First, because of the latent fear of infection which causes many a good man to conceal his condition even from the doctor as well as his fellow men; secondly, because the provision of a competent medical officer and accommodation is more than most companies can afford. This is not because their hearts are not willing, necessarily, but they are most uncertain of success.

"The link up of home, hostel and night sanatorium is essential; but instead of setting aside a portion of an existing factory, I would suggest the setting aside of a process of manufacture. Rollier has done this in Switzerland. When I visited him last in 1937 his patients were assembling the valve gear of gas masks and prior to that, fuses for the State railways.

"Another method is for one or several of the many trade associations of manufacturers to commute as a group their quota or a portion of it by an undertaking to sub-contract a percentage of their annual sales to a fully integrated factory, doing its manufacturing job from start to finish. Financed by the Disabled Persons Corporation in part or whole the Association might well take a pride in a subsidiary firm which not only serves their own requirements, but also represents a corporate enterprise of national value.

"If Papworth can save the community £25,000 per annum, as we do every year, and substitute a purchasing power of £50,000, then I suggest that a very considerable burden may be taken off the shoulders of the community by expansion on the lines indicated.

"Just before the war, tuberculosis was costing a minimum of £4,000,000 net each year. For every case that died, more than two more were found. For every known case we had just £15 to spend per annum; and less than one-tenth of a bed for his or her treatment. And the loss of purchasing power to the country caused by this disease could not have been less than £1,000,000, and in production not less than £100,000,000."

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 JUNE 15, 1946

Summary

A total of 184 cases of poliomyelitis was reported, as compared with 161 last week and 96 for the corresponding week last year. States reporting currently 6 or more cases are as follows (last week's figures in parentheses): *Increases*—Illinois 6 (4), Georgia 6 (1), Kentucky 6 (0), Alabama 25 (15), Oklahoma 10 (2), Texas 39 (35), Colorado 10 (5); *decreases*—Florida 25 (33), California 14 (15). States reporting 20 or more cases each during the past 4 weeks (aggregating 392, or 69 percent of cases for the period) are as follows: Florida 111, Alabama 66, Louisiana 20, Texas 123 (last year 120), Colorado 23, California 49. Both the total for the current week and the total for the year to date (1,381), are in excess of the respective corresponding figures for any of the past 11 years.

A total of 6 cases of smallpox, as compared with 4 last week and a 5-year median of 11, was reported during the week—2 in Indiana and 1 each in Kansas, Idaho, Colorado, and California. No new case has been reported in the past 2 weeks in Washington. The cumulative total is 242, as compared with 235 for the same period last year and a 5-year median of 542.

The total of 19,261 cases of measles, as compared with 25,041 last week and a 5-year median of 12,480, is more than reported for the corresponding week in any of the past 4 years. The cumulative figure is 586,748, as compared with a 5-year median of 485,042.

The total of 256 cases of diphtheria, as compared with 229 last week, and the total for the year to date (7,981), are above the respective corresponding figures since 1939.

