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THE DETECTION AND ANALYSIS OF ARSENIC IN WATER CONTAMINATED WITH CHEMICAL WARFARE AGENTS[1]

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Arsenical contamination is one of the possible dangers to water supplies in surprise attacks of modern chemical warfare. For this reason waterworks chemists should become familiar with reliable methods of determining arsenic and be prepared to detect immediately dangerous contamination of public supplies and prevent their use. Unfortunately chemical warfare arsenicals in the form in which they would be discharged into water supplies cannot readily be determined quantitatively by ordinary methods. The organic arsenicals must be decomposed and oxidized to be determined quantitatively in the low but toxic concentration that is likely to occur. This memorandum has been prepared to familiarize waterworks chemists with the possibilities and assist them to meet the problem of arsenic contamination if and when it occurs.

Some of the more important arsenical compounds which if used in chemical warfare may contaminate water supplies (*1*, *2*, *3*) include the following:

Chemical	Solubility, mg. per liter 20° C.	Formula	Chemical warfare symbol
1. Methyldichlorarsine	1,000[1]	CH_3AsCl_2	MD
2. Ethyldichlorarsine	1,000[1]	$C_2H_5AsCl_2$	ED
3. Lewisite-B chlorovinyldichlorarsine	500[1]	$ClCH{:}CHAsCl_2$	M1
4. Phenyldichlorarsine	Insoluble[1]	$C_6H_5AsCl_2$	
5. Diphenylchlorarsine	14.4[1]	$(C_6H_5)_2AsCl$	DA
6. Adamsite phenylarsazine chloride	15.7[2]	$NH(C_6H_4)_2AsCl$	DM
7. Diphenylcyanoarsine	Sparingly soluble[1]	$(C_6H_5)_2AsCN$	CDA
8. Diphenylaminocyanoarsine	(?)	$NH(C_6H_4)_2AsCN$	

[1] Reference (*1*).
[2] Determined in this laboratory.

[1] From the Stream Pollution Investigations Station (Cincinnati, Ohio), of the Division of Public Health Methods, National Institute of Health.

The first three compounds above represent the aliphatic arsines and are all vesicants. There are a number of similar compounds, including dimethylbromoarsine, dimethylfluorarsine, methyldicyanoarsine, and ethyldibromoarsine that have been found to be inferior to methyldichlorarsine in aggressive properties. These are not likely to be encountered, although 45 percent of ethyldibromoarsine was used in a mixture with ethyldichlorarsine in the first world war.

Lewisite seems to be the most important representative of a group of compounds which includes dichlorovinylchlorarsine, trichlorovinylarsine, B bromovinyldibromoarsine, B chlorostyrildichlorarsine, B chlorovinylmethylchlorarsine, and phenyl B chlorovinylchlorarsine. Although these compounds also are vesicants, their aggressive properties are less well known and none of them seem as likely to be used as lewisite.

The three representative vesicant aliphatic arsenicals are all sufficiently soluble in water to be extremely dangerous because of systemic poisoning.

Besides, all three are rapidly hydrolyzed, and the soluble arsenic concentrations may thereby be increased according to the following equations:

$CH_3AsCl_2+H_2O\rightarrow$	$2HCl+CH_3AsO$
$C_2H_5AsCl_2+H_2O\rightarrow$	$2HCl+C_2H_5AsO$
$ClCH:CHAsCl_2+H_2O\rightarrow$	$2HCl+ClCH:CHAsO$ (M1 oxide)

The arsenic hydrolysis products of the first two are soluble in water. The M1 oxide (chlorovinyl arsenious oxide) resulting from the hydrolysis of lewisite is usually referred to as sparingly soluble. This oxide, which is also a vesicant, is precipitated by the rapid hydrolysis of lewisite, after which it readily goes into solution and was found by us to be soluble to the extent of about 12,400 p. p. m. at 20°C. Appearance and odor of the water containing any of these three materials cannot be depended upon to indicate toxic contamination, consequently analysis for arsenic must be made if the water is suspected. Possible change in pH of the water should be watched, as such change might indicate contamination by one of these more soluble arsenicals and should immediately be followed by examination for arsenic.

