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## ACUTE RESPONSE OF GUINEA PIGS TO VAPORS OF SOME NEW COMMERCIAL ORGANIC COMPOUNDS: I. ETHYLENE DICHLORIDE<sup>1</sup>

REPORT OF THE UNITED STATES BUREAU OF MINES TO THE CARBIDE AND CARBON CHEMICALS CORPORATION

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### REASON FOR INVESTIGATION

A consideration of the hazards to health and safety is an important feature in the innovation of chemicals which may have rather wide use under conditions where persons are exposed to air containing their vapors. Frequently, however, the information necessary for a basis of evaluation of the hazards is lacking, due mainly to the materials, being relatively new products, or at least new to the particular field or conditions of use. In view of this, there is a continual need of research and investigations to supply the information, especially at the present time, when there is considerable activity in the development of new organic compounds of domestic and industrial importance. Fortunately, along with the activity in development, progressive chemical industries have realized the importance of the health aspects in the manufacture, marketing, and utilization of their products, and many have initiated and supported research to that end.

The investigation described in this report was undertaken at the request of the Carbide and Carbon Chemicals Corporation and conducted jointly with the United States Bureau of Mines, under whose direction and supervision it was done at its Pittsburgh Experiment Station.

### ACKNOWLEDGMENTS

The writers desire to acknowledge J. G. Davidson, manager of chemical sales, Carbide and Carbon Chemicals Corporation, and

<sup>1</sup> This report is the first of a series covering the physiological response attending exposure to vapors of some organic compounds which have recently gained rather wide commercial importance. Published by permission of the Director, U. S. Bureau of Mines. (Not subject to copyright.)

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E. W. Reid, senior fellow of this firm's fellowship at the Mellon Institute, Pittsburgh, Pa., for sponsoring the investigation and for advice; G. St. J. Perrott, superintendent, and L. B. Berger, laboratory assistant, of the Pittsburgh Experiment Station of the Bureau of Mines, for assistance in planning and conducting the experiments.

#### SCOPE OF WORK

The scope of the work included a study of the physiological response and toxicity of the vapor of ethylene dichloride, as determined by exposure of guinea pigs. The experiments were planned to give information relative to the concentration and periods of exposure which produce no response or but slight response, moderate response, and serious response. Consideration was given only to acute effects as produced by a single exposure.

#### DESCRIPTION OF MATERIALS USED FOR TESTS

Ethylene dichloride,  $C_2H_4Cl_2$ , is a colorless liquid which possesses a pleasant chloroformlike odor. The boiling point of the pure compound is  $83.5^\circ C.$ ; specific gravity, 1.2569 at  $20/20^\circ C.$ ; flash point,  $14^\circ C.$ ; soluble in water to the extent of 0.87 g. per 100 g. water at  $20^\circ C.$ ; and vapor pressure 78 mm. Hg. at  $20^\circ C.$  Ordinarily, it is very stable and resistant to hydrolysis, though it lends itself readily to synthetic reactions. Under proper conditions both chlorine atoms are replaceable by many other groups.

Ethylene dichloride is principally used as a solvent in the extraction of oils and fats; as a solvent for rubber in the manufacture of dipped goods, and in general is finding increasing use as a substitute for other solvents. A mixture of 75 per cent ethylene dichloride and 25 per cent carbon tetrachloride (to reduce the fire and explosion hazards) is also used under certain conditions as a fumigant.<sup>6, 7, 8</sup> It has been satisfactorily used to kill moths in over-stuffed furniture, rolled rugs, sealed cartons, and similar places, also for the fumigation of grain and flour to kill weevils. A mixture having the above proportions of ethylene dichloride and carbon tetrachloride is now being marketed as a combined fabric cleaner and fumigant. Ethylene dichloride has also been cited as a stimulant for sprouting potatoes.

#### *Specifications of material used in tests*

The ethylene dichloride used in these tests was a commercial product which conformed to the following plant specifications:

<sup>6</sup> Hoyt, L. F., Comparative tests with certain fumigants. *Ind. & Eng. Chem.*, **20**, 835-37 (1928).

<sup>7</sup> Roark, R. C., and Cotton, R. T., Fumigation tests with certain chlorides. *Jour. Econ. Entomol.*, **21**, 135-42 (1928).

<sup>8</sup> Hoyt, L. F., Fumigation tests with ethylene dichloride, carbon tetrachloride mixtures. *Ind. & Eng. Chem.*, **22**, 2632 (1928).

Specific gravity.....	1.254 to 1.264 at 20/20° C.
Initial boiling point.....	Not less than 78° C. at 760 mm.
Boiling range.....	Not less than 90 per cent distills over from 81.7° to 84.7° C. at 760 mm.
Dry point.....	Not more than 86° C. at 760 mm.
Acidity.....	Not more than 0.0005 per cent calculated as HCl.

## TEST APPARATUS

The apparatus used for preparing vapor-air mixtures and the chambers used for exposing the animals are shown in Figures 1, 2, 3, and 4. The steel chamber (figs. 1 and 2) was used for making exposure to mixtures which were dangerous from the standpoint of explosions. Briefly, this chamber consisted of a 30-inch length of 20-inch diameter extra-heavy steel pipe closed at the ends by circular pieces of steel plate 2 inches in thickness. The ends of the pipe

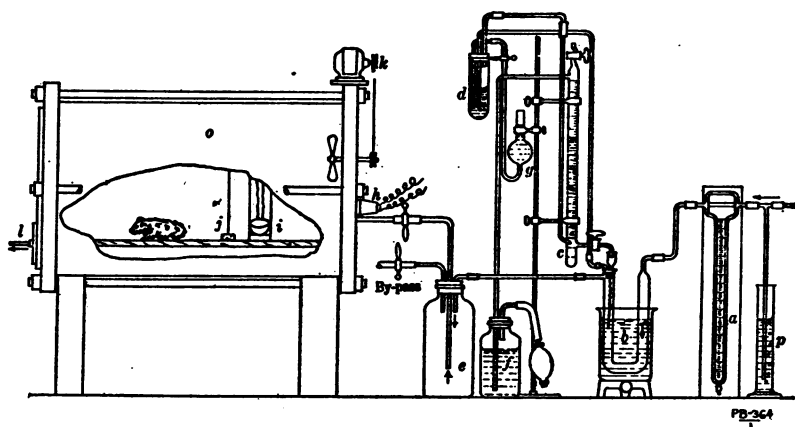


FIGURE 1.—Apparatus for making exposure to vapor-air mixtures close to or within the explosive range

were fitted into  $\frac{1}{2}$ -inch channels in the plate and the entire arrangement drawn together with twenty-four  $\frac{3}{4}$ -inch stay bolts. The joints were made gas tight by means of thin sheet-lead gaskets placed in the channels. The end of the chamber adjacent to the observers (fig. 2) was pierced by three 2-inch holes covered on the inside with circular pieces of  $\frac{3}{4}$ -inch plate glass. Two of the holes were for making observations and the third for illumination by the spot light *h*. The only other openings through this end were two small holes for admitting the vapor-air mixtures and withdrawing samples for analysis and a third hole fitted with a brass bushing through which extended the shaft of an externally driven fan. No lights, electrical apparatus, or connections were inside the chamber. The end of the chamber opposite the position occupied by the observers (fig. 2) had a 10 by 13 inch elliptical opening, which was closed with a skeleton frame removable iron door clamped against a sheet-rubber

gasket. This door was removed only when necessary to place apparatus inside the chamber or for cleaning. A circular opening 5 inches in diameter closed by a slide gate, which could be clamped against a rubber gasket, was provided for introducing and removing the animals. The major portion of the area between a narrow circular frame for the central opening and the frame which encircled the elliptical opening was cut away and the open space covered with parchment to provide relief in event of an explosion within the chamber. The effluent vapor-air mixture escaped through a hole in the door and a waste pipe leading to the exterior of the laboratory. A flat false floor was provided to avoid crowding of the animals due to the curvature of the pipe. An evaporating dish *i* with gauze wicks supported in it was placed in front of the fan and used at the beginning of experiments for evaporating substances within the chamber in order to bring the confined air to the desired vapor composition at the beginning of the test rather than purging or sweeping out the original air content with vapor-air mixtures prepared by the apparatus described in the succeeding paragraph. A screen *j* separated the animals from the evaporating device and fan.

To avoid oxygen deficiency or accumulation of carbon dioxide during the exposure, a stream of the vapor-air mixture was passed through the chamber continually. The apparatus for preparing the mixture is also shown in Figures 1 and 2. In operation air held at constant pressure by regulator *p* is forced in through flow meter *a* at a rate designed to give three air changes per hour in the test chamber *o*. The air is then passed through the U-tube *b*, suspended in an oil bath the temperature of which is maintained a few degrees above the boiling point of the material to be vaporized. The ethylene dichloride measured in burette *c* escapes through small capillary and drops onto a cotton-gauze wick in the outlet side of the U-tube. The flow of liquid is regulated by varying the height of the column of water in pressure regulator *d* by raising or lowering leveling bulb *g*. The number of drops per cubic centimeter are previously found in order to facilitate regulation of the flow; *e* is a mixing chamber, and *f* a reserve chamber of solvent for filling the burette as required. A by-pass connecting to the exterior of the laboratory is provided for use while regulating the flow through the vaporizing apparatus and when it is not desirable to have vapor-air mixtures enter test chamber *o*. In principle, the liquid-measuring device is similar to a Mariotte bottle from which the liquid drops at a constant rate, regardless of change in the level of the liquid. In the particular modifications used in this work, changes in pressure in the liquid in burette *c* are compensated for through pressure regulator *d*. Air fed through *d* enters the burette through a capillary opening at the bottom and simultaneously displaces liquid which escapes through the stopcock and

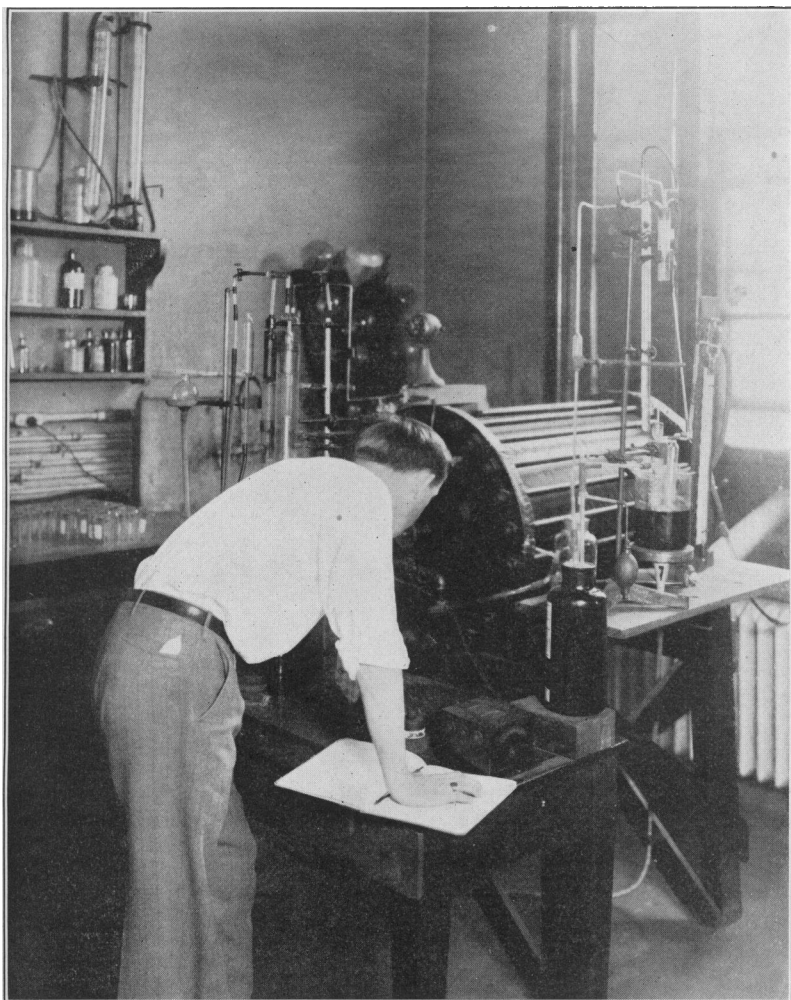


FIGURE 2.—Apparatus for preparing vapor-air mixtures of materials which were liquids at room temperatures

drops onto the wick. The success of the dropping arrangement depends upon the delivery of air to the burette in small bubbles and at a regular flow. The size and angle of the capillary air inlets in *d*

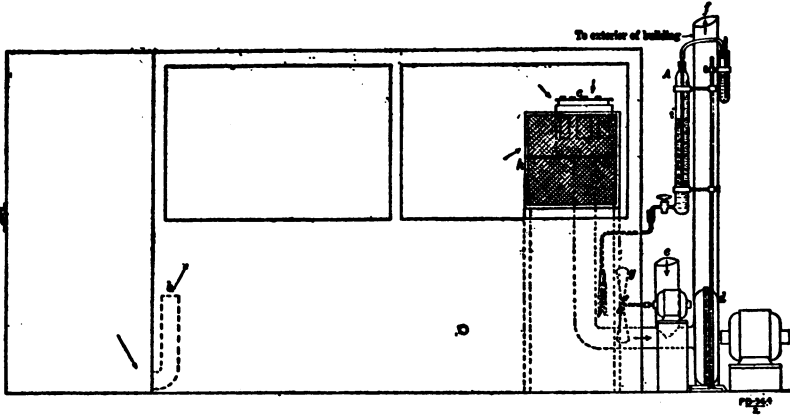


FIGURE 3.—Apparatus for making exposure to noninflammable vapor-air mixtures (side elevation plan)

and into the bottom of *c* are the important features in obtaining small bubbles and regularity of flow.