Deaths registered during the week in 93 large cities of the United States totaled 8,782, as compared with 9,171 last week, 8,291 and 8,849, respectively, for the corresponding weeks of 1945 and 1944, and a 3-year (1943–45) average of 8,544. The cumulative figure is 231,370, as compared with 225,453 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended June 15, 1946, and comparison with corresponding week of 1945 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 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45
	June 15, 1946	June 16, 1945		June 15, 1946	June 16, 1945		June 15, 1946	June 16, 1945		June 15, 1946	June 16, 1945	
NEW ENGLAND												
Maine	6	0	0	-	-	-	244	-	155	1	0	0
New Hampshire	0	0	0	-	-	-	37	-	10	0	0	0
Vermont	1	1	0	-	-	-	192	49	74	0	0	0
Massachusetts	9	3	2	-	-	-	2,239	359	851	1	6	6
Rhode Island	0	1	1	-	26	1	170	7	14	0	0	1
Connecticut	2	0	0	-	2	2	461	99	246	0	1	1
MIDDLE ATLANTIC												
New York	20	19	13	[1] 5	[1] 1	[1] 1	2,931	200	1,028	10	18	18
New Jersey	6	3	2	4	1	2	1,898	73	547	5	5	6
Pennsylvania	6	5	5	-	1	1	1,484	562	562	6	6	6
EAST NORTH CENTRAL												
Ohio	9	7	3	2	9	9	634	90	318	3	5	5
Indiana	6	5	2	1	2	3	152	12	58	2	3	3
Illinois	4	5	11	1	1	2	345	352	352	6	14	14
Michigan [2]	5	15	5	2	3	1	501	213	285	2	6	6
Wisconsin	6	2	1	17	6	13	1,723	66	1,136	1	4	1
WEST NORTH CENTRAL												
Minnesota	6	1	1	2	-	-	83	11	146	3	3	3
Iowa	5	4	2	-	-	-	106	55	130	1	3	0
Missouri	5	6	2	-	3	1	143	34	67	1	5	5
North Dakota	0	3	1	-	-	-	6	2	17	0	0	0
South Dakota	1	0	0	-	-	-	4	6	16	2	0	0
Nebraska	0	2	1	-	1	1	65	13	25	1	0	0
Kansas	9	8	3	12	9	3	69	65	112	1	6	4
SOUTH ATLANTIC												
Delaware	0	1	0	-	-	-	5	1	4	0	0	0
Maryland [2]	11	15	3	-	2	2	633	25	116	4	2	6
District of Columbia	0	0	0	-	-	-	127	2	74	1	1	1
Virginia	5	4	4	60	41	41	514	16	152	2	7	6
West Virginia	2	3	2	7	3	3	37	17	32	0	2	2
North Carolina	9	6	5	-	-	-	188	26	251	0	5	5
South Carolina	1	3	6	95	112	112	221	17	74	0	1	1
Georgia	5	4	4	3	-	4	56	5	30	2	1	1
Florida	4	1	1	2	-	3	100	12	56	0	1	1
EAST SOUTH CENTRAL												
Kentucky	4	2	2	-	-	1	126	67	56	3	2	2
Tennessee	6	2	1	6	13	13	103	30	62	7	6	3
Alabama	3	3	2	14	10	14	112	7	45	2	0	1
Mississippi [2]	3	8	3	-	-	-	-	-	-	0	3	1
WEST SOUTH CENTRAL												
Arkansas	1	2	3	8	3	5	75	39	46	0	0	0
Louisiana	9	6	2	9	2	2	117	9	19	11	2	2
Oklahoma	4	6	2	15	2	4	124	11	45	1	2	1
Texas	33	31	21	235	336	237	779	320	327	8	3	4
MOUNTAIN												
Montana	1	2	1	-	6	1	104	4	38	0	1	0
Idaho	2	0	0	15	-	-	34	1	5	0	0	0
Wyoming	2	0	0	-	-	1	37	4	31	0	0	0
Colorado	10	3	6	5	42	20	204	4	94	0	1	1
New Mexico	0	3	2	3	3	-	39	11	11	1	0	0
Arizona	4	12	1	18	25	26	127	16	30	2	0	0
Utah [2]	0	0	0	-	-	-	164	136	79	0	0	0
Nevada	0	0	0	-	-	-	3	1	10	0	0	0
PACIFIC												
Washington	7	5	4	-	1	1	82	99	158	1	1	1
Oregon	1	2	2	-	2	6	166	57	79	0	1	1
California	23	20	16	10	20	40	1,497	1,075	1,075	6	6	6
Total	256	234	154	551	688	688	19,261	4,280	12,480	97	133	133
24 weeks	7,981	6,349	6,051	187,067	65,147	77,305	586,748	83,539	485,042	3,798	5,153	5,153

