

Public Health Reports

Vol. 59 • AUGUST 18, 1944 • No. 33

STUDIES ON THE DURATION OF DISABLING SICKNESS

V. Frequency of Short-term Absences and Its Relation to Total Frequency¹

By W. M. GAFAFER, *Principal Statistician*, and ROSEDITH SITGREAVES, *Junior Statistician, United States Public Health Service*

The short-term absence now generally defined as lasting less than 4 days is the subject of the present inquiry, the fifth of a series (1-4). Absences of short duration are of particular interest from the standpoint of prevention, since it is recognized that the sicknesses generally responding most readily to control efforts are the minor disabilities in which a number of psychological factors as well as physical ill-health may be involved (5). Furthermore, there is a notable paucity of published quantitative material on the time changes in the behavior of short-term absences, reference being made particularly to seasonal variation. The investigation will concern itself principally with the ratio of the frequency of short-term absences to the frequency of all sick absences. More specifically, two relationships will be considered: first, the variation of the ratio with time for specific quarter years, and second, the correlation of the ratio with the frequency of all sick absences without losing the identity of the quarter years yielding the frequencies.

With regard to causes of sickness, attention will be directed to those absences for which a respiratory disease was recorded, since the frequency of absences due to the respiratory group presents a relatively wide variation with time. Indeed, as is well known, the periodicity characterizing the variation of the frequency of all sick absences is determined by the periodicity of the respiratory group of diseases. Moreover, a similar periodicity is shown by the frequency of short-term absences as well as by the absences of 4 days or longer for both all sickness and the respiratory group of diseases.

¹ From the Industrial Hygiene Division, Bureau of State Services. For earlier papers in the series, see references 1-4.

The supporting data have been derived from the recorded disability experience of a public utility company² and cover the 10 years 1933-42. During this period approximately 26,000 male-years of exposure yielded 22,704 absences due to sickness lasting 1 calendar day or longer; of these, 12,846, or 57 percent, lasted less than 4 days. With reference to the age distribution of the exposed population it may be noted that during the years 1933-40 approximately 50 percent of the males were under 40 years of age, the percentage decreasing to 46 in 1941 and to 42 in 1942.

FREQUENCY OF SHORT-TERM ABSENCES

Table 1 presents among other things the average annual number of absences per 1,000 males due to sickness and respiratory diseases disabling for 1 to 3 days, and 1 day or longer, according to quarter-year in which absence began.

For all sickness the rates for short-term absences range in value from 251.2 per 1,000 males in the third quarter of 1940 to 855.8 per 1,000 in the first quarter of 1939, the mean of the 40 quarters for the 10 years being 488.7. For the respiratory diseases, on the other hand, the rates range from 102.7 in the third quarter of 1941 to 670.5 in the first quarter of 1939, the corresponding mean being 308.2. On the average the respiratory diseases contribute 63 percent of all sick absences of 1 to 3 days and approximately the same proportion of sick absences of all durations.

An examination of the table reveals a number of interesting relationships in the quarterly variation of the rates for short-term absences and those of all durations which hold for both the all sickness and respiratory groups. These relationships may be conveniently summarized as follows:

(1) In general, in any year, for both the 1 to 3 day absences and those of 1 day or longer, the highest frequency occurs in the first quarter, the second highest in the fourth quarter, the third highest in the second quarter, and the lowest in the third quarter. Thus the periodicity of the movement of the frequencies is apparent.

(2) If the 40 rates for a particular one of the 4 classifications are related to their mean it will be found that all of the first quarter rates show excesses, all of the second and third quarter rates show defects, and the fourth quarter rates show both excesses and defects.

(3) With only 3 exceptions, namely, the first quarters of 1933, 1937, and 1941, the short-term absences contribute over half of the total frequency in any quarter. Hence, in general, the frequencies of the short-term absences are higher than the corresponding frequencies of the longer absences.

² The present report constitutes the ninth paper based on data from this company. A list of the earlier papers will be found in reference 6, the eighth paper of the series.

TABLE 1.—Ratio of the frequency of short-term absences (1-3 calendar days) to the frequency of all absences (1 calendar day or longer) for all sickness and the respiratory diseases, according to quarter-year in which absence began; experience of male employees in a public utility, 1933-42, inclusive

Quarter-year in which absence began	All sickness			Respiratory diseases			Average number of males
	Average annual number of absences per 1,000 males		Ratio A to B	Average annual number of absences per 1,000 males		Ratio A' to B'	
	A: Short-term absences (1-3 days)	B: All absences (1 day or longer)		A': Short-term absences (1-3 days)	B': All absences (1 day or longer)		
<i>1933</i>							
First.....	612.8	1,365.0	0.45	457.6	1,118.0	0.41	2,561
Second.....	291.0	495.5	.59	160.4	267.4	.60	2,450
Third.....	284.3	452.7	.63	131.3	219.4	.60	2,568
Fourth.....	492.3	898.4	.55	338.4	615.3	.55	2,579
<i>1934</i>							
First.....	770.5	1,402.3	.55	572.0	1,087.2	.53	2,574
Second.....	429.3	680.0	.63	203.7	340.0	.60	2,590
Third.....	309.5	528.8	.59	143.1	247.3	.58	2,551
Fourth.....	503.7	865.5	.58	316.6	558.3	.57	2,544
<i>1935</i>							
First.....	678.6	1,334.9	.51	506.6	990.8	.51	2,546
Second.....	388.3	726.1	.53	219.4	391.5	.56	2,541
Third.....	283.8	488.6	.58	116.3	198.5	.59	2,558
Fourth.....	479.7	795.3	.60	297.1	484.3	.61	2,564
<i>1936</i>							
First.....	654.4	1,188.6	.55	446.7	848.1	.53	2,575
Second.....	371.5	673.4	.55	195.0	357.6	.55	2,598
Third.....	365.3	563.1	.65	190.3	270.9	.70	2,614
Fourth.....	502.4	879.5	.57	334.9	580.8	.58	2,637
<i>1937</i>							
First.....	691.2	1,498.7	.46	530.6	1,203.5	.44	2,652
Second.....	372.5	631.3	.59	190.0	327.6	.58	2,681
Third.....	352.9	503.2	.63	136.8	219.1	.62	2,698
Fourth.....	444.2	761.7	.58	257.8	444.2	.58	2,724
<i>1938</i>							
First.....	629.2	1,179.6	.53	419.0	805.9	.52	2,778
Second.....	371.3	634.7	.59	185.7	333.9	.56	2,787
Third.....	315.4	540.9	.58	152.7	269.7	.57	2,780
Fourth.....	595.2	991.5	.60	383.5	631.0	.61	2,773
<i>1939</i>							
First.....	855.8	1,626.3	.53	670.5	1,283.7	.52	2,758
Second.....	423.5	763.5	.55	244.7	444.0	.55	2,737
Third.....	374.7	563.5	.66	162.7	223.7	.73	2,732
Fourth.....	563.7	894.3	.63	375.8	559.3	.67	2,724
<i>1940</i>							
First.....	735.3	1,362.4	.54	532.2	966.6	.55	2,713
Second.....	380.3	719.1	.53	182.7	344.7	.53	2,707
Third.....	251.2	440.7	.57	126.3	199.8	.63	2,708
Fourth.....	404.6	719.2	.56	265.8	462.2	.58	2,694
<i>1941</i>							
First.....	738.5	1,567.0	.47	585.4	1,293.8	.45	2,702
Second.....	326.3	548.8	.59	176.5	280.3	.63	2,704
Third.....	287.5	440.0	.65	102.7	155.5	.66	2,705
Fourth.....	451.6	737.0	.61	297.2	463.4	.64	2,697
<i>1942</i>							
First.....	830.4	1,351.9	.61	622.4	980.3	.63	2,652
Second.....	462.6	741.1	.62	262.8	379.2	.69	2,549
Third.....	476.5	701.1	.68	271.1	378.6	.72	2,473
Fourth.....	797.7	1,229.9	.65	565.8	855.7	.66	2,825

(4) For both the short-term absences and those of 1 day or longer the rates for the third and fourth quarters of 1942 are the highest third and fourth quarter rates of the 10 years, each rate being over 30 percent in excess of its respective 10-year mean.

(5) For absences of short duration the 5 highest first-quarter rates are found in 1934, 1939, 1940, 1941, and 1942; for absences of all durations the 5 highest first-quarter rates occur in 1933, 1934, 1937, 1939, and 1941.

RATIO OF THE FREQUENCY OF SHORT-TERM ABSENCES TO THE TOTAL FREQUENCY

The ratios of the frequency of short-term absences to the corresponding total frequency for each quarter and year, given in table 1

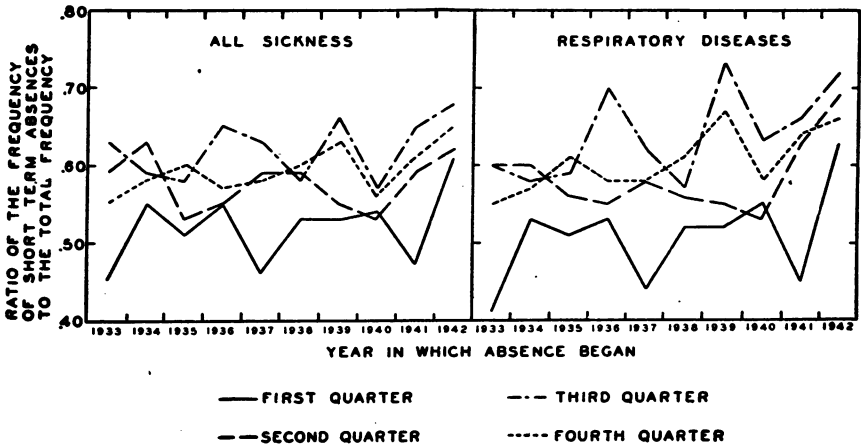


FIGURE 1.—Ratio of the frequency of short-term absences (1-3 calendar days) to the frequency of all absences (1 calendar day or longer) due to (a) all sickness and (b) the respiratory diseases, according to quarter-year in which absence began; experience of male employees in a public utility, 1933-42, inclusive.

for all sickness and the respiratory diseases, are presented graphically in figure 1.

