Public Health Reports

Vol. 61 JUNE 7, 1946 *No. 23* *

Printed With the Approval of the Bureau of the Budget as Required by Rule 42 of the Joint Committee on Printing

EDITORIAL [1]

BCG VACCINATION AGAINST TUBERCULOSIS

The results of BCG [2] vaccination reported in international medical literature have not been uniformly satisfactory, nor have they gained wide acceptance. Furthermore, there has been considerable variation in methods of application and in the population groups served. Careful review of the voluminous literature on the subject since the initial work of Calmette and Guerin in Paris in 1920 fails to reveal irrefutable evidence of the vaccine's effectiveness. Several of the studies in the Scandinavian countries and in South America suggest a relationship between vaccination and decreased incidence of the disease among children over a short period of time. Analysis of these researches, however, shows no valid statistical proof of long-time benefits.

Briefly, the advocates of BCG vaccination have formulated their rationale in this fashion: the virulence of bovine tuberculosis bacilli is first reduced by special cultural procedures; then the vaccine is introduced into tuberculin-negative infants and children. The introduction of these attenuated organisms initiates a benign and self-limiting infectious process which rather rapidly produces a variable degree of resistance against virulent strains of bovine and human tubercle bacilli.

The opponents of BCG vaccination emphasize the dangers of such deliberate imposition of infection, no matter how benign, and insist that only infected persons get tuberculosis and, furthermore, that this induced infection does not give significant immunity. Indeed, this group asserts that persons who have been infected early in life are those who die from tuberculosis later in life.

Up to the present, the use of BCG has been limited in its application mostly to persons in areas of high tuberculosis mortality. The inadequacy or the complete absence of isolation facilities and other

* This is the fourth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear the first week of each month. The series began with the Mar. 1, 1946, issue

[1] From the Office of the Chief, Tuberculosis Control Division.

[2] Bacillus of Calmette and Guerin.

control measures in such places made it imperative that persons who were constantly subject to massive exposure to tuberculosis should have some means of protection. In the United States, however, the relative availability of sanatoria in many areas has minimized the need for an immunizing campaign, and epidemiological studies, particularly analyses by such scholars of public health as Wade Hampton Frost, raised pertinent questions as to the permanent value of vaccination against tuberculosis. These studies showed that cohorts of such high mortality years as 1880, 1890, 1900, and 1910 made up the highest point of the statistical curve of tuberculosis deaths in 1930. In other words, those persons who apparently had the greatest exposure and, by implication, the highest infection rate in their early years, and yet survived, came to death from tuberculosis in middle age. It is recognized, however, that the intensity and amount of this internal infection with virulent tubercle bacilli may well have been greater than the artificial and measured inoculation with attenuated organisms used in BCG vaccination. The total effect of the vaccine on tuberculosis must await the day when a reduction in morbidity and mortality can be precisely measured.

The first article in this issue presents statistical evidence of the efficacy of BCG for the first 6 years of vaccination among American Indians, and implies at least that vaccination might be useful among other infected groups especially where there is little chance of isolation. These groups would include nurses and other young employees in general hospitals and sanatoria where exposure is great and standards of care may not always permit protection.

Although we are looking to chemotherapy for striking results in the future, it appears from the present study that the use of BCG vaccination should be seriously considered for limited protection of heavily exposed groups. Such practice should not interfere with or delay the search for a drug or antibiotic which will be effective against tuberculosis. When such a discovery is made, the synergistic effect of a practicable vaccine and a potent antibiotic could be explored, for the ultimate benefit of the innumerable contacts of the tuberculous population.

EXPERIENCE WITH BCG VACCINE IN THE CONTROL OF TUBERCULOSIS AMONG NORTH AMERICAN INDIANS

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By 1935 the combined evidence from world-wide studies indicated that BCG [3] vaccine might be an effective preventive against tuberculosis, and consideration was given to utilizing it to reduce the high

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[2] From the Field Studies Section, Tuberculosis Control Division, U. S. Public Health Service.

[3] Bacillus of Calmette and Guerin.

incidence of the disease among North American Indians. However, since there was uncertainty at that time about the validity of many of the reports on the subject, it was decided to conduct first a controlled study of the value of the vaccine rather than an uncontrolled broad-scale program of vaccination.

A preliminary summary of the results of the first 3 years of the study has been reported in a previous paper.[4] The present report is based on observations made during 3 additional years. Differences in the morbidity from tuberculosis between the preliminary report and the present one are accounted for by changes made as a result of subsequent examinations and, to some extent, by changes in definitions and interpretations.

Design of the Study

Briefly, the general plan of the study first involved the selection of a group of Indian children and young adults, living on different reservations and communities in various parts of the United States and Alaska, who were free from tuberculosis as indicated by their failure to react, definitely, to a maximum dose (0.005 mg.) of a standardized tuberculin PPD. Second, a random portion of the negative reactors was vaccinated intracutaneously with freshly prepared BCG vaccine, while the remainder served as controls. Systematic annual follow-up of the two groups by means of X-ray films of the chests, tuberculin tests, and histories of exposure to tuberculosis, was then instituted to determine the effectiveness of the BCG vaccine in preventing the development of tuberculosis. An outline of the name and location of the reservation, date of tuberculin testing, vaccination, times of annual re-examination, year last examined, and years of observation is presented in table 1.

The present report is based on a study of 3,007 Indian persons ranging in age from 1 to 20 years, inclusive. One thousand five hundred and fifty of these persons were vaccinated with a single dose of either 0.1 or 0.15 mg. of one of 13 different, freshly prepared lots of BCG vaccine. The remaining 1,457 were injected with 0.1 cc. of sterile physiological salt solution. No change in the living conditions of the persons in the study, including exposure to tuberculosis, was made either at the beginning or during the study.

The study was conducted on 4 widely scattered reservations in the United States and in 12 communities of southeastern Alaska. The field study was initiated in December 1935, and it was not until February 1938 that the initial tuberculin tests to select the study group and the vaccinations were completed. The interval from the time of the initial tuberculin tests to the time of injection of the vaccine or

[4] Townsend, J. G.; Aronson, Joseph D.; Saylor, Robert; and Parr, Erma I.: Tuberculosis control among North American Indians. Am. Rev. Tuberc., 45:41-52 (1942).

TABLE 1.—*Outline of field work and time schedule of BCG study, by reservation.*

Reservation [1]	Time of—			Year last observed	Number of years covered
	Initial tuberculin	Vaccination	Yearly visit		
Pima, Ariz.:					
Group A [2]	December 1935–February 1936.	February–March 1936.	March–May	1944	8
Group B	December 1936–January 1937.	February 1937	March–May	1944	7
Wind River, Wyo.:					
Shoshone	May–June 1936	June 1936	September–November.	1943	7
Arapaho	May–July 1936	July 1936	September–November.	1943	7
Turtle Mountain, N. Dak.:					
Chippewa	September 1936	October 1936	May–August	1944	8
Marty Mission	September 1937	October 1937	May–September	1944	7
Rosebud, S. Dak	September 1937	October 1937	September–October.	1943	6
Southeastern Alaska	September 1937–January 1938.	January–February 1938.	December–February.	1944 (February).	6

[1] The term "reservation" is used in a broad sense to cover the several types of Indian groups which are actually reservations, tribes, school, or geographic region, as the case may be.
[2] A and B are designations for groups started in succeeding years.

physiological salt solution averaged 6 weeks, with a maximum interval of 21 weeks.

With relatively few exceptions, an initial X-ray film of the chest was made sometime during the interval of time between the initial tuberculin test and the vaccination or saline injection, or as soon thereafter as practicable. Four persons, three vaccinated and one control, were excluded from the study, since roentgenologically demonstrable, pulmonary lesions that suggested tuberculosis were noted in films that had been made between the time of the original negative tuberculin reaction and the time of the injection of the BCG vaccine. Despite the presence of the pulmonary lesions, those persons who were injected with the vaccine failed to show a Koch phenomenon. The decision to exclude these four persons was made, because it was intended that only persons free of tuberculosis at the beginning of the study be included, and because the same criterion for exclusion was applicable to members of both the BCG and control groups. There were two additional persons among the BCG vaccinated group who gave indication of tuberculous infection at the start of the program. This indication was a Koch phenomenon 48 hours after vaccination. One of these persons died of tuberculous meningitis less than 3 months later. Some consideration was given to eliminating these persons from the study, but since there was no similar method of detecting tuberculosis in the control group, they were not excluded.

The sites of the intracutaneous injection of both the vaccine and the physiological salt solution were examined 48 hours following the injection in order to observe the character of the local inflammatory reaction and to discover the occurrence of a Koch phenomenon. Subse-

quent observations were made over a period of several weeks in order to collect data on the character of the inflammatory reaction, ulceration, involvement of the regional axillary nodes and to note the occurrence of subjective symptoms. The variation in the character of the local inflammatory reaction and ulceration following the intracutaneous injection of BCG vaccine has been reported previously.[5] In no instance, however, was surgical intervention necessary in the treatment of the local ulcer; regional nodes did not ulcerate; nor did any of the vaccinated persons develop significant subjective symptoms.

Re-examination of the BCG vaccinated and control groups was made at approximately annual intervals by the members of the Tuberculosis Control Unit, assisted by the local Indian Service field nurses. Excellent cooperation was obtained on the reservations through meetings with members of the Tribal Council and with parents in their local Parent-Teacher groups. The importance of re-examination was emphasized and, in consequence, a high percent of those included in the study were re-examined year after year. World War II, however, made it impractical to follow many of the persons who had either entered the armed forces or had moved to centers of war industry. For this reason and because of the shortage of trained personnel, the annual re-examination was temporarily discontinued in September 1944. At that time six annual examinations had been made on all reservations and communities while seven or eight re-examinations had been completed in others.

At the time of the annual examination, which usually was conducted at the local school, the persons in the study were retested with 0.00002 mg. of PPD. Those who failed to react to this dose were reinjected 48 hours later with 0.005 mg. of the same preparation of PPD. At the same time a roentgenological examination of the chest was made by means of a mobile X-ray unit which was part of the equipment of the Control Unit. The films which were developed at each reservation or community were interpreted by the radiologist of the Tuberculosis Control Unit. No film was identified in any manner as being from a vaccinated or control person. The results of the roentgenological examination and the tuberculin test were entered on the individual record card from which compilations were made. In the interval between the annual examinations, the field nurse maintained a record of the occurrence of any intercurrent disease as well as a record of known exposure to tuberculosis.

In 1945, Dr. H. B. Zwerling, radiologist of the Field Studies Section of the Tuberculosis Control Division of the United States Public Health Service, who had not been associated, in any capacity, with the study, reviewed each set of serial films without reference to the tuberculin test or clinical record, and without knowledge of whether

[5] Aronson, Joseph; Parr, Erma I.; and Saylor, Robert M.: BCG vaccine, its preparation and the local reaction to its injection. Am. Rev. Tuberc., 42: 651-666 (1940).

the subject was in the BCG or control group. The method of combining the results of Dr. Zwerling's readings with the field interpretations is described below.

Methodology

Adequacy of Samples

The validity of any conclusions which may be drawn from the study is obviously dependent on the comparability of the vaccinated and control groups. It is, of course, not possible to be certain that no bias was, unintentionally, introduced. Nevertheless, some tests of the material for factors known to be pertinent to the study may be made. The factors considered are age, the percent re-examined annually, and degree of exposure to tuberculosis.

In table 2 and figure 1 it may be seen that the age distribution of the children in the BCG group is essentially the same as that of the control group.

TABLE 2.—*Age distribution of persons in the BCG study (attained age at beginning of study)*

Age (in years)	Number		Percentage		Age (in years)	Number		Percentage	
	BCG	Control	BCG	Control		BCG	Control	BCG	Control
Under 1	104	107	6.7	7.3	11	89	85	5.7	5.8
1	82	93	5.3	6.4	12	78	79	5.0	5.4
2	89	75	5.7	5.1	13	65	57	4.2	3.9
3	87	71	5.6	4.9	14	43	33	2.8	2.3
4	71	68	4.6	4.7	15	32	32	2.1	2.2
5	100	93	6.5	6.4	16	22	20	1.4	1.4
6	157	137	10.1	9.4	17	7	10	.5	.7
7	153	139	9.9	9.5	18	9	3	.6	.2
8	139	129	9.0	8.9	19	2	3	.1	.2
9	111	125	7.2	8.6	20		1		.1
10	110	97	7.1	6.7	Total	1,550	1,457	100.0	100.0

The percentage of persons tuberculin tested during the 6 years of the program is shown in tables 3 and 4. These tables indicate the degree of completeness of follow-up in two ways: (1) Table 3 gives the percentage of children actually tuberculin tested each year; (2) table 4 shows the percentage of living children who are known to have been in the study each year. Table 3 somewhat understates the degree of completeness of the follow-up, since there was a number of persons who were missed in one year but who were re-tested in subsequent years. Table 4 takes this factor into account, and also eliminates the factor of deaths which contributes to the smaller percentages in table 3.

The degree of completeness of the follow-up was essentially the same in the control and vaccinated groups, as may be judged from the almost identical percentages shown in both the tables. Furthermore, it may be noted that at least until the sixth year of the program, substantially more than 90 percent of the original study group was

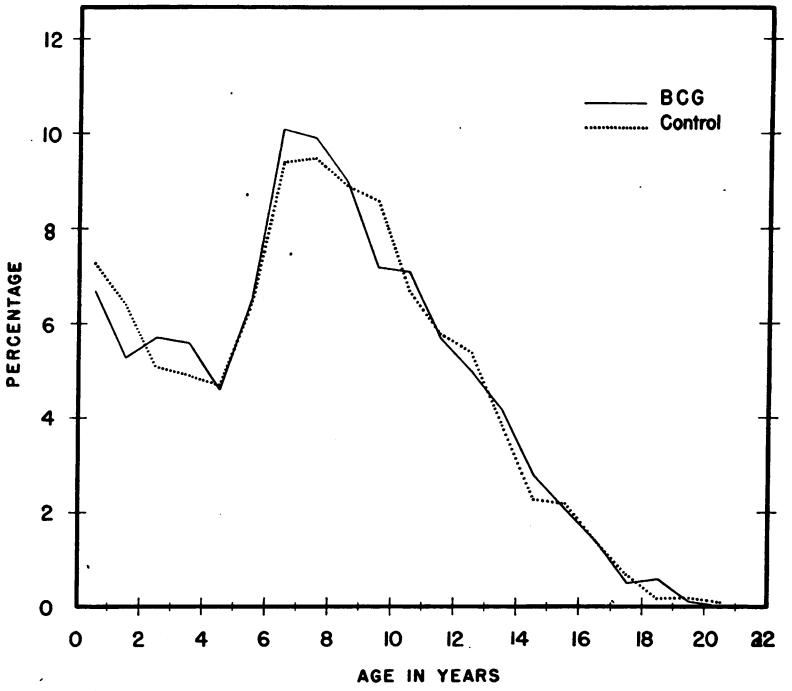

FIGURE 1.—Age distribution of persons at beginning of study, for BCG and control groups.