The large chamber shown in Figures 3 and 4 was used for making exposures to vapor-air mixtures whose composition was a safe margin below the lower inflammable limit. Figure 3 is a side elevation and Figure 4 is a horizontal plan. The capacity of the chamber is 8

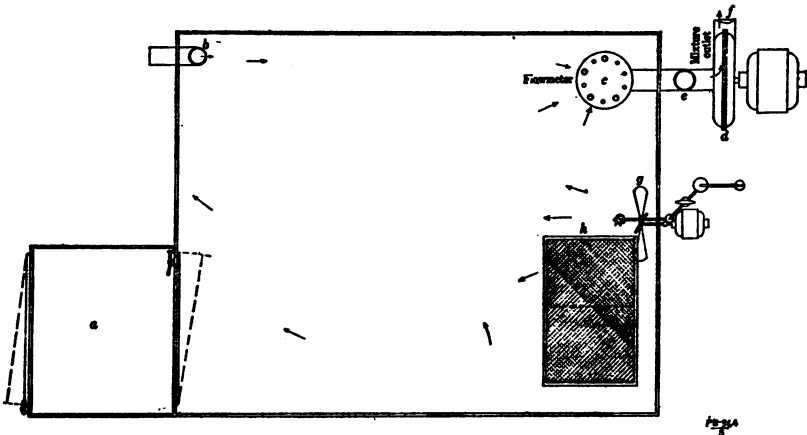


FIGURE 4.—Apparatus for making exposure to noninflammable vapor-air mixtures (horizontal plan)

feet long by 6 feet wide by 5¼ feet high (252 cu. ft.) constructed of sheet metal with soldered joints and glass embedded in putty. It is equipped with double doors and an anteroom or "gas lock" *a* for entering and leaving during the course of an experiment.

The air intake *b* is a 2-inch pipe opening 10 inches from the floor and at the opposite end from the exhaust orifice *c*, which is 16 inches from the top of the chamber. A negative pressure is maintained on the exhaust orifice by a motor-driven suction fan *d*, and the differential pressure is indicated by a slope-type draft gage (not shown) and controlled by a damper placed in a by-pass between the chamber and fan. The exhaust from the fan is carried through a 4-inch duct *f* to the exterior of the building. The chamber is equipped with an internal circulating fan *g* whose shaft extends through the wall of the chamber to an electric motor, thus eliminating the motor as a source of ignition in event of an accidental vapor-air mixture of explosive proportions. A 4-compartment screen cage is situated above the fan and near the windows in the end opposite the door.

The apparatus and method for preparing ethylene dichloride vapor-air mixtures in this large chamber is much the same as previously described for the small chamber *o*, Figures 1 and 2, except that the gas and air enter the chamber separately and are mixed inside the chamber rather than externally, as *e*, Figure 1.

The ethylene dichloride is measured by means of a large burette and allowed to drop on a wick hanging in front of the fan. The dropping of liquid from the burette *i* (fig. 3) was regulated by a pressure regulator similar to the one shown in Figure 1, except that it is adjusted to atmospheric pressure. Compensation for changes in pressure of the air stream are unnecessary.

The air flow in through *b* and out *c* was regulated to two changes per hour and liquid measured in at a rate required to give the desired concentration of vapors. The air-measuring device *c* consists of a series of 10 small orifices of equal size designed to permit wide variations in flow, as any number of orifices between 1 and 10 can be used by inserting or removing rubber stoppers. The fan and duct are large enough to maintain the same pressure differential, regardless of the number of orifices inserted, and the flow for any number of orifices at a given differential is a multiple of the flow for a single orifice at that differential. The variability of flow is further widened by changing the pressure differential by means of by-pass *e*. The orifice plate forms the top of an open and cylindrical cup which extends into a water seal at the bottom of a truncated cone. The water seal readily permits raising the cup and allowing the air to enter the exhaust duct unobstructed through the square side slots (fig. 3) when it is desired to sweep large volumes through the chamber quickly to remove the atmosphere used in a preceding experiment.

#### METHODS OF COMPUTATION AND ANALYSIS OF VAPOR-AIR MIXTURES

The composition of the vapor-air mixtures were calculated from the volume of air and liquid entering the system in unit time. No

attention was given to possible deviation from the gram-molecular-volume relation of a perfect gas. The results of frequent checks by chemical analysis substantiated the validity of the computed values for the purpose of this study. The results obtained by computation were frequently checked by combustion analysis using an explosion pipette and electrolytic gas, and in low concentrations by absorption in air-equilibrated activated charcoal and determining the gain in weight.

#### TEST PROCEDURE

All animals used for making exposure to a given concentration of vapor were exposed in groups of three or six. The choice of number rested on a combination of factors, such as the probable effect, the importance of the experiment in relation to the general plan, and the information already at hand regarding somewhat similar conditions. When the small chamber was used for dealing with explosive mixtures only 1 group of 6 or 2 groups of 3 pigs each were admitted at the start of an experiment. As many as 4 groups of 6 pigs each could easily be accommodated in the large chamber. The object in simultaneously admitting several groups was that they could be successively removed after various periods of exposure and thus the range of results from no response to serious response could be covered in a single experiment.

The technique of performing the experiments was to adjust the vaporizing apparatus to give a flow of vapor-air mixture of the desired concentration, but with the mixture by-passed around the chamber. The quantity of the substance necessary to create a similar vapor concentration in the chamber was admitted direct, whereupon the by-pass was closed and the flow from the vaporizing apparatus led into the chamber. The animals were then quickly placed in the chamber and allowed to remain for a predetermined period. During exposure they were continuously observed for symptoms. At the end of a period the entire number of a single group were quickly removed. One-third of the group was killed almost immediately (if they did not die before removal) by injection of approximately 2 c. c. of a saturated solution of magnesium sulphate into the heart. At the end of 4 days 2 more were examined, and the remainder by the end of 8 days, provided that again they did not die earlier. Groups of unexposed control animals from the same stock as the exposed animals were also observed and examined. All animals that died or were killed were examined for gross pathological changes and specimens of tissue taken for microscopic examination, but as the latter has not been completed the results thereof are not included in this report, but will be described in a later report dealing entirely with microscopic pathology produced by inhaling vapors of ethylene dichloride.



DESCRIPTION AND CARE OF ANIMALS

The animals were healthy stock, ranging in size from two-thirds to full grown. All of them, including controls and stock animals, were housed in the same room and given the same treatment excepting exposure to gas. The feed consisted of clover hay, oats, carrots, and water.

RESULTS OF TEST

The detailed test data are too voluminous to be presented in this report, and accordingly only the summarized results pertinent to symptoms, gross pathology, and fatality are given.

SYMPTOMS

*Control animals.*—The control group consisted of 25 animals, among which there were no symptoms or deaths. Also, no symptoms or deaths occurred in the group of approximately 200 stock animals from which test animals were taken.

*Exposed animals.*—In their order of occurrence the symptoms exhibited by the exposed animals were eye and nasal irritation, manifested by squinting and lacrimation of the eyes and rubbing the nose, vertigo, static and motor ataxia, retching movements, apparent unconsciousness, incoordination of extremities, and marked changes in the respiration.

Table 1 gives the average period necessary to produce these symptoms by various concentrations of vapor in air. When viewing the table the reader should note that the figures in parentheses indicate that the particular symptoms did not occur in the maximum period of test as given, whereas all of the remaining values indicate the average time for occurrence of the symptoms.

TABLE 1.—Symptoms produced in guinea pigs exposed to vapors of ethylene dichloride. (Concentrations of vapor in per cent by volume; time in minutes)

Type of symptom	Concentration of vapor and period of exposure causing symptoms						
	6.0 to 7.0	2.5 to 3.5	1.0 to 1.7	0.40 to 0.45	0.20	0.12	0.06
Nasal irritation—rubbing nose.....	1	1-2	1-2	3-10	6	*(480)	*(480)
Eye irritation—squinting and lacrimation...	1	1-2	1-2	3-10	6	*(480)	*(480)
Vertigo—unsteadiness.....	1-2	1-2	2-3	8-18	20-45	*(480)	*(480)
Static and motor ataxia—inability to walk....	2-4	3-5	4-10	30	*(480)	*(480)	*(480)
Retching movements—spasmodic contraction of abdominal wall, head lifted, mouth open.	2-4	5-13	7-15	*(360)	*(480)	*(480)	*(480)
Jerky, rapid respiration.....	4-8	5-13	10-30	*(360)	*(480)	*(480)	*(480)
Slow, shallow respiration.....	(c)	(c)	(c)	240	*(480)	*(480)	*(480)
Apparent semiconsciousness to unconsciousness.....	3-7	4-7	10-20	30-60	*(480)	*(480)	*(480)
Uncoordinated scratching movement of extremities.....	10-20	10-20	25	*(360)	*(480)	*(480)	*(480)

\* Not observed during maximum exposure period as given in parentheses.  
 † Occasional retching movement in 1 pig out of a total of 18.  
 ‡ Not determined.

Lacrimation, squinting of the eyes, and rubbing the nose were early and constant symptoms, the eyes being usually held shut after but a short period of the exposure. Examination of the eyes immediately after test revealed the conjunctiva to be reddened, with a prominence of the conjunctival vessels.

The apparent vertigo followed by static and motor ataxia was inferred from the inability of the pigs to stand or to move about without falling on their sides. This was also an early symptom, coming on within the first few minutes of the test.

The retching movements noted consisted in spasmodic contractions of the abdominal muscles accompanied by a lifting of the head with the mouth held open, resembling an attempt to vomit. This symptom occurred at the time of or shortly after the static and motor ataxia and continued through the unconscious period. It occurred in only a few of the pigs exposed to concentrations below 1 per cent.

Semiconsciousness and apparent unconsciousness were noted on all tests with vapor concentrations of 0.45 per cent and above. In lower concentrations this symptom varied from a stuporous condition, in which the animals made some attempt to move about, to a slight drowsiness noted with concentrations of 0.2 per cent and 0.12 per cent.

The respirations were jerky, rapid, and later gasping in type, these changes occurring a little later than the retching movements. They were noted in all exposures to concentrations of 1.7 per cent and above. With lower concentrations the respiration changed from normal to slight increase in rate followed by a slow, shallow type of breathing.

Immediate examination of the pigs which were rendered unconscious during test revealed that the pupils were dilated and responded feebly to light.

The period of recovery from semiconsciousness and unconsciousness to the apparently normal actions of the pigs varied from 15 to 60 minutes.

A monkey exposed to 0.45 per cent of the vapors in air for 10 minutes showed a slight lacrimation of the eyes and a disturbance of equilibrium or dizziness manifested by an inability to retain itself on the perch of the cage.

Two men exposed two minutes to 0.12 per cent of the vapors in air experienced no subjective or objective symptoms, except that the odor was very noticeable at this concentration.

#### *Pathology*

*Control animals.*—A total of 25 control animals were killed for autopsy during the experiments. These animals were taken from the same stock and selected in the same manner as the groups of animals used for exposure to vapor-air mixtures. No gross pathological

changes were found which simulated the changes occurring in the animals exposed to the vapors. In two of the control animals a pearly gray consolidation of the upper lobes of the lungs was noted. These lobes cut with difficulty and gave evidence of fibrosis and calcification.