All sickness.—If the ratios for all sickness are examined it will be found that they vary from 0.45 to 0.68, their mean being 0.58. In any year the lowest ratio is generally found in the first quarter while the highest ratio tends to occur in the third, the means of the 10 ratios for each quarter being 0.52 for the first, 0.58 for the second, 0.62 for the third, and 0.60 for the fourth. It is a striking fact that the high total frequencies regularly appearing in the first quarter of each year are associated with relatively small proportions of short term absences while the low total frequencies occurring in the third quarters are made up of relatively large proportions of such absences. Furthermore, it will be observed that the first quarters of 1933, 1937, and 1941, yielding total frequencies sufficiently high to be considered

epidemic in character, show the 3 lowest ratios of the 40 quarters, and are the only ones which are less than 0.50.

In general the ratios for each quarter show a slight upward trend over the 10 years, the ratios for the 4 quarters of 1942 being unusually high. For the first, third, and fourth quarters of this year the ratio of the frequency of short-term absences to the total frequency is higher than for any other year of the period under study, while the 1942 second-quarter ratio is surpassed only by the one for 1934.

Respiratory diseases.—The 40 ratios for the respiratory diseases, ranging in value from 0.41 to 0.73, show more variation than the ratios for all sickness but their mean value is the same, namely, 0.58. For the 4 quarters the respective 10-year means become 0.51 for the first, 0.58 for the second, 0.64 for the third, and 0.61 for the fourth, and these values are of the same order of magnitude as the corresponding means for all sickness. Again it will be observed that the first quarters, consistently associated with high frequency rates, reveal relatively low proportions of short-term absences while relatively high proportions of such absences occur in the third quarters where markedly low frequency rates are found. Furthermore, the highest total respiratory disease frequency of the 40 quarters (1,293.8 in the first quarter of 1941) yields 1 of the 3 ratios which are less than 0.50, the other 2 occurring in the epidemic first quarters of 1933 and 1937.

The trend of the respiratory disease ratios for each quarter over the 10-year period appears to be increasing, the year 1942 yielding the highest first and second quarter ratios of the 10 years while the third and fourth quarter ratios for that year are surpassed only by the corresponding ratios for 1939.

CORRELATION OF THE RATIO WITH THE TOTAL FREQUENCY

All sickness.—To investigate further the relationship between the proportion of short-term absences and the magnitude of the total frequency, figure 2 presents an appropriate scatter diagram for all sickness. An inverse association between the two variables is immediately observed. Thus, for example, all ratios less than 0.53 in value are associated with total frequencies greater than 1,300 while, with but two exceptions, all ratios greater than 0.56 have corresponding total frequencies of less than 1,000. It is of interest to observe that the year 1942 accounts for both exceptions.

Identifying symbols for each of the 4 quarters show clearly the contribution of each to the total picture. Noteworthy is the contribution of the first quarter which is an important determining factor in the inverse character of the correlation. With the exception of 1942, all first-quarter ratios are less than 0.57 while the frequency rates range from 1,100 to 1,700. The ratios and rates for the other 3

quarters tend to fall in the lower right-hand quarter of the figure. It will be observed that all but one of the ratios for the fourth quarter lie between 0.55 and 0.64 while the corresponding frequency rates range from 700 to 1,000. The second-quarter ratios vary from 0.53 to 0.64 with 8 of the 10 associated frequencies lying between 600 and 800. The ratios for the third quarter range from 0.57 to 0.68 with 9 of the 10 frequencies falling between 400 and 600.

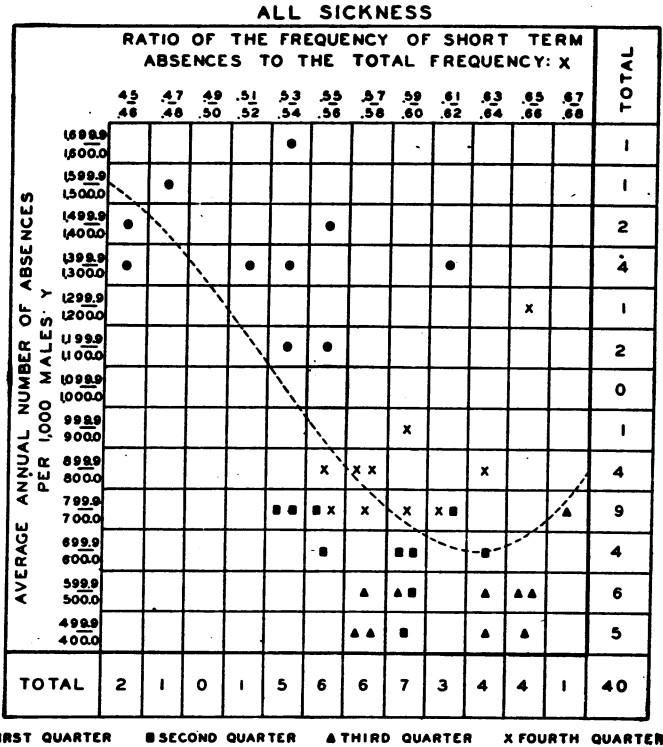


FIGURE 2.—Scatter diagram showing the relationship between the proportion of short-term absences and the total frequency of absences due to all sickness; experience of male employees in a public utility, 1933-42, inclusive. The broken curve may be described by the cubic equation: $Y = -22,678 + 149,754X - 298,994X^2 + 190,572X^3$.

The question arises of describing more precisely the trend of the observations shown in figure 2. Since the frequency-ratio relationship is not linear a curve of higher order was chosen and specifically determined by the method of least squares. The equation of the curve reads $Y = -22,678 + 149,754X - 298,994X^2 + 190,572X^3$ where Y is the total frequency and X the ratio. The curve is shown in figure 2 and describes reasonably well the trend of the observations.

Respiratory diseases.—A similar scatter diagram for the respiratory diseases is presented in figure 3. A wider variation in the values of the ratio is clearly evident in the figure, but the inverse association of ratio and rate is retained. All ratios less than 0.53 are associated

with total frequency rates of more than 800 while all ratios larger than 0.56 are, with two exceptions, associated with frequencies of less than 700, the two exceptions, as in the corresponding instance of all sickness, being the first and fourth quarters of 1942.

The contribution of the first quarter is again an important element in the determination of the inverse character of the relationship; the

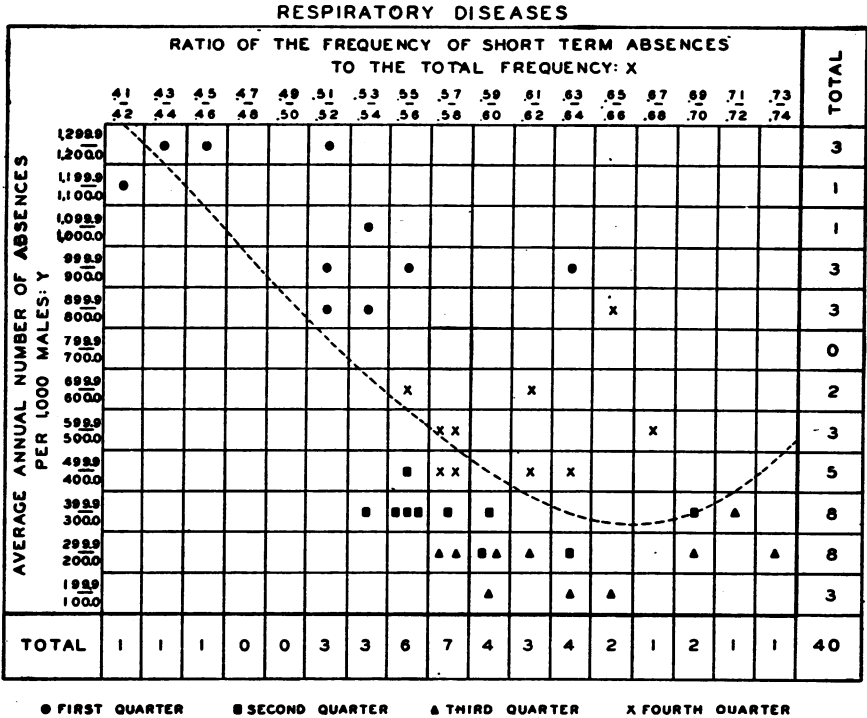


FIGURE 3.—Scatter diagram showing the relationship between the proportion of short-term absences and the total frequency of absences due to the respiratory diseases; experience of male employees in a public utility, 1933-42, inclusive. The broken curve may be described by the cubic equation: $Y = -836 + 23,071X - 61,536X^2 + 44,316X^3$.

first-quarter rates, all higher than 800, are in general associated with ratios of less than 0.57. Also of importance is the contribution of the third quarter whose ratios range from 0.57 to 0.74, the associated frequencies falling between 100 and 400.

As in the instance of all sickness it is possible to describe the frequency-ratio trend by a cubic curve. The calculated equation of the curve reads $Y = -836 + 23,071X - 61,536X^2 + 44,316X^3$, and the curve is shown in figure 3.