TABLE 3.—*Percentage of all persons in BCG study, tuberculin tested, by years from beginning of study*

Group	Year					
	1	2	3	4	5	6
BCG	94.5	92.4	93.2	92.5	88.2	77.5
Control	89.9	92.2	93.5	90.7	86.6	74.3

TABLE 4.—*Percentage of living persons remaining in the study each year* [1]

Group	Year					
	1	2	3	4	5	6
BCG	99.4	98.8	98.3	97.4	93.4	83.4
Control	99.0	99.4	98.2	96.1	92.4	82.5

[1] The percentage given is 100 minus the percentage of living persons permanently missing from the study.

still under observation. The decrease in the sixth year, to about 83 percent, is attributable to factors related to the war.

The validity of the conclusions, with respect to the effectiveness of the vaccine, depends not only on the design of the program and on the methods of analysis but also on whether the members of the vaccinated group experienced the same degree of exposure to tuberculosis as

those in the control group. The history of contact of each member of the program with tuberculous persons during the period of the study was evaluated in terms of degree of intimacy of contact and the type of case. Intimacy varied from sleeping in the same room regularly with a person who has infectious tuberculosis to visiting occasionally in the house of a person with the disease. Type of case varied from a sputum-positive to a probable or arrested case of tuberculosis. These factors were combined to assign a rating (1+, 2+, or 3+) to each individual having exposure or contact. The highest rating, 3+, was limited to "very intimate contact with a sputum-positive case." The standards for classification of each individual as to degree of exposure were admittedly arbitrary. However, the important fact is that the ratings were made without knowledge of whether the individual had been vaccinated.

Table 5 reveals the fact that the members of the vaccinated and control groups were exposed to tuberculous infection to essentially the same extent. Approximately 20 percent of the personnel of both groups were exposed, and the distribution as to degree was very similar. This may be observed by comparing the percentages of persons who had 3+, 2+, and 1+ degrees of exposures. Furthermore, the figures for each reservation show excellent correspondence between the total exposed in the BCG group versus the total exposed in the control group. There is even a remarkable similarity between the distribution as to degree of contact at each reservation. The conclusion, therefore, is that the factor of exposure to tuberculosis probably produced no bias in the outcome of the study of the value of the vaccine.

Ordinarily one method of estimating whether the control group is adequate would be in terms of its total mortality experience in relation to that of the general population from which the control group was

TABLE 5.—*Number of persons in BCG study and percentage having different degrees of exposure to tuberculosis, by reservation*

Reservation	BCG group					Control group				
	Number persons in study	Percentage				Number persons in study	Percentage			
		Total exposed	Degree of exposure [1]				Total exposed	Degree of exposure [1]		
			3+	2+	1+			3+	2+	1+
Pima A	259	10.8	5.4	3.5	1.9	263	9.5	4.9	3.4	1.1
Pima B	95	10.5	4.2	3.2	3.2	86	8.1	3.4	4.7	----
Shoshone	110	22.7	12.7	7.3	2.7	85	17.6	3.5	10.6	3.5
Arapaho	118	31.4	2.5	23.7	5.1	106	22.6	3.8	13.2	5.7
Chippewa	170	22.9	2.9	13.5	6.5	162	24.1	3.1	12.3	8.6
Marty	41	19.5	2.4	12.2	4.9	25	16.0	4.0	8.0	4.0
Rosebud	260	16.2	4.6	6.2	5.4	266	16.5	4.1	5.3	7.1
Alaska	497	28.8	3.0	18.3	7.4	464	28.2	4.1	15.9	8.2
Total	1,550	21.4	4.4	11.8	5.2	1,457	19.8	4.0	10.0	5.8

[1] 3+ indicates the greatest degree of exposure.

selected. This, however, could not be accomplished in this study, because of the known inadequacies of the reporting of vital statistics for the Indian population. When dealing with a group where reporting is poor, the death rates obtained by intensive follow-up are expected to exceed those obtained from routine vital statistics reports.

Method of Analysis

In the main, the object of a study on BCG is to determine whether or not the immunized individual is protected from tuberculosis. Faced with this objective, the investigator must define what is to be meant by the term "tuberculosis." Depending on the point of view, tuberculosis may include such a mild manifestation of infection as a positive tuberculin reaction alone or extensive local or generalized disease accompanied by demonstrable, virulent organisms. Further, evidence provided in any given study is limited by the extent and type of observations made. If the material consists of complete and frequent clinical observations, extensive laboratory investigations, as well as frequent skin tests and frequently repeated radiological examinations, it would be possible to analyze the material in such a way as to evaluate the effectiveness of the vaccine according to different definitions of tuberculosis. In the present study such complete data are not available. Principally, the information for analysis consists of annual observations on the tuberculin reaction and annual X-ray films of the chest, with only limited clinical and laboratory data.

Aside from a comparison of the vaccinated and control groups with respect to deaths from tuberculosis and cases of extrapulmonary tuberculosis, the evaluation which may be made from the present study must be directed to the effectiveness of BCG in preventing pulmonary lesions characteristic of tuberculosis that appear on serial X-ray films. These "cases" can be subdivided into several categories according to the extent and character of X-ray findings.

The frequency of "cases" so selected may, for comparative purposes, be considered an index of the true incidence of tuberculosis. The use of such an index is not a serious limitation, for it may be assumed that a large majority of actual cases of tuberculosis, by any criteria, will be found among those in this selected group of cases. Furthermore, since there are no reasons for believing that similar considerations are not applicable to both the BCG and control groups, the comparisons of the two groups based on this index should be valid.

In view of the above considerations, the effectiveness of vaccination is determined by comparing the two groups, from which the cases were selected, in terms of the following categories:

1. Total deaths.
2. Deaths due to tuberculosis.
3. Extrapulmonary tuberculosis.
4. Moderately and far-advanced pulmonary.

5. Minimal.
6. Enlarged hilar glands:
   (*a*) With parenchymal lesions.
   (*b*) Without parenchymal lesions.
7. Pleural effusion.

Procedure of X-ray Interpretation

The first step in the identification of cases consisted of a review of all chest films on each individual. Such films as revealed parenchymal lesions characteristic of tuberculosis, or enlargements of hilar lymph nodes, were selected for further review. The second step was to compare these interpretations with those made annually in the field during the course of the study, retaining for further review only cases in which suspicious shadows were observed in both readings. On some of these cases, clinical and laboratory data were available to establish a diagnosis of tuberculosis. For the remaining group of cases, the data on the tuberculin reaction were used to confirm the X-ray findings.

It was arbitrarily required for the cases in this study that the tuberculin reaction be positive to the first dose (0.00002 mg.) at the time of the positive X-ray film. Exception to this rule was made in a relatively small number of cases where the tuberculin reaction became positive to the first dose in the year following the first positive X-ray film (providing the X-ray evidence was not of pleural effusion alone).

For cases classified as pleural effusion it was required not only that the tuberculin reaction be positive to the first dose in the year of the indicated involvement, but also that it must not have been positive longer than a year.

It is recognized that the significance of the tuberculin reaction is different for the control than for the BCG group. Details of the differences between the control and vaccinated groups, with respect to changes in the tuberculin reactions were published in a previous paper.[6] In general, the tuberculin reaction becomes positive after vaccination. Approximately 37 percent of the persons in the BCG group reacted to the first dose and 56 percent to the second dose 1 year after vaccination. Among persons in the control group, however, only 7 percent reacted to the first and 5 percent to the second dose at the end of the first year of the program. In using the tuberculin reaction as a criterion in the diagnosis of a case the conservative view is being taken. In other words, because there are more reactors to the first dose of tuberculin among the vaccinated group than among the control group, more nontuberculous individuals would be called cases among the BCG than among the controls on the basis of the tuberculin criterion.

[6] Aronson, J. D.; Parr, E. I.; Saylor, R. M.: The specificity and sensitivity of the tuberculin reaction following vaccination with BCG. Am. J. Hyg., 33; 42-49 (March 1941).

Results

Total Mortality

The most striking comparison that can be made between the BCG and control groups, and the one least subject to diagnostic variation, is that between the total number of deaths in the two groups. Among the controls there were 60 deaths from all causes during the 6-year period as compared with only 34 in the BCG group. This comparison becomes even more significant when the populations of the two groups are considered. There were, as was noted previously, only 1,457 members in the control group while those in the BCG numbered 1,550. The former contributed 8,367 person-years of experience, while the latter contributed 8,977. In terms of deaths per 1,000 person-years of experience the death rate in the BCG group was 3.8 while that for the control group was 7.2. This comparison assumes that there was no difference in the members of the BCG and control groups, with respect to their inherent vitality. As far as is known, the method of selection of the two groups should have precluded any such differences.

It should be noted that such favorable results could not be expected in populations where the tuberculosis mortality rate is relatively low. The reason for the very favorable results in terms of the mortality shown above can be explained only because the tuberculosis mortality rate among the Indians is very high and deaths from tuberculosis in these ages compose a very large proportion of deaths from all causes.

Tuberculosis Mortality

Actually, the difference in the number of deaths attributed to tuberculosis in the 2 groups was not quite so large as the difference in total deaths. The reason for this may be that in the control group some of the deaths which were assigned to nontuberculous causes may actually have been a consequence of tuberculosis. Whether this be true or not, comparison between the BCG and control groups in the deaths which were attributed to tuberculosis is sufficiently striking. Among the members of the control group there were 28 deaths from tuberculosis,[7] while among the members of the vaccinated group there were only 4 such deaths. All 4 of the deaths in the BCG group occurred in cases which had their onset during the first 2 years of the study, while the 28 deaths in the control group were distributed fairly evenly among cases developing throughout the whole 6-year period.

Morbidity

General considerations.—In presenting the analysis of morbidity between BCG and control groups, it is desirable to give separate comparison for the different classes of cases that can be distinguished,

[7] Three of these deaths occurred after the 6-year period of study, although onset of the disease was within the period. No such deaths occurred after the study period in the vaccinated group.

principally, on the basis of roentgenographic evidence. Table 6 gives the results of such a comparison between the vaccinated and control groups.

TABLE 6.—*Distribution of cases and deaths from tuberculosis according to type of case at time first observed and at most severe stage observed*

Type of case [1]	Cases [2]				Tuberculosis deaths			
	At time first observed		At most severe stage observed		By type of case as first observed		By type of case at most severe stage observed	
	BCG	Control	BCG	Control	BCG	Control	BCG	Control
Enlarged hilar glands	21	122	19	99	3	14		
With a parenchymal lesion	13	92	11	74		13		
Without a parenchymal lesion	8	30	8	25		1		
Minimal	10	29	8	20		4		
Advance [3]	1	2	6	29		1	2	12
Extrapulmonary [4]	2	8	3	19	1	8	2	16
Pleural effusion	6	24	4	18		1		
Total	40	185	40	185	4	28	4	28

[1] Type as determined by X-ray diagnosis, except for extrapulmonary cases.
[2] Includes deaths from tuberculosis.
[3] Includes moderately and far advanced cases.
[4] Includes intestinal, military, osseous, meningeal tuberculosis, and tuberculous cervical adenitis.

During the 6-year period of observation many of the cases did not remain in the same category throughout the time during which they were followed. Table 6 shows, therefore, the distribution of both cases and deaths in two ways: (1) The type of case at the time first observed, and (2) the most severe or advanced stage of the disease that was observed during the period of the study. The following comparisons will be based on the latter.

Of the moderately and the far-advanced pulmonary and the extrapulmonary cases, there was a total of 48 in the control compared with 9 in the BCG group. Excluding deaths which occurred among those in this classification of cases, 20 were in the control and 5 in the vaccinated group, giving a ratio of 4:1, in favor of the BCG group. In the minimal group there were 20 cases in the control and 8 in the BCG group. For pleural effusion, the respective numbers were 18 and 4. For cases in which the X-ray evidence was that of enlarged hilar glands, there were 99 in the control and 19 among the BCG; among those with parenchymal lesions the numbers were 74 and 11; and among those without parenchymal lesions comparable figures were 25 and 8 respectively.

Total incidence.—Since the comparisons shown above indicate that the benefit to the BCG group was not confined either to tuberculosis deaths or to any special diagnostic category, it is considered justifiable to present the analysis which follows in terms of total incidence of cases. This includes cases and all deaths from the disease.

The total number of cases, as defined in this way, was 185 in the control group and 40 in the BCG group. Expressed in terms of 1,000

person-years of life, the total incidence was 24.3 in the control and 4.7 in the vaccinated group. The rate for the controls was, therefore, 5.2 times that of the vaccinated.

It may be well at this point to note that the use of the supplemental data on the tuberculin reaction in defining a case had relatively little effect on the comparisons presented above. If a positive reaction to the first dose of tuberculin were not made a prerequisite, and the classification made on the appearance of the shadows on the X-ray films alone, there would have been 26 additional cases—13 in each group, of which 9 in the BCG group and 10 in the control group were pleurisy cases. On this basis the comparison of total incidence between the BCG and control groups would have been that of 53 against 198, instead of 40 against 185 where the tuberculin criterion is used.

Total incidence by years from vaccination.—In addition to the general findings that vaccination is associated with a reduction in the incidence, it is of considerable importance to review the data with respect to the time interval from vaccination to onset of disease. For example, it becomes important to determine whether or not the protection afforded by vaccination changes with time. Information bearing on this subject is provided in tables 7 and 8, and figure 2.

Table 7 presents, by year after vaccination, the number of new cases observed at the time of the annual examinations.

TABLE 7.—*Number of cases and deaths, by years from the beginning of BCG study to time of first observation of case*

Years	Cases [1]		Deaths [2]	
	BCG	Control	BCG	Control
1	18	37	2	6
2	9	32	2	7
3	3	31		5
4	6	33		6
5	3	26		2
6	1	26		2
Total	40	185	4	28

[1] Includes deaths.
[2] By year of first observation of case.