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

Telegraphic morbidity reports from State health officers for the week ended June 15, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [2]		
	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45
	June 15, 1946	June 16, 1945		June 15, 1946	June 16, 1945		June 15, 1946	June 16, 1945		June 15, 1946	June 16, 1945	
NEW ENGLAND												
Maine	0	0	0	24	30	18	0	0	0	2	0	1
New Hampshire	0	0	0	9	7	3	0	0	0	0	0	0
Vermont	0	1	0	0	14	4	0	0	0	0	0	0
Massachusetts	0	0	0	118	316	254	0	0	0	7	9	2
Rhode Island	0	0	0	2	24	9	0	0	0	0	0	0
Connecticut	0	2	0	33	42	42	0	0	0	2	0	0
MIDDLE ATLANTIC												
New York	4	10	3	356	563	288	0	0	0	1	3	5
New Jersey	2	2	1	124	88	88	0	0	0	0	1	1
Pennsylvania	3	2	2	193	308	186	0	0	0	6	2	6
EAST NORTH CENTRAL												
Ohio	3	1	0	165	190	170	0	1	1	2	1	4
Indiana	3	3	0	21	23	23	2	0	0	0	2	2
Illinois	6	0	0	112	202	100	0	0	1	1	0	5
Michigan [2]	1	0	1	146	233	129	0	0	0	1	0	1
Wisconsin	0	1	0	79	153	110	0	4	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	1	0	0	39	45	45	0	1	1	0	0	0
Iowa	3	0	0	27	25	21	0	0	0	0	0	0
Missouri	0	0	0	21	38	25	0	0	0	1	0	2
North Dakota	0	0	0	0	14	3	0	0	0	0	0	0
South Dakota	0	0	0	3	5	5	0	0	0	0	0	0
Nebraska	1	0	0	6	34	14	0	0	0	0	0	0
Kansas	4	0	1	19	49	26	1	1	0	1	0	1
SOUTH ATLANTIC												
Delaware	0	0	0	2	2	4	0	0	0	0	0	0
Maryland [2]	0	0	0	31	92	60	0	0	0	0	0	1
District of Columbia	0	0	0	7	25	10	0	0	0	1	0	0
Virginia	0	3	2	24	49	12	0	0	0	2	2	3
West Virginia	2	2	0	15	27	13	0	0	6	0	0	3
North Carolina	3	2	0	33	40	11	0	0	0	1	0	4
South Carolina	0	7	1	5	2	2	0	0	0	2	3	5
Georgia	6	2	0	3	10	9	0	2	0	5	10	10
Florida	25	0	1	5	5	1	0	0	0	3	4	4
EAST SOUTH CENTRAL												
Kentucky	6	0	0	11	24	23	0	0	0	2	7	5
Tennessee	0	3	1	14	33	17	0	0	1	5	6	3
Alabama	25	8	1	10	18	7	0	0	0	1	4	4
Mississippi [3]	4	0	0	5	3	2	0	0	0	2	3	3
WEST SOUTH CENTRAL												
Arkansas	2	1	2	2	10	4	0	0	0	0	11	5
Louisiana	3	1	2	3	14	3	0	0	0	7	6	7
Oklahoma	10	0	0	3	4	6	0	0	0	2	1	1
Texas	39	37	4	26	49	21	0	0	0	10	17	15
MOUNTAIN												
Montana	0	0	0	2	13	9	0	0	0	1	0	0
Idaho	0	0	0	4	9	7	1	0	0	4	1	0
Wyoming	0	0	0	0	3	7	0	0	0	2	0	0
Colorado	10	0	0	39	28	22	1	0	0	1	0	1
New Mexico	2	0	0	7	6	4	0	0	0	3	1	1
Arizona	0	0	0	3	9	9	0	1	0	1	3	2
Utah [2]	0	2	1	6	4	8	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	1	0
PACIFIC												
Washington	2	0	0	20	43	21	0	1	0	0	3	0
Oregon	0	1	0	12	18	18	0	0	0	1	2	2
California	14	5	6	133	303	129	1	0	0	2	3	3
Total	184	96	71	1,922	3,246	2,031	6	11	11	82	106	117
24 weeks	1,379	999	657	79,409	123,662	89,533	242	235	542	1,350	1,507	1,900

[2] Period ended earlier than Saturday.