DISCUSSION

The 10-year experience of the male public utility workers showed generally a relatively low proportion of short absences in the quarter

for which were recorded relatively high frequencies of sickness or respiratory diseases. The mean proportion of short absences for all sickness varied in the 4 quarters from 52 percent in the first quarter to 62 percent in the third, with 58 percent and 60 percent representing the second and fourth quarters, respectively. The corresponding upper and lower limits for the respiratory diseases were 51 and 64 percent, with 58 and 61 percent for the second and fourth quarters, respectively. Thus the elimination of the nonrespiratory diseases effected relatively little change in the proportions for all sickness.

However, the range of the proportions corresponding to the 40 quarter-years increased from 45-68 percent to 41-74 percent when the nonrespiratory diseases were eliminated, the frequency range changing from 400-1,700 to 100-1,300. Thus, while the range of the proportions widened, the frequency range remained almost the same but was translated necessarily to a lower level, the downward movement covering approximately 300 frequency units.

The inverse association of frequency and proportion of short-term absences is of particular interest from the standpoint of seasonal variation. The effect of the winter months on absence frequency is well known; it now appears that the periodic increase in frequency is not evenly distributed among the disabilities of different durations but is less in evidence among the short-term absences. Likewise, the general decrease in frequency during the summer months is accompanied by a relatively smaller decrease in the frequency of the short-term absences.

SUMMARY

The present inquiry, the fifth of a series on the duration of disabling sickness, is concerned with the frequency of short-term absences lasting less than 4 days and its relation to the total frequency.

Based on the 10-year disability experience of a public utility company, it is shown that high total frequencies regularly occurring in the first quarter of each year are associated with relatively small proportions of short-term absences, the proportion tending to become smaller in epidemic periods; on the other hand, the low total frequencies generally appearing in the third quarter of each year are associated with relatively large proportions of such absences. A further investigation of this relationship by means of scatter diagrams for all sickness and the respiratory group of diseases revealed, in general, an inverse association between the magnitude of the total frequency and the proportion of short-term absences. Two cubic equations describing the trend of the relationship are presented for all sickness and the respiratory group of diseases.

REFERENCES

- (1) Gafafer, W. M., and Frasier, E. S.: Studies on the duration of disabling sickness. I. Duration of disability from sickness and nonindustrial injuries among the male and female memberships of 25 industrial sick benefit organizations, 1935-37, inclusive. Pub. Health Rep., 55: 1892-1903 (Oct. 18, 1940). (Reprint No. 2201.)
- (2) Gafafer, W. M., and Frasier, E. S.: Studies on the duration of disabling sickness. II. Duration of disability from sickness and nonindustrial injuries among male workers, disabilities lasting one calendar day or longer. Pub. Health Rep., 57: 1378-1384 (Sept. 11, 1942). (Reprint No. 2404.)
- (3) Gafafer, W. M., Sitgreaves, R., and Frasier, E. S.: Studies on the duration of disabling sickness. III. Duration of disability from sickness and nonindustrial injuries among the male employees of an oil refining company with particular reference to the older worker, 1933-39, inclusive. Pub. Health Rep., 57: 112-125 (Jan. 23, 1942). (Reprint No. 2350.)
- (4) Gafafer, W. M., and Sitgreaves, R.: Studies on the duration of disabling sickness. IV. Duration of disability from the nonrespiratory-nondigestive diseases among male employees with particular reference to the older worker. Pub. Health Rep., 58: 969-979 (June 25, 1943). (Reprint No. 2487.)
- (5) Gafafer, W. M.: Absenteeism. Chapter 24 in *Manual of Industrial Hygiene and Medical Service in War Industries*. W. B. Saunders Co., Philadelphia, 1943.
- (6) Gafafer, W. M.: Frequency and duration of disabilities causing absence from work among the employees of a public utility, 1938-42. Pub. Health Rep., 58: 1554-1560 (Oct. 15, 1943). (Reprint No. 2520.)

PATHOLOGIC CHANGES IN ANIMALS EXPOSED TO A COMMERCIAL CHLORINATED DIPHENYL¹

By J. W. MILLER, *Surgeon (R), United States Public Health Service*

The demands of industry as a result of the war have greatly increased the use of chlorinated naphthalenes and chlorinated diphenyls. In the past few years the hazards associated with their application have attracted much interest and a number of reports regarding the systemic and dermatologic effects of exposure, including fatal cases, have been made.

Only the pathologic changes in animals exposed to a commercial chlorinated diphenyl are given here.

The chlorinated diphenyl used was viscous, almost water white, and clear at room temperature. It consisted of a mixture of isomers of diphenyl chlorinated in different positions and extent, with an approximate chlorine content of 42 percent and an approximate empirical formula of $C_{12}H_7Cl_3$. It was insoluble in water but soluble in mineral and vegetable oils, other chlorinated hydrocarbons, and fat solvents. Its specific gravity was 1.374 to 1.393.

Guinea pigs, rats, and rabbits were exposed to the above compound by subcutaneous injections, feeding, and applications to the skin and cornea. The survival times given here refer only to animals subjected to pathologic examination in each exposed group. Certain additional

¹ From the Industrial Hygiene Research Laboratory, National Institute of Health. This material is based on experiments conducted by Surgeon Benjamin F. Jones and Physiologist D. D. Donahue.

results reported are from groups of animals exposed solely to obtain pathologic data.

I. SUBCUTANEOUS INJECTIONS

(A) GUINEA PIGS

A series of 31 guinea pigs was injected subcutaneously with a single dose of 0.05 cc. (69 mg.) of the chlorinated diphenyl. Some of these animals were killed and examined at 2-day intervals up to 38 days after injection. Sections were made of the liver, lungs, spleen, kidneys, adrenals, pancreas, heart, and skin, and were stained with hematoxylin and eosin, eosin-polychrome methylene blue (1), and frozen sections with hematoxylin and Sudan IV (2).

Skin.—In 2 days the skin lesion at the site of subcutaneous injection consisted of a central, faintly basophilic necrotic mass containing much nuclear debris, many polymorphonuclears, and lymphocytes. Much of the nuclear material was present at the periphery. On the periphery were, first a zone of fibrin, then one of monocytes, leucocytes, lymphocytes, and, externally, a few fibroblasts which extended into the adjacent muscle and subcutaneous tissue. In 4 days a poorly-defined zone of fibroblasts accompanied by numerous capillaries was noted in the periphery. In 6 days the necrotic material had become eosinophilic. There was a central portion of finely granular and fibrinoid material surrounded by a zone of nuclear fragments, and a fairly well defined capsule of connective tissue and fibroblasts which extended into the adjacent fat and muscle. If, however, the injected material had been placed in the superficial portion of the derma, the inner portion of the capsule was partially lined by stratified squamous epithelium extending down from the epidermis. The layers of cells adjacent to the necrotic debris were strongly oxyphil, flattened, and lacked nuclei, thus presenting the appearance of early keratinization. These changes are essentially those of chloracne (3, 4, 5), though the latter are thought to be due to mechanical occlusion of the ducts resulting in accumulation of secretion within the glands.

Encapsulation progressed from the eighth to the thirty-eighth day. When the lesion was superficial, the epithelium continued to develop until it lined the cyst wall, and the portion adjacent to the necrotic material was cornified. The outer layers of fibrous tissue became increasingly collagenous. The necrotic material remained eosinophilic in most cases and nuclear remains became less abundant. When the lesion was deep, the capsule consisted of adult connective tissue; otherwise the appearance was the same.

Liver.—Eight to 10 days after injection, fat droplets were noted in the liver cells. At early examinations, these were very few in numbers, but after 16 days they were present in moderate or very large

numbers. Small fat droplets were generally scattered throughout the lobule, although in some of the sections they were present only about the portal canals. Central atrophy, usually slight or moderate in degree, occurred in practically all of the animals with hepatic fat, and made its appearance at about the same time as the fat. Congestion of the sinusoids was absent in all but 2 of the animals. At irregular intervals and with no particular regard to interval after injection, a slight to moderate amount of perinuclear, basophilic granulation was noted in the liver cells in sections stained with eosin-methylene blue. Focal necrosis occurred in only 4 of 31 animals. It was found in various portions of the lobules and may not be significant.

Spleen.—The spleen showed no particular lesions.

Kidneys.—The kidneys were essentially normal in most of the series. A slight to moderate congestion of the interstitial capillaries was noted. Fat was present in the cells of the convoluted tubules in only two animals.

The adrenals, heart, lungs, and pancreas showed no noteworthy changes.

In another series of 23 animals receiving larger single doses of 0.1 to 0.5 cc. (138 to 690 mg.), which were killed or died from 2 to 24 days after injection, pathologic changes consistent with those found in the previous series were noted. Fatty degeneration in the liver was more marked, appearing on the second day in animals injected with 0.5 cc. (690 mg.). Approximately the same degree of central atrophy resulted from the injection of 0.5 cc. (690 mg.) as from 0.05 cc. (69 mg.); central atrophy was more frequent in animals dying or killed before the tenth day. Changes in the spleen were essentially the same except that lymphoid hyperplasia was more frequent and few to moderate numbers of hemosiderin-bearing cells were seen in 12 of 23 animals. In the kidneys congestion of capillaries was more frequent. Fat was absent. The adrenals showed cortical congestion in most animals, sometimes also medullary. Similar adrenal congestion has been observed with carbon tetrachloride (6). However in the latter it often goes on to hemorrhage and necrosis. The lungs in the animals which died during the test showed congestion of the alveolar capillaries and focal extravasation of red blood cells and serum into alveoli in only 4 animals. The changes in the skin were essentially the same as those noted before. However, in contrast with the findings following administration of smaller doses, with larger doses the necrotic material in the derma remained basophilic in reaction. The heart and pancreas were normal.