Even a casual review of the number of cases developing each year reveals that there has been certainly no reduction in the protection afforded by vaccination during the 6-year period of observation. About half as many cases (18:37) developed in the BCG group as in the control group during the first year. During the second year, the ratio improved to approximately one-quarter (9:32), and for the last year the ratio declined to 1:26.

A more precise analysis of the incidence of tuberculosis by years from vaccination is shown in table 8. The data given there compensates for the difference in the number of persons in the BCG and

TABLE 8.—*Life table experience: Determination of annual incidence of cases (by years from beginning of BCG study)*

Year	Number					Average number at risk	Attack rate per 1,000 person-years
	Lost by death or other reason	Remaining in study at end of year	Previously [1] counted as case	In study at end of year, not case at beginning of year	New cases		
	BCG group (1,550)						
1	20	1,530	0	1,530	18	1,521	11.8
2	14	1,516	17	1,499	9	1,494	6.0
3	16	1,500	24	1,476	3	1,474	2.0
4	19	1,481	25	1,456	6	1,453	4.1
5	63	1,418	30	1,388	3	1,386	2.2
6	153	1,265	25	1,240	1	1,240	.8
	Control group (1,457)						
1	20	1,437	0	1,437	37	1,418	26.1
2	10	1,427	35	1,392	32	1,376	23.3
3	22	1,405	60	1,345	31	1,330	23.3
4	40	1,365	84	1,281	33	1,264	26.1
5	60	1,305	104	1,201	26	1,188	21.9
6	150	1,155	101	1,054	26	1,041	25.0

[1] Excludes previous cases which have dropped out of study.

control groups, 1,550 and 1,457, respectively, and also takes into account the reduction in the size of both groups through the years. This is accomplished by presenting attack rates, that is, the number of new cases developing within a given year, per 1,000 persons exposed to risk during that year. This latter figure is obtained by conventional methods by eliminating the experience of all persons who have been lost from the study,[8] either because of death or other reasons, as well as those who became cases in previous years. The rationale back of the latter procedure is the fact that a person who has once become a case cannot be counted again as among those exposed to the risk of becoming attacked. For each of the years the number of persons exposed to risk is obtained by subtracting from the number of persons observed at the end of the year, one half of the number of the cases that developed during that year, on the theory that these cases have developed uniformly during the year.

The attack rates given in the last right-hand column of table 8 are shown graphically in figure 2. It may be noted that among the controls cases appeared at a nearly constant rate of around 24 per 1,000, each year of the program. By contrast with this uniform attack rate for the controls, the members of the BCG group experienced progressively lower rates of attack in successive years after vaccination. The highest attack rate in the BCG group was during the first year after vaccination (11.8 cases per 1,000); during the sixth year the rate

[8] The experience of persons who drop out of the study during a given year was eliminated in computing the average number at risk for that year since there is no prior assurance that cases which may have developed during the year in that group were more likely to have remained in the study than those who did not.

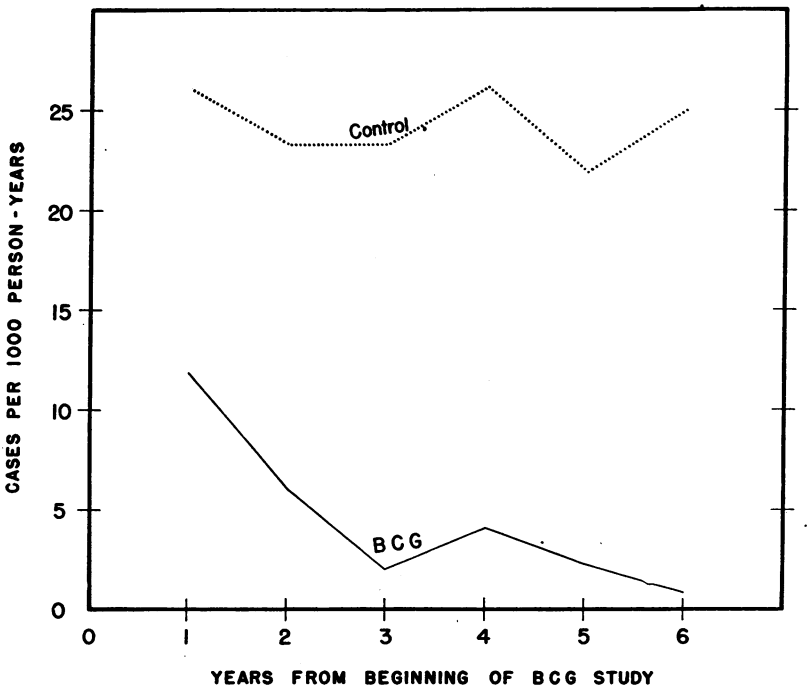

FIGURE 2.—Number of cases per 1,000 persons-years, by years from beginning of study, for BCG and control groups.

was reduced to less than 1 per 1,000. It should be noted, however, that even during the first year the attack rate for the BCG group was less than half that for the control group.

The downward trend of attack rates for the BCG group is probably slightly exaggerated in that the rate for the first year exceeds the true rate. An excess of first-year cases over the number in succeeding years in both BCG and control groups might arise from including persons having tuberculosis with onset before the beginning of the study, despite efforts to eliminate them. Further, an additional small number of cases might have developed between the time of the initial tuberculin test and the time of vaccination, which averaged 6 weeks and extended in some instances to 21 weeks.

While extraneous factors might account for a certain proportion of cases in the first year after vaccination, there still remains a definite downward trend in the attack rate in the BCG group. Even discounting the experience in the first year, there was a reduction in the attack rate from 6 per 1,000 person-years of experience the second year to less than 1 per 1,000 in the sixth year. Although no direct evidence can be offered, it is possible that the protection afforded by vaccination increases with the passage of time.

Total incidence by age.—Table 9 presents the attack rates by age,

TABLE 9.—*Number of cases, person-years of exposure and attack rates, by attained age groups*

[Cases are grouped according to the age of the person when case was first observed]

Attained ages [1]	Cases	Person-years of exposure	Attack rates per 1,000 person-years
	BCG group		
1–5	9	1,222	7.4
6–10	19	3,176	6.0
11–15	9	3,105	2.9
16–20	3	984	3.0
21–25	0	81	
All ages	40	8,568	4.7
	Control group		
1–5	36	1,171	30.7
6–10	63	2,734	23.0
11–15	61	2,770	22.0
16–20	23	872	26.3
21–25	2	70	28.6
All ages	185	7,617	24.3

[1] Age at time of annual examination; average age during the year of observation was 6 months less.

in 5-year age groups—that is, the number of new cases developing among the persons of a given age group per 1,000 person-years observed in that age group. Person-years of observations are accumulated without respect to year in the program, according to conventional life table procedures.

It may be observed that for the control groups the attack rate shows relatively little change with age. By contrast, in the BCG group there is a more apparent downward trend of the rates with increasing age (fig. 3). The rate for the youngest age group was 7.4 per 1,000 person-years, while the rate for persons over 15 is less than half that value.

These findings, when considered in conjunction with those from the analysis by year since vaccination, suggest that the mechanism of protection afforded by BCG is associated with the age of the individual, the interval of time after vaccination, or both these factors. Sufficient data are not available for a more satisfactory evaluation of the independent operation of these factors.

Total incidence by reservation and vaccine lot.—An analysis of the incidence of cases by reservation is given in table 10 and figure 4. The distribution for the BCG group is further detailed by vaccine lot number. (Each lot was numbered in order of preparation and some lots were used at more than one reservation.)

Because of the relatively small number of persons at some of the reservations, the more precise analysis of incidence by life-table methods was not considered to be justified. For the purposes of

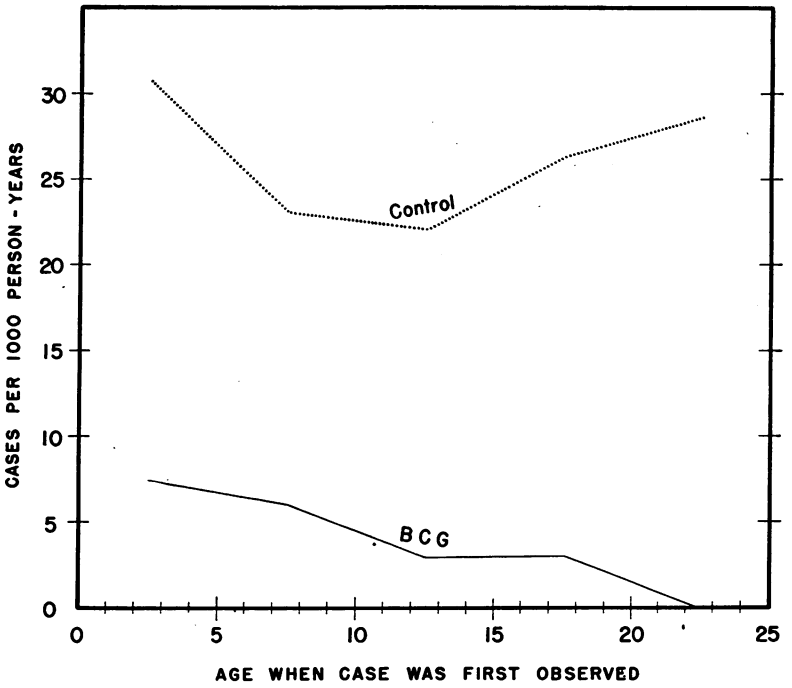

FIGURE 3.—Number of cases per 1,000 persons-years, by age at time case was first observed, for BCG and control groups.

TABLE 10.—*Number of persons in BCG study, number of cases and deaths, cases as percentage of number in study, and ratio of percentages, by reservation and vaccine lot number*

Reservation and lot number	Number						Cases as percentage of number in study		Ratio of percentages: BCG
	Persons in study		Cases [1]		Tuberculosis deaths				
	BCG	Control	BCG	Control	BCG	Control	BCG	Control	Control
Pima A	259	263	4	11	1	2	1.5	4.2	0.37
Lot 1	88		2		1		2.3		
Lot 2	171		2				1.2		
Shoshone	110	85		4		1		4.7	.00
Lot 3	98								
Lot 4	4								
Lot 5	8								
Arapaho	118	106	2	24	1	4	1.7	22.6	.07
Lot 3	3								
Lot 4	111		1		1		.9		
Lot 5	4		1				(2)		
Chippewa	170	162	2	13			1.2	8.0	.15
Lot 6	170		2				1.2		
Pima B	95	86	1	3		2	1.1	3.5	.32
Lot 7	95		1				1.1		
Rosebud	260	266	16	34	2	6	6.2	12.8	.48
Lot 8	126		11		2		8.7		
Lot 9	124		4				3.2		
Lot 10	10		1				(2)		
Marty	41	25		2		1		8.0	.00
Lot 9	41								
Alaska	497	464	15	94		12	3.0	20.3	.15
Lot 11	254		12				4.7		
Lot 12	28		1				3.6		
Lot 13	215		2				.9		
Total	1,550	1,457	40	185	4	28	2.6	12.7	.20

[1] Includes tuberculosis deaths.

[2] Percentages based on less than 25 persons not shown.

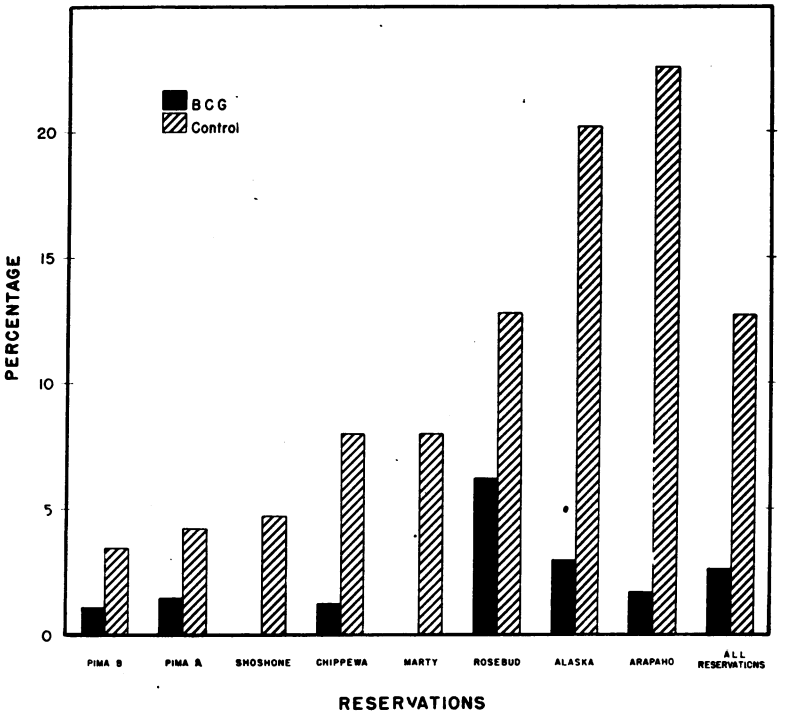

FIGURE 4.—Percentage of persons in study that became cases, by reservation, for BCG and control groups.

obtaining an indication of the effectiveness of the different lots of vaccine, it seemed sufficient to compare the cases as simple percentages of the number of persons enrolled in the program at the beginning of the study.

Since the incidence among the control group differed considerably in the different reservations (from a total incidence for the 6-year period of 3.5 percent for the Pima B series to 22.6 percent for the Arapaho tribe on the Wind River Reservation) it becomes necessary to consider the variations of the percentages for the vaccinated in conjunction with those of the controls. This is accomplished by showing, in the last column of table 10, the ratios of the percentages for the BCG groups to those for the controls.

From these ratios it appears that vaccination is associated with a substantial reduction in the incidence of cases at every reservation. The best results appear to have been obtained at the Wind River Reservation on the Shoshone and Arapaho Indians, with lots 3, 4, and 5. The incidence of cases in the BCG group at these two reservations was reduced to about 6 percent of that in the control group.