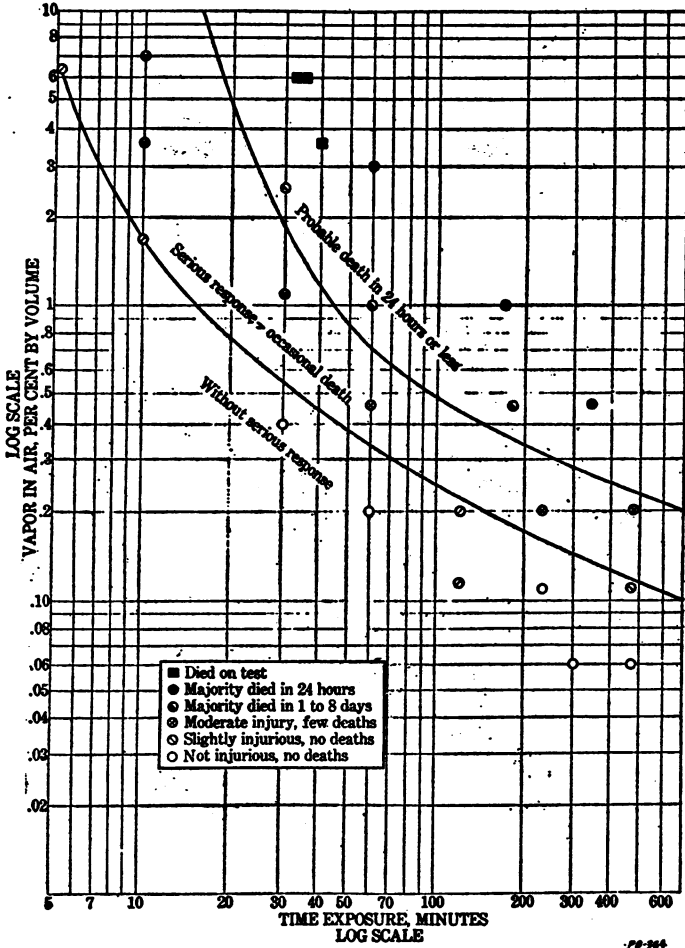


FIGURE 5.—Acute effects of exposure of guinea pigs to ethylene dichloride vapor in air

*Exposed animals.*—The pathological findings in animals that died during exposure (see fig. 5 for conditions of exposure causing death on test) were congestion and edema of the lungs with a generalized passive congestion throughout the abdominal viscera. The lungs in these cases were voluminous and deep pink in color. The cut section bled freely and a frothy serous exudate was expressible from

the bronchioles and air sacs. The rest of the viscera showed a prominence of the surface vessels and on cut section were found to be apparently engorged with blood.

The findings in those animals that were exposed to conditions that caused death to some of the members of a group within one to eight days (represented in fig. 5 by filled, half-filled, and crossed circles) varied with the severity of exposure, the time of autopsy, and whether or not the animal died as a result of the exposure.

The animals that died as a result of the exposure within one to eight days showed congestion and edema of the lungs with apparent degenerative changes in the kidneys. The kidneys were found to be pale, dirty yellow in color, and boggy to palpation. The cut section revealed the cortex pale, shrunken, and separated from the medulla by a prominent zone of hyperemia. The medulla was hyperemic in appearance.

The findings in the animals that were killed immediately after exposure were congestion and edema of the lungs, the severity of which varied directly with the severity of exposure, and congestion of the liver, spleen, and kidneys.

In those animals which did not die and were killed three to four days after exposure the congestion and edema of the lungs was apparently worse than that noted in the preceding with a presence of the kidney lesion noted in those animals that died as a result of the exposures.

Animals killed seven to eight days following exposure showed a distinct decrease in the lung condition with a change in the gross appearance of the kidney. In these the kidneys were found to be hyperemic and congested, the apparent degenerative appearance of the cortex not being found.

The findings in the animals killed immediately after exposure to conditions (see fig. 5 for concentration of vapor and duration of exposure) that did not cause death but which caused some pathological injury were similar in character but considerably milder in degree and less frequent in occurrence than those found in animals which were exposed to conditions that caused death to some members of the group. The lesions were principally slight congestion or hyperemia of lungs, kidney, and liver. The lung lesion was absent in the large majority of cases. In animals killed three to four days following exposure the lung lesion was a little more pronounced than noted in the animals killed immediately after exposure. In animals killed seven to eight days following exposure the previous findings were negative in most cases, with a few cases of congestion of the kidney and singular cases of lung congestion.

*Discussion of pathology*

The principal pathological finding in animals exposed to ethylene dichloride vapors was congestion and edema of the lungs, a severe degree being found in all animals that died as a result of the exposures. The amount of congestion and edema was directly proportional to the concentration of the vapors and duration of exposure. The lesion appeared to be worse for three or four days following exposure and then apparently began to clear up, being only slight or entirely lacking in those animals that survived seven or eight days. The occurrence of edema in animals exposed to ethylene dichloride vapors has been recently reported by other investigators.<sup>9</sup>

The kidney lesion noted in those animals that died as a result of the exposure was apparently secondary to the damage to the lung and more or less dependent upon the elimination of the products of decomposition of the gas or of the toxic products resulting from the lung damage. This was inferred from the fact that the lesion did not occur in those animals that died during exposure, nor was it present as a constant finding in those animals killed immediately after test. Furthermore, a clearing up of the lung lesions was accompanied by changes in the gross appearance of the kidney, which were apparently indicative of a reparative process.

The pathological changes were directly related to the occurrence of death, but had no apparent relation to symptoms exhibited during exposure.

*Fatality and summary of physiological response*

The fatality and summary of the response of guinea pigs exposed to the conditions used in the tests with ethylene dichloride vapor in air are shown graphically in Figure 5. From this graph may be ascertained the probable response attending a given condition as regards concentration of vapor and period of exposure. The results of each experiment are represented symbolically in six degrees of response. Each point on the graph represents the entire group of animals exposed in a particular experiment. With few exceptions the symbol describes the condition of at least half the individuals, and in the majority of cases the condition of all or nearly all the individuals of the group.

As will be noted from the legend in Figure 5, the six degrees of response are:

1. Died on test.
2. Majority died in 24 hours.
3. Majority died in one to eight days.
4. Moderate injury, few deaths.
5. Slightly injurious, no deaths.
6. Not injurious, no deaths.

<sup>9</sup> Kistler, G. H., and Luckhardt, A. B., *Anesthesia and Analgesia*, 8, No. 2, pp. 65-74, 1929.

In addition to representing the response of each group by symbols, these have been separated into three general fields or zones of probable response, namely—

1. Probable death in 24 hours or less.
2. Serious response—occasional death.
3. Without serious response.

It should be noted that a logarithmic scale has been used for both the abscissæ and ordinates of the graph shown in Figure 5. This mode of representation appears desirable in view of the nature of the data and significance of the results within certain ranges of conditions; for example, in the long exposures a fraction of 1 per cent change in composition is of more importance than exact periods of time, whereas with short exposures it is desired to lay more emphasis on the time than on small changes in composition of the air.

Table 2 gives four rather conventional degrees of response which may be used for making comparison to data which appear in the literature<sup>10,11,12,13</sup> for other compounds.

TABLE 2.—*Acute effects of exposure of guinea pigs to ethylene dichloride vapor*

Period	Concentration, per cent by volume
Kills in few minutes.....	• 10-20
Dangerous in 30 to 60 minutes.....	0.4-0.6
Maximum amount for 60 minutes without serious disturbance.....	.35
Slight symptoms after several hours or maximum amount without serious disturbance.....	.1

\* Air saturated at 20° C. contains approximately 10 per cent vapors of ethylene dichloride.

#### GENERAL DISCUSSION OF HEALTH HAZARDS

A comparison of the results obtained for ethylene dichloride with those reported in the literature for other compounds indicates that for single exposures and periods of an hour or more the toxicity of ethylene dichloride is of about the same order as that of gasoline, benzene, carbon tetrachloride, and chloroform.<sup>14</sup> For periods of less than an hour it is less toxic than these compounds.

The odor of ethylene dichloride is distinct and noticeable in relatively safe concentrations. Also, it produces marked symptoms of dizziness in concentrations that will not cause permanent damage. If the odor or the first symptoms of dizziness are taken as a warning of the presence of vapor and the person retires from the contaminated atmosphere it is not likely that injury will occur from acute exposure.

<sup>10</sup> Sayers, R. R., Yant, W. P., Thomas, B. G. H., and Berger, L. B.: Physiological response attending exposure to vapors of methyl bromide, methyl chloride, ethyl bromide, and ethyl chloride. U. S. Public Health Service Bull. No. 185, 1929, 56 pp.

<sup>11</sup> International Critical Tables, first edition (1927), vol. 2, p. 318. Also see errata sheet, vol. 2.

<sup>12</sup> Henderson, Y. H., and Haggard, H. H.: Noxious Gases. American Chemical Society Monograph No. 35, 1927, Chemical Catalog Co., New York.

<sup>13</sup> Fieldner, A. C., Katz, S. H., and Kinney, S. P.: Gas Masks for Gases Met in Fighting Fires. U. S. Bureau of Mines Tech. Paper 248, 1921, 56 pp.

<sup>14</sup> International Critical Tables, first edition (1927), vol. 2, p. 318. Also see errata sheet, vol. 2.

Serious effects might easily result, however, from forced exposure, involuntary exposure, or exposure to a high concentration of vapor which would cause unconsciousness before escape could be made.

In conclusion, it should be stated that the investigation described in this report was designed to give information pertaining to the relative toxicity and effects of a single exposure to ethylene dichloride vapor. Accordingly the results can not be interpreted as applying to the possible effects of repeated exposure. There were, however, no indications that repeated exposure might cause a chronic type of poisoning of a nature other than the logical expectation of a possible accumulation of the effects noted and described for acute poisoning, when the daily exposure is sufficient to cause the latter. It is always a safe recommendation, however, that the manufacture, distribution, and use of new chemicals of this nature be accompanied by a period of observation of the effect on health, so that if poisoning occurs it may be detected in the incipient stage, thereby obviating serious results and permitting the design of a remedy for the situation.

#### SUMMARY AND CONCLUSION

The acute physiological response of guinea pigs exposed to air containing ethylene dichloride vapors was determined. The concentrations of vapor and periods of exposure ranged from those which produced death in a few minutes to those that caused no apparent effect after several hours. The symptoms, gross pathology, and fatality are given, together with a brief discussion of potential health hazards.

1. In the order of occurrence, the symptoms produced in guinea pigs by inhalation of ethylene dichloride vapor are eye and nose irritation, vertigo, static and motor ataxia, retching movements, semiconsciousness and unconsciousness accompanied by uncoordinated movements of the extremities, and death if exposure is continued. Exposure to 6 per cent vapors causes all these symptoms, excepting death, to occur in less than 10 minutes, and death in about 30 minutes. Exposure to 1 per cent causes all the symptoms to appear in 25 minutes with the possibility of death occurring a day or more following an exposure of about 15 to 20 minutes. Exposure to 0.12 per cent did not cause apparent symptoms or death following an exposure of eight hours. Tables in the report should be consulted for intermediate and additional data.

2. The gross pathological findings were hyperemia, congestion and edema of the lungs with secondary degenerative changes in the kidneys. The severity of the pathology increased with the concentration of vapor and duration of exposure. The lung lesion was the most prominent and probably the greatest causative factor in death. No serious pathology was found for the following concentrations of vapor and periods of exposure: 6 per cent for 5 minutes, 1.7 per cent for 10 minutes, 0.4 per cent for 30 minutes, 0.2 per cent for 120

minutes, and 0.11 per cent for 480 minutes. Also these concentrations and exposures did not cause the death of the animals.

3. The summarized physiological response given in the four degrees usually reported are: 10 to 20 per cent kills in a few minutes; 0.4 to 0.6 per cent, dangerous in 30 to 60 minutes; 0.35 per cent maximum amount for 60 minutes without serious disturbances; 0.1 per cent, slight symptoms after several hours or maximum amount without serious disturbances.

4. A comparison of the results obtained with those reported in the literature for other compounds indicates that for single exposures and periods of an hour or more the toxicity of ethylene dichloride appears to be of about the same order as gasoline, benzene, carbon tetrachloride, and chloroform. For periods of less than an hour it is less toxic than these compounds.