A third series of 10 guinea pigs received a single 0.5 cc. (345 mg. as chlorinated diphenyl) dose of the chlorinated diphenyl dissolved in an equal amount of mineral oil. These all died within 13 days. The

pathologic picture was essentially the same as noted in the previous series. The lungs showed somewhat greater congestion and edema in 9 of 10 guinea pigs.

(B) RATS

A series of 20 rats received a single dose of 0.05 cc. (69 mg.) of chlorinated diphenyl subcutaneously. Animals were killed at 2 and 7 days and at 10-day intervals thereafter up to 90 days.

Liver.—Fat appeared in liver cells of rats much earlier than in guinea pigs. It was already present 2 days after injection and was fairly constant throughout the remainder of the series. Central atrophy was less marked. There was no greater periportal lymphocytic infiltration than in untreated rats. Irregular basophilic stippling of liver cell cytoplasm was noted, as much in untreated controls as in experimental animals.

Spleen.—Congestion of the cavernous veins was more frequent, while reticuloendotheliosis was only slight and often absent. Pulp myelosis, most about trabeculae, occurred in all but two of the animals and varied from slight to marked, as commonly seen in rats.

The lungs, kidneys, adrenals, and pancreas showed no changes. The lesions in the skin were identical with those noted in the guinea pigs in which the materials had been injected deeply. In all but one of the cases the capsule about the necrotic mass consisted of fibrous tissue and fibroblasts. In one animal killed 60 days after injection, a partial epithelial lining of the cavity was noted.

A second series of 10 rats, receiving a 0.5 cc. (690 mg.) dose, was killed at the same time intervals, the last at 40 days. In these, fatty changes in the liver were more marked. The spleen showed considerable hypertrophy in most cases. The other organs were essentially the same.

Two other groups of 4 rats each were given 10 doses (total of 690 mg.) on alternate days and 27 doses (total of 1,863 mg.) daily of 0.05 cc. (69 mg.), respectively. Half of each group was killed 60 and 90 days after the first injection. In all of the rats receiving 10 such doses peculiar round or oval intracellular bodies were observed in the livers of the animals in both 60- and 90-day groups. However a negligible number were found in only 1 rat injected 27 times.

These bodies varied considerably in size. The smaller were homogeneous and usually oxyphilic. Somewhat larger ones showed a denser periphery and paler center. As size increased the central portion became either granular, reticular, or foamy in appearance and occasionally contained a small faintly eosinophilic body about the size of a nucleolus. With the increase in size the shell became sharply demarcated. It was hyaline and deeply eosinophilic, with a scant basophilic outer margin, and sometimes presented a concentric

lamination. The thickness of this hyaline shell varied. Many of the bodies were often within a single cell. They were generally present in the cells in the central one-third to four-fifths of the lobule. The changes in the other organs were consistent with the findings in the previous groups.

(C) RABBITS

Two rabbits were given 0.5 cc. (690 mg.) and another 1.0 cc. (1,380 mg.) for 10 consecutive days. They died 16, 72, and 14 days after injection. Three more received 10 similar daily doses of 345 and 690 mg. as a 50 percent solution of the material in mineral oil and died in 46, 360, and 42 days. Both groups showed essentially the same pathology.

The liver contained numerous fine fat droplets accompanied by focal necrosis in 2 of the rabbits receiving the undiluted material. No fat or other significant changes were observed in those injected with the 50 percent solution. Occasionally slight centrolobular atrophy of liver cell cords was noted. The pathology of the other organs and of the skin lesions was identical with that encountered in the guinea pig and the rat.

II. SKIN APPLICATION TESTS

(A) GUINEA PIGS

One series of 11 guinea pigs received 11 daily skin applications of about 1/40 of a cc. (34.5 mg.) of the undiluted chlorinated diphenyl. These died at various intervals up to 21 days following first application. The pathologic changes in the liver, kidneys, lungs, adrenals, and heart were essentially those noted in the subcutaneous injection series. The spleen showed less pathology. The skin lesions, however, differed from those in the subcutaneous group. In another series of 2 animals receiving 11 (17 mg.) doses with an equal amount of mineral oil, similar changes were noted.

Changes in the skin were not constant in the animals which died in 12 to 21 days after the first of 11 applications of the undiluted material. The principal changes were injection of the capillaries of the derma and occasional thickening of the epidermis. The congestion was sometimes accompanied by edema of the derma adjacent to the small blood vessels. In one instance, a moderate infiltration of lymphocytes occurred.

In a group of 14 animals painted daily with 10, 20, 30, and 50 percent (3.5 to 17 mg.) chlorinated diphenyl in mineral oil, and which died or were killed 7 to 15 days after first application, the primary change was thinning and often destruction of the superficial, cornified layers of the epithelium. When destruction of the epidermis occurred, the superficial cells contained fine, granular material, and in

some eosinophilic inclusions. The amount of involvement of the skin appeared to have no relationship with the dose or length of exposure. The reaction was not that of an acute inflammation.

(B) RATS

Sixteen rats received 25 daily applications of about 1/40 of a cc. (34.5 mg.) of the undiluted chlorinated diphenyl and were killed at 10-day intervals beginning at 30 and ending at 90 days after initial treatment.

Very little fat was found in the liver of 6 of the animals. Three rats showed the hyaline bodies in the liver cells at the 60- and 90-day intervals.

Slight to moderate degree of congestion of the cavernous veins of the spleen was noted. Pulp myelosis was present in a moderate degree. In 7 of the 16 animals, a slight to moderate amount of intracellular hemosiderin was noted.

No significant changes were found in the kidneys, heart, pancreas, and lungs.

In some of the rats the treated skin was much thickened, and the hair follicles were swollen and poorly defined.

(C) RABBITS

Eleven rabbits received cutaneous applications, at 2-day intervals, of about 86 mg. for the first 7 and 172 mg. for the last 8 applications of the undiluted chlorinated diphenyl. The animals were examined as death occurred between 17 and 98 days. The number of applications varied from 9 to 15. Seven of the rabbits received the latter number.

Fatty degeneration and central atrophy of the liver cells were more prominent than in the previous series of experiments.

The spleen showed less pathology and in two of the animals (90 and 98 days) was normal. The changes noted were slight to marked congestion of the cavernous veins and slight to moderate follicular lymphoid hyperplasia. Focal caseous necrosis occurred in four instances, but was probably due to intercurrent infections.

Changes in the heart, lungs, adrenals, and kidneys were slight and consisted primarily in congestion.

The skin showed thinning of the prickle cell layer and relative thickening of the outer cornified layers.

III. FEEDING EXPERIMENTS

(A) GUINEA PIGS

A series of 8 guinea pigs received 2 doses of 0.05 cc. (69 mg.) of the chlorinated diphenyl 1 week apart. Death occurred in 11 to 29 days after initial feeding.

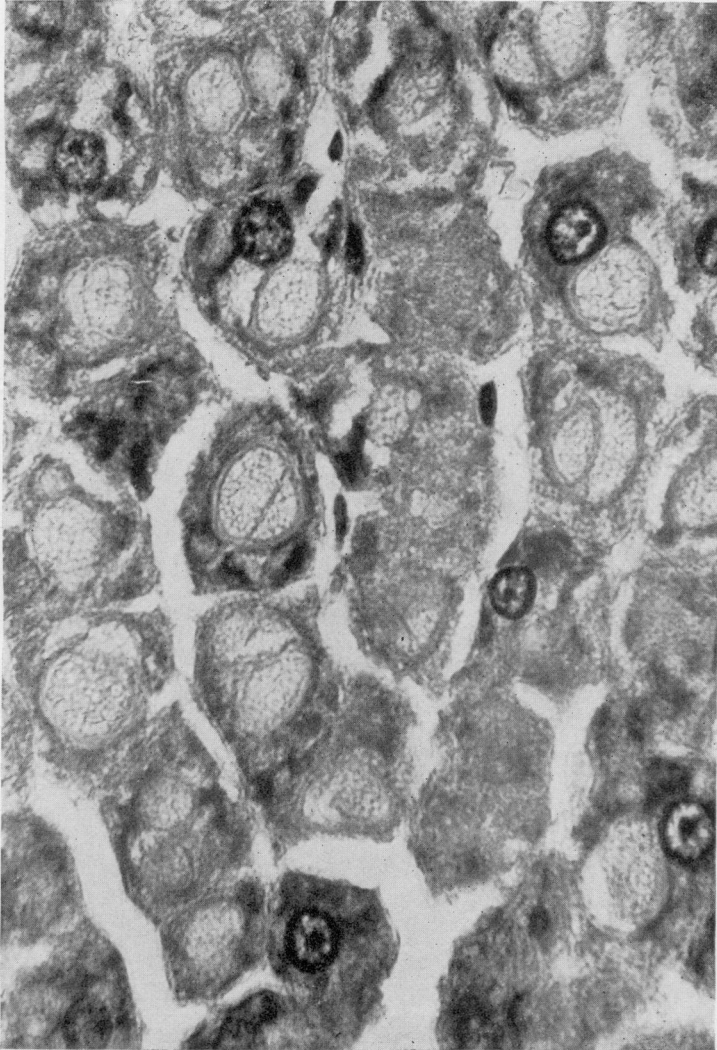


FIGURE 1.—Intracellular hyaline bodies in livers of rats exposed to a chlorinated diphenyl.