It will be noted from figure 4 and table 10 that the percentage of cases that developed among the BCG group at the Rosebud Reservation, where lots 8, 9, and 10 were used, was much higher than that at any other, while the incidence for the control group

is equal to the average for all reservations. The percentage for the vaccinated at Rosebud (6.2) is based on a large enough group (260) to be considered a significant deviation from the average (2.6 percent). Another way to describe the poor results is to say that the Rosebud personnel formed 17 to 18 percent of the total number of persons in the study and yielded 18 percent of the cases among the controls, but produced 40 percent of the cases among the vaccinated. These relatively poor results may be attributed, perhaps, to the fact that the three lots of vaccine used on this reservation were prepared from a slow-growing culture (on veal-potato media) in place of Sauton's media, and probably contained many dead organisms. Another fact of interest in this connection was the finding of slight local reactions following the injection of the vaccine, and the low degree of sensitivity to tuberculin shown by the Rosebud group 1 year later. Details relative to these latter facts are given in a previous paper (see footnote 5). The combined evidence indicated that it would have been appropriate to discard the Rosebud Reservation data as being nonrepresentative and noncomparable in the present study. The more conservative position was taken, however, and the experience for this reservation was included. Despite the substandard performance of the vaccine at Rosebud, its use had a marked effect on the incidence of cases which was only one-half as great in the vaccinated as in the control group.

Summary

The present paper gives the results of a study, begun in December 1935, on the effect of BCG vaccination on the incidence of tuberculosis among American Indians. The study group consisted of 3,007 persons, ages 1 to 20 years, who were selected from a larger group on the basis of a negative tuberculin reaction. BCG vaccine was given intracutaneously to 1,550 with 1,457 serving as controls. These persons were followed for 6 years with annual tuberculin tests and chest X-ray examinations.

Tests of the vaccinated and control groups as to age, amount of exposure to tuberculosis, and completeness of follow-up indicate that the two groups are comparable in these respects.

Results from the analysis of the records show that BCG vaccination is associated with marked protection against the development of tuberculosis as measured by mortality and morbidity experience of the two groups.

During the 6-year period, 60 deaths from all causes occurred among the 1,457 persons in the control group compared with 34 among 1,550 vaccinated. In terms of deaths per 1,000 person-years, the death rates were 7.2 and 3.8, respectively. There were 28 deaths assigned to tuberculosis among the controls as compared with only 4 such deaths among the BCG group.

Comparison of cases, as determined mainly from radiological evidence, supplemented by data from tuberculin tests, revealed similar wide differences between the two groups. Including those that died from tuberculosis, 48 cases were classified as having extrapulmonary tuberculosis or advanced pulmonary lesions among the controls while only 9 such cases were found among the vaccinated. There were 20 cases showing X-ray evidence of minimal lesions among the controls and 8 among the vaccinated. The corresponding figures for cases showing enlarged hilar glands were 99 and 19, respectively, and for pleural effusion 18 and 4, respectively.

The comparison for total incidence, cases of all types and deaths, is that of 185 among the controls and 40 in the vaccinated. In terms of cases per 1,000 person-years, the rates were 24.3 and 4.7, respectively.

There is no evidence from the analysis that a diminution of immunity occurred with the passage of time after vaccination. On the contrary, indications were that the protection may be greater in the later than in the earlier years after vaccination.

The total incidence of cases among the controls was nearly constant for all age groups, while among the vaccinated there was a marked decrease in incidence with advancing age. The evidence is suggestive, although not conclusive, that BCG vaccination may be more effective in the older than the younger children.

Some variation in the effectiveness of the different lots of vaccine was noted. Lots 8, 9, and 10 appeared to afford much less protection than the others used.

Acknowledgment

The study was initiated by Dr. J. G. Townsend, Director of Health of the Office of Indian Affairs, Department of the Interior, and was conducted cooperatively with the Henry Phipps Institute of the University of Pennsylvania, with the support of the Medical Research Committee of the National Tuberculosis Association. Dr. J. D. Aronson of the Phipps Institute was placed in charge of the study and was assisted by Dr. R. Saylor and Miss E. Parr of the Indian Service. The analysis of the data was made in cooperation with Dr. Aronson by the Field Studies Section of the Tuberculosis Control Division, United States Public Health Service, under the general direction of Dr. Carroll E. Palmer. A considerable part of the planning of the analysis and of the interpretation of the data was done by Dr. M. L. Furcolow. The preparation of the report has been the responsibility of Lawrence W. Shaw, assisted in great measure by Mrs. Teresa Roache who assembled the data for analysis and prepared the tables and figures. Valuable service was rendered by Mrs. J. D. Aronson, who worked with the field staff and assisted in the preparation of the material for analysis.

INDOLENT EARLY TUBERCULOSIS [1]

"Tuberculosis is said to be a disease without prognosis; and we are finding that this is no less true when the disease is diagnosed in its earliest stages than when it is overt. Nowadays its presence is being revealed 'accidently' by mass radiological surveys many months before any symptoms would have led to a clinical diagnosis, and quite a number of cases thus detected are showing a disappointing lack of response to all forms of treatment.

"A preclinically diagnosed patient will usually profess to feeling perfectly well, or—on maturer consideration, only slightly 'off colour,' for which other excellent excuses can be proffered. In addition to the ominous shadow, his erythrocyte-sedimentation rate is somewhat raised, and maybe his mean temperature also. So he is straightway put to bed, where in a few weeks he loses all traces of malaise, gains weight prodigiously, and feels fighting fit. His temperature and ESR return to normal limits and his x-ray appearances are little changed. But from time to time there is a small setback, sometimes unaccountable and sometimes occurring when after months of sameness the patient is allowed to do a little more for himself. He suffers a few hours' malaise, there is slight irregularity on his temperature chart, a slight rise in his ESR, and on his next film a fresh mottling in some zone hitherto translucent. It is noteworthy that at this stage excavation is rare, or at any rate can rarely be discerned radiologically. Sooner or later an artificial pneumothorax may be induced with encouraging immediate results, which however do not last, because a faint lesion appears in the opposite lung and causes another mild constitutional upset. Even with bilateral APs. the patient still seems to hang fire. Eventually in desperation he may be allowed to get up and start walking exercise. Paradoxically he improves in all respects for a few weeks, and then succumbs to another setback. This time it may be a small pool of fluid in one or other pleural space, which neither waxes nor wanes, and suggests a very indolent 'cold' pleurisy. This unsatisfactory lack of definite progress may persist for as long as two or three years, making all concerned with the case wish to Heaven it would Do Something. And then something does happen. A change of the patient's milieu will sometimes bring about a radical change in the tempo and quality of his disease reactions. In the old days a patient at this juncture might be transferred from Britain to the High Alps—or vice versa—and his new medical attendants would reap the kudos of having pulled him round the corner. More usually the change takes place mysteriously within the patient himself. Up to now he has been neither ill nor well, but increasingly disheartened. He now becomes really ill with full panoply of pyrexia, toxaemia, and abrupt loss of weight. On investigation he is found to have de-

[1] Editorial from The Lancet, 1: 821–822 (June 30, 1945) (London).

veloped some dramatic extension of his disease: perhaps excavation, perhaps a fulminating pleural effusion. Thereafter his clinical course is much more definite for better or for worse, and his response to treatment is more decisive. Moreover he is less disheartened.

"Investigation and comparison of experience in these indolent cases is called for. There are several lines of inquiry to be pursued. First, it will be generally agreed that this is not a new phenomenon. Reference to archives shows the occasional case in the past which was accidentally diagnosed in the preclinical stage and which failed to fulfill expectations of early resolution and dragged on and on. In the welter of more chronic cases these disappointing therapeutic failures were apt to slip from the memory. In this country war conditions do not seem to have appreciably altered the character of the disease, although the incidence of overt tuberculosis may be higher. These indolent early cases are obviously following much the same course they would be pursuing had they remained undetected. Some of them would never have come to light and would subsequently have shown calcified scars of old battles fought unsung. Others—and we have no means yet of knowing what proportion—would have proceeded to frank clinical disease. What then determines whether and when an indolent case will become 'energised'? In many so-called self-limiting diseases there is a rhythm in bodily response. Before the use of sulphonamides was customary, a case of lobar pneumonia could be relied on to become steadily worse until the crisis at the end of the week. Even now, when sulphonamides produce the expected clinical improvement within a few hours part of this rhythmical mechanism persists, for the ESR will still rise for the statutory seven days or so and will then commemorate a crisis on its own. If there is a comparable mechanism in pulmonary tuberculosis, the operative factor cannot be mere length of time but some quantitative measure of provocation; the phoney war drags on until a threshold is passed when the body tissues are provoked to rise and engage the invaders in major conflict. Thereafter it is the body-tissues which wage war. It is they that 'flare-up.' Looked at in this light, excavation appears to be a desperate attempt at scorched-earth policy, by which the invaders are ringed about with impervious granulation tissue and their habitat cut off from supplies. Bacilli are harmless in a cavity so long as the barriers hold. Cavities per se do not kill. One has only to survey the x-ray films of full-time workers at places like Preston Hall Colony to be reminded that health, happiness, and efficient citizenship are compatible with lungs resembling egg-crates. It is the unchecked Panzer-like infiltration of tissues that kills. A good brisk pleural effusion also often works wonders in rousing the bodily defences and proving the turning-point in laggard cases. When the pleurisy has resolved, the patient's progress is often much more decisive. This may be due partly to the purely mechanical restriction of the ipselateral

lung movement owing to the thickened pleura, but disease in the opposite lung will also improve and it is no rare finding that sputum manifestly coming from the opposite lung ceases to be TB-positive.

"Nevertheless the problem remains—Why is the bodily response in these early cases so indolent? Perhaps the answer lies elsewhere. It must not be forgotten that pulmonary tuberculosis appears to be one of the diseases (like rheumatism and peptic ulcer) which can be psychogenically determined. There exists, in fact, a striking resemblance between tuberculosis and the psychoneuroses. The onset in both often appears to follow hard on some severe emotional upset and the course seems to depend on the successful emotional reorientation of the patient. In both the prognosis is also influenced by any 'secondary gain' which the possession of a disabling illness may bring the patient; for the disease process of any patient who becomes well adjusted to invalidism is apt to run a chronic course and resist all attempts at unwelcome or untimely cure. Both tuberculosis and the psychoneuroses run protracted courses, and where the two conditions coexist in the same patient—as they often do—it is surely no flight of fancy to regard them as being the intimately linked outward expressions, in terms of bodily and mental illness, of a sickness at heart. The whole patient is sick in mind, body, and spirit. It is surely significant that in the early stages of both diseases the symptoms are overlooked or rationalised and ignored by the sufferer. He is 'off colour' but he will not admit it until some dramatic symptom—physical or mental—forces itself on his attention. During these early stages the trouble is present, the seeds of conflict are sown, an ordeal lies ahead, but the patient is not ready to fight the matter out. It is he that is indolent."

Excerpt From

REHABILITATING THE TUBERCULOUS

"Workers abroad who are specially interested in the practical application of rehabilitation measures—and all tuberculosis physicians should be—would do well to study intensively the techniques of rehabilitation before embarking on any grand ideal such as is implied in the Bill which is now law in Great Britain, for it is to be remembered that not only in the tuberculosis field but also in the realm of orthopaedics, blindness, deafness, and in other conditions there has been built up a vast experience of this subject over a period of many years in Great Britain, and this end, which has been achieved by the passage of the Disabled Persons Employment Bill, is merely the logical outcome of a vast amount of work which has been done mostly by voluntary organisations over a period of twenty-five years and more. In this coun-

[1] From Tuberculosis: A Symposium of Current Thought and Practice in Great Britain. United Nations Relief and Rehabilitation Administration, London. Pp. 29–30 (May 1945).

try we have learned some lessons which should be taken to heart by all. We know that progress is inevitably slow at first; that a start should be made at the bottom of the ladder and that the work should lead upwards and develop in the light of experience gained in the lower rungs. A key personnel has to be selected and used as a nucleus for the training of others. Schemes are better delayed until success is assured than to be launched with the possible risk of failure. The problem is, as I have said, essentially a clinical one and becomes even more so when the business direction and management is made easier by what amounts to Government intervention by supplying and guaranteeing markets for goods produced. No longer must we rely on diversional pursuits to amuse our patients. It is not for one moment suggested that amusement should not be provided or that recreational facilities should be denied to patients, but it is strongly advised that it is a waste of time and a thoroughly bad economic investment to have large numbers of patients spending valuable time, when the lesion in the chest is quiescent, in undertaking a variety of pastimes which are not related in any way to the major tasks in life which lie ahead. Facilities for workshops near towns are also envisaged in the Government scheme for rehabilitation as is also the opportunity for men and women who may be considered suitable to conduct small businesses on their own. Central direction is necessary and regionalisation is most desirable. Isolated independent schemes should be discouraged unless they are founded securely on the basic principles of successful experience and are prepared to co-operate in the national scheme as a whole * * *.

"We may say that rehabilitation in Great Britain during the war years has taken on a new lease of life. It is now being regarded as an integral part of treatment. There are many devices which may be adopted all with the same object in view—the restoration of the tuberculous patient to his normal working capacity, or to that degree of working capacity which is within the confines of the patient's physical limitations. Government assistance and subsidy and moral support are essential for the extension of any scheme on a national scale, and the economic repercussions on normal industry must be clearly recognised. Above all, the measures adopted in the rehabilitation of the tuberculous must be regarded in the light of clinical tests. That there will be failures as in all other medical and surgical procedures is without doubt, but there will also be a large proportion of brilliant successes. Our duty is to restore as many cases to normal working capacity as possible while they are still patients in the sanatorium, and for those who fail to reach the desired economic level it will be essential to provide sheltered industry in one form or another, whether this be in the sanatorium workshop, in the special centres near large towns (municipal workshops) or in the home. Such schemes for sheltered employment are for the open case in particular and they

fulfil the magnificent dual object of solving to some degree the economic plight of so many of our patients who are severely handicapped physically and of offering them that degree of voluntary segregation which is in itself a safeguard to the general population by reducing the total amount of massive infection in their midst.

"Successful rehabilitation does not show itself on a temperature and pulse chart. It is not capable of producing a radiographic image which can be compared with another, and it cannot in the nature of things be measured by a yardstick other than that of the well-being, contentment, happiness, and prolongation of life in our patients—a reward which more than compensates for the many difficulties which may lie in its successful application."