[3] Including paratyphoid fever reported separately, as follows: Massachusetts 6; Missouri 1; Georgia 2; Florida 1; Kentucky 1; Tennessee 1; Louisiana 1; Texas 4; New Mexico 1.

Telegraphic morbidity reports from State health officers for the week ended June 15, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended June 15, 1946							
	Week ended—		Median 1941–45	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	June 15, 1946	June 16, 1945		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine	14	44	22								
New Hampshire		3	3								
Vermont	12	17	17								1
Massachusetts	132	178	178								1
Rhode Island	23	14	20		1						
Connecticut	33	39	44								
MIDDLE ATLANTIC											
New York	98	203	224	13	11		1				7
New Jersey	152	130	130		9			2			1
Pennsylvania	110	179	198					1			1
EAST NORTH CENTRAL											
Ohio	55	121	137					1			2
Indiana	35	17	34								1
Illinois	102	54	82	4			1	1	1		15
Michigan [2]	160	44	169		2						5
Wisconsin	105	31	144								9
WEST NORTH CENTRAL											
Minnesota	3	12	25								3
Iowa	26		12		1						
Missouri	15	15	15			1		1	2		2
North Dakota			1								1
South Dakota	1	2	3					1			6
Nebraska	1	2	11								11
Kansas	17	40	40				1		1		5
SOUTH ATLANTIC											
Delaware	1		1								
Maryland [2]	22	69	69			1		2			1
District of Columbia	10	11	16					1			
Virginia	95	71	92			104		8			4
West Virginia	39	16	18					1			
North Carolina	105	188	188						1	2	
South Carolina	64	61	131		33						
Georgia	16	22	22		8			3	2	11	3
Florida	35	7	16	1						13	4
EAST SOUTH CENTRAL											
Kentucky	24	57	48		1			1			
Tennessee	36	54	54		1				6	1	2
Alabama	11	44	51						1	10	2
Mississippi [2]									1	3	4
WEST SOUTH CENTRAL											
Arkansas	5	19	19	1					3		2
Louisiana	13	4	4	1			1			6	1
Oklahoma	9	10	25	1	3		1				
Texas	241	297	297	25	341	24	3			30	16
MOUNTAIN											
Montana	6	2	16					1	2		1
Idaho	14	3	1								
Wyoming	35	9	6					2	1		
Colorado	24	16	18		1			1			2
New Mexico	21	6	10	3							
Arizona	10	4	11			34					1
Utah [2]	37	52	52						1		1
Nevada											
PACIFIC											
Washington	20	14	35								
Oregon	28	15	17								1
California	91	422	292	2	4				1	1	4
Total	2,106	2,618	3,721	51	416	164	8	27	23	77	120
Same week, 1945	2,618			32	575	70	10	22	13	94	115
Average, 1943–45	2,958			34	574	141	8	[4] 21	16	[4] 73	
24 weeks: 1946	45,011			948	8,013	2,874	208	132	423	1,144	2,093
1945	60,055			753	10,493	2,760	166	113	376	1,364	2,177
Average, 1943–45	67,024		[4] 91,802	728	7,757	2,086	231	[4] 124	361	[4] 1,134	

[2] Period ended earlier than Saturday.
[4] 5-year median, 1941–45.

Leprosy: Florida, 1 case.