5. The odor of ethylene dichloride is distinct and noticeable, and warning symptoms are produced by relatively safe concentrations.

### AUTOMOBILE FATALITIES IN 78 LARGE CITIES, 1925-1929

The Department of Commerce, through the Bureau of the Census, announces that for the 52-week period ended December 29, 1929, there were 8,403 deaths from automobile accidents in 78 large cities of the United States, as compared with 7,516 for the corresponding period of 1928—an increase in 1929 of nearly 12 per cent over the figures for 1928.

For the four weeks ended December 28, 1929, there were reported 646 automobile fatalities in these cities, as compared with 771 such deaths during the corresponding period of 1928.

The following table gives a comparison, by 4-week periods, of the numbers of deaths from automobile accidents in the 78 large cities from May, 1925, to December, 1929:

*Automobile fatalities for 78 cities by 4-week periods*

1925		1926		1927		1928		1929	
4 weeks ended—	No.	4 weeks ended—	No.	4 weeks ended—	No.	4 weeks ended—	No.	4 weeks ended—	No.
		Jan. 30.....	428	Jan. 29.....	471	Jan. 28.....	531	Jan. 26.....	612
		Feb. 27.....	374	Feb. 26.....	441	Feb. 25.....	504	Feb. 23.....	466
		Mar. 27.....	346	Mar. 26.....	441	Mar. 24.....	421	Mar. 23.....	526
		Apr. 24.....	423	Apr. 23.....	495	Apr. 21.....	530	Apr. 20.....	528
May 23.....	421	May 22.....	493	May 21.....	530	May 19.....	537	May 18.....	582
June 20.....	492	June 19.....	547	June 18.....	507	June 16.....	506	June 15.....	602
July 18.....	493	July 17.....	482	July 16.....	573	July 14.....	523	July 13.....	635
Aug. 15.....	467	Aug. 14.....	499	Aug. 13.....	510	Aug. 11.....	585	Aug. 10.....	660
Sept. 12.....	521	Sept. 11.....	558	Sept. 10.....	526	Sept. 8.....	622	Sept. 7.....	710
Oct. 10.....	527	Oct. 9.....	650	Oct. 8.....	662	Oct. 6.....	624	Oct. 5.....	752
Nov. 7.....	612	Nov. 6.....	676	Nov. 5.....	684	Nov. 3.....	624	Nov. 2.....	840
Dec. 5.....	623	Dec. 4.....	632	Dec. 3.....	619	Dec. 1.....	738	Nov. 30.....	839
		1927							
1926		1927							
Jan. 2.....	550	Jan. 1.....	522	Dec. 31.....	624	Dec. 29.....	771	Dec. 28.....	846
52 weeks.....			6,690		7,083		7,516		8,397

<sup>1</sup> Incomplete.



## DEATHS DURING WEEK ENDED JANUARY 18, 1930

Summary of information received by telegraph from industrial insurance companies for the week ended January 18, 1930, and corresponding week of 1929. (From the Weekly Health Index, January 23, 1930, issued by the Bureau of the Census, Department of Commerce)

	Week ended Jan 18, 1930	Corresponding week, 1929
Policies in force.....	75, 374, 773	72, 868, 895
Number of death claims.....	15, 936	22, 838
Death claims per 1,000 policies in force, annual rate.....	11. 0	16. 3

Deaths from all causes in certain large cities of the United States during the week ended January 18, 1930, infant mortality, annual death rate, and comparison with corresponding week of 1929. (From the Weekly Health Index, January 23, 1930, issued by the Bureau of the Census, Department of Commerce)

City	Week ended Jan. 18, 1930		Annual death rate per 1,000, corresponding week, 1929	Deaths under 1 year		Infant mortality rate, week ended Jan. 18, 1930 <sup>a</sup>
	Total deaths	Death rate <sup>1</sup>		Week ended Jan. 18, 1930	Corresponding week, 1929	
Total (63 cities).....	7, 384	13. 2	18. 8	641	946	58
Akron.....	43			10	12	91
Albany <sup>4</sup> .....	44	19. 1	21. 7	3	8	66
Atlanta.....	89	18. 2	19. 4	13	13	137
White.....	41			3	8	95
Colored.....	48	( <sup>5</sup> )	( <sup>5</sup> )	10	5	159
Baltimore <sup>4</sup> .....	214	13. 4	23. 0	16	29	54
White.....	166			10	20	43
Colored.....	48	( <sup>5</sup> )	( <sup>5</sup> )	6	9	97
Birmingham.....	82	19. 2	37. 3	3	18	28
White.....	45			2	10	31
Colored.....	37	( <sup>5</sup> )	( <sup>5</sup> )	1	8	24
Boston.....	213	13. 9	23. 0	30	30	85
Bridgeport.....	37			6	14	103
Buffalo.....	131	12. 3	23. 5	19	23	85
Cambridge.....	28	11. 6	18. 7	3	5	56
Camden.....	31	11. 9	16. 2	1	4	18
Canton.....	24	10. 7	11. 2	3	3	74
Chicago <sup>4</sup> .....	764	12. 6	15. 7	54	79	48
Cincinnati.....	128			3	24	18
Cleveland.....	197	10. 2	19. 7	28	35	84
Columbus.....	87	15. 2	23. 0	5	7	49
Dallas.....	75	18. 0	24. 2	8	14	
White.....	56			5	11	
Colored.....	19	( <sup>5</sup> )	( <sup>5</sup> )	3	3	
Dayton.....	37	10. 5	14. 4	2	3	30
Denver.....	89	15. 8	20. 2	5	8	52
Des Moines.....	54	18. 5	14. 8	4	2	69
Detroit.....	292	11. 0	15. 6	32	53	49
Duluth.....	20	8. 9	11. 6	2	1	54
El Paso.....	43	19. 0	18. 6	5	13	
Erie.....	24			3	5	64
Fall River <sup>4</sup> .....	29	11. 3	24. 8	2	3	46
Flint.....	28	9. 8	15. 1	6	8	70
Fort Worth.....	35	10. 7	20. 2	5	5	
White.....	31			3	4	
Colored.....	4	( <sup>5</sup> )	( <sup>5</sup> )	2	1	
Grand Rapids.....	31	9. 8	8. 6	4	3	61
Houston.....	50			3	11	
White.....	36			2	7	
Colored.....	14	( <sup>5</sup> )	( <sup>5</sup> )	1	4	
Indianapolis.....	92	12. 6	14. 7	10	12	75
White.....	74			7	9	61
Colored.....	18	( <sup>5</sup> )	( <sup>5</sup> )	3	3	161
Jersey City.....	71	11. 4	22. 6	4	13	35
Kansas City, Kans.....	30	13. 2	15. 4	6	5	142
White.....	23			5	4	133
Colored.....	7	( <sup>5</sup> )	( <sup>5</sup> )	1	1	217
Kansas City, Mo.....	107	14. 3	16. 0	10	9	78
Knorrville.....	28	13. 9	33. 6	1	6	23
White.....	19			1	4	26
Colored.....	9	( <sup>5</sup> )	( <sup>5</sup> )	0	2	0

(Footnotes at end of table.)

Deaths from all causes in certain large cities of the United States during the week ended January 18, 1930, infant mortality, annual death rate, and comparison with corresponding week of 1929. (From the Weekly Health Index, January 23, 1930, issued by the Bureau of the Census, Department of Commerce)—Contd.

City	Week ended Jan. 18, 1930		Annual death rate per 1,000, corresponding week, 1929	Deaths under 1 year		Infant mortality rate, week ended Jan. 18, 1930
	Total deaths	Death rate		Week ended Jan. 18, 1930	Corresponding week, 1929	
Los Angeles.....	339			19	18	58
Lowell.....	22			2	4	47
Lynn.....	28	13.8	13.8	5	3	126
Milwaukee.....	103	9.9	17.2	12	21	60
Minneapolis.....	118	13.5	14.4	7	10	45
Nashville.....	40	14.9	33.2	4	8	62
White.....	34			3	5	62
Colored.....	6	( <sup>1</sup> )	( <sup>1</sup> )	1	3	63
New Bedford.....	30			1	8	26
New Haven.....	45	12.5	14.4	2	1	39
New Orleans.....	168	20.4	24.2	12	11	70
White.....	99			7	3	62
Colored.....	69	( <sup>1</sup> )	( <sup>1</sup> )	5	8	84
New York.....	1,526	13.2	20.0	147	232	62
Bronx Borough.....	189	10.4	16.5	19	26	45
Brooklyn Borough.....	523	11.8	17.8	50	90	53
Manhattan Borough.....	619	18.4	26.8	55	89	90
Queens Borough.....	151	9.2	14.5	19	20	55
Richmond Borough.....	44	15.2	27.7	4	7	74
Newark, N. J.....	100	11.0	19.3	11	13	58
Oakland.....	84	16.0	15.4	5	6	60
Oklahoma City.....	33			7	8	137
Omaha.....	51	11.9	16.9	1	6	11
Paterson.....	27	9.7	18.7	2	5	35
Philadelphia.....	478	12.1	17.9	30	59	44
Pittsburgh.....	166	12.8	18.7	22	21	81
Portland, Oreg.....	88			3	5	37
Providence.....	73	13.3	16.2	5	9	46
Richmond.....	53	14.2	23.6	6	5	89
White.....	30			1	0	22
Colored.....	23	( <sup>1</sup> )	( <sup>1</sup> )	5	5	218
Rochester.....	71	11.3	14.5	5	9	44
St. Louis.....	216	13.3	19.2	12	13	39
St. Paul.....	64			2	2	20
Salt Lake City <sup>1</sup> .....	38	14.4	15.9	5	2	79
San Antonio.....	93	22.2	26.3	6	16	
San Diego.....	48			1	1	21
San Francisco.....	201	17.9	16.7	9	5	62
Schenectady.....	14	7.8	24.0	0	4	0
Seattle.....	84	11.4	12.5	3	6	30
Somerville.....	31	15.7	16.8	5	3	163
Spokane.....	33	15.8	17.7	0	1	0
Springfield, Mass.....	44	15.3	15.0	1	3	16
Syracuse.....	63	16.5	23.5	5	5	62
Tacoma.....	22	10.4	11.8	1	0	26
Toledo.....	77	12.8	15.6	4	14	37
Trenton.....	46	17.3	20.3	2	4	37
Utica.....	44	22.0	27.5	3	2	85
Washington, D. C.....	146	13.8	21.3	12	23	70
White.....	100			9	9	78
Colored.....	46	( <sup>1</sup> )	( <sup>1</sup> )	3	14	53
Waterbury.....	23			4	4	102
Wilmington, Del.....	31	12.6	17.9	2	1	45
Worcester.....	41	10.8	15.0	5	2	65
Yonkers.....	30	12.9	20.2	2	3	48
Youngstown.....	34	10.2	17.7	4	8	63

<sup>1</sup> Annual rate per 1,000 population.

<sup>2</sup> Deaths under 1 year per 1,000 births. Cities left blank are not in the registration area for births.

<sup>3</sup> Data for 71 cities.

<sup>4</sup> Deaths for week ended Friday.

<sup>5</sup> In the cities for which deaths are shown by color the colored population in 1920 constituted the following percentages of the total population: Atlanta, 31; Baltimore, 15; Birmingham, 39; Dallas, 15; Fort Worth, 14; Houston, 25; Indianapolis, 11; Kansas City, Kans., 14; Knoxville, 15; Nashville, 30; New Orleans, 26; Richmond, 32; and Washington, D. C., 25.