Excerpt From

CHEMOTHERAPY IN TUBERCULOSIS[1]

"In human tuberculosis the investigation of possible chemotherapeutic agents presents some peculiar difficulties. For example, in-vitro activity often bears little relationship to in-vivo activity; thus sulphathiazole was found by Ballon and Guernon to exert a pronounced inhibitory effect on the growth of human tubercle bacilli on solid media, but the same workers and others could demonstrate only a doubtful effect in tuberculous guinea pigs. Another difficulty is the difference between tuberculosis in laboratory animals and in man. Tuberculosis in the guinea pig is a relatively simple progressive disease with neither native nor acquired resistance apparently playing any part. Tuberculosis in man is often a most complex disease with a clinical and pathological picture very different from that in the guineapig. There may well be a fundamental difference in the permeability of the tubercle in man and in animals. Rich argues that the tubercle must be permeable to substances in solution, and quotes experimental evidence that foreign substances injected intravenously penetrate to the centre of the tubercle. Lewis and Menkin and Menkin, among others, used rabbits for this experimental work, but Tytler points out that in man the lesions are often largely necrotic and non-vascular compared with the relatively cellular and vascular lesions in animals. He suggests that it would be difficult for any chemical agent to penetrate and sterilise the necrotic lesions of man * * * .

"A substance * * * streptomycin, an antibiotic obtained from an actinomyces found in soil, was described by Schatz and Waksman as having a pronounced bacteriostatic and bactericidal action in vitro against a human strain of tubercle bacillus. With this substance Feldman and his colleagues have reported results in experi-

[1] From The Lancet, 1: 57–58 (Jan. 12, 1946). (London.)

mental tuberculosis in guinea pigs, which are strikingly better than any previously recorded with other drugs. The toxicity for guinea pigs is very low, so low that a cytotoxicity test showed approximately equal results with streptomycin and penicillin. Treatment of the infected guinea pigs was begun 48 days after infection and continued for 166 days. At the end of this time thirteen out of twenty-five treated guinea pigs showed no macroscopic or microscopic tuberculosis; in eight of these no tubercle bacilli were isolated either in culture or after inoculation. Sixteen out of twenty-four of the control untreated guinea pigs had died with extensive tuberculosis before the end of the experiment. A remarkable feature of the experiment was the result of tuberculin testing. Before treatment was started all the guinea pigs gave a positive reaction to tuberculin. When the experiment ended all the untreated controls still surviving remained tuberculin-positive, whereas nine of the treated animals had become tuberculin-negative. Feldman is rightly cautious about translating the experimental results into terms applicable to human tuberculosis. He again emphasises the difference between tuberculosis in man and in guinea pigs and deprecates any effort to predict what streptomycin may accomplish for human tuberculosis. 'Serious harm,' he says, may 'result to patients who refuse such proved remedies as sanatorium care and collapse therapy in the remote hope that a powerful chemotherapeutic remedy is imminent.'

"It is now clear that it is possible to exert a profound effect on experimental tuberculosis by chemotherapy. Whether the discovery of the effective chemotherapeutic agent for human tuberculosis comes soon or is long delayed, it is reasonable to believe that it will come. There may well be disappointments ahead—perhaps because of unexpected toxic effects arising from the long-continued administration of a potent drug in so chronic a disease as human tuberculosis. But considering the triumphs of the last few years it is hard to imagine that they will withstand an integrated attack by scientists and clinicians."

Excerpt From

TUBERCULOSIS IN SWEDEN AND THE FIGHT AGAINST IT IN RECENT YEARS [1]

"Since 1880 the tuberculosis mortality curve in Sweden has almost without interruption been on the decline, except for a sharp 'peak' during the First World War. During the Second World War a minor increase in tuberculosis mortality occurred in 1941 (from 0.71 to 0.74 0/00). In 1942 the curve again fell (to 0.68), in 1943 the mortality remained unchanged and in 1944 it declined to 0.65. Thus the

[1] Lundquist, John: Tubercle (London), 39–43 (March–April 1946).

crisis has caused a break in the fall of the mortality curve, but fortunately no major increase has set in. It is an interesting point that it was in the very year 1941 that the food supplies in Sweden were at their lowest, and a causal connexion between this fact and the rise in tuberculosis mortality seems not improbable.

"Despite the steady decline of the tuberculosis mortality in our country, tuberculosis still plays an important part as an endemic disease. It ranks as No. 4 amongst the causes of death, being surpassed only by cardiac and vascular diseases, tumours and senile diseases. In 1944 there were in Sweden nearly 4,250 deaths from tuberculosis. Whereas formerly most cases of death from tuberculosis were in young people, the trend has gradually shifted, so that the excessive mortality at the ages of 20–30 years has declined very considerably * * *. The mortality curve shows a decided tendency to shift toward the higher ages. The chief reason for this would appear to be that the period for primary infection now more frequently than before sets in at a higher age. Calmette vaccination in early youth may also have exercised some influence, though scarcely to any great extent, since prior to this period (1936–40) vaccination was carried out only on a somewhat limited scale. Formerly the towns of Sweden recorded a higher tuberculosis mortality than the country districts, but since about 1933 the mortality curve has been somewhat higher for the rural than for the urban population. In the major towns the tuberculosis mortality is far higher amongst men than amongst women, while the difference between the sexes is slight amongst the rural population. The reason for the excessive mortality in the case of males in the major towns is probably that men are exposed to greater risk of infection as a consequence of industrialization * * *.

FLUOROGRAPHY

"Miniature-radiographic investigations are being carried out on an ever-increasing scale. At the central dispensaries, side by side with the dispensary work proper, mass examinations are being undertaken on a large scale of different groups of the population, such as industrial workers, children, etc., with miniature radiography. These examinations are partly financed by contributions from the National Anti-Tuberculosis Society. Since 1940 all conscripts in the Services have been subjected to miniature-radiographic tests, and since 1942 the National Anti-Tuberculosis Society has itself organized extensive miniature-radiographic tests in various parts of the country, partly with a lorry specially built for the purpose and partly with transportable apparatus assembled at the place of work. Moreover, in certain parts of the country where the tuberculosis incidence is particularly high, an examination of the entire population has been carried out by the National Society, and it has there proved possible, thanks to

assistance from the local authorities, health organizations, etc., to obtain practically 100 percent cooperation along voluntary lines. According to the experience gained so far, on an average 1 to 2 percent of the cases of tuberculosis are detected by these mass examinations. Among the adult population about 3 persons per 1,000 inhabitants are found to be in need of medical care at a sanatorium. Generally, the fresh cases of tuberculosis discovered through district-examination have largely belonged to the higher-age groups. Thus, it was found that of the fresh cases discovered in Gotland, where 99 percent of the population were examined, both absolutely and relatively the majority of the cases previously unknown to the dispensaries belonged to the ages over 60. Similar findings have been noted elsewhere in the country, and this implies that the dispensaries have to pay special attention to elderly persons.

FLUOROGRAPHY FOR ALL

"So far about 750,000 persons, excluding those in the defence forces, have been examined in this way. The Medical Council has recently submitted proposals for a general miniature-radiographic examination of the entire population of the country. According to this scheme, the nation-wide examination would not be obligatory, and one-third of the country would be examined annually, either by the aid of fixed apparatus at the central dispensaries or else by ambulatory patrols under the supervision of specially trained doctors. For about a year a special form of miniature-radiographic examination has been practised by the National Anti-Tuberculosis Society at its miniature-radiographic bureau in Stockholm. This bureau is primarily intended for those seeking jobs at labour exchanges and for domestic servants employed in private homes, children's nurses, etc. By this means it is hoped, to some extent at least, to be able to reach the young women at the age that is particularly exposed to tuberculosis. Moreover, with the financial aid of the Society similar examinations of these groups are carried on at the central dispensaries for a very small charge * * *.

BCG

"Calmette vaccination has been carried on in Sweden on an ever-increasing scale since about the year 1937, when Wallgren largely took the initiative in practising vaccination. At the dispensaries vaccination is performed amongst the dependents of tuberculous patients (in 1944 over 84,000 Calmette vaccinations were performed at the dispensaries alone). All conscripts are offered Calmette vaccination, and in recent years the children in most schools have been vaccinated in the leaving classes and in the beginners' classes. The *per os* method formerly practised in north Sweden has been abandoned

and replaced by the subcutaneous method. In certain areas experiments have been made with Rosenthal's cutaneous vaccination. In some of the larger towns all those reacting negatively to tuberculin tests have also been subjected to Calmette vaccination in conjunction with the miniature-radiographic examination. According to a law passed in 1944 the tuberculin test is obligatory for the pupils at certain schools, and those showing a negative reaction are advised to undergo Calmette vaccinations * * *."

NEW FILMS AVAILABLE ON ADMINISTRATION OF MASS RADIOGRAPHY PROGRAMS

Two motion pictures on miniature film photofluorography and tuberculosis case-finding methods have just been completed by the United States Public Health Service, under the supervision of the Tuberculosis Control Division. These are teaching and orientation films intended for an audience of professional, technical, or administrative personnel in the field of medicine, public health, and hospital care.

The film, "Routine Admission Chest X–Ray in General Hospitals," shows the step-by-step sequence of routine miniature film chest X-ray service for all patients admitted to the hospital or clinic. Animated drawings illustrate the operation of the phototimer, present case-finding statistics, and demonstrate the physical arrangement of the admission chest X-ray unit. The dangers of undiagnosed tuberculosis in patient and personnel groups. and the practicability and advantages of routine admission chest x-ray examination in the general hospital are emphasized.

The film, "Techniques of Group Chest X-ray Services," provides community health leaders and public health personnel with a detailed procedure outline for administration and operation of mass radiography programs in tuberculosis case finding. The film illustrates the functions and responsibilities of official and voluntary health agencies, professional groups, labor, and management, before, during, and following a typical mass radiography project.

The second half of this film depicts an actual mass radiography project in operation—from the time it is first scheduled until it has been completed and the films read and reports tabulated. The photography and narration highlight all the details that must be carefully considered by the responsible administative group and by operating personnel.

The films are one reel each, 16 mm. in size, black and white, with sound. Prints are available for short-term loan from Tuberculosis Control Consultants stationed in the District Offices of the

United States Public Health Service. Health agencies that desire to purchase prints should order by title from Castle Films, Inc., 30 Rockefeller Plaza, New York 20, N. Y.

LARYNGEAL SWABS FOR DETECTION OF TUBERCULOSIS [1]

"In a considerable proportion of cases of pulmonary tuberculosis, there is no spontaneous expectoration, especially in female patients, and patients under collapse treatment. A simple and efficient method is described to obtain suitable material for bacteriological examination in these cases. A laryngeal swab, made up from a piece of wire with cotton-wool wrapped round its end, is passed down the larynx and the patient asked to cough. Two swabs are taken from each patient. The swabs are passed through sterile test tubes containing 10% sulphuric acid and 2% sodium hydroxide solutions, for five minutes in each, and then 2 petragnani media are inoculated with each swab. The cultures are examined after five days for contamination and after 28 days for macroscopical colonies of tubercle bacilli. The results obtained in two groups of cases of 166 and 107 patients were: 37.95% and 54.20% positive cultures respectively. The highest positive figures were obtained in female patients. Thus tubercle bacilli were demonstrated in a considerable proportion of cases previously regarded as sputum-negative or having no sputum. Apart from diagnosis, the method gives valuable help in judging the efficiency of treatment. The findings of bacilli in early infiltrative lesions is of considerable practical as well as theoretical importance."

[1] Nassau, E.: The culture of tubercle bacilli from laryngeal swabs. Proceedings of the Royal Society of Medicine (London), 34: 397-400 (May 1941).

INCIDENCE OF HOSPITALIZATION, APRIL 1946

Through the cooperation of the Hospital Service Plan Commission of the American Hospital Association, data on hospital admissions among members of Blue Cross Hospital Service Plans are presented monthly. These plans provide prepaid hospital service. The data cover hospital service plans scattered throughout the country mostly in large cities.

Item	April	
	1945	1946
1. Number of plans supplying data	80	80
2. Number of persons eligible for hospital care	16,954,625	20,877,914
3. Number of persons admitted for hospital care	149,184	191,170
4. Incidence per 1,000 persons, annual rate during current month (daily rate × 365)	107.1	111.4
5. Incidence per 1,000 persons, annual rate for the 12 months ended April 30, 1946	103.7	108.1
6. Number of plans reporting on hospital days	21	29
7. Days of hospital care per case discharged during month [1]	7.89	8.81

[1] Days include entire stay of patient in hospital whether at full pay or at a discount.

DEATHS DURING WEEK ENDED MAY 11, 1946

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

	Week ended May 11, 1946	Corresponding week, 1945
Data for 92 large cities of the United States:		
Total deaths	9,053	9,050
Average for 3 prior years	9,141	
Total deaths, first 19 weeks of year	185,179	179,070
Deaths under 1 year of age	614	567
Average for 3 prior years	601	
Deaths under 1 year of age, first 19 weeks of year	11,447	11,799
Data from industrial insurance companies:		
Policies in force	67,197,338	67,296,785
Number of death claims	12,357	12,024
Death claims per 1,000 policies in force, annual rate	9.6	9.3
Death claims per 1,000 policies, first 19 weeks of year, annual rate	10.8	11.0

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 MAY 18, 1946

Summary

Of 11 cases of smallpox reported, 2 occurred in the State of Washington, 7 in Indiana, and 2 in Illinois. The cumulative total to date is 204, the same as for the corresponding period last year. The 5-year median is 437 (see page 843).

A total of 84 cases of poliomyelitis was reported for the week, as compared with 56 last week, 47 for the corresponding week last year, and a 5-year (1941–45) median of 36. Of the current total, more than reported for any corresponding week of record (since 1927), States reporting more than 5 cases each are as follows (last week's figures in parentheses): Florida 18 (17), Colorado and California 11 each (2 each), Texas 10 (16). The total for the year to date is 813, as compared with 696 for the corresponding period last year, and a 5-year median of 460. States reporting 12 or more cases since March 16 (last year's figures in parentheses) are as follows: New York 35 (50), Florida 67 (17), Louisiana 12 (5), Texas 45 (62), Colorado 22 (1), Washington 12 (4), California 43 (16).

The incidence of measles declined during the week in all of the 9 geographic sections except for a slight increase in the North Central areas. The total for the week, 32,317, as compared with 35,208 last week and a 5-year median of 22,881, is more than reported for a corresponding week since 1941. The total to date, 486,655, as compared with a 5-year median of 396,365, was exceeded in the corresponding periods of both 1941 and 1944.

Of the total of 259 cases of diphtheria for the week, New York and Texas reported 25 each, Kansas 22, and Maryland 14. The current total, while more than that for a corresponding week since 1939, is less than reported for any previous week this year except for each of the 2 immediately preceding weeks. The cumulative total, 6,929, as compared with a 5-year median of 5,439, is more than recorded for the corresponding period of any year since 1939.