Compounds Nos. 4 to 8 in the table represent the more important aromatic arsines. Of these the phenyldichlorarsine, a liquid, is a lung injurant and also has vesicant properties, but it is less aggressive than methyldichlorarsine. The last four compounds are all sternutators or toxic smokes and are used as aerosols. The aromatic arsines are all much less soluble in water than the aliphatic compounds. However, diphenylchlorarsine and adamsite, though usually considered insoluble, were found to be sufficiently soluble to produce

toxic waters when saturated. These arsenicals hydrolyze in a similar way to the aliphatic arsines, but at a lower rate, to give the corresponding arsenious oxides and HCl. Additional aromatic arsines that may be mentioned include phenyldibromoarsine, diphenylbromoarsine, and the phenarsazine bromide, iodide, and fluoride that have toxic properties similar to adamsite.

The identification of the arsenical used to contaminate a water is unimportant for immediately safeguarding public supplies. The important action is to determine if and to what extent arsenic is present in the water supply after an attack.

The United States Public Health Service Drinking Water Standards (*4*) states that arsenic in excess of 0.05 p. p. m. should not be permitted in water for drinking or culinary purposes. It is suggested, however, that in emergencies where other supplies are not available arsenic in concentrations up to 1 to 2 p. p. m. might be permitted for several days and concentrations as high as 5.0 p. p. m. might even be permitted for one day.

Assuming a water consumption of 2 liters per day (this is 2.12 quarts and is probably high) 4 mg. of arsenic would be ingested daily through use of a water containing 2 p. p. m. arsenic and 10 mg. would be ingested in one day from the water containing 5 p. p. m. arsenic. This amount is not excessive. Arsenic trioxide is administered internally in doses of 0.001 to 0.003 gm. three or four times a day (*5*, *6*). This corresponds to 3 to 9.1 mg. of arsenic per day and is essentially the same as would be obtained by using the contaminated waters previously mentioned.

The Department of Agriculture's standard of tolerance for arsenic in foodstuffs is 1.4 p. p. m. and for spray residues is 3.58 p. p. m. (*3*).

McNally (*7*) states that the commonly accepted figure for a fatal dose of arsenic is 175 to 204 mg.

The use of contaminated water should not be continued for more than a few days, however, as small quantities of arsenic consumed daily for extended periods of time have been known to produce fatalities (*8*).

PREPARATION OF SAMPLE

Perhaps the most important step in the determination of arsenic present in a water contaminated with organic arsines is the preparation of the sample. As stated before, it is necessary to decompose the arsenicals and oxidize the arsenic before making the determination by the methods that are most easily applied to waters containing small but toxic concentrations of these agents. Several methods of preparing the sample were studied, using samples contaminated with some of the more important arsenicals listed in the first table. It was

found that the treatment of the sample with chlorine to satisfy the immediate (5 to 10 minute) chlorine demand permitted only qualitative detection of arsenic. Permanganate treatment of the sample in the cold was more effective than chlorination. Such oxidation permitted about 50 percent recovery of arsenic from most agents but was still very ineffective on methyldichlorarsine, in which case only about 5 percent of the arsenic present was indicated. Acid digestion of the sample, which unfortunately is time-consuming, was the only procedure which permitted quantitative recovery of the arsenic from all agents that were tried. Acid permanganate treatment of the sample in a hot water bath for 30 minutes permitted quantitative recovery of arsenic from diphenylchlorarsine, adamsite, and lewisite but not from ethyldichlorarsine or methyldichlorarsine. In the case of ethyldichlorarsine about 50 percent recovery of the arsenic was obtained after hot permanganate treatment, and in samples contaminated with methyldichlorarsine only about 25 percent recovery of the arsenic was obtained after this procedure. The acid digestion procedure is therefore recommended as best and the acid permanganate treatment at boiling temperature for 30 minutes as permissible where a rapid field procedure is desired for preparation of the sample. Both procedures are described here.

ANALYTICAL PROCEDURE

The two procedures studied for the determination of arsenic in water supplies are the Gutzeit and the molybdenum blue method. Although the Gutzeit procedure has been standard in the methods of the Association of Official Agricultural Chemists for many years, we prefer and recommend the molybdenum blue method. The Gutzeit procedure is placed last because it is more time-consuming and because our experience confirms published opinions that it cannot be relied upon for accurate quantitative interpretation by the average analyst.