# 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

### CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended January 18, 1930, and January 19, 1929

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended January 18, 1930, and January 19, 1929

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Jan. 18, 1930	Week ended Jan. 19, 1929	Week ended Jan. 18, 1930	Week ended Jan. 19, 1929	Week ended Jan. 18, 1930	Week ended Jan. 19, 1929	Week ended Jan. 18, 1930	Week ended Jan. 19, 1929
<b>New England States:</b>								
Maine.....	2	8	9	2, 134	3	218	0	2
New Hampshire.....	9	2	1	170	28	61	0	0
Vermont.....	1	4		347	13	24	0	0
Massachusetts.....	130	116	9	2, 277	225	532	6	0
Rhode Island.....	12	13		799	2	51	0	0
Connecticut.....	22	34	9	3, 359	44	283	0	2
<b>Middle Atlantic States:</b>								
New York.....	152	250	129	1, 349	379	843	17	29
New Jersey.....	106	128	14	1, 693	154	157	5	7
Pennsylvania.....	191	165			613	1, 003	11	9
<b>East North Central States:</b>								
Ohio.....	60	42	11	1, 138	989	299	8	2
Indiana.....	27	22		336	67	141	16	0
Illinois.....	180	128	105	541	268	252	18	9
Michigan.....	72	79	3	1, 368	291	95	28	30
Wisconsin.....	25	22	71	2, 483	679	154	3	12
<b>West North Central States:</b>								
Minnesota.....	27	20	1	495	123	131	2	2
Iowa.....	14	4			165		2	3
Missouri.....	36	55	20	1, 193	33	169	16	13
North Dakota.....	21	7		172	12	28	3	9
South Dakota.....	1	1		12	25	17	0	0
Nebraska.....	21	27	50	243	249	21	8	1
Kansas.....	22	18	9	347	219	24	4	3
<b>South Atlantic States:</b>								
Delaware.....	6	1		47		4	0	0
Maryland <sup>1</sup> .....	30	27	32	5, 579	6	56	1	1
District of Columbia.....	12	9		407	2	4	0	0
West Virginia.....	13	25	37	5, 733	116	88	0	2
North Carolina.....	56	51	38		21	23	3	0
South Carolina.....	18	20	981	4, 123		5	6	0
Georgia.....	21	14	180	3, 833	30	97	5	1
Florida.....	12	7	9	713	32	15	0	1
<b>East South Central States:</b>								
Kentucky.....	15	10		2, 734	63		0	0
Tennessee.....	25	6	123	4, 495	259	5	9	1
Alabama.....	22	31	129	12, 444	28	114	5	3
Mississippi.....	16	13		4, 658			8	0

<sup>1</sup> New York City only.

<sup>2</sup> Week ended Friday.

*Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended January 18, 1930, and January 19, 1929—Continued*

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Jan. 18, 1930	Week ended Jan. 19, 1929	Week ended Jan. 18, 1930	Week ended Jan. 19, 1929	Week ended Jan. 18, 1930	Week ended Jan. 19, 1929	Week ended Jan. 18, 1930	Week ended Jan. 19, 1929
<b>West South Central States:</b>								
Arkansas.....	3	24	75	3,456	9	29	2	2
Louisiana.....	34	14	34	7,856	36	57	9	2
Oklahoma <sup>1</sup> .....	37	47	132	7,836	30	11	0	23
Texas.....	54	46	68	1,886	79	20	1	3
<b>Mountain States:</b>								
Montana.....	3	3	-----	24	12	130	2	1
Idaho.....	-----	-----	-----	10	45	8	1	6
Wyoming.....	2	-----	3	404	3	2	0	0
Colorado.....	-----	7	-----	182	26	12	8	10
New Mexico.....	8	5	3	120	161	3	2	1
Arizona.....	3	2	14	11	2	13	7	11
Utah <sup>1</sup> .....	1	3	-----	4	78	1	4	5
<b>Pacific States:</b>								
Washington.....	2	15	-----	42	73	48	2	5
Oregon.....	8	11	69	284	22	44	0	2
California.....	93	73	110	455	490	32	18	4
Division and State	Pollomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Jan. 18, 1930	Week ended Jan. 19, 1929	Week ended Jan. 18, 1930	Week ended Jan. 19, 1929	Week ended Jan. 18, 1930	Week ended Jan. 19, 1929	Week ended Jan. 18, 1930	Week ended Jan. 19, 1929
<b>New England States:</b>								
Maine.....	0	0	45	23	0	0	3	0
New Hampshire.....	0	0	19	15	0	0	0	0
Vermont.....	0	0	5	5	7	0	0	0
Massachusetts.....	2	0	354	255	0	0	4	3
Rhode Island.....	0	0	23	27	0	0	1	0
Connecticut.....	0	1	84	56	0	0	1	0
<b>Middle Atlantic States:</b>								
New York.....	0	1	423	464	14	0	10	15
New Jersey.....	1	0	251	143	0	0	2	2
Pennsylvania.....	1	1	478	378	1	0	12	6
<b>East North Central States:</b>								
Ohio.....	0	0	262	195	269	36	7	2
Indiana.....	0	0	224	149	226	72	1	0
Illinois.....	2	2	531	362	147	104	14	7
Michigan.....	1	0	340	301	90	26	2	4
Wisconsin.....	0	1	116	167	38	6	6	2
<b>West North Central States:</b>								
Minnesota.....	0	1	143	123	3	0	0	0
Iowa.....	0	0	59	113	108	32	2	0
Missouri.....	0	0	71	74	60	46	5	2
North Dakota.....	2	0	23	27	15	0	0	0
South Dakota.....	1	0	27	22	38	39	0	0
Nebraska.....	0	0	79	85	37	52	1	1
Kansas.....	1	0	158	107	68	73	4	2
<b>South Atlantic States:</b>								
Delaware.....	0	0	15	3	0	0	0	0
Maryland <sup>1</sup> .....	0	0	80	62	0	2	3	2
District of Columbia.....	0	0	19	22	0	0	0	0
West Virginia.....	1	1	36	24	32	7	10	5
North Carolina.....	0	0	84	2	59	13	3	1
South Carolina.....	1	1	21	15	4	0	7	2
Georgia.....	0	0	36	16	0	0	8	0
Florida.....	1	0	15	7	2	1	2	1
<b>East South Central States:</b>								
Kentucky.....	0	0	63	43	42	2	2	2
Tennessee.....	0	0	26	11	14	1	3	1
Alabama.....	1	0	35	26	0	1	11	0
Mississippi.....	0	0	13	5	0	0	1	2

<sup>1</sup> Week ended Friday.

<sup>2</sup> Figures for 1930 are exclusive of Oklahoma City and Tulsa and for 1929 are exclusive of Tulsa only.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended January 18, 1930, and January 19, 1929—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Jan. 18, 1930	Week ended Jan. 19, 1929	Week ended Jan. 18, 1930	Week ended Jan. 19, 1929	Week ended Jan. 18, 1930	Week ended Jan. 19, 1929	Week ended Jan. 18, 1930	Week ended Jan. 19, 1929
<b>West South Central States:</b>								
Arkansas.....	0	0	18	22	18	3	1	1
Louisiana.....	0	0	26	32	3	5	10	8
Oklahoma <sup>1</sup> .....	0	0	33	35	81	39	4	0
Texas.....	1	0	52	31	122	49	2	2
<b>Mountain States:</b>								
Montana.....	0	0	26	35	16	10	0	0
Idaho.....	0	0	14	12	21	19	0	0
Wyoming.....	0	0	5	5	8	9	0	0
Colorado.....	1	0	26	17	34	14	3	1
New Mexico.....	0	0	18	12	2	2	3	1
Arizona.....	0	0	11	4	33	1	2	0
Utah <sup>2</sup> .....	0	0	11	26	2	3	7	0
<b>Pacific States:</b>								
Washington.....	0	0	54	38	95	78	1	4
Oregon.....	2	0	47	33	25	47	3	2
California.....	2	1	278	378	157	41	3	3

<sup>1</sup> Week ended Friday.

<sup>2</sup> Figures for 1930 are exclusive of Oklahoma City and Tulsa and for 1929 are exclusive of Tulsa only.

**SUMMARY OF MONTHLY REPORTS FROM STATES**

The following summary of monthly State reports is published weekly and covers only those States from which reports are received during the current week:

State	Menin- gococ- cus menin- gitis	Diph- theria	Influ- ensa	Malaria	Measles	Pella- gra	Polio- myelitis	Scarlet fever	Small- pox	Ty- phoid fever
<i>December, 1929</i>										
Alabama.....	3	214	411	193	32	13	2	130	11	40
Louisiana.....	24	190	159	56	58	16	1	76	4	35
Maine.....	2	14	24	-----	30	-----	0	172	0	11
Maryland.....	3	111	151	5	66	-----	1	316	0	20
Minnesota.....	14	123	4	-----	795	-----	1	529	75	26
New Hampshire.....	-----	17	3	-----	-----	-----	2	76	0	-----
New York.....	72	748	-----	9	1,173	-----	10	1,527	35	46
Ohio.....	27	362	145	1	1,904	-----	12	1,235	753	53
Oregon.....	2	32	101	-----	98	-----	1	156	53	7
Tennessee.....	22	100	480	20	77	7	5	156	43	35
Vermont.....	-----	11	-----	-----	120	-----	0	76	22	1
Wyoming.....	3	20	1	-----	12	-----	0	22	50	2

*December, 1929*

<b>Anthrax:</b>	Cases	<b>Chicken pox—Continued</b>	Cases
Louisiana.....	1	Tennessee.....	143
New York.....	1	Vermont.....	177
<b>Botulism:</b>		Wyoming.....	39
New York.....	1	<b>Conjunctivitis:</b>	
<b>Chicken pox:</b>		Maine.....	4
Alabama.....	83	<b>Dengue:</b>	
Louisiana.....	66	Alabama.....	1
Maine.....	316	<b>Diarrhea:</b>	
Maryland.....	420	Maryland.....	9
Minnesota.....	1,642	<b>Diarrhea and enteritis (under 2 years):</b>	
New York.....	2,895	Ohio.....	19
Ohio.....	3,255	<b>Dysentery:</b>	
Oregon.....	223	Louisiana.....	2
		Maryland.....	6

	Cases		Cases
<b>Dysentery—Continued.</b>		<b>Scabies:</b>	
Minnesota.....	1	Maryland.....	3
Minnesota (amebic).....	1	Oregon.....	6
New York.....	6	<b>Septic sore throat:</b>	
Tennessee.....	1	Louisiana.....	3
<b>Favus:</b>		Maryland.....	11
Maine.....	2	New York.....	15
<b>Food poisoning:</b>		Ohio.....	50
Ohio.....	1	Oregon.....	6
<b>German measles:</b>		Tennessee.....	1
Maine.....	13	Wyoming.....	2
Maryland.....	18	<b>Tetanus:</b>	
New York.....	151	Louisiana.....	3
Ohio.....	11	Maryland.....	2
<b>Hookworm disease:</b>		New York.....	6
Louisiana.....	15	Ohio.....	3
<b>Impetigo contagiosa:</b>		<b>Trachoma:</b>	
Maryland.....	10	Minnesota.....	1
Oregon.....	13	New York.....	1
<b>Lead poisoning:</b>		Ohio.....	2
Ohio.....	28	Tennessee.....	21
<b>Lethargic encephalitis:</b>		<b>Trichinosis:</b>	
Alabama.....	2	Ohio.....	1
Louisiana.....	3	<b>Tularaemia:</b>	
Maryland.....	1	Louisiana.....	3
Minnesota.....	1	Maryland.....	15
New York.....	28	Ohio.....	25
Ohio.....	2	Tennessee.....	21
Oregon.....	1	<b>Typhus fever:</b>	
<b>Mumps:</b>		Alabama.....	6
Alabama.....	21	New York.....	1
Louisiana.....	2	Tennessee.....	1
Maine.....	125	<b>Undulant fever:</b>	
Maryland.....	46	Alabama.....	1
New York.....	1,204	Louisiana.....	1
Ohio.....	369	Maryland.....	1
Oregon.....	63	Minnesota.....	3
Tennessee.....	12	New York.....	17
Vermont.....	7	Ohio.....	3
Wyoming.....	65	Wyoming.....	1
<b>Ophthalmia neonatorum:</b>		<b>Vincent's angina:</b>	
New York.....	1	Maine.....	6
Ohio.....	88	Maryland.....	3
<b>Paratyphoid fever:</b>		New York.....	75
Louisiana.....	1	Oregon.....	2
Maine.....	1	Tennessee.....	6
New York.....	1	Wyoming.....	3
Tennessee.....	3	<b>Whooping cough:</b>	
<b>Puerperal fever:</b>		Alabama.....	97
New York.....	12	Louisiana.....	8
Ohio.....	6	Maine.....	96
Tennessee.....	1	Maryland.....	164
<b>Rabies in animals:</b>		Minnesota.....	216
Louisiana.....	3	New York.....	1,232
Maryland.....	6	Ohio.....	615
New York.....	5	Oregon.....	42
Oregon.....	1	Tennessee.....	77
<b>Rabies in man:</b>		Vermont.....	93
Ohio.....	2	Wyoming.....	7

**RECIPROCAL NOTIFICATIONS**

*Notifications regarding communicable diseases sent during the month of December, 1929, by departments of health of certain States to other State health departments*

Disease	California	Illinois	Kansas	Minnesota	New York
Diphtheria.....					1
Measles.....					1
Meningococcus meningitis.....	1			1	
Smallpox.....		3			
Syphilis.....			1		
Tuberculosis.....		16		13	
Typhoid fever.....	1			4	3
Undulant fever.....				1	

**GENERAL CURRENT SUMMARY AND WEEKLY REPORTS FROM CITIES**

The 97 cities reporting cases used in the following table are situated in all parts of the country and have an estimated aggregate population of more than 31,485,000. The estimated population of the 89 cities reporting deaths is more than 29,670,000. The estimated expectancy is based on the experience of the last nine years, excluding epidemics.