A total of 8,901 deaths was recorded for the week in 93 large cities of the United States, as compared with 9,144 last week, 9,202 and 8,906, respectively, for the corresponding weeks of 1945 and 1944, and a 3-year (1943–45) average of 9,047. The total for the year to date is 196,267, as compared with 190,001 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended May 18, 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			Meninigitis, meningococcus		
	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45
	May 18, 1946	May 19, 1945		May 18, 1946	May 19, 1945		May 18, 1946	May 19, 1945		May 18, 1946	May 19, 1945	
NEW ENGLAND												
Maine	2	0	0	2	------	------	318	3	69	0	0	0
New Hampshire	0	0	0	------	------	------	43	------	40	0	1	1
Vermont	0	0	0	------	------	------	83	9	66	0	1	0
Massachusetts	5	2	2	------	------	------	2,338	190	1,053	1	3	7
Rhode Island	0	0	0	------	26	------	64	12	39	0	1	1
Connecticut	3	1	0	2	2	1	411	144	467	1	2	2
MIDDLE ATLANTIC												
New York	25	13	15	[1] 4	[1] 1	[1] 4	4,125	112	1,316	12	26	26
New Jersey	12	1	2	5	5	5	3,893	66	1,261	0	11	10
Pennsylvania	12	7	10	1	3	1	2,573	445	1,591	11	8	8
E. NORTH CENTRAL												
Ohio	10	2	5	7	4	11	727	96	469	3	13	13
Indiana	2	1	3	16	6	6	483	46	103	3	2	2
Illinois	8	11	17	4	2	6	868	275	536	7	14	14
Michigan [2]	7	6	5	2	3	2	1,407	339	661	8	6	6
Wisconsin	3	3	1	25	46	31	2,812	53	2,021	2	4	4
W. NORTH CENTRAL												
Minnesota	5	3	3	------	2	1	66	4	388	2	2	2
Iowa	1	0	3	------	------	2	352	56	185	1	2	2
Missouri	3	4	3	5	1	1	188	36	247	5	2	2
North Dakota	1	3	2	------	1	------	10	3	67	0	0	0
South Dakota	7	1	1	------	------	------	29	35	21	0	0	0
Nebraska	4	3	1	5	9	2	280	56	195	1	0	0
Kansas	22	9	2	1	------	2	344	44	378	0	2	2
SOUTH ATLANTIC												
Delaware	1	1	0	------	------	------	23	1	46	0	1	0
Maryland [2]	14	13	8	------	1	2	683	51	369	1	6	7
District of Columbia	0	2	0	------	------	1	332	11	119	1	0	2
Virginia	10	5	4	100	103	103	779	45	376	4	1	6
West Virginia	1	0	4	------	6	4	100	43	97	1	1	1
North Carolina	10	10	8	------	------	4	542	103	402	0	2	2
South Carolina	5	6	5	157	168	188	264	29	213	0	2	2
Georgia	3	2	3	3	6	8	234	6	90	3	1	1
Florida	7	4	3	3	1	3	183	8	93	2	5	5
E. SOUTH CENTRAL												
Kentucky	0	0	2	------	1	2	71	24	119	3	3	3
Tennessee	2	3	2	17	7	15	191	79	150	1	6	6
Alabama	3	5	1	14	20	49	154	20	114	0	8	7
Mississippi [2]	3	3	3	------	------	------	------	------	------	0	0	4
W. SOUTH CENTRAL												
Arkansas	3	0	2	14	25	17	189	28	112	1	3	0
Louisiana	7	3	4	6	14	4	100	25	52	1	2	2
Oklahoma	6	1	2	22	11	22	223	24	74	3	1	0
Texas	25	32	22	415	546	442	1,577	422	733	6	6	6
MOUNTAIN												
Montana	0	0	0	1	2	2	182	8	113	0	0	0
Idaho	0	0	0	6	1	------	83	2	12	0	0	0
Wyoming	4	0	0	------	------	1	77	7	51	1	0	0
Colorado	2	8	6	6	4	14	897	16	315	0	1	1
New Mexico	1	4	1	6	------	------	65	10	41	0	0	0
Arizona	3	0	0	43	54	61	120	23	116	0	0	0
Utah [2]	0	0	0	1	3	6	353	253	98	0	0	0
Nevada	0	0	0	------	------	------	4	5	5	0	0	0
PACIFIC												
Washington	7	4	2	------	------	2	490	212	342	3	5	5
Oregon	1	3	2	3	11	11	322	94	115	0	2	2
California	9	22	18	13	5	53	2,665	1,451	1,451	5	19	19
Total	259	201	194	909	1,100	1,124	32,317	5,024	22,881	93	175	175
20 weeks	6,929	5,537	5,439	184,505	61,524	74,496	486,655	64,170	396,365	3,379	4,522	4,522

[1] New York City only.

[2] Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended May. 18, 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
	May 18, 1946	May 19, 1945		May 18, 1946	May 19, 1945		May 18, 1946	May 19, 1945		May 18, 1946	May 19, 1945	
NEW ENGLAND												
Maine	0	0	0	32	44	16	0	0	0	0	0	0
New Hampshire	0	0	0	0	6	6	0	0	0	0	0	0
Vermont	1	0	0	5	8	11	0	0	0	0	0	0
Massachusetts	1	0	0	235	357	357	0	0	0	0	1	2
Rhode Island	0	0	0	10	17	19	0	0	0	0	0	0
Connecticut	0	0	0	69	56	56	0	0	0	0	1	0
MIDDLE ATLANTIC												
New York	4	6	1	572	567	488	0	0	0	3	4	5
New Jersey	0	0	1	165	146	146	0	0	0	4	2	2
Pennsylvania	1	0	0	336	607	388	0	0	0	4	8	4
EAST NORTH CENTRAL												
Ohio	1	4	1	357	364	231	0	0	0	6	3	4
Indiana	0	0	0	46	75	75	7	1	1	1	0	1
Illinois	3	0	1	182	258	258	2	0	1	1	2	2
Michigan [3]	0	0	0	230	256	255	0	0	0	2	3	3
Wisconsin	0	0	0	100	203	203	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	1	0	0	48	95	69	0	0	0	0	0	0
Iowa	0	0	0	55	44	41	0	0	0	0	0	0
Missouri	1	0	0	53	68	68	0	0	0	1	2	0
North Dakota	0	0	0	11	34	6	0	1	0	3	1	0
South Dakota	0	0	0	6	24	22	0	0	0	0	0	0
Nebraska	0	0	0	24	95	20	0	0	0	0	0	0
Kansas	1	0	0	53	51	47	0	0	1	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	8	8	8	0	0	0	1	1	0
Maryland [3]	2	1	0	200	155	100	0	0	0	1	2	1
District of Columbia	0	0	0	14	34	12	0	0	0	0	0	0
Virginia	1	0	1	63	66	32	0	0	0	2	1	4
West Virginia	0	1	0	23	56	38	0	0	0	0	1	2
North Carolina	3	0	0	31	65	21	0	0	0	0	2	2
South Carolina	0	4	3	6	14	8	0	0	0	5	2	2
Georgia	2	0	0	11	31	16	0	0	0	3	1	5
Florida	18	0	0	6	8	3	0	0	0	0	1	4
EAST SOUTH CENTRAL												
Kentucky	1	1	1	12	52	52	0	0	0	1	6	6
Tennessee	0	0	0	18	46	43	0	1	0	1	4	4
Alabama	0	2	0	19	19	10	0	0	0	0	1	2
Mississippi [3]	1	0	1	5	18	6	0	0	0	1	0	1
WEST SOUTH CENTRAL												
Arkansas	0	0	0	4	8	3	0	1	1	5	1	1
Louisiana	5	1	1	5	7	7	0	0	0	7	1	6
Oklahoma	0	2	0	9	13	13	0	1	0	5	0	2
Texas	10	24	4	46	70	33	0	0	0	4	8	10
MOUNTAIN												
Montana	0	0	0	20	31	15	0	0	0	0	3	0
Idaho	0	0	0	10	13	13	0	0	0	2	1	0
Wyoming	0	0	0	11	7	11	0	0	0	0	0	0
Colorado	11	0	0	45	56	56	0	0	0	1	0	0
New Mexico	2	0	0	14	20	4	0	1	0	1	0	1
Arizona	0	0	1	16	36	8	0	0	0	1	2	1
Utah [3]	0	0	0	20	15	15	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	3	1	1	25	65	30	2	0	0	1	1	1
Oregon	0	0	0	43	17	17	0	0	1	2	1	0
California	11	0	2	148	349	140	0	0	0	4	3	3
Total	84	47	36	3,421	4,654	3,686	11	6	16	73	70	93
20 weeks	813	696	460	69,924	108,150	79,410	264	204	437	1,029	1,184	1,490

[2] Period ended earlier than Saturday.

[3] Including paratyphoid fever reported separately, as follows: New Jersey 2; Ohio 1; Missouri 1; Virginia 2; South Carolina 1; Georgia 1; Louisiana 3; Colorado 1; Arizona 1; Oregon 2.

Telegraphic morbidity reports from State health officers for the week ended May 18, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended May 18, 1946							
	Week ended—		Median 1941–45	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	May 18, 1946	May 19, 1945		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine	27	55	23								3
New Hampshire	6	4	1								
Vermont	13	35	23								2
Massachusetts	147	162	162		1						2
Rhode Island	21	11	29								
Connecticut	35	56	74								1
MIDDLE ATLANTIC											
New York	155	213	257	1	4					1	8
New Jersey	171	136	136	2		2					1
Pennsylvania	110	186	213				1				1
EAST NORTH CENTRAL											
Ohio	81	144	167				1				4
Indiana	25	13	30	1			1		2		8
Illinois	107	40	100	5							13
Michigan [2]	158	71	233	3	2						3
Wisconsin	90	27	125								2
WEST NORTH CENTRAL											
Minnesota	13	7	41	4							5
Iowa	32	7	20								9
Missouri	12	36	21							1	1
North Dakota		1	4								
South Dakota			2								3
Nebraska	7	1	6								1
Kansas	24	14	46	1							15
SOUTH ATLANTIC											
Delaware	2	3	3					1			
Maryland [2]	12	59	65			3	1	2			3
District of Columbia	13	8	9								
Virginia	51	63	96			54		2			1
West Virginia	40	7	12					1			
North Carolina	100	155	155					2		1	
South Carolina	49	108	108		15				2	1	
Georgia	6	7	23		4				1	9	2
Florida	23	6	13	1						10	1
EAST SOUTH CENTRAL											
Kentucky	14	38	62						1		
Tennessee	22	20	33	1				2	1	1	2
Alabama	12	32	51				1		2	6	2
Mississippi [2]									4	4	3
WEST SOUTH CENTRAL											
Arkansas	1	8	22						2		2
Louisiana	12	10	10	2			1		1	1	
Oklahoma	11	19	19	3							
Texas	182	247	288	24	580	41	1			17	18
MOUNTAIN											
Montana	8	2	13	1							
Idaho	22	4	4			2					1
Wyoming		3	3	3				1			
Colorado	32	34	34								
New Mexico	21	3	16								
Arizona	9	28	18			16					
Utah [2]	16	53	67					1	1		2
Nevada											
PACIFIC											
Washington	35	20	25					2			1
Oregon	24	21	21	2							
California	75	373	373	5	1		3				11
Total	2,026	2,550	3,767	59	607	118	10	14	17	52	131
Same week, 1945	2,550			32	382	96	4	10	15	70	118
Average, 1943–45	2,881			31	394	113	6	[4] 10	18	[4] 52	
20 weeks: 1946	37,026			763	6,254	2,107	166	56	356	909	1,684
1945	49,852			595	8,504	2,287	133	42	317	1,002	1,760
Average, 1943–45	55,648		[4] 76,786	567	5,830	1,569	189	[4] 63	291	[4] 878	

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

Anthrax: Texas 1 case.

NOTIFIABLE DISEASES, FIRST QUARTER, 1946

The figures in the following table are the totals of the monthly morbidity reports received from the State health authorities for January, February, and March 1946. These reports are preliminary and the figures are therefore more or less incomplete and subject to correction by final reports. In most instances they include cases reported in both civilian and military populations. The comparisons made are with similar preliminary reports; but owing to population shifts and the presence of large military populations in certain States, the figures for some States are not comparable with those for prior years, especially for certain diseases. Each State health officer has been requested to include in the monthly report for his State all diseases that are required by law or regulation to be reported in the State, although some do not do so. The lists of diseases required to be reported are not the same for each State. Only 11 of the common communicable diseases are notifiable in all the States. In some instances cases are reported, in some States, of diseases that are not required by law or regulation to be reported and the figures are included although manifestly incomplete. There are also variations among the States in the degree of, and checks on, the completeness of reporting of cases of the notifiable diseases. As compared with the deaths, incomplete case reports are obvious for such diseases as malaria, pellagra, pneumonia, and tuberculosis while in many States other diseases, such as puerperal septicemia, rheumatic fever, and Vincent's infection, are not reportable.

In spite of these known deficiencies, however, these monthly reports, which are published quarterly and annually in consolidated form, have proved of value in presenting early information regarding the reported incidence of a large group of diseases and in indicating trends by providing a comparison with similar preliminary figures for prior years. The table gives a general picture of the geographic prevalence of certain diseases, as the States are arranged by geographic areas.

Leaders are used in the table to indicate that no case of the disease was reported.