The changes in the liver were more marked in this series than in the others. Fatty metamorphosis was extensive in all of the animals and was of mixed fine, medium, and large droplet variety. Central atrophy was noted in only 2 animals dying 18 and 29 days after the initial feeding.

The changes in the other organs were of the same negligible character and degree as observed in the other experiments. The gastrointestinal tract showed no abnormal histology. No changes were noted in the central nervous system.

(B) RATS

Twelve rats receiving 25 daily doses of 0.1 cc. (138 mg.) were killed and examined at 10-day intervals, beginning at 30 and ending at 90 days after initial feeding.

The pathologic findings were practically identical with those of the series of rats receiving skin applications of 25 daily doses. The intracellular hyaline bodies mentioned previously were found in the livers of 2 of the animals. No changes were noted in the gastrointestinal tract.

IV. APPLICATIONS TO CORNEA

RATS

A small amount (1 drop from a 25-gage hypodermic needle, approximately 1/80 cc. or 17 mg.) of chlorinated diphenyl was instilled into the eyes of 8 rats for 25 consecutive days. Beginning 30 days after the initial dose, 2 of the animals were killed and examined each 10 days.

The pathologic changes were very scant in degree. Slight central atrophy of the liver cords occurred in half of the rats at various irregular intervals. Slight to moderate congestion of cavernous veins of the spleen was constant. The presence of blood pigment, both free and intracellular, occurred rather frequently in the spleen.

The conjunctival tissue presented no gross changes when examined under magnification in the living animal.

SUMMARY AND DISCUSSION

Guinea pigs, rats, and rabbits were exposed to a commercial chlorinated diphenyl by subcutaneous injections and applications to the skin. The material was also administered to guinea pigs and rats by ingestion and to rats alone by corneal instillations. The doses varied from 17 to 1,380 mg. and were either single or were repeated at regular intervals.

Two conspicuous pathologic findings were observed—liver damage in all series of experiments and skin changes in the animals receiving subcutaneous injections or applications of the material to the skin.

Fatty degeneration and atrophy of the centrolobular cells were present in varying amounts and in varying numbers of animals in

the different test groups. In the rat an additional finding, hyaline bodies within the liver cells, was noted in certain animals. It was possible to detect a difference in response of the three species to the material on the basis of liver damage. Most liver damage was found in the guinea pig, less in the rabbit, and least in the rat. This same species order was followed, regardless of dose, duration of test, or mode of administration.

Hepatic fat appeared in the guinea pigs receiving 0.05 cc. subcutaneously in 10 days and remained in significant amounts throughout 38 days. Rats receiving the same amount showed fat in 2 days but only small amounts were noted in some of the animals over a period of 90 days. Fat appeared earlier in both rats and guinea pigs receiving larger doses. The involvement was generally centrolobular.

Fatty degeneration, when compared with the other routes of administration, was most marked in the guinea pigs fed the chlorinated hydrocarbon but was absent in rats similarly treated. Central atrophy was more or less the same throughout the series of tests. Only slight central atrophy was present in about half of the rats treated by application of the material to the cornea.

Intracellular hyaline bodies were found in the liver of the rat alone. They were present, usually in large numbers, in all of the rats receiving 10 0.05-cc. doses and in some of the animals receiving 25 doses by skin and corneal applications and ingestion, but were not observed in any of the animals subjected to single doses. These bodies were noted in the animals sacrificed 50, 60, and 90 days after first exposure. None were observed in rats examined prior to 50 days on test. They occurred in from 20 to 38 percent of the animals treated in the various ways. They were somewhat less marked in degree and in number of animals when the chlorinated diphenyl was ingested. These findings agree with Bennett (7) who reported similar hyaline bodies in liver cells of white rats exposed to mixtures of chlornaphthalenes and chlorinated diphenyl, chlorinated diphenyl, and less frequently to mixtures of chlornaphthalenes. To date such bodies have only been observed in rats exposed to such chlorinated compounds.

It is interesting to note that while the bodies appeared in all of a series of 4 rats receiving 10 0.05-cc. subcutaneous doses given on alternate days, they were absent in 4 rats treated with the same amount by 27 consecutive daily injections after 60 and 90 days following first exposure. The liver cells in the latter series showed very slight deviation from normal, namely, areas of oxyphil granulation of cytoplasm and occasional loss of nucleus. It is possible that the gradual accumulation of 1,863 mg. over a period of 27 days so damaged the liver cells functionally that they were unable to form the hyaline material. The hyaline bodies are morphologically different from those produced by butter yellow in hepatic tumor cells (8).

They probably represent further development of the same general type of hyaline degeneration as has been observed with certain azobenzenes (9).

The skin lesions produced by subcutaneous injection were histologically similar to those of chloracne in man. The changes produced by direct application to the skin were not constant and were essentially those of low-grade irritation. The failure of local applications to produce acne lesions may be due to relatively early deaths from systemic toxic action before pathology could be produced in the skin or the amount tolerated without causing death was too small to cause such lesions.

Attention is called to the fact that the chlorinated diphenyl used in the above experiments produces liver changes in the rat having marked differences from those resulting from other toxic substances and that such changes were not found in the guinea pig and rabbit.

REFERENCES

- (1) Lillie, R. D.: Romanowsky staining with buffered solutions. III. Extension of the method to Romanowsky stains in general. *Stain Tech.*, **16**: 1-6 (1941).
- (2) Herxheimer, G.: Zur Fettfarbung. *Centralbl. f. Allg. path. u. Anat.*, **14**: 891 (1903).
- (3) Schwartz, L., and Peck, S. M.: Occupational acne. *New York State Med.J.*, **43**: 1711-1718 (Sept. 15, 1943).
- (4) Schwartz, L., and Barlow, F. A.: Chloracne from cutting oils. *Pub. Health Rep.*, **57**: 1747-1752 (Nov. 20, 1942).
- (5) Schwartz, L.: An outbreak of halowax acne ("cable rash") among electricians. *J. Am. Med. Assoc.*, **122**: 158-161 (May 15, 1943).
- (6) Lillie, R. D.: Personal communication.
- (7) Bennett, G. A., Drinker, C. K., and Warren, M. F.: Morphological changes in the livers of rats resulting from exposure to certain chlorinated hydrocarbons. *J. Indust. Hyg. and Toxicol.*, **20**: 97-123 (February 1938).
- (8) Edwards, J. E., and White, Julius: Pathologic changes with special reference to pigmentation and classification of hepatic tumors in rats fed *p*-dimethylaminoazobenzene (butter yellow). *J. Nat. Cancer Inst.*, **2**: 157-183 (October 1941).
- (9) Smith, M. I., Lillie, R. D., and Stohlman, E. F.: The toxicity and histopathology of some azo compounds as influenced by dietary protein. *Pub. Health Rep.*, **58**: 304-317 (Feb. 19, 1943).

DEATHS DURING WEEK ENDED AUGUST 5, 1944

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

	Week ended Aug. 5, 1944	Correspond- ing week, 1943
Data for 93 large cities of the United States:		
Total deaths.....	8, 125	8, 286
Average for 3 prior years.....	7, 801	
Total deaths, first 31 weeks of year.....	288, 008	294, 930
Deaths under 1 year of age.....	654	639
Average for 3 prior years.....	600	
Deaths under 1 year of age, first 31 weeks of year.....	19, 218	20, 927
Data from industrial insurance companies:		
Policies in force.....	66, 691, 894	65, 698, 468
Number of death claims.....	11, 548	10, 889
Death claims per 1,000 policies in force, annual rate.....	9. 1	8. 6
Death claims per 1,000 policies, first 31 weeks of year, annual rate.....	10. 3	10. 1

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 AUGUST 12, 1944

Summary

The number of reported cases of poliomyelitis increased from 932 for the preceding week to 1,015 for the current week, increased incidence being reported in the Northeastern, Northern, and Western geographic areas, decreases in the South Central States, and the same number being reported for each week in the South Atlantic area. Of 14 States reporting 20 or more cases for the current week, 5 States reported decreases, 8 reported increases, and 1 State, Massachusetts, reported the same number for each week (23 cases): *Increases* (last week's figures in parentheses)—New York 356 (311), New Jersey 21 (16), Ohio 57 (48), Illinois 27 (14), Michigan 53 (40), Minnesota 24 (14), North Carolina 61 (40), Oregon 20 (16); *decreases*—Pennsylvania 72 (86), Indiana 33 (36), Maryland 26 (27), Virginia 35 (63), Kentucky 47 (65). The incidence increased in North Carolina after a decline for 4 successive weeks.

A total of 5,009 cases has been reported to date this year, as compared with 3,311 for the same period last year, 3,729 and 3,942 for the corresponding periods of 1934 and 1931, respectively. For the 7 weeks since June 25, a total of 4,227 cases has been reported, as compared with 2,417 for the same period last year.

The annual case rates of poliomyelitis per 100,000 population for recent years in the United States are as follows: 1934—5.9; 1935—8.4; 1936—3.5; 1937—7.3; 1938—1.3; 1939—5.6; 1940—7.4; 1941—6.9; 1942—3.2; 1943—9.3.

The incidence of meningococcus meningitis continues to decline, although it is still currently nearly 6 times the median expectancy, while the cumulative total to date this year is nearly 10 times the 5-year (1939-43) cumulative median for the period, though slightly below that for last year.

Of a total of 198 cases of endemic typhus fever reported for the current week (131 for the same week last year), Texas reported 81 cases, Alabama 31, and Georgia 28.

The cumulative incidence of typhoid fever to date this year (3,087) has dropped below the figure for last year (3,090), which was the lowest on record.