WEEKLY REPORTS FROM CITIES

City reports for week ended June 8, 1946

This table lists the reports from 89 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	46	0	2	0	0	0	0	6
New Hampshire:												
Concord	0	0	------	0	-------	0	2	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	-------	0	2	0	1	0	0	------
Massachusetts:												
Boston	1	0	------	0	307	0	9	0	22	0	0	14
Fall River	0	0	------	0	55	0	0	0	2	0	0	1
Springfield	0	0	1	1	86	0	0	0	3	0	0	1
Worcester	0	2	------	0	324	0	8	0	0	0	0	35
Rhode Island:												
Providence	0	0	------	0	131	0	0	0	2	0	0	22
Connecticut:												
Bridgeport	0	0	------	0	1	0	2	0	2	0	0	1
Hartford	0	0	------	0	16	0	1	0	6	0	0	4
New Haven	0	0	------	0	74	0	0	0	2	0	0	1
MIDDLE ATLANTIC												
New York:												
Buffalo	9	0	------	0	30	0	0	0	8	0	0	5
New York	12	1	2	1	823	7	42	2	174	0	2	48
Rochester	0	0	------	0	89	0	2	0	24	0	0	2
Syracuse	0	0	------	0	8	0	4	0	8	0	0	1
New Jersey:												
Camden	0	0	------	0	1	0	1	0	4	0	0	2
Newark	0	0	------	0	161	0	2	0	17	0	0	28
Trenton	0	0	------	0	111	0	1	0	1	0	0	3
Pennsylvania:												
Philadelphia	3	0	------	0	187	0	18	0	44	0	0	19
Pittsburgh	2	0	------	0	18	4	2	0	16	0	1	8
Reading	0	0	------	0	6	0	1	0	3	0	0	2
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0	------	0	13	0	4	0	6	0	0	4
Cleveland	0	0	------	0	171	1	6	1	32	0	0	10
Columbus	0	0	1	1	7	0	0	0	2	0	0	6
Indiana:												
Fort Wayne	0	0	------	0	6	0	0	0	0	0	0	------
Indianapolis	0	0	------	1	32	0	6	0	5	0	0	14
South Bend	0	0	------	0	1	0	0	0	1	0	0	------
Terre Haute	0	0	------	0	20	0	0	0	4	0	0	------
Illinois:												
Chicago	1	0	------	0	145	4	22	0	82	0	0	32
Springfield	0	0	------	0	-------	0	1	0	0	0	0	2
Michigan:												
Detroit	2	0	1	4	96	1	7	0	50	0	0	52
Flint	0	0	------	0	1	0	4	0	3		0	3
Grand Rapids	0	0	------	0	117	0	2	0	10	0	0	8
Wisconsin:												
Kenosha	0	0	------	0	175	0	0	0	1	0	0	------
Milwaukee	0	0	------	0	362	0	9	0	15	0	0	36
Racine	0	0	------	0	158	0	0	0	5	0	0	2
Superior	0	0	------	0	3	0	0	0	1	0	0	4
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	13	0	3	0	0	0	0	------
Minneapolis	1	0	------	0	20	0	3	3	9	0	0	------
St. Paul	0	0	------	0	5	0	1	0	18	0	0	8
Missouri:												
Kansas City	0	0	------	0	3	1	8	0	5	0	0	6
St. Joseph	0	0	------	0	-------	0	0	0	0	0	0	------
St. Louis	0	0	1	0	88	2	6	2	4	0	0	1