*Weeks ended January 11, 1930, and January 12, 1929*

	1930	1929	Estimated expectancy
<i>Cases reported</i>			
Diphtheria:			
46 States.....	1,740	1,774	
97 cities.....	717	828	1,076
Measles:			
43 States.....	5,180	6,094	
97 cities.....	881	1,422	
Meningococcus meningitis:			
46 States.....	252	214	
97 cities.....	100	123	
Poliomyelitis:			
46 States.....	17	16	
Scarlet fever:			
46 States.....	4,943	3,728	
97 cities.....	1,656	1,311	1,438
Smallpox:			
46 States.....	1,660	737	
97 cities.....	177	32	59
Typhoid fever:			
46 States.....	164	107	
97 cities.....	20	22	41
<i>Deaths reported</i>			
Influenza and pneumonia:			
89 cities.....	1,075	3,719	
Smallpox:			
89 cities.....	0	0	

## City reports for week ended January 11, 1930

The "estimated expectancy" given for diphtheria, poliomyelitis, scarlet fever, smallpox, and typhoid fever is the result of an attempt to ascertain from previous occurrence the number of cases of the disease under consideration that may be expected to occur during a certain week in the absence of epidemics. It is based on reports to the Public Health Service during the past nine years. It is in most instances the median number of cases reported in the corresponding weeks of the preceding years. When the reports include several epidemics, or when for other reasons the median is unsatisfactory, the epidemic periods are excluded and the estimated expectancy is the mean number of cases reported for the week during non-epidemic years.

If the reports have not been received for the full nine years, data are used for as many years as possible, but no year earlier than 1921 is included. In obtaining the estimated expectancy, the figures are smoothed when necessary to avoid abrupt deviation from the usual trend. For some of the diseases given in the table the available data were not sufficient to make it practicable to compute the estimated expectancy.

Division, State, and city	Chick- en pox, cases re- ported	Diphtheria		Influenza		Meas- les, cases re- ported	Mumps, cases re- ported	Pneu- monia, deaths re- ported
		Cases, esti- mated expect- ancy	Cases re- ported	Cases re- ported	Deaths re- ported			
<b>NEW ENGLAND</b>								
<b>Maine:</b>								
Portland.....	32	1	0	0	0	0	2	6
<b>New Hampshire:</b>								
Concord.....	0	0	0	0	0	0	0	1
Manchester.....	0	1	0	0	0	0	0	2
Nashua.....	0	0	0	0	0	0	0	0
<b>Vermont:</b>								
Barre.....	5	0	0	0	0	2	0	0
Burlington.....	7	0	1	0	0	0	0	2
<b>Massachusetts:</b>								
Boston.....	92	40	42	2	0	27	66	34
Fall River.....	14	5	1	0	0	1	0	4
Springfield.....	28	5	6	1	0	1	7	3
Worcester.....	40	5	2	0	0	19	0	3
<b>Rhode Island:</b>								
Pawtucket.....	25	2	3	0	0	0	0	2
Providence.....	6	11	12	0	0	0	0	9
<b>Connecticut:</b>								
Bridgeport.....	8	7	2	3	0	0	0	5
Hartford.....	20	8	2	2	0	0	5	4
New Haven.....	53	1	0	0	0	0	17	5
<b>MIDDLE ATLANTIC</b>								
<b>New York:</b>								
Buffalo.....	37	16	7	0	0	4	5	25
New York.....	279	221	123	34	15	69	92	227
Rochester.....	23	10	0	0	0	7	2	7
Syracuse.....	85	5	0	0	0	0	74	11
<b>New Jersey:</b>								
Camden.....	2	7	8	0	0	0	0	3
Newark.....	123	21	39	6	1	63	14	17
Trenton.....	1	4	0	0	0	17	0	5
<b>Pennsylvania:</b>								
Philadelphia.....	195	80	40	9	7	18	35	64
Pittsburgh.....	38	24	18	0	6	63	9	39
Reading.....	24	3	1	0	0	2	0	5
Scranton.....	1	5	1	0	0	0	0	0
<b>EAST NORTH CENTRAL</b>								
<b>Ohio:</b>								
Cincinnati.....	26	13	8	0	1	2	0	14
Cleveland.....	167	39	15	11	1	6	13	13
Columbus.....	20	6	2	1	1	6	2	5
Toledo.....	112	11	2	1	1	311	4	10
<b>Indiana:</b>								
Fort Wayne.....	6	5	2	0	0	0	0	4
Indianapolis.....	33	10	3	0	0	21	0	15
South Bend.....	0	1	1	0	0	0	0	6
Terre Haute.....	3	2	1	0	0	0	0	4
<b>Illinois:</b>								
Chicago.....	149	112	118	13	9	13	45	73
Springfield.....	7	1	0	1	1	1	0	3



City reports for week ended January 11, 1930—Continued

Division, State, and city	Chick- en pox, cases re- ported	Diphtheria		Influenza		Meas- les, cases re- ported	Mumps, cases re- ported	Pneu- monia, deaths re- ported
		Cases, esti- mated expect- ancy	Cases re- ported	Cases re- ported	Deaths re- ported			
<b>EAST NORTH CENTRAL—Con.</b>								
<b>Michigan:</b>								
Detroit.....	94	63	52	3	4	169	45	45
Flint.....	27	6	1		0	0	0	1
Grand Rapids.....	6	2	1		1	1	0	4
<b>Wisconsin:</b>								
Kenosha.....	13	3	0		0	0	0	0
Milwaukee.....	203	22	4	2	2	3	42	7
Racine.....	17	2	1		0	2	1	0
Superior.....	1	1	0		0	21	0	1
<b>WEST NORTH CENTRAL</b>								
<b>Minnesota:</b>								
Duluth.....	4	2	0		1	21	0	1
Minneapolis.....	183	23	9		5	35	51	18
St. Paul.....	34	12	0		2	4	6	6
<b>Iowa:</b>								
Davenport.....	1	1	0		0	0	0	0
Des Moines.....	4	3	0		0	19	0	0
Sioux City.....	12	1	0		0	1	2	0
Waterloo.....	18	0	2			62	0	
<b>Missouri:</b>								
Kansas City.....	24	8	5		1	3	0	16
St. Joseph.....	5	2	0		0	0	0	3
St. Louis.....	19	48	27	8		4	7	
<b>North Dakota:</b>								
Fargo.....	6	0	0		0	1	6	0
Grand Forks.....	1	0	0		0	0	0	0
<b>South Dakota:</b>								
Aberdeen.....	22	0	0		0	0	3	0
Sioux Falls.....	0	1	0		0	8	0	0
<b>Nebraska:</b>								
Omaha.....	17	5	20			22	2	
<b>Kansas:</b>								
Topeka.....	35	2	1	2	1	6	10	2
Wichita.....	15	4	1		0	1	0	5
<b>SOUTH ATLANTIC</b>								
<b>Delaware:</b>								
Wilmington.....	13	3	2		0	0	0	5
<b>Maryland:</b>								
Baltimore.....	91	31	15	25	4	4	11	28
Cumberland.....	0	1	0		0	0	0	1
Frederick.....	0	0	0		0	0	0	1
<b>District of Columbia:</b>								
Washington.....	31	21	8	2	2	1	0	14
<b>Virginia:</b>								
Lynchburg.....	11	1	2		0	57	11	6
Norfolk.....	3	3	1		0	0	17	9
Richmond.....	0	7	5		2	0	8	3
Roanoke.....	3	2	3		0	0	9	2
<b>West Virginia:</b>								
Charleston.....	20	2	0	2	0	0	0	2
Wheeling.....	3	1	1		0	0	0	2
<b>North Carolina:</b>								
Raleigh.....	4	1	2		1	0	0	2
Wilmington.....	4	1	1		0	0	0	3
Winston-Salem.....	8	2	1		1	0	30	5
<b>South Carolina:</b>								
Charleston.....	0	1	1	47	2	0	3	4
Columbia.....	9	1	1		0	2	4	0
<b>Georgia:</b>								
Atlanta.....	9	4	1	38	4	0	8	13
Brunswick.....	0	0	0		0	0	1	0
Savannah.....	0	2	1		0	0	0	5
<b>Florida:</b>								
Miami.....	0	2	3		0	2	0	3
St. Petersburg.....	0	0	0		0	0	0	2
Tampa.....	11	2	1	1	1	0	3	0

## City reports for week ended January 11, 1930—Continued

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
<b>EAST SOUTH CENTRAL</b>								
Kentucky:								
Covington.....	0	1	0	0	0	0	0	0
Tennessee:								
Memphis.....	12	6	4	4	4	1	8	6
Nashville.....		3	3	3	3	1		7
Alabama:								
Birmingham.....	9	4	3	29	2	0	2	2
Mobile.....	3	1	1	2	0	0	0	4
Montgomery.....	12	0	1			0	0	
<b>WEST SOUTH CENTRAL</b>								
Arkansas:								
Fort Smith.....	7	0	0			0	0	
Little Rock.....	9	1	0		0	0	1	4
Louisiana:								
New Orleans.....	3	13	19	8	6	26	0	23
Shreveport.....	2	2	0		0	0	3	7
Oklahoma:								
Oklahoma City.....	5	2	4	5	1	8	0	2
Texas:								
Dallas.....	17	9	14	6	5	57	1	5
Fort Worth.....	9	4	2		2	0	1	3
Galveston.....	0	2	0		0	0	0	0
Houston.....	2	7	9		1	1	0	7
San Antonio.....	0	3	2		4	0	0	7
<b>MOUNTAIN</b>								
Montana:								
Billings.....	1	0	1		0	0	15	1
Great Falls.....	5	0	0		0	4	39	3
Helena.....	0	0	0		0	0	72	0
Missoula.....	0	0	0	1	1	0	2	0
Idaho:								
Boise.....	5	0	0		0	0	0	0
Colorado:								
Denver.....	46	11	6		4	8	13	12
Pueblo.....	18	2	0		0	0	34	1
New Mexico:								
Albuquerque.....	3	0	1		0	0	7	2
Arizona:								
Phoenix.....	2	0	3		1	0	3	4
Utah:								
Salt Lake City.....	61	4	1		0	5	9	9
Nevada:								
Reno.....	0	0	0		0	0	0	0
<b>PACIFIC</b>								
Washington:								
Seattle.....	72	4	0			4	38	
Spokane.....	25	2	2	4		0	0	
Tacoma.....	26	3	4		1	0	1	5
Oregon:								
Portland.....	22	12	3	5	2	1	12	7
Salem.....	2	0	0		0	0	7	0
California:								
Los Angeles.....	78	43	18	24	3	9	22	39
Sacramento.....	16	3	4		0	3	38	2
San Francisco.....		19						