A total of 8,150 deaths was reported for the week in 93 large cities in the United States as compared with 8,140 last week and a 3-year average of 7,591 for the week. The cumulative figure for these cities to date is 296,173 as compared with 302,958 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended August 13, 1944, and comparison with corresponding week of 1943 and 5-year median

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

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1939-43	Week ended—		Median 1939-43	Week ended—		Median 1939-43	Week ended—		Median 1939-43
	Aug. 12, 1944	Aug. 14, 1943		Aug. 12, 1944	Aug. 14, 1943		Aug. 12, 1944	Aug. 14, 1943		Aug. 12, 1944	Aug. 14, 1943	
NEW ENGLAND												
Maine.....	3	1	0				2	28	12	0	0	0
New Hampshire.....	0	0	0				0	0	1	1	0	0
Vermont.....	0	0	0				4	19	14	0	2	0
Massachusetts.....	1	3	3				46	121	83	8	11	2
Rhode Island.....	0	0	0				0	12	11	0	4	0
Connecticut.....	1	0	0		2		9	26	19	4	5	1
MIDDLE ATLANTIC												
New York.....	6	2	8	1	(1)	11	129	310	208	22	21	7
New Jersey.....	3	1	1	1	3	2	38	153	66	9	12	1
Pennsylvania.....	7	5	8				34	47	47	12	12	2
EAST NORTH CENTRAL												
Ohio.....	1	5	3	1	2	4	21	87	32	8	6	1
Indiana.....	5	7	5	3	2	2	5	23	6	1	9	0
Illinois.....	4	6	13	4	2	2	18	58	40	8	11	0
Michigan ¹	9	2	2	1	1	1	37	96	88	8	3	1
Wisconsin.....	1	2	0	14	7	7	144	240	141	3	4	0
WEST NORTH CENTRAL												
Minnesota.....	4	0	0	1	1		12	39	11	1	2	0
Iowa.....	3	4	2				2	5	21	4	1	0
Missouri.....	1	1	1	1			29	16	3	11	5	0
North Dakota.....	0	0	3				0	23	5	0	0	0
South Dakota.....	0	2	1				0	9	3	0	0	0
Nebraska.....	1	2	0	2	2		12	3	3	0	0	0
Kansas.....	2	3	3				6	10	10	1	0	0
SOUTH ATLANTIC												
Delaware.....	0	0	0				0	2	0	1	2	0
Maryland ¹	0	1	2	1	1		1	30	6	5	2	1
District of Columbia.....	0	0	1	1			6	7	7	1	3	0
Virginia.....	9	3	9	23	26	37	11	20	20	2	8	1
West Virginia.....	10	2	4			2	1	6	5	4	0	0
North Carolina.....	11	9	10				31	29	29	2	7	1
South Carolina.....	5	7	7	57	101	110	8	11	6	0	1	1
Georgia.....	5	7	9	5	24	16	4	10	6	3	2	1
Florida.....	4	2	2		5	4	4	1	4	4	10	0
EAST SOUTH CENTRAL												
Kentucky.....	3	1	3	1		1	13	4	4	2	0	1
Tennessee.....	5	5	4	9	5	6	2	27	9	3	0	0
Alabama.....	5	11	11	3	9	16	3	20	8	3	0	2
Mississippi ¹	7	3	3							3	4	1
WEST SOUTH CENTRAL												
Arkansas.....	4	3	6	12	1	11	4	21	4	0	0	0
Louisiana.....	3	8	2	5	1	3	4	4	4	0	0	0
Oklahoma.....	1	1	3	2	2	7	22	10	2	0	4	0
Texas.....	30	22	21	210	210	151	75	50	50	3	4	2
MOUNTAIN												
Montana.....	1	2	1				1	36	8	1	0	0
Idaho.....	0	0	0				6	3	1	0	0	0
Wyoming.....	4	2	2		1		2	5	5	1	1	1
Colorado.....	4	3	4	4	16	9	5	23	8	2	2	0
New Mexico.....	7	1	0				2	0	4	0	1	0
Arizona.....	2	3	1	8	40	18	8	16	9	2	1	1
Utah ¹	0	0	0				7	12	12	2	0	0
Nevada.....	1	0	0				9	13	2	0	0	0
PACIFIC												
Washington.....	0	10	2	2			26	21	21	0	3	0
Oregon.....	2	0	0	3	4	3	45	20	20	2	3	1
California.....	20	13	10	6	26	17	201	126	113	11	19	2
Total.....	195	165	165	380	483	451	1,139	1,852	1,539	158	185	33
32 weeks.....	6,557	7,053	7,456	338,114	81,161	151,290	590,181	535,948	465,740	12,944	13,368	1,392

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

Telegraphic morbidity reports from State health officers for the week ended August 12, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever ²		
	Week ended—		Me-dian 1939-43	Week ended—		Me-dian 1939-43	Week ended—		Me-dian 1939-43	Week ended—		Me-dian 1939-43
	Aug. 12, 1944	Aug. 14, 1943		Aug. 12, 1944	Aug. 14, 1943		Aug. 12, 1944	Aug. 14, 1943		Aug. 12, 1944	Aug. 14, 1943	
NEW ENGLAND												
Maine.....	0	0	0	14	2	2	0	0	0	0	0	0
New Hampshire.....	0	0	0	0	2	1	0	0	0	0	0	0
Vermont.....	3	0	1	1	6	3	0	0	0	1	0	0
Massachusetts.....	23	1	1	47	45	45	0	0	0	3	1	2
Rhode Island.....	1	8	0	0	0	0	0	0	0	1	0	0
Connecticut.....	10	27	2	4	6	4	0	0	0	0	3	3
MIDDLE ATLANTIC												
New York.....	356	30	11	54	48	61	0	0	0	9	8	16
New Jersey.....	21	5	5	16	11	18	0	0	0	1	8	6
Pennsylvania.....	72	3	3	36	32	41	0	0	0	3	10	15
EAST NORTH CENTRAL												
Ohio.....	57	1	9	82	49	49	0	0	0	2	10	10
Indiana.....	33	3	7	12	6	10	1	1	0	5	5	6
Illinois.....	27	70	8	46	33	35	0	2	1	3	4	7
Michigan ³	53	4	10	39	18	35	1	0	0	4	4	4
Wisconsin.....	8	1	1	52	44	34	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota.....	24	5	7	14	13	13	0	1	0	2	0	1
Iowa.....	13	5	3	13	9	6	0	0	0	0	5	5
Missouri.....	2	11	4	4	9	13	0	0	0	4	7	9
North Dakota.....	2	2	1	0	3	3	2	9	0	0	0	0
South Dakota.....	0	0	0	3	19	6	6	0	1	2	0	0
Nebraska.....	4	5	1	3	3	5	0	0	0	0	0	0
Kansas.....	9	59	6	7	15	16	0	0	0	4	0	4
SOUTH ATLANTIC												
Delaware.....	9	0	0	1	0	0	0	0	0	0	0	0
Maryland ³	26	0	1	16	10	10	0	0	0	3	3	3
District of Columbia.....	10	0	0	4	5	3	0	0	0	0	1	1
Virginia.....	35	3	3	12	13	11	0	0	0	4	7	9
West Virginia.....	15	2	2	24	22	12	0	0	0	10	5	6
North Carolina.....	61	3	5	23	27	24	0	0	0	4	3	8
South Carolina.....	6	0	2	1	6	4	0	0	0	4	4	8
Georgia.....	5	0	1	12	5	7	0	0	0	15	12	23
Florida.....	0	0	2	2	1	2	0	0	0	7	2	5
EAST SOUTH CENTRAL												
Kentucky.....	47	3	6	13	11	13	0	0	0	17	11	17
Tennessee.....	49	1	3	9	22	12	0	0	0	6	8	11
Alabama.....	6	1	2	13	4	8	0	0	0	3	4	12
Mississippi ³	5	0	2	3	4	4	0	0	0	2	11	11
WEST SOUTH CENTRAL												
Arkansas.....	2	5	3	3	2	5	0	0	0	4	7	19
Louisiana.....	11	7	2	2	2	1	0	0	0	5	10	10
Oklahoma.....	3	40	2	2	5	5	0	0	0	6	10	10
Texas.....	7	67	3	27	22	12	0	1	0	16	17	16
MOUNTAIN												
Montana.....	1	0	0	3	3	5	0	1	0	0	3	1
Idaho.....	1	0	0	4	1	1	0	0	0	0	0	0
Wyoming.....	0	0	0	0	5	1	0	0	0	0	0	0
Colorado.....	0	7	1	5	19	8	0	0	0	0	1	1
New Mexico.....	0	5	1	0	1	1	0	1	1	1	3	2
Arizona.....	3	2	2	1	8	2	0	0	0	1	5	1
Utah ³	2	9	1	6	11	2	0	0	0	0	0	1
Nevada.....	1	0	0	0	1	0	0	0	0	0	0	0
PACIFIC												
Washington.....	1	13	3	11	16	8	0	0	0	0	0	0
Oregon.....	20	13	0	7	8	6	1	0	0	1	5	3
California.....	11	94	12	60	62	35	0	0	0	3	0	4
Total	1,015	545	278	711	660	593	11	7	7	161	197	355
32 weeks.....	5,009	3,311	1,796	146,942	96,866	96,866	299	607	1,175	3,047	3,080	4,195

¹ Period ended earlier than Saturday.

² Including paratyphoid fever cases reported separately as follows: Massachusetts 7, Rhode Island 1, New York 2, Michigan 1, Minnesota 1, Georgia 2, Florida 2.