Consolidated monthly State morbidity reports for January, February, and March 1946

Division and State	Anthrax	Chickenpox	Conjunctivitis [1]	Diphtheria*	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria [2]	Measles*	Meningitis, meningococcus*	Mumps	Ophthalmia neonatorum	Pellagra	Pneumonia, all forms
NEW ENGLAND																		
Maine		666		32	1				351		122	28	247	13	1,116			288
New Hampshire		184		2					72		60		254	8	210			55
Vermont		745		10					229		311		73	2	821			88
Massachusetts		3,178	32	51	2	27		3	969			216	5,245	58	2,168	18		[3] 792
Rhode Island		201		8		1			6		28	[4] 69	48	17	249			126
Connecticut		1,866	22	31	8	7			934	3	779	245	1,117	32	3,695			1,319
MIDDLE ATLANTIC																		
New York	2	6,458		206	44	62		12			[5] 259	889	29,045	245	[6] 1,703	10		6,821
New Jersey	1	5,258		49	8	1	13	3	3,661		289	403	13,728	71	2,449	6		1,745
Pennsylvania	4	5,162		235				8			101		14,687	185	4,112	4		1,233
EAST NORTH CENTRAL																		
Ohio		3,398		395	3	6		1	582		389	236	2,749	119	1,520	92	1	1,005
Indiana		1,101	3	191	11	2	3	4	75		733	132	5,766	39	348			140
Illinois		2,768		201	22	12		10	690		218	212	15,306	186	2,372	128		2,714
Michigan		4,474	51	160	10	39		2	875		89	197	23,829	76	4,107	6		851
Wisconsin		5,631		26	3			2	1,584		2,061	29	8,060	38	6,077	4		[3] 317

WEST NORTH CENTRAL																		
Minnesota		725	1	235	[6] 21	2	2	1		[7] 2	39	315	358	51				85
Iowa		405		53	3			1	90		59	142	1,083	36	498			71
Missouri		319	1	84			3		139		161	77	4,230	72	426			462
North Dakota		120		37			4	2			248	1	66	11				249
South Dakota		156		14							164	13	669	6	231			19
Nebraska	2	482		30				1			1,042	59	1,280	7	172			67
Kansas		1,268	109	90	3		1	4	182		2,569	19	8,812	18	1,394			245
SOUTH ATLANTIC																		
Delaware		138		7								7	195	9	36			4
Maryland		1,301	3	192	4	9	1	3	443		155	27	2,699	49	250	5	1	651
District of Columbia [8]		201		1		1					34	[8] 13	1,172	21	127		1	308
Virginia		898		141	3		408				17,884	116	4,383	90	529		9	1,207
West Virginia		295		53	[9] 42	[9] 1					4,310	44	694	48	266			104
North Carolina				187	10	3		3				116	2,865	70				
South Carolina		603		73	23	180			229	283	16,382	1,086	2,751	17	423	11	220	2,078
Georgia		276	5	68	8	15	27			1,119	1,646	180	1,818	17	195		8	346
Florida		394	1	81	30	1		6	98	698	443	114	939	35	441	1	1	166
EAST SOUTH CENTRAL																		
Kentucky		435		107	1	10		7	67	4	3,144	184	5,224	67	303		3	498
Tennessee		346	1	116		3	2	7	207	6	2,334	160	2,211	75	105	2	14	1,005
Alabama		392		82	6			5	709		10,368	316	1,369	55	510		9	1,661
Mississippi		2,687		104	346	1,592				1,085	41,291	2,360	9,752	56	1,583	10	455	7,647
WEST SOUTH CENTRAL																		
Arkansas		511		119	47	16		3	562		5,303	242	1,244	53	667	1	4	754
Louisiana		207		104	35	3			114	127	19,642	94	1,591	61	149	7	1	821
Oklahoma		215		76	7	4	1				5,751	92	1,310	24	135		4	519
Texas		5,228		569	130	3,345	497	3			55,084	1,675	9,891	125	3,742	23	222	5,095
MOUNTAIN																		
Montana		527	29	29	2				317		789	6	230	5	780			118
Idaho	1	290	14	21	1			2	281		1,489	20	994	2	107			144
Wyoming		162	8	14					23		18	5	357	4	69			51
Colorado		1,167		74	3	8			280		1,296	37	3,146	12	623			567
New Mexico		113	5	19	1	5	10	1	21		46	31	150	9	600			238
Arizona		535		54	1		269	2	104		3,235	106	529	4	583	2	2	568
Utah		1,203			1				263		7,752	28	4,008	8	744			145
Nevada		33	18	1							48	2	875	1	79			34
PACIFIC																		
Washington		1,508	73	91	1	1	29	7	268		200	8	6,826	44	2,068			300
Oregon		474		65	3		1				459	28	2,085	25	520			306
California		9,604	12	407	43	62		10	5,250		4,926	608	23,457	236	7,550			[3] 968
Total	10	74,308	388	4,995	887	5,418	1,271	113	19,675	3,327	213,750	10,978	229,417	2,512	56,852	330	955	44,995
First quarter 1945	14	133,938	599	3,981	667	7,907	1,591	94	11,076	5,230	74,254	10,996	37,584	3,231	76,829	489	854	40,814
Median, 1941–45	18	128,054		3,917	591	3,929	1,094	142	42,543	5,230	86,624	5,016	222,463	3,231	76,829	387	907	57,938
Alaska		61		13					6		386		186		3			25
Hawaii Territory		224	1	5	6	14			392	1	11,652	[10] 43	314	5	84			[3] 33
Panama Canal Zone [11]		20		63	14	10						210	22	9	14			[12] 119

See footnotes at end of table.

Consolidated monthly State morbidity reports for January, February, and March 1946—Continued

Division and State	Poliomyelitis*	Rabies in man	Rheumatic fever	Rocky Mountain spotted fever	Scarlet fever*	Septic sore throat	Smallpox*	Tetanus	Trachoma	Trichinosis	Tuberculosis, all forms*	Tuberculosis, respiratory	Tularemia	Typhoid and paratyphoid fever*	Paratyphoid fever	Typhus fever, endemic	Undulant fever*	Vincent's infection	Whooping cough*
NEW ENGLAND																			
Maine					485	3				1	120	112		4	1		6	2	298
New Hampshire	1				331	46					38			1				18	94
Vermont	4				125	1					57			2	2		13	13	280
Massachusetts	3				2,411	38		1	1	11	809	769		25	21		6		1,485
Rhode Island	1		23		147	4				1	115	111		2	2		2		525
Connecticut	1				630	80		1		9	296	285		9	7		26		756
MIDDLE ATLANTIC																			
New York	33				[13] 6,562					14	3,223	3,053	5	16	2	1	49		2,725
New Jersey	6				1,436	59	1	4		4	1,073			16	3		8		1,804
Pennsylvania	14	1	160		4,282			2			907			27	2	1	25		1,646
EAST NORTH CENTRAL																			
Ohio	17	1	27		4,285	15	5	1	2	4	1,288		7	19	1		23	15	1,036
Indiana	6		1		1,174	67	9			1	654	621	10	10	1		13	12	272
Illinois	8		67	1	2,509	46	1	7	9	2	1,510	1,363	18	34	1		78	50	1,038
Michigan	8		115		1,838	90					1,147		1	16	5	1	21		1,401
Wisconsin	3				1,718	43					465		3	3			54		825
WEST NORTH CENTRAL																			
Minnesota	1		28		710	263		1			[6] 366		2	6			91	27	105
Iowa	9		5		692	35	5				164			4			[14] 60	4	110
Missouri	7		30		840	7	1				485		5	12			5		97
North Dakota			6		136	3			41		43	[15] 24		1			1	49	3
South Dakota					205	1			64		48	32		1			17		7
Nebraska	1				579		1				116			2			1		43
Kansas	5				1,034	5	4	2	6		194	191	4	2			49	34	316
SOUTH ATLANTIC																			
Delaware					84						47	47		2					49
Maryland	2		26		1,107	30		3			669	639		6	1		9	11	255
District of Columbia	1				258						506	488		9		1			72
Virginia	6				1,106	333		1	1		613	[16] 302	23	17		2	10		507
West Virginia	3				486	11					446			4			1		239
North Carolina	9				608	17	2				701	690	17	16	4	12	1		722
South Carolina	3		184		141			3			125		1	13	3	25	7		750
Georgia	8		2		149	107	2	2			335	333	26	35	17	93	43	18	169
Florida	53				102	12		5			320	317		11	4	67	15	24	131

EAST SOUTH CENTRAL																			
Kentucky	4			1	518	4			13		580	577	9	8			5	4	208
Tennessee	9		2		519	55	1	5			934		32	18	3	13	10	51	259
Alabama	5				271		4	8			760		6	11		77	23		206
Mississippi	16				223		7		19		353	349	25	15		29	10		1,432
WEST SOUTH CENTRAL																			
Arkansas	12				157	105	5		103		321	302	10	11	1	6	6		98
Louisiana	19		50		149	134	3	7			692	678	23	30	3	43	7		34
Oklahoma	7				296	53	7		100		670			7		2	6	2	98
Texas	31			1	1,043	152	19		54		1,178		12	69	8	213	178		1,789
MOUNTAIN																			
Montana	[17] 19		3		123	20	[18] 1	1	35		94	35	7	1			2	3	32
Idaho			[22]		100	58	8				58			4			2	11	131
Wyoming	1		1	1	117	4			2		10			1			1	1	11
Colorado	2		95		487	153	5				165			8	2		5	10	346
New Mexico	6				194	3			1		[6] 813	[6] 792		5			1		111
Arizona	3		2		176	2			66	1	290			10			14		186
Utah	6		23		420	1					52	46	1	1	1		6		246
Nevada					58	13			2		57							6	23
PACIFIC																			
Washington	33		97		492	49	31				544			5	1		11	143	562
Oregon	3		3	1	316	30					165	163		4	1		6		135
California	102		271	1	3,070		8	12	7	1	2,320	2,205	3	43	11	14	73		1,419
Total	[17] 491	2	1,243	6	44,899	2,152	130	66	526	49	27,536	14,524	250	576	108	600	1,000	508	25,146
First quarter 1945	416	3	831	5	74,781	3,173	136	68	502	169	[19] 29,310	[19] 17,123	242	723	108	649	1,111	554	34,023
Median 1941–45	305	7		5	51,491	2,513	299	59	763	130	27,061	15,065	237	924		558	624	499	52,715
Alaska					2	21					158	134							
Hawaii Territory	8				14	12	[10] 1	3			228	218		4	2	16			1
Panama Canal Zone [11]											[12] 14	[12] 10		9	6	2			[12] 9

See foot notes on p. 840.

FOOTNOTES FOR TABLE ON PAGES 836 TO 839

*Diseases marked with an asterisk (*) are reportable by law or regulation in all the States, including the District of Columbia. Typhoid fever is reportable in all the States; paratyphoid fever in all except 6 States. Syphilis is reportable in all the States and the District of Columbia but is not included in the table. Chickenpox, conjunctivitis, influenza, and pellagra were dropped from the list of reportable diseases in North Carolina in 1945. Rheumatic fever has been made reportable in Louisiana.

[1] Includes cases of kerato- and suppurative conjunctivitis and of pink eye.
[2] In some States practically all in the military.
[3] Lobar pneumonia only.
[4] Includes 1 case contracted by blood transfusion.
[5] New York City only.
[6] Includes nonresidents.
[7] Nonresidents.
[8] The total number of cases of malaria reported in the District of Columbia for the year 1945 should be 89 instead of 144 as published on page 423 of the PUBLIC HEALTH REPORTS of Mar. 22, 1946.
[9] Includes cases in Ashford General Hospital.
[10] Off-shipping.
[11] Includes the cities of Colon and Panama.
[12] In the Canal Zone only.
[13] Includes septic sore throat.
[14] Includes delayed reports.
[15] For February and March only.
[16] For January and February only.
[17] Includes 2 cases delayed reports for 1945.
[18] Occurred on board a trooptrain.
[19] Corrected figures.

The following list includes certain rare conditions, diseases of restricted geographical distribution, and those reportable in or reported by only a few States; last year's figures in parentheses (where no figures are given no cases were reported last year):

Actinomycosis: Connecticut 1 (1), Illinois 3, Minnesota 4 (3), Iowa 2 (1), South Dakota 1.
Coccidioidomycosis: New Mexico 1, Arizona 6, California 14 (10).
Dengue: South Carolina 2 (4), Georgia 1, Texas 3, Oregon 1.
Diarrhea: Pennsylvania 3 (diarrhea and enteritis), Ohio 63 (diarrhea and enteritis), Illinois 3 (1), Maryland 26 (7), South Carolina 2,300 (1,971), Florida 6 (12), Colorado 3 (1) (diarrhea and enteritis), New Mexico 43 (52) (diarrhea and enteritis), Utah 1 (15), Washington 56 (diarrhea and enteritis), California 18.
Dog bite: Illinois 2,140 (1,873) (all animals), Michigan 1,232 (1,387), Arkansas 206 (88).
Food poisoning: Indiana 6, Illinois 3 (1), Louisiana 1 (5), Idaho 1, Nevada 1, California 104 (65).
Glanders: Tennessee 1.
Granuloma, unspecified: Ohio 14 (13).
Granuloma inguinale: Missouri 8 (1), Florida 43 (48), Tennessee 17 (15), Mississippi 204 (143), Louisiana 93 (48), Arizona 1.
Impetigo contagiosa: Ohio 5, Indiana 26 (5), Illinois 10 (22), Michigan 23 (262), Missouri 3, North Dakota 8 (1), Kansas 4 (21), Maryland 6 (2), Kentucky 1, Montana 2 (21), Idaho 16, Wyoming 3 (22), Colorado 24 (39), Nevada 44 (7), Washington 258 (250), Hawaii Territory 5 (27).
Jaundice (including hepatitis and Weil's disease): Ohio 4, Indiana 33 (6), Illinois 19 (39), Michigan 15 (61), Minnesota 9 (7), North Dakota 2, Maryland 5 (4), South Carolina 3 (110), Florida 4 (6), Tennessee 2, Louisiana 1, Montana 10, Idaho 1 (10), Utah 12 (1), Washington 29 (43), Oregon 18 (2), California 104 (101), Alaska 4, Hawaii Territory 5 (108).
Lead poisoning: New Mexico 1.
Leprosy: Florida 1, California 2 (5), Hawaii Territory 8 (9).
Lymphocytic choriomeningitis: Tennessee 4 (2).
Lymphogranuloma venereum: Missouri 12 (2), Florida 24 (51), Tennessee 41 (18), Louisiana 42 (45), Utah 1 (1).
Psittacosis: Illinois 7 (1).
Puerperal septicemia: Mississippi 70 (65).
Rabies in animals: New York 224 (184), Pennsylvania 4, Ohio 228 (197), Illinois 101 (103), Michigan 2 (12), Iowa 10 (28), Kansas 14 (5), Delaware 1, Maryland 8 (7), District of Columbia 3 (56), West Virginia 1, South Carolina 44 (40), Florida 4 (3), Alabama 233 (81), Arkansas 42 (50), Louisiana 20 (59), Texas 218 (228), New Mexico 7 (3), Utah 1 (5), Oregon 1, California 102 (132).
Rat bite fever: Georgia 1, Tennessee 1.
Relapsing fever: Pennsylvania 3 (1), Texas 10 (6), Panama Canal Zone 3.
Ringworm: Pennsylvania 147 (290), Ohio 20, Indiana 12, Illinois 1,025, Michigan 228 (583), Minnesota 87, Iowa 10, Kansas 3, Montana 4 (4), Idaho 14, Wyoming 1, Washington 232 (95).
Scabies: Pennsylvania 84 (24), Michigan 408 (178), Missouri 6, North Dakota 10 (22), Kansas 52 (33), Kentucky 8, Montana 22 (32), Idaho 64, Wyoming 1 (3), Nevada 24.
Silicosis: New Hampshire 1, New Mexico 3, Utah 1.