## City reports for week ended January 11, 1930—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuber- culo- sis, deaths re- ported	Typhoid fever			Whoop- ing cough, cases re- ported	Deaths, all causes
	Cases, esti- mated expect- ancy	Cases re- ported	Cases, esti- mated expect- ancy	Cases, re- ported	Deaths re- ported		Cases, esti- mated expect- ancy	Cases re- ported	Deaths re- ported		
WEST NORTH CENTRAL—contd.											
Missouri:											
Kansas City	15	23	1	0	0	6	0	0	7	104	
St. Joseph	3	2	1	2	0	0	0	0	0	40	
St. Louis	43	16	1	12	0	8	1	1	0	211	
North Dakota:											
Fargo	2	7	0	3	0	1	0	0	1	5	
Grand Forks	0	0	0	3			0	0	0		
South Dakota:											
Aberdeen	0	1	0	0			0	0	6		
Sioux Falls	2	0	0	17			0	0	0	3	
Nebraska:											
Omaha	5	6	2	5			0	0	0		
Kansas:											
Topeka	3	3	0	1	0	0	0	0	10	17	
Wichita	5	14	0	4	0	0	0	0	1	44	
SOUTH ATLANTIC											
Delaware:											
Wilmington	6	10	0	0	0	1	0	0	0	34	
Maryland:											
Baltimore	34	41	0	0	0	14	2	3	12	244	
Cumberland	1	4	0	0	0	0	1	0	0	17	
Frederick	0	2	0	0	0	0	0	0	2	6	
District of Columbia:											
Washington	26	19	1	0	0	6	1	0	10	143	
Virginia:											
Lynchburg	1	2	0	0	0	1	0	0	8	21	
Norfolk	2	2	0	0	0	0	0	0	0		
Richmond	5	11	0	0	0	4	0	0	0	54	
Rosnoke	2	0	0	0	0	0	1	0	0	12	
West Virginia:											
Charleston	1	0	0	0	0	0	0	0	14	9	
Wheeling	2	0	0	0	0	1	1	0	12	20	
North Carolina:											
Raleigh	1	1	1	0	0	0	0	0	3	21	
Wilmington	1	0	0	0	0	0	0	0	3	17	
Winston-Salem	2	4	1	0	0	1	0	0	3	32	
South Carolina:											
Charleston	1	0	1	0	0	1	0	0	1	34	
Columbia	0	0	0	0	0	1	0	0	14	9	
Georgia:											
Atlanta	6	7	2	0	0	4	0	1	3	83	
Brunswick	0	0	0	0	0	0	0	0	0	5	
Savannah	1	6	0	0	0	2	0	0	0	46	
Florida:											
Miami	2	5	0	0	0	0	1	0	3	21	
St. Petersburg	0	0	0	0	0	1	0	0	0	23	
Tampa	1	2	0	0	0	0	1	1	4	26	
EAST SOUTH CENTRAL											
Kentucky:											
Covington	2	0	0	0	0	0	0	0	0	34	
Tennessee:											
Memphis	7	5	1	1	0	5	0	1	0	73	
Nashville	2	1	0	0	0	0	0	0	0		
Alabama:											
Birmingham	4	6	3	0	0	2	0	0	4	50	
Mobile	1	3	0	0	0	1	0	0	0	19	
Montgomery	0	1	0	0			0	0	0		
WEST SOUTH CENTRAL											
Arkansas:											
Fort Smith	1	3	0	0			0	0	0		
Little Rock	2	1	0	3		1	1	0	0		
Louisiana:											
New Orleans	6	15	1	0	0	10	3	1	0	173	
Shreveport	1	0	1	1	0	1	0	0	0	32	

City reports for week ended January 11, 1930—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
<b>WEST SOUTH CENTRAL—contd.</b>											
Oklahoma:											
Oklahoma City.....	3	6	1	8	0	2	1	0	0	0	36
Texas:											
Dallas.....	5	9	1	0	0	1	1	0	0	0	55
Fort Worth.....	3	1	2	5	0	2	0	0	0	0	38
Galveston.....	2	1	0	0	0	3	0	0	0	0	19
Houston.....	3	2	1	4	0	5	0	0	0	0	59
San Antonio.....	2	0	0	3	0	8	0	0	0	0	75
<b>MOUNTAIN</b>											
Montana:											
Billings.....	2	8	0	0	0	0	0	0	0	0	8
Great Falls.....	2	18	0	0	0	0	0	0	0	1	9
Helena.....	1	0	0	0	0	0	0	0	0	4	1
Missoula.....	1	2	0	3	0	1	0	0	0	0	8
Idaho:											
Boise.....	1	0	0	1	0	0	0	0	0	0	15
Colorado:											
Denver.....	10	19	1	1	0	8	0	0	1	6	79
Pueblo.....	3	0	0	0	0	0	0	0	0	0	9
New Mexico:											
Albuquerque.....	1	0	0	0	0	4	0	0	0	0	12
Arizona:											
Phoenix.....	1	0	0	10	0	1	0	0	0	0	19
Utah:											
Salt Lake City.....	4	7	3	0	0	1	0	0	0	16	36
Nevada:											
Reno.....	0	2	0	0	0	0	0	0	0	0	2
<b>PACIFIC</b>											
Washington:											
Seattle.....	9	9	3	3			0	0		13	
Spokane.....	8	1	4	43			0	0		5	
Tacoma.....	3	5	3	9	0	0	0	0	0	6	24
Oregon:											
Portland.....	6	3	12	4	0	3	0	2	1	2	85
Salem.....	0	0	1	0	0	0	0	0	0	0	
California:											
Los Angeles.....	33	73	4	6	0	23	1	2	1	19	313
Sacramento.....	2	15	0	8	0	1	0	0	0	0	37
San Francisco.....	17		2				1				

Division, State, and city	Meningococcus meningitis		Lethargic encephalitis		Pellagra		Poliomyelitis (infantile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, estimated expectancy	Cases	Deaths
<b>NEW ENGLAND</b>									
Massachusetts:									
Boston.....	1	1	0	0	1	0	1	0	0
Connecticut:									
Hartford.....	0	0	0	1	0	0	0	0	0
<b>MIDDLE ATLANTIC</b>									
New York:									
New York.....	13	3	2	2	0	0	1	0	0
New Jersey:									
Newark.....	5	0	0	0	0	0	0	0	0
Pennsylvania:									
Philadelphia.....	2	2	0	0	0	0	0	0	0
Pittsburgh.....	3	3	0	1	0	0	0	0	0

## City reports for week ended January 11, 1930—Continued

Division, State, and city	Meningococcus meningitis		Lethargic encephalitis		Pellagra		Poliomyelitis (infantile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, estimated expectancy	Cases	Deaths
<b>EAST NORTH CENTRAL</b>									
Ohio:									
Cleveland.....	6	1	0	0	0	0	0	0	0
Toledo.....	1	0	0	0	0	0	0	0	0
Indiana:									
Indianapolis.....	10	7	0	0	0	0	0	0	0
South Bend.....	2	2	0	0	0	0	0	0	0
Terre Haute.....	1	1	0	0	0	0	0	0	0
Illinois:									
Chicago.....	6	4	0	1	0	0	0	1	0
Springfield.....	1	0	0	0	0	0	0	0	0
Michigan:									
Detroit.....	23	9	0	0	1	0	0	1	0
<b>WEST SOUTH CENTRAL</b>									
Missouri:									
Kansas City.....	1	1	0	0	0	0	0	0	0
St. Joseph.....	0	1	0	0	0	0	0	0	0
St. Louis.....	4	2	0	0	0	0	0	0	0
North Dakota:									
Fargo.....	0	0	1	0	0	0	0	0	0
Nebraska:									
Omaha.....	5	0	0	0	0	0	0	0	0
Kansas:									
Topeka.....	1	1	0	0	0	0	0	0	0
<b>SOUTH ATLANTIC</b>									
Maryland:									
Baltimore.....	1	0	0	0	0	0	0	0	0
Virginia:									
Lynchburg.....	0	0	0	0	0	1	0	0	0
North Carolina:									
Winston-Salem.....	0	0	0	0	0	1	0	0	0
South Carolina:									
Charleston.....	0	0	0	0	2	1	0	0	0
Columbia.....	0	1	0	0	0	1	0	0	0
Georgia:									
Atlanta.....	2	2	0	0	0	0	0	0	0
Savannah.....	0	0	0	0	0	3	0	0	0
<b>EAST SOUTH CENTRAL</b>									
Kentucky:									
Covington.....	1	1	0	0	0	0	0	0	0
Tennessee:									
Memphis.....	3	0	0	0	0	0	0	0	0
Nashville.....	1	0	0	0	0	0	0	0	0
Alabama:									
Birmingham.....	0	0	0	0	1	0	0	1	0
<b>WEST SOUTH CENTRAL</b>									
Arkansas:									
Little Rock.....	0	0	0	0	0	1	0	0	0
Louisiana:									
New Orleans.....	3	4	0	0	0	0	0	0	0
Shreveport.....	0	1	0	0	0	0	0	0	0
Oklahoma:									
Oklahoma City.....	1	0	0	0	0	0	0	0	0
<b>MOUNTAIN</b>									
Colorado:									
Denver.....	1	0	0	0	0	0	0	0	0
Arizona:									
Phoenix.....	1	0	0	0	0	0	0	0	0
Utah:									
Salt Lake City.....	4	1	0	0	0	0	0	0	0
<b>PACIFIC</b>									
California:									
Los Angeles.....	2	3	0	0	0	0	1	1	2

The following table gives the rates per 100,000 population for 98 cities for the 5-week period ended January 11, 1930, compared with those for a like period ended January 12, 1929. The population figures used in computing the rates are approximate estimates, authoritative figures for many of the cities not being available. The 98 cities reporting cases have an estimated aggregate population of more than 32,000,000. The 91 cities reporting deaths have nearly 30,500,000 estimated population.

*Summary of weekly reports from cities, December 8, 1929, to January 11, 1930—  
Annual rates per 100,000 population, compared with rates for the corresponding period of 1928-29*<sup>1</sup>

DIPHTHERIA CASE RATES

	Week ended—									
	Dec. 14, 1929	Dec. 15, 1928	Dec. 21, 1929	Dec. 22, 1928	Dec. 28, 1929	Dec. 29, 1928	Jan. 4, 1930	Jan. 5, 1929	Jan. 11, 1930	Jan. 12, 1929
98 cities.....	134	159	129	146	<sup>2</sup> 120	133	<sup>3</sup> 117	148	<sup>4</sup> 119	139
New England.....	118	216	170	159	<sup>2</sup> 125	170	136	163	156	183
Middle Atlantic.....	112	139	106	146	113	156	86	178	113	157
East North Central.....	170	206	167	166	166	133	<sup>3</sup> 156	153	130	124
West North Central.....	148	149	110	139	67	119	114	161	123	158
South Atlantic.....	107	130	107	122	79	105	86	111	83	118
East South Central.....	136	98	122	133	109	105	112	88	79	190
West South Central.....	304	251	233	191	178	174	201	111	170	119
Mountain.....	61	18	61	71	35	18	52	70	69	87
Pacific.....	60	61	57	95	85	43	120	60	<sup>4</sup> 95	67

MEASLES CASE RATES

98 cities.....	113	183	110	179	<sup>2</sup> 92	161	<sup>3</sup> 130	196	<sup>4</sup> 146	235
New England.....	86	837	93	800	<sup>2</sup> 98	676	125	964	112	873
Middle Atlantic.....	47	91	59	68	51	77	76	80	116	94
East North Central.....	133	194	94	251	97	206	<sup>3</sup> 118	230	153	315
West North Central.....	202	272	210	225	146	201	277	198	303	394
South Atlantic.....	28	88	39	52	30	73	132	114	118	66
East South Central.....	14	0	0	28	0	7	7	14	13	7
West South Central.....	63	12	138	12	91	4	101	24	325	43
Mountain.....	104	257	139	204	78	106	197	383	146	427
Pacific.....	479	64	431	49	337	84	315	40	<sup>4</sup> 54	115

SCARLET FEVER CASE RATES

98 cities.....	276	203	250	184	<sup>2</sup> 217	183	<sup>3</sup> 250	195	<sup>4</sup> 274	221
New England.....	378	251	312	241	<sup>2</sup> 314	308	377	296	397	317
Middle Atlantic.....	172	143	176	145	164	138	186	148	232	190
East North Central.....	438	290	354	233	311	220	<sup>3</sup> 344	239	352	251
West North Central.....	271	252	235	241	179	262	245	258	216	283
South Atlantic.....	193	163	253	166	144	132	186	154	201	124
East South Central.....	88	168	48	154	75	182	125	197	106	156
West South Central.....	142	174	103	101	126	162	89	142	120	182
Mountain.....	322	62	583	27	322	27	378	113	481	157
Pacific.....	352	182	252	197	254	151	271	185	<sup>4</sup> 348	282

<sup>1</sup> The figures given in this table are rates per 100,000 population, annual basis, and not the number of cases reported. Populations used are estimated as of July 1, 1930, 1929, and 1928, respectively.

<sup>2</sup> Hartford, Conn., not included.

<sup>3</sup> South Bend, Ind., and Racine, Wis., not included.

<sup>4</sup> San Francisco, Calif., not included.