³ For the month of July, 2 additional cases of poliomyelitis were reported in Tennessee and are included in the cumulative totals.

Telegraphic morbidity reports from State health officers for the week ended August 12, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough			Week ended August 12, 1944								
	Week ended—		Median 1939-43	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	Aug. 12, 1944	Aug. 14, 1943			Amebic	Bacillary	Unspecified					
NEW ENGLAND												
Maine.....	18	14	20	0	0	0	0	0	0	0	0	0
New Hampshire.....	0	0	0	0	0	0	0	0	0	0	0	0
Vermont.....	39	42	14	0	0	0	0	0	0	0	0	0
Massachusetts.....	57	75	147	0	0	10	0	1	0	1	0	0
Rhode Island.....	2	14	13	0	0	0	0	0	0	0	0	0
Connecticut.....	54	30	36	0	0	3	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York.....	178	251	343	3	4	29	0	1	0	2	0	1
New Jersey.....	68	158	158	0	0	0	0	0	0	0	0	0
Pennsylvania.....	80	188	230	1	0	0	0	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio.....	257	150	243	0	0	2	0	1	0	1	0	0
Indiana.....	29	83	50	0	1	0	0	0	0	0	0	0
Illinois.....	143	190	204	0	3	3	0	2	0	0	0	0
Michigan ²	106	205	264	0	1	6	0	0	0	0	0	0
Wisconsin.....	176	236	220	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota.....	42	58	51	0	6	0	0	0	0	0	0	0
Iowa.....	5	20	42	0	0	0	0	1	0	1	0	0
Missouri.....	20	99	31	0	0	0	0	1	0	1	2	0
North Dakota.....	70	29	13	0	0	0	0	1	0	0	0	0
South Dakota.....	0	5	4	0	0	0	0	0	0	0	0	0
Nebraska.....	9	22	13	0	0	0	0	0	0	0	0	0
Kansas.....	42	58	50	0	1	0	0	1	0	0	0	0
SOUTH ATLANTIC												
Delaware.....	4	1	3	0	0	0	0	0	0	0	0	0
Maryland ²	124	124	74	0	0	0	2	0	0	4	0	1
District of Columbia.....	1	27	21	0	0	0	0	0	0	0	0	0
Virginia.....	53	163	81	0	0	0	226	0	0	4	1	0
West Virginia.....	29	44	43	0	0	0	0	0	0	0	0	0
North Carolina.....	215	136	145	0	0	0	0	0	0	5	0	15
South Carolina.....	77	71	35	0	0	21	0	0	0	0	1	4
Georgia.....	12	8	8	0	1	11	0	0	0	4	0	28
Florida.....	14	27	6	0	3	0	1	0	0	0	0	16
EAST SOUTH CENTRAL												
Kentucky.....	54	38	43	0	0	1	0	0	0	0	0	0
Tennessee.....	19	64	54	0	0	0	5	1	0	0	0	0
Alabama.....	9	26	21	0	2	0	0	0	0	0	0	31
Mississippi ²				0	0	0	0	0	0	0	0	13
WEST SOUTH CENTRAL												
Arkansas.....	11	21	14	0	2	45	0	0	0	0	1	0
Louisiana.....	0	13	15	0	4	36	0	0	0	0	0	8
Oklahoma.....	13	16	16	0	0	0	0	0	0	0	0	0
Texas.....	245	191	132	0	31	538	0	0	0	0	0	81
MOUNTAIN												
Montana.....	16	17	17	0	0	0	0	0	0	0	0	0
Idaho.....	3	0	3	0	0	0	0	0	0	0	0	0
Wyoming.....	11	1	4	0	0	0	0	0	0	2	0	0
Colorado.....	17	40	22	0	0	0	0	1	0	0	0	0
New Mexico.....	2	10	8	0	1	6	3	0	0	0	0	0
Arizona.....	20	13	11	0	0	0	47	0	0	0	0	0
Utah ²	62	89	55	0	0	0	0	0	0	0	3	0
Nevada.....	3	2	2	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	14	80	40	0	0	0	0	0	0	0	0	0
Oregon.....	2	43	30	0	0	0	0	0	0	0	0	0
California.....	53	155	155	0	2	13	0	1	0	0	0	0
Total	2,483	3,347	3,302	4	62	724	284	12	0	25	8	198
Same week, 1943.....	3,347			1	41	428	416	22	0	32	15	131
Same week, 1942.....	3,039			1	30	392	278	19	0	24	24	164
32 weeks, 1944.....	61,317			30	1,062	13,448	4,869	362	18	348	375	2,499
32 weeks, 1943.....	128,864			40	1,310	9,682	4,298	398	18	330	579	2,054
32 weeks, 1942.....	119,319		*128,864	56	682	5,320	4,027	299	34	*353	637	*1,409

² Period ended earlier than Saturday.^{*} 5-year median, 1939-43.

WEEKLY REPORTS FROM CITIES

City reports for week ended July 29, 1944

This table lists the reports from 88 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	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Case	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0	1	0	0	0	1	0	3	0	0	1
New Hampshire:												
Concord.....	0	0		0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston.....	2	0		0	39	2	10	2	7	0	1	10
Fall River.....	0	0		0	0	2	2	0	0	0	0	10
Springfield.....	0	0		0	4	2	0	2	1	0	0	8
Worcester.....	0	0		0	0	0	0	0	1	0	0	4
Rhode Island:												
Providence.....	0	0		0	11	1	0	0	1	0	0	6
Connecticut:												
Bridgeport.....	0	0		0	0	0	0	1	0	0	0	8
Hartford.....	0	0		0	1	1	0	0	3	0	0	0
New Haven.....	0	0		0	1	0	0	0	1	0	0	2
MIDDLE ATLANTIC												
New York:												
Buffalo.....	1	0		1	4	0	6	47	5	0	0	0
New York.....	7	1	2	0	14	14	39	50	27	0	5	64
Rochester.....	0	0		0	18	0	1	4	0	0	0	6
Syracuse.....	0	0		0	0	0	2	5	1	0	0	16
New Jersey:												
Camden.....	0	0		0	0	0	0	0	0	0	0	0
Newark.....	0	0		0	9	1	0	0	4	0	0	7
Trenton.....	0	0		0	0	0	1	0	0	0	0	0
Pennsylvania:												
Philadelphia.....	1	0		0	12	4	7	11	15	0	0	14
Pittsburgh.....	0	0		0	1	1	7	23	8	0	0	3
Reading.....	0	0		0	1	0	0	0	0	0	0	2
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	0	0		0	0	0	1	5	10	0	0	8
Cleveland.....	0	0		0	1	3	3	8	7	0	2	30
Columbus.....	0	0		0	0	0	0	2	4	0	0	25
Indiana:												
Fort Wayne.....	0	0		0	0	0	0	3	2	0	0	4
Indianapolis.....	0	0		0	0	3	2	0	2	0	0	2
South Bend.....	0	0		0	0	0	0	0	1	0	0	0
Terre Haute.....	0	0		0	0	0	0	0	1	0	0	0
Illinois:												
Chicago.....	2	0	2	0	17	9	10	5	11	0	0	35
Springfield.....	0	0		0	0	0	0	0	0	0	0	0
Michigan:												
Detroit.....	7	0		0	20	2	8	21	12	0	1	58
Flint.....	0	0		0	0	0	2	0	0	0	0	0
Grand Rapids.....	0	0		0	1	0	0	0	0	0	0	1
Wisconsin:												
Kenosha.....	0	0		0	1	0	0	0	0	0	0	22
Milwaukee.....	0	0		0	21	0	2	1	6	0	0	34
Racine.....	0	0		0	19	0	1	0	1	0	0	7
Superior.....	0	0		0	3	0	0	0	1	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	0	0		0	10	1	1	0	4	0	0	0
Minneapolis.....	0	0		0	1	1	5	2	13	0	1	0
St. Paul.....	0	0		0	4	1	2	6	0	0	0	16
Missouri:												
Kansas City.....	1	0		0	2	0	2	0	5	0	0	0
St. Joseph.....	0	0		0	0	0	0	0	1	0	0	0
St. Louis.....	0	2		0	1	3	5	0	3	0	1	7
Nebraska:												
Omaha.....	1	0		0	0	1	0	0	0	0	0	0
Kansas:												
Topeka.....	0	0		0	3	0	0	0	2	0	0	3
Wichita.....	0	0		0	0	0	2	1	1	0	0	4