WEEKLY REPORTS FROM CITIES

City reports for week ended May 11, 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	------	0	1	0	4	0	0	5
New Hampshire:												
Concord	0	0	------	0	------	0	0	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	1	0	0	0	0	0	0	------
Massachusetts:												
Boston	6	0	------	0	381	0	7	0	49	0	0	19
Fall River	0	0	------	0	104	0	0	0	4	0	0	3
Springfield	0	0	------	0	79	0	1	0	9	0	0	------
Worcester	0	0	------	0	401	0	5	0	7	0	0	22
Rhode Island:												
Providence	0	0	------	0	20	1	2	0	6	0	0	16
Connecticut:												
Bridgeport	0	0	------	0	3	0	1	0	1	0	0	1
Hartford	1	0	------	0	8	0	0	0	3	0	0	3
New Haven	0	0	------	0	90	0	1	0	0	0	0	------
MIDDLE ATLANTIC												
New York:												
Buffalo	4	0	------	0	100	1	4	0	12	0	0	10
New York	7	0	5	0	1,199	5	43	2	343	0	0	34
Rochester	0	0	------	0	310	0	5	0	25	0	0	2
Syracuse	0	0	------	0	18	1	1	0	5	0	0	1
New Jersey:												
Camden	2	0	------	0	51	1	2	0	0	0	0	6
Newark	0	0	1	1	510	1	6	0	15	0	0	23
Trenton	0	0	------	0	46	0	1	0	4	0	0	7
Pennsylvania:												
Philadelphia	1	0	1	0	500	2	25	0	63	0	1	24
Pittsburgh	0	0	------	0	19	2	7	0	32	0	1	1
Reading	0	0	------	0	12	0	1	0	7	0	0	14
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	3	0	------	1	43	2	4	0	11	0	0	------
Cleveland	1	0	------	1	106	1	9	0	48	0	0	13
Columbus	0	1	------	0	9	0	1	0	10	0	0	3
Indiana:												
Fort Wayne	0	0	------	0	1	0	1	0	2	0	0	------
Indianapolis	0	0	------	0	176	0	7	0	14	0	1	1
South Bend	0	0	------	0	3	0	0		0	0	0	------
Terre Haute	0	0	------	0	9	0	1	0	0	0	0	------
Illinois:												
Chicago	3	0	------	1	296	6	21	0	93	0	0	39
Springfield	0	0	------	------	17	0	0	0	2	0	0	1
Michigan:												
Detroit	5	0	1	0	232	2	13	0	72	0	0	33
Flint	0	0	------	0	19	0	1	0	6	0	0	------
Grand Rapids	0	0	------	0	181	0	0	0	6	0	0	11
Wisconsin:												
Kenosha	0	0	------	0	147	0	0	0	0	0	0	------
Milwaukee	0	0	1	1	1,254	2	8	0	17	0	0	7
Racine	0	0	------	0	54	0	2	0	0	0	0	------
Superior	0	0	------	0	2	0	0	0	0	0	0	4
WEST NORTH CENTRAL												
Minnesota:												
Duluth	1	0	------	0	14	0	1	0	2	0	0	1
Minneapolis	3	0	------	0	10	0	1	0	14	0	0	2
St. Paul	0	0	------	0	4	0	2	0	18	0	0	4
Missouri:												
Kansas City	0	0	------	1	5	0	8	0	11	0	0	4
St. Joseph	0	0	------	0	------	0	0	0	3	0	0	------
St. Louis	1	1	1	0	100	0	6	0	6	0	1	3

City reports for week ended May 11, 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	42	0	6	0	1	0	0	------
Kansas:												
Topeka	0	0	------	0	7	0	0	0	11	0	0	9
Wichita	0	0	------	0	83	0	1	0	1	0	0	------
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	10	0	1	0	2	0	0	1
Maryland:												
Baltimore	6	0	2	1	457	0	7	0	25	0	0	10
Cumberland	0	0	------	0	-------	0	2	0	2	0	0	------
Frederick	1	0	------	0	-------	0	0	0	0	0	0	------
District of Columbia:												
Washington	2	0	1	1	338	5	4	0	13	0	1	8
Virginia:												
Lynchburg	0	0	------	0	32	0	0	0	0	0	0	------
Richmond	0	0	------	0	82	0	3	0	7	0	0	4
Roanoke	0	0	------	0	8	0	0	0	0	0	0	3
West Virginia:												
Charleston	0	0	3	0	-------	0	0	0	2	0	0	------
Wheeling	0	0	------	0	1	0	2	0	0	0	1	29
North Carolina:												
Raleigh	0	0	------	0	22	0	0	0	1	0	0	------
Wilmington	0	0	------	0	22	0	0	0	0	0	0	------
Winston-Salem	0	0	------	0	16	0	0	0	1	0	0	1
South Carolina:												
Charleston	1	0	1	0	6	0	2	0	1	0	1	1
Georgia:												
Atlanta	0	0	1	0	42	0	3	0	6	0	0	------
Brunswick	0	0	------	0	1	0	0	0	0	0	0	------
Savannah	0	0	1	0	8	0	0	0	0	0	0	------
Florida:												
Tampa	0	0	------	1	44	0	1	3	0	0	1	------
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	------	0	17	0	14	0	3	0	0	2
Nashville	0	0	------	0	2	0	2	0	0	0	0	------
Alabama:												
Birmingham	1	0	1	0	30	0	1	1	1	0	0	------
Mobile	0	0	------	0	1	1	0	0	1	0	0	------
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	------	0	8	0	0	0	1	0	0	------
Louisiana:												
New Orleans	0	0	------	0	20	0	2	0	2	0	1	------
Shreveport	1	0	------	0	-------	0	2	0	0	0	0	------
Texas:												
Dallas	1	0	------	0	35	0	1	0	8	0	0	6
Galveston	1	0	------	0	6	0	1	0	0	0	0	------
Houston	1	0	------	0	3	0	4	0	2	0	0	------
San Antonio	0	0	1	1	19	1	2	7	0	0	0	5
MOUNTAIN												
Montana:												
Billings	0	0	------	0	1	0	1	0	0	0	0	------
Great Falls	0	0	------	0	14	0	0	0	0	0	0	------
Helena	0	0	------	0	3	0	0	0	0	0	0	------
Missoula	0	0	------	0	-------	0	0	0	0	0	0	------
Idaho:												
Boise	0	0	------	0	2	0	0	0	0	0	0	------
Colorado:												
Denver	8	0	1	0	655	0	3	2	15	0	0	17
Pueblo	0	0	------	0	27	0	2	0	0	0	0	------
Utah:												
Salt Lake City	0	0	------	0	121	0	2	0	4	0	0	6

City reports for week ended May 11, 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	2	0	------	0	57	0	5	0	18	0	0	7
Spokane	0	0	------	0	24	0	2	0	0	0	0	2
Tacoma	0	0	------	0	4	0	0	0	0	0	0	3
California:												
Los Angeles	3	0	8	2	368	2	1	1	24	0	0	7
Sacramento	1	0	------	0	241	0	1	0	0	0	0	1
San Francisco	1	0	------	0	150	3	9	0	20	0	0	4
Total	68	2	30	13	9,563	39	286	16	1,096	0	9	443
Corresponding week, 1945	67	------	21	17	1,373	------	285	------	1,614	0	11	568
Average, 1941–45	59	------	65	[1] 20	[2] 5,966	------	[1] 364	------	1,510	1	15	989

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

Anthrax.—Cases: Boston 1; Philadelphia 1.
Dysentery, amebic.—Cases: New York 1; Detroit 2; St. Louis 1; Pueblo 1; Los Angeles 2.
Dysentery, bacillary.—Cases: New York 2; Chicago 1; Baltimore 1; Charleston, S. C., 3.
Dysentery, unspecified.—Cases: San Antonio 25.
Rocky Mountain spotted fever.—Cases: Roanoke 1.
Tularemia.—Cases: New Orleans 1.
Typhus fever, endemic.—Cases: New Orleans 1; Galveston 1; San Antonio 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	18.3	0.0	0.0	0.0	2,841	2.6	47.1	0.0	217	0.0	0.0	180
Middle Atlantic	6.5	0.0	3.2	0.9	1,280	6.0	44.0	0.9	234	0.0	0.9	56
East North Central	7.3	0.6	1.2	2.4	1,550	7.9	41.3	0.0	171	0.0	0.6	68
West North Central	10.1	2.0	2.0	2.0	533	0.0	50.3	0.0	135	0.0	2.0	46
South Atlantic	16.3	0.0	14.7	4.9	1,780	8.2	40.9	4.9	98	0.0	6.5	93
East South Central	5.9	0.0	5.9	0.0	295	5.9	100.3	5.9	30	0.0	0.0	12
West South Central	11.5	0.0	2.9	2.9	261	2.9	34.4	20.1	37	0.0	2.9	32
Mountain	63.5	0.0	7.9	0.0	6,537	0.0	63.5	15.9	151	0.0	0.0	183
Pacific	11.1	0.0	12.7	3.2	1,335	7.9	28.5	1.6	98	0.0	0.0	38
Total	10.3	0.3	4.6	2.0	1,455	5.9	43.5	2.4	167	0.0	1.4	67

SMALLPOX IN SEATTLE, WASHINGTON

Week Ended May 18, 1946

During the week ended May 18, 2 new cases of smallpox, both fatal, were reported in the Puget Sound area of Washington State. A new focus of the disease was reported in Port Angeles (Clallam County), where one case occurred with onset on May 8, terminating fatally. The source of the infection was stated to be Seattle. One new case, also fatal, with onset on May 9, was reported in Seattle. The total for the State to May 18 is 61 cases, 19 deaths.

No case was reported during the week in San Francisco or in California outside of that city.

FOREIGN REPORTS

BELGIUM

Vital statistics—Years 1940–1945—Inclusive.—For the years 1940 to 1945 inclusive, the following numbers of births and deaths have been reported in Belgium:

Year	Number of live births	Total number of deaths	Deaths of infants under 1 year of age
1940	111,520	133,718	9,508
1941	99,805	121,134	8,405
1942	107,765	121,274	8,277
1943	122,374	110,898	8,217
1944	126,062	131,188	9,442
1945	126,277	119,199	12,017

Population, approximately 8,330,000.

CANADA

Provinces—Communicable diseases—Week ended April 20, 1946.—During the week ended April 20, 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		16		76	186	14	11	34	106	443
Diphtheria		8		24	5		1			38
Dysentery, bacillary				5						5
Encephalitis, infectious							1			1
German measles		1		18	62	1		37	8	127
Influenza		10			34	1			47	92
Measles		104	5	545	960	11	2	76	32	1,735
Meningitis, meningococcus				1	2	1				4
Mumps			1	47	213	71	60	41	168	601
Poliomyelitis		2					1			3
Scarlet fever		2	4	77	44	8	5	6	30	176
Tuberculosis (all forms)		3	17	62	45	12	10	15	51	215
Typhoid and paratyphoid fever				3	1			1		5
Undulant fever				1	1	1				3
Venereal diseases:										
Gonorrhea	3	17	6	74	99	35	26	40	53	353
Syphilis		5	3	86	50	11	8	9	32	204
Whooping cough		22		38	62	6		2		130

JAMAICA

Notifiable diseases—4 weeks ended May 4, 1946.—During the 4 weeks ended May 4, 1946, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis	1	2	Puerperal sepsis		1
Chickenpox	8	31	Scarlet fever		1
Diphtheria		5	Tuberculosis (pulmonary)	32	66
Dysentery, unspecified	1	6	Typhoid fever	3	106
Erysipelas		1	Typhus fever (murine)	1	
Leprosy		2			

NORWAY

Notifiable diseases—January 1946.—During the month of January 1946, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	26	Mumps	128
Diphtheria	475	Pneumonia (all forms)	4,299
Dysentery, unspecified	6	Poliomyelitis	24
Encephalitis, epidemic	3	Rheumatic fever	251
Erysipelas	481	Scabies	6,456
Gastroenteritis	5,058	Scarlet fever	634
Gonorrhea	741	Syphilis	159
Hepatitis, epidemic	789	Tuberculosis (all forms)	426
Impetigo contagiosa	3,993	Typhoid fever	23
Influenza	8,460	Undulant fever	1
Malaria	2	Weil's disease	4
Measles	3,561	Whooping cough	3,420

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

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during 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 of each month.

Cholera

Ceylon—Polonnaruwa.—A report dated May 21, 1946, states that a total of 23 cases of cholera with 10 deaths have occurred in Polonnaruwa, Ceylon. The first cases were reported on May 17, when 9 cases occurred, 4 of which proved fatal on May 21, 1946.

Smallpox

Morocco (French).—For the period April 21–30, 1946, 83 cases of smallpox were reported in French Morocco. Regions reporting the highest incidence are: Agadir and frontier districts, 13; Casablanca, 7; Fez, 14; Marrakech, 32; Meknes, 5; Oujda, 6; Rabat, 6.

Venezuela.—For the month of April 1946, 86 cases of smallpox (alastrim) were reported in Venezuela. States reporting the highest incidence are: Aragua, 15 cases; Federal District, 14 cases; Guarico, 21 cases.

Typhus Fever

Ecuador.—For the month of April 1946, 88 cases of typhus fever with 8 deaths were reported in Ecuador. Cities reporting the highest incidence are: Ambato, 15 cases; Cuenca, 11 cases; Guayaquil, 2 cases of murine typhus; Latacunga, 9 cases; Quito, 25 cases, 6 deaths.

Guatemala.—For the month of March 1946, 64 cases of typhus fever with 9 deaths were reported in Guatemala. Departments reporting the highest incidence are: Chimaltenango, 10 cases, 1 death; Quezaltenango, 8 cases, 2 deaths; Totonicapan, 31 cases, 5 deaths.

Morocco (French).—For the period April 21–30, 1946, 193 cases of typhus fever were reported in French Morocco. Regions reporting the highest incidence are: Agadir and frontier districts, 9; Casablanca, 31; Fez, 50; Marrakech, 33; Meknes, 29; Oujda, 2; Rabat, 39.

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