Summary of weekly reports from cities, December 8, 1929, to January 11, 1930—  
Annual rates per 100,000 population compared with rates for the corresponding  
period of 1928-29—Continued

## SMALLPOX CASE RATES

	Week ended—									
	Dec. 14, 1929	Dec. 15, 1928	Dec. 21, 1929	Dec. 22, 1928	Dec. 28, 1929	Dec. 29, 1928	Jan. 4, 1930	Jan. 5, 1929	Jan. 11, 1930	Jan. 12, 1929
98 cities.....	23	8	23	8	<sup>1</sup> 18	4	<sup>2</sup> 20	3	<sup>4</sup> 29	5
New England.....	2	0	0	2	<sup>0</sup> 0	2	0	0	0	2
Middle Atlantic.....	0	0	0	0	0	0	0	1	0	0
East North Central.....	29	16	31	4	20	3	<sup>3</sup> 16	6	27	3
West North Central.....	56	0	60	6	58	10	80	2	89	6
South Atlantic.....	0	2	0	0	2	2	2	0	0	2
East South Central.....	0	7	7	0	7	7	0	7	7	41
West South Central.....	36	24	36	41	28	12	15	4	43	16
Mountain.....	78	44	52	44	44	35	52	35	43	78
Pacific.....	122	20	117	56	80	15	107	5	<sup>4</sup> 233	7

## TYPHOID FEVER CASE RATES

98 cities.....	6	5	5	4	<sup>2</sup> 4	5	<sup>2</sup> 2	4	<sup>3</sup> 3	4
New England.....	7	7	0	2	<sup>0</sup> 0	2	2	5	0	2
Middle Atlantic.....	6	4	4	4	3	4	1	2	3	4
East North Central.....	3	1	3	1	1	5	<sup>2</sup> 2	3	2	1
West North Central.....	6	4	8	2	2	6	0	0	2	0
South Atlantic.....	7	6	4	8	9	6	6	9	9	4
East South Central.....	14	21	0	7	34	7	7	0	7	7
West South Central.....	8	16	40	8	8	8	0	4	4	28
Mountain.....	9	9	17	9	0	9	9	9	0	0
Pacific.....	7	8	2	10	10	8	10	7	<sup>7</sup> 7	0

## INFLUENZA DEATH RATES

91 cities.....	16	80	19	118	<sup>2</sup> 19	180	<sup>3</sup> 17	234	<sup>4</sup> 19	241
New England.....	7	9	9	14	<sup>0</sup> 10	14	7	48	0	100
Middle Atlantic.....	9	27	18	66	13	129	10	165	14	161
East North Central.....	15	44	14	124	13	201	<sup>3</sup> 15	238	12	236
West North Central.....	12	174	15	220	15	254	27	240	<sup>6</sup> 34	165
South Atlantic.....	19	101	13	134	26	281	18	343	31	395
East South Central.....	59	100	52	77	30	268	29	970	65	1,592
West South Central.....	81	96	69	212	97	379	79	596	64	467
Mountain.....	0	735	26	594	26	296	17	218	43	165
Pacific.....	20	317	30	212	20	182	13	134	<sup>4</sup> 20	79

## PNEUMONIA DEATH RATES

91 cities.....	151	202	159	250	<sup>2</sup> 144	315	<sup>3</sup> 170	383	<sup>4</sup> 170	408
New England.....	136	108	158	199	<sup>2</sup> 96	159	163	201	170	323
Middle Atlantic.....	156	190	165	247	155	294	181	395	192	443
East North Central.....	115	171	117	255	116	382	<sup>3</sup> 113	466	122	414
West North Central.....	174	318	180	444	174	364	195	216	<sup>6</sup> 173	285
South Atlantic.....	191	251	184	228	152	344	221	360	177	485
East South Central.....	215	199	215	207	193	261	251	533	136	659
West South Central.....	239	182	243	254	243	408	329	670	210	528
Mountain.....	192	629	235	390	209	363	180	174	223	200
Pacific.....	111	222	144	109	108	169	118	148	<sup>4</sup> 232	134

<sup>1</sup> Hartford, Conn., not included.<sup>2</sup> South Bend, Ind., and Racine, Wis., not included.<sup>3</sup> San Francisco, Calif., not included.<sup>4</sup> Omaha, Nebr., and San Francisco, Calif., not included.<sup>6</sup> Omaha, Nebr., not included.



## FOREIGN AND INSULAR

### CANADA

*Provinces—Communicable diseases—Week ended January 4, 1930.*—The Department of Pensions and National Health reports cases of certain communicable diseases in Canada for the week ended January 4, 1930, as follows:

Province	Cerebrospinal fever	Influenza	Smallpox	Typhoid fever
Prince Edward Island <sup>1</sup> .....				
Nova Scotia.....		6		
New Brunswick.....				2
Quebec.....	1			
Ontario.....	2	6	15	7
Manitoba.....			3	
Saskatchewan.....			12	
Alberta.....			7	
British Columbia.....	2		7	
Total.....	5	12	44	11

<sup>1</sup> No case of any disease included in the table was reported for the week.

*Quebec Province—Communicable diseases—Week ended January 11, 1930.*—The Bureau of Health of the Province of Quebec, Canada, reports cases of certain communicable diseases for the week ended January 11, 1930, as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis.....	3	Mumps.....	87
Chicken pox.....	133	Scarlet fever.....	184
Diphtheria.....	77	Tuberculosis.....	41
German measles.....	4	Typhoid fever.....	5
Influenza.....	11	Whooping cough.....	128
Measles.....	159		

### CHINA

*Meningitis.*—During the week ended January 4, 1930, 10 cases of meningitis, with 10 deaths were reported at Canton, China.

### JAMAICA

*Communicable diseases—Four weeks ended January 4, 1930.*—During the four weeks ended January 4, 1930, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island of Jamaica outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis.....		1	Paratyphoid fever.....		1
Chicken pox.....		3	Puerperal fever.....		1
Dysentery.....	3	5	Scarlet fever.....		4
Erysipelas.....	1		Tuberculosis.....	53	51
Leprosy.....	1	3	Typhoid fever.....	10	56

### VIRGIN ISLANDS

*Communicable diseases—December, 1929.*—During the month of December, 1929, cases of certain communicable diseases were reported in the Virgin Islands as follows:

#### St. Thomas and St. John:

Dysentery.....	1
Gonorrhoea.....	3
Syphilis.....	7

#### St. Croix:

Gonorrhoea.....	3
Leprosy.....	1
Syphilis.....	10
Tuberculosis.....	1
Uncinariasis.....	2



India (French):																				
Chandernagor.....	D	2	1																	
Karkal.....	D	2	1					1	1											
Fondicherry Province.....	D		1							2										P
India (Portuguese):																				
Indo-China (see also table below):	D																			
Pnompeh.....	D		1																	
Saigon and Cholou.....	D		1																	
Japan.....	D																			
Kobe.....	D		2																	
Osaka.....	D		5																	
Shimonoseki.....	D		2																	
Siam.....	D		371																	
Anthoang.....	D		202																	
Ayudhaya.....	D		4																	
Bangkok.....	D		4																	
Dhannapuri.....	D		11																	
Lobpuri.....	D		1																	
Nagara Rajisima.....	D		7																	
Smud Songram.....	D		1																	
Sridharmaraj Provinces <sup>1</sup> .....	D		3																	
On vessel:	D																			
S. S. Cap. St. Jacques, at Singapore, from Saigon-Cholon.....	D		15																	
S. S. Sunsey, at Shanghai.....	D		13																	
S. S. Texas Maru, at Nagasaki, from Shanghai.....	D																			

Place	July, 1929		August, Septem-ber, 1929		October, 1929			November, 1929			December, 1929	
	1	2	1	2	1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20
Indo-China (French) (see also table above):												
Amur.....	O	9	17	1								
Cambodia.....	O	186	25	38								
Cochin-China.....	O	315	60	48		121	100			2		41
Laos.....	O	13	3	12			3			43		46
Loos.....	O									15		

<sup>1</sup> There were 98 cases of cholera with 16 deaths in Nagara Sridharmaraj Province, Siam, from May 16 to July 7, 1929.







Place	July, 1929	August, 1929	September, 1929	October, 1929	November, 1929	December, 1929
Turkey:						
Adalia.....		1				
Constantinople.....		2				
Union of Socialist Soviet Republics:						
Caucasia.....		3	1			P
Kazak.						
Ural-Kirghiz.....		1				
Union of South Africa:						
Cape Province.....		17	2	11	4	
Orange Free State.....		13	5	5	1	
On vessel:						
S. S. Chaban, at Port Said, from Jaffa.....		1				
S. S. Tokio, at Shanghai, from Singapore.....		1				
Steamship at Porto Novo, from Lagos.....		1				
Place	July, 1929	August, 1929	September, 1929	October, 1929	November, 1929	December, 1929
British East Africa (see also table above):						
Kenya.....	67	19	28	146	62	
Uganda.....	1,203	866				
Ecuador: Guayaquil.....	1	6	7	12	14	
Plague-infected rats.....		1	3	4	3	
Greece (see also table above):						
Indo-China (see also table above):						
Madagascar (see also table above):						
Ambositra Province.....	3	2	5	5	2	
Antsirabe Province.....	1	2	2	2	1	
Itasy Province.....	37	9				
Majunga Province.....	18	48	195	203		
Miarinarivo.....	19	48	192	193		
Senegal:						
Esol.....	1					
Dakar.....	9	9	2	2		
Louga.....	9	9	2	2		
Rufisque.....	2	1	13	17		
Tlites.....	2	1	13	17		
Tivouane.....	2	5	5	5		
Tivouane <sup>1</sup> .....		2				
Tivouane <sup>1</sup> .....		2				
Tivouane <sup>1</sup> .....		11	11	11		
Tivouane <sup>1</sup> .....		11	11	11		

<sup>1</sup> Incomplete reports.













Place	Aug. 1929	Sep. 1929	Oct. 1929	Nov. 1929	Dec. 1929	Jan. 1930
British East Africa (see also table above):						
Kenya.....	C 60	66				
Chosen.....	D 1	1				
Mexico: Durango (see also table above).....	D	2	2	2	2	4

**TYPHUS FEVER**

Place	Week ended—											
	Oct. 26, 1929			November, 1929				December, 1929			January, 1930	
	2	9	16	23	30	7	14	21	28	4	11	
Algeria:												
Algiers.....												
Constantine Department.....												
Oran.....												
Boulvia, Psoajys Province—Caiaoco Canton.....												
Brazil: Sao Paulo: <sup>1</sup>												
Bulgaria:												
Sofia.....												
Chile: Valparaiso.....												
China: Tientsin.....												
Chosen (see table below).....												
Czechoslovakia (see table below).....												
Egypt:												
Alexandria.....												
Assuan.....												
Behera Province.....												

<sup>1</sup> Press reports show that 10 deaths from typhus fever have occurred in Sao Paulo, Brazil, from Nov. 3 to 30, 1929.



Orange Free State..... C P P P P P P P P P P P P  
 Travasal..... C P P P P P P P P P P P P  
 Yugoslavia (see table below).

Place	July, 1929	Aug. 1929	Sep-tem-ber, 1929	Octo-ber, 1929	No-vem-ber, 1929	De-cem-ber, 1929
	C	P	P	P	P	P
Chosen: Seoul.....	C	1	1	3	1	1
Czechoslovakia.....	C	1	1	1	1	1
France.....	C	6	3	7	1	1
Greece: Athens.....	C	1	1	1	1	1
Latvia.....	C	10	7	3	6	4
Lithuania.....	D	1	1	1	1	1

Place	July, 1929	Aug. 1929	Sep-tem-ber, 1929	Octo-ber, 1929	No-vem-ber, 1929	De-cem-ber, 1929
	C	P	P	P	P	P
Peru: Arequipa.....	D	1	1	1	1	1
Turkey.....	C	3	4	4	10	2
Yugoslavia.....	C	3	7	1	1	5
	D	1	2			

YELLOW FEVER

Place	June 30-July 27, 1929	July 28-Aug. 24, 1929	Aug. 25-Sept. 21, 1929	Sept. 22-Oct. 19, 1929	Week ended—												
					November, 1929								December, 1929				
					Oct. 26, 1929	2	9	16	23	30	7	14	21				
Brazil:																	
Bahia.....	1																
Nittheroy.....	1																
Para.....	1		1														
Rio de Janeiro.....	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Colombia:																	
Simacota.....	4																
Socorro.....	12																
Gold Coast.....	4																
Liberia: Monrovia.....	1		1														1

1 From June 19 to July 8, 1929, 41 cases of yellow fever with 23 deaths were reported in Socorro, Colombia.

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