City reports for week ended June 8, 1946—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	2	0	5	0	3	0	0	------
Kansas:												
Topeka	0	0	------	0	------	0	0	0	3	0	0	3
Wichita	0	1	1	1	20	0	2	4	0	0	0	3
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	11	3	0	0	0	0	0	------
Maryland:												
Baltimore	11	0	------	0	510	1	4	0	22	0	0	20
Cumberland	0	0	------	0	------	0	0	0	3	0	0	------
Frederick	0	0	------	0	------	0	0	0	0	0	0	------
District of Columbia:												
Washington	1	0	------	0	137	0	2	0	13	0	0	6
Virginia:												
Lynchburg	0	0	------	0	19	0	1	0	0	0	0	------
Richmond	1	0	1	1	107	0	2	0	6	0	0	7
Roanoke	0	0	------	0	16	0	0	0	1	0	0	------
West Virginia:												
Charleston	0	0	------	0	2	0	0	0	1	0	0	------
Wheeling	1	0	------	0	1	0	1	0	0	0	0	10
North Carolina:												
Raleigh	0	0	------	0	3	0	1	0	1	0	0	------
Wilmington	0	0	------	0	8	0	2	0	0	0	0	1
Winston-Salem	0	0	------	0	5	0	0	0	2	0	0	10
South Carolina:												
Charleston	0	0	------	0	2	0	1	0	1	0	0	2
Georgia:												
Atlanta	0	0	------	0	26	0	0	0	0	0	0	------
Brunswick	0	0	------	0	------	0	0	0	0	0	0	1
Savannah	0	0	1	0	4	0	2	0	0	0	0	------
Florida:												
Tampa	0	0	1	0	20	0	3	4	1	0	0	2
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	1	1	0	11	0	5	0	1	0	0	5
Nashville	0	0	------	1	1	1	1	0	2	0	0	1
Alabama:												
Birmingham	0	0	------	0	14	1	3	1	1	0	1	------
Mobile	0	0	------	0	------	0	1	1	0	0	1	------
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	------	0	8	0	1	0	1	0	0	------
Louisiana:												
New Orleans	1	0	3	0	13	0	9	4	5	0	0	------
Shreveport	0	0	------	0	------	0	5	1	0	0	0	------
Texas:												
Dallas	2	0	------	0	10	0	0	2	3	0	0	1
Galveston	1	0	------	0	------	0	0	0	0	0	2	2
Houston	1	0	------	0	2	0	2	0	2	0	1	1
San Antonio	0	0	1	0	8	0	5	11	0	0	0	4
MOUNTAIN												
Montana:												
Billings	0	0	------	0	2	0	3	0	0	0	0	------
Great Falls	0	0	------	0	21	1	0	0	0	0	0	------
Helena	0	0	------	0	3	0	0	0	0	0	0	------
Missoula	0	0	------	0	3	0	2	0	1	0	0	------
Idaho:												
Boise	0	0	------	0	2	0	0	0	0	0	0	------
Colorado:												
Denver	1	0	1	0	147	0	3	1	14	0	1	10
Pueblo	0	0	------	0	30	0	1	0	1	0	0	1
Utah:												
Salt Lake City	0	0	------	0	60	0	0	1	7	0	0	1

City reports for week ended June 8, 1946—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	3	0	------	0	31	0	3	0	2	0	0	9
Spokane	0	0	------	0	4	0	2	0	1	0	0	5
Tacoma	0	0	------	0	6	0	0	0	2	0	0	3
California:												
Los Angeles	5	0	5	0	160	3	3	4	35	0	1	5
Sacramento	0	0	------	0	45	0	0	0	1	0	1	------
San Francisco	2	0	------	0	89	4	5	1	15	0	0	1
Total	62	5	21	11	5,473	34	261	43	743	0	11	505
Corresponding week, 1945	40	------	30	13	1,920	------	289	------	1,307	0	11	677
Average, 1941–45	56	------	36	[1] 12	[2] 4,299	------	[1] 298	------	978	2	19	967

[1] 3-year average, 1943–45.
[2] 5-year median ,1941–45.

Dysentery, amebic.—Cases: Buffalo 1; New York 2; Chicago 1.
Dysentery, bacillary.—Cases: New York 2; Detroit 2; Richmond 1; Charleston, S. C., 11; San Antonio 3; Los Angeles 1.
Dysentery, unspecified.—Cases: San Antonio 20.
Rocky Mountain spotted fever.—Cases: Washington, D. C., 1; Spokane 1.
Typhus fever, endemic.—Cases: Savannah 1; Birmingham 1; Mobile 1; Shreveport 1; Galveston 1; Houston 1; San Antonio 1; Los Angeles 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 89 cities in the preceding table (estimated population, 1943, 34,366,400)