City reports for week ended July 29, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia Deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0		0	0	0	1	0	0	0	0	0
Maryland:												
Baltimore.....	0	0		0	2	3	4	6	9	0	0	84
Cumberland.....	0	0		0	0	0	0	0	1	0	0	0
Frederick.....	0	0		0	0	0	0	0	0	0	0	0
District of Columbia:												
Washington.....	0	0		0	6	3	10	4	5	0	0	0
Virginia:												
Lynchburg.....	0	0		0	0	0	0	4	0	0	0	0
Richmond.....	0	0		0	0	0	2	0	2	0	0	0
Roanoke.....	0	0		0	0	0	0	9	1	0	0	3
West Virginia:												
Charleston.....	0	0		0	0	0	0	0	0	0	0	0
Wheeling.....	0	0		0	3	0	2	0	1	0	0	4
North Carolina:												
Raleigh.....	0	0		0	0	0	0	0	0	0	0	7
Wilmington.....	0	0		0	3	0	1	1	0	0	0	15
Winston-Salem.....	0	0		0	0	0	1	0	1	0	0	5
South Carolina:												
Charleston.....	0	0		0	0	1	0	0	0	0	0	1
Georgia:												
Atlanta.....	0	0	5	1	2	1	4	1	2	0	0	1
Brunswick.....	0	0		0	0	0	0	0	0	0	0	0
Savannah.....	0	0		0	0	0	2	1	0	0	0	0
Florida:												
Tampa.....	1	0	1	0	1	0	5	0	1	0	0	3
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	0	0		0	0	0	4	0	0	0	2	11
Nashville.....	0	0		0	1	0	3	1	0	0	0	1
Alabama:												
Birmingham.....	0	0		0	0	0	3	0	0	0	0	2
Mobile.....	0	0		0	0	1	0	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0	1	0	0	0	0	0	1	0	0	4
Louisiana:												
New Orleans.....	0	0		0	0	0	4	0	0	0	0	0
Shreveport.....	0	0		0	0	0	3	0	1	0	2	0
Texas:												
Dallas.....	0	0		0	3	0	1	0	1	0	0	4
Galveston.....	0	0		0	0	0	0	0	0	0	0	0
Houston.....	5	0		0	0	0	3	0	2	0	1	4
San Antonio.....	0	0	1	0	1	0	7	0	0	0	0	1
MOUNTAIN												
Montana:												
Billings.....	0	0		0	1	0	0	0	0	0	0	2
Great Falls.....	0	0		0	0	0	0	0	0	0	1	0
Helena.....	0	0		0	0	0	0	0	0	0	0	0
Missoula.....	0	0		0	0	0	0	1	1	0	0	0
Idaho:												
Boise.....	0	0		0	0	0	0	0	0	0	0	0
Colorado:												
Denver.....	2	0		0	4	0	3	0	4	0	0	20
Pueblo.....	0	0		0	0	0	0	0	2	0	0	0
Utah:												
Salt Lake City.....	0	0		0	11	0	1	0	2	0	0	14
PACIFIC												
Washington:												
Seattle.....	1	0		0	6	0	4	0	2	0	0	3
Spokane.....	0	0		0	5	0	1	0	0	0	0	1
Tacoma.....	5	0		0	2	0	2	0	3	0	0	1

City reports for week ended July 29, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC—continued												
California:												
Los Angeles.....	7	0	1	0	65	5	0	2	11	0	0	11
Sacramento.....	0	0	-----	0	4	0	3	0	4	0	0	4
San Francisco.....	1	0	1	1	41	1	4	0	10	0	0	6
Total.....	44	3	15	3	380	64	200	229	232	0	17	624
Corresponding week, 1943.....	24	-----	24	7	838	-----	262	-----	179	0	36	1,273
Average, 1939-43.....	44	-----	15	7	739	-----	245	-----	230	1	40	1,299

¹ 3-year average, 1941-43.

² 5-year median.

- Dysentery, amebic.*—Cases: Detroit, 2; St. Louis, 1; Los Angeles, 2; San Francisco, 1.
Dysentery, bacillary.—Cases: New Haven, 1; New York, 4; Chicago, 1; Detroit, 5; Charleston, S. C., 21; Nashville, 1; Los Angeles, 9.
Dysentery, unspecified.—Cases: Pittsburgh, 1; Richmond, 5; Shreveport, 1.
Rocky Mountain spotted fever.—Cases: New York, 1; Nashville, 1.
Tularemia.—Cases: Duluth, 1; St. Louis, 1.
Typhus fever, endemic.—Cases: Charleston, S. C., 1; Atlanta, 3; Brunswick, 1; Savannah, 4; Tampa, 7; Birmingham, 7; Mobile, 8; Shreveport, 2; Houston, 4; San Antonio, 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 88 cities in the preceding table (estimated population, 1943, 34,357,500)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Pollomyelitis 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.....	5.3	0.0	2.6	0.0	147	15.8	34.1	13.1	45	0.0	2.6	129
Middle Atlantic.....	4.2	0.5	0.9	0.5	27	8.3	29.2	54.8	28	0.0	1.3	47
East North Central.....	5.5	0.0	1.2	0.0	50	10.3	17.6	27.4	35	0.0	1.3	137
West North Central.....	4.0	4.0	0.0	0.0	42	12.1	34.2	18.1	58	0.0	4.0	60
South Atlantic.....	1.6	0.0	9.8	1.6	28	13.1	52.3	42.5	38	0.0	0.0	209
East South Central.....	0.0	0.0	0.0	0.0	6	5.9	59.0	5.8	0	0.0	11.3	83
West South Central.....	14.3	0.0	5.7	0.0	11	0.0	51.7	0.0	17	0.0	8.6	37
Mountain.....	15.9	0.0	0.0	0.0	127	0.0	31.8	7.9	71	0.0	7.6	286
Pacific.....	22.1	0.0	3.2	1.6	195	9.5	22.1	3.2	47	0.0	0.0	41
Total.....	6.7	0.5	2.3	0.5	58	9.7	30.4	34.8	35	0.0	2.6	95

TERRITORIES AND POSSESSIONS

Panama Canal Zone

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

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox.....	5	-----	1	-----	12	-----	-----	-----	18	-----
Diphtheria.....	7	-----	-----	-----	-----	-----	2	-----	9	-----
Dysentery (amebic).....	1	2	-----	-----	1	-----	4	-----	5	3
Dysentery (bacillary).....	3	2	2	-----	-----	-----	-----	-----	5	2
Malaria.....	26	2	4	-----	141	-----	66	6	237	8
Measles.....	-----	-----	-----	-----	8	-----	-----	-----	8	-----
Mumps.....	-----	-----	2	-----	2	-----	2	-----	6	-----
Paratyphoid fever.....	-----	-----	-----	-----	1	-----	2	-----	3	-----
Pneumonia.....	-----	7	-----	6	22	1	-----	1	22	15
Relapsing fever.....	-----	-----	-----	-----	-----	-----	1	-----	1	-----
Tuberculosis.....	-----	24	-----	5	3	1	-----	8	23	38
Typhoid fever.....	-----	1	-----	-----	-----	-----	-----	-----	-----	1

¹ 41 recurrent cases.

² In the Canal Zone only.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended July 15, 1944.—During the week ended July 15, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox.....		25		26	202	27	8	75	46	409
Diphtheria.....	2		1	49	1	5	1			59
Dysentery (bacillary).....				3					8	11
Encephalitis, infectious.....						1				1
German measles.....		2		11	30	2	5	8	15	73
Influenza.....					9					11
Measles.....		3		240	135	43	32	37	13	503
Meningitis, meningococcus.....				1	4					5
Mumps.....				49	65	10	14	26	12	176
Poliomyelitis.....			1		8			5		14
Scarlet fever.....	6		5	24	59	24	15	54	22	209
Tuberculosis (all forms).....	2			76	52	13	61	21	32	257
Typhoid and paratyphoid fever.....				8	4					12
Whooping cough.....		16		23	26	6	7	16	13	107

CUBA

Habana—Communicable diseases—4 weeks ended July 22, 1944.—During the 4 weeks ended July 22, 1944, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria.....	25	1	Measles.....	7	
Leprosy.....	1		Tuberculosis.....	7	2
Malaria.....	2		Typhoid fever.....	44	2

NEW ZEALAND

Notifiable diseases—4 weeks ended July 15, 1944.—During the 4 weeks ended July 15, 1944, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Actinomycosis.....	1		Ophthalmia neonatorum.....	3	
Cerebrospinal meningitis.....	14	1	Puerperal fever.....	1	2
Diphtheria.....	92	3	Scarlet fever.....	863	2
Dysentery (amebic).....	3		Tetanus.....	2	1
Dysentery (bacillary).....	17	1	Trachoma.....	3	
Erysipelas.....	36		Tuberculosis (all forms).....	183	34
Food poisoning.....	1		Typhoid fever.....	5	1
Malaria.....	57		Undulant fever.....	3	

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

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

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

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

Smallpox

French Equatorial Africa.—For the month of May 1944, 180 cases of smallpox with 45 deaths were reported in French Equatorial Africa.

India—Calcutta.—Smallpox has been reported in Calcutta, India, as follows: Weeks ended July 15, 1944, 108 cases, 88 deaths; July 22, 1944, 93 cases, 85 deaths.

Typhus Fever

Algeria.—For the period July 1–10, 1944, 26 cases of typhus fever were reported in Algeria.

Chile.—For the period May 21 to June 17, 1944, 46 cases of typhus fever with 1 death were reported in Chile. Provinces reporting the highest incidence of the disease are as follows: Antofagasta, 10 cases; Santiago, 18 cases, 1 death; Valparaiso, 7 cases. According to telegraphic information dated July 27, 1944, there has been an epidemic of typhus fever in the Island of Tac, Chiloe Province, Chile, with 62 cases and 11 deaths reported.

Egypt.—For the week ended July 8, 1944, 284 cases of typhus fever with 66 deaths were reported in all of Egypt.

Hungary.—For the 2 weeks ended July 15, 1944, 159 cases of typhus fever (77 cases in Subcarpathia) were reported in Hungary.

Irish Free State—Galway County—Oughterard.—For the week ended July 22, 1944, 1 case of typhus fever was reported in Oughterard, Galway County, Irish Free State.

Rumania.—For the week ended April 7, 1944, 120 cases of typhus fever were reported in Rumania.

Spain.—Typhus fever has been reported in Spain as follows: weeks ended—May 27, 1944, 11 cases; June 3, 1944, 7 cases.

Yellow Fever

Brazil—Para State.—Yellow fever has been reported in Para State, Brazil, as follows: May 13, 1944, 1 death in Braganza; May 19, 1944, 1 death in Igarape-Miri.