	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	5.2	2.6	2.6	2,718	0.0	68.0	0.0	105	0.0	0.0	222
Middle Atlantic	12.0	0.5	0.9	0.5	664	5.1	33.8	0.9	138	0.0	1.4	55
East North Central	2.4	0.0	1.2	3.6	795	3.6	37.1	0.6	132	0.0	0.0	105
West North Central	2.0	2.0	4.0	2.0	304	6.0	56.3	18.1	84	0.0	0.0	42
South Atlantic	22.9	0.0	4.9	1.6	1,424	6.5	31.1	6.5	83	0.0	0.0	96
East South Central	0.0	5.9	5.9	5.9	153	11.8	59.0	11.8	24	0.0	11.8	35
West South Central	14.3	0.0	11.5	0.0	118	0.0	63.1	51.7	32	0.0	8.6	23
Mountain	7.9	0.0	7.9	0.0	2,129	7.9	71.5	15.9	183	0.0	7.9	95
Pacific	15.8	0.0	7.9	0.0	530	11.1	20.6	7.9	89	0.0	3.2	36
Total	9.4	0.8	3.2	1.7	833	5.2	39.7	6.5	113	0.0	1.7	77

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended May 18, 1946.—During the week ended May 18, 1946, 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		14		136	322	28	23	29	105	657
Diphtheria		5	3	15	13	3			1	40
Dysentery, bacillary									1	1
Encephalitis, infectious								1		1
German measles		2		40	34			6	4	86
Influenza		4			7	1				12
Measles		101	7	597	942	42	102	165	25	1,981
Meningitis, meningococcus			1	1	2			1		5
Mumps			1	47	661	67	20	48	233	1,077
Poliomyelitis		1								1
Scarlet fever		7	11	56	75	4	4	11	8	176
Tuberculosis (all forms)		8	1	179	80	10	8	6	90	382
Typhoid and paratyphoid fever				1			1			2
Undulant fever			1	2	2			1		6
Venereal diseases:										
Gonorrhea		25	15	98	134	38	37	69	82	498
Syphilis	1	24	9	70	94	13	14	17	65	307
Whooping cough		1		51	60	9		9		130

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-mentioned diseases, except yellow fever, during recent months. 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 in each month.

Cholera

India.—According to a report dated June 7, 1946, cholera is said to be epidemic in Bengal, Bihar, and the United Provinces, India. In one week 1,300 deaths from cholera were reported in Bengal, 2,400 deaths in Bihar, and 1,700 deaths in the United Provinces.

Plague

Egypt.—For the week ended June 1, 1946, 4 cases of plague were reported in Alexandria and 5 cases were reported in Suez, Egypt.

Great Britain—Malta.—For the week ended June 8, 1946, a case of plague was reported in Malta, the first reported case since the week ended March 2, 1946.

Peru—Lima Department.—For the month of April 1946, 1 case of plague was reported in Monte Culebra Farm, Carabayllo Valley, Lima Department, Peru.

Smallpox

Morocco (French).—For the period May 21–31, 1946, 61 cases of smallpox were reported in French Morocco.

Typhus Fever

Bulgaria.—For the week ended May 18, 1946, 50 cases of typhus fever were reported in Bulgaria.

Morocco (French).—For the period May 21–31, 1946, 238 cases of typhus fever were reported in French Morocco.

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DEATHS DURING WEEK ENDED JUNE 8, 1946

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

	Week ended June 8, 1946	Corresponding week, 1945
Data for 92 large cities of the United States:		
Total deaths	9,146	8,843
Average for 3 prior years	8,780	
Total deaths, first 23 weeks of year	221,544	215,585
Deaths under 1 year of age	648	574
Average for 3 prior years	606	
Deaths under 1 year of age, first 23 weeks of year	14,063	14,122
Data from industrial insurance companies:		
Policies in force	67,206,152	67,360,606
Number of death claims	12,454	13,256
Death claims per 1,000 policies in force, annual rate	9.7	10.3
Death claims per 1,000 policies, first 23 weeks of year, annual rate	10.4	10.9