However, the molybdenum blue method is subject to interference by silicon and phosphorus. In our experience 200 p. p. m. or more of silicon are necessary to give interference. As this quantity of silicon is very unusual in water, silicon interference will be rare. Phosphorus interference, however, will not be so unusual. It is not uncommon for polluted waters to contain sufficient phosphates (0.2 to 1.0 p. p. m.) to interfere with the arsenic determination. We have also encountered an unpolluted deep well supply containing 1.6 p. p. m. of PO_4, which prevented the direct application of the molybdenum blue procedure. It would seem desirable for all chemists charged with the protection of water supplies to try the molybdenum blue method and determine beforehand whether this rapid and satisfactory procedure

is applicable to their supplies. If the procedure is not directly applicable after preparation of the sample, the Gutzeit procedure can still be avoided by distilling the arsenic from a Gutzeit generator and catching it in a trap for later application of the molybdenum blue method.

Chemists who have had considerable experience with the Gutzeit method may prefer to continue its use. The method is perfectly reliable in experienced hands when all of the precautions are observed. It can be applied to a sample prepared by complete acid digestion or treated with hot acid permanganate for 30 minutes with equal success for most arsenicals. However, if a light yellow stain rather than the dark brown stain is obtained with the Gutzeit method it indicates incomplete digestion of the sample if organic arsenic is present.

The recommended procedures in order of preference are as follows:

A. Preparation of sample:
   (1) Acid digestion.
   (2) Treatment with acid permanganate in a boiling water bath for 30 minutes.

B. Analysis of prepared sample by:
   (1) Direct molybdenum blue procedure (in absence of PO_4).
   (2) Gutzeit generation followed by molybdenum blue method on arsine distillate.
   (3) Gutzeit procedure.

DETAILED LABORATORY INSTRUCTIONS

PREPARATION OF WATER SAMPLE

A. 1. Acid digestion procedure.

1.1 *Reagents.*

1.11 sulfuric acid—C. P. Analytical reagent

1.12 nitric acid—C. P. Analytical reagent.

1.2 *Procedure.*

To a 50 to 100 ml. water sample in a 500 ml. Kjeldahl flask add 10 ml. of C. P. sulfuric acid, 1 ml. of C. P. nitric acid, and a small piece of ignited pumice. If a red or purple color develops upon the addition of nitric acid, adamsite is indicated. Similarly a purple color will develop in the hot acid permanganate digestion if adamsite is present. This color formation is due to diphenylamine always present as an impurity in the adamsite.

Mix by shaking and digest under a hood until fumes of sulfuric acid are given off. After cooling, 50 ml. of distilled water are added and the digestion is continued until sulfuric acid fumes are again obtained. Cool and add 10 ml. of water and transfer to a 50 ml. or 100

ml. volumetric flask. Rinse the Kjeldahl flask with water and add to the volumetric flask, making the sample up to 50 ml. or 100 ml. Proceed to the analysis by one of the following procedures adjusting the acidity if the molybdenum blue method is to be used.

A. 2. Hot acid permanganate oxidation. (Does not give quantitative results on MD and ED.)

2.1 *Reagents.*

2.11 Dilute sulfuric acid. Prepared by adding one volume of concentrated analytical reagent acid to three volumes of distilled water.

2.12 Potassium permanganate solution. Dissolve 0.4 gm. of C. P. potassium permanganate in 1 liter of distilled water.

2.13 Ammonium oxalate solution. Dissolve 1.0 gm. of C. P. ammonium oxalate in 1 liter of distilled water.

2.2 *Procedure.*

To a 20 ml. water sample in a large test tube or small Erlenmeyer flask add 2.5 ml. of dilute sulfuric acid and an excess of potassium permanganate solution; usually ½ to 1 ml. will be sufficient. The sample is then immersed in boiling water for 30 minutes. This may be easily accomplished by placing the tubes in a wire basket, which is then placed in the bath. If the permanganate color of the samples fades, additional permanganate is added. At the end of the oxidation period the excess permanganate may be destroyed by ammonium oxalate solution in increments of 1/10 ml. followed by an interval of a minute after each addition. If only a small excess of permanganate remains, its destruction is unnecessary. The contents of the tubes may then be washed into comparison tubes if the molybdenum blue procedure is to be used, or transferred to the Gutzeit generator. Further adjustment of the acidity is unnecessary for the molybdenum blue method if this oxidation was carried out as described.

B. 1. Direct molybdenum blue method.

1.1 *Reagents.*

1.11 Standard arsenious oxide solution. Dissolve exactly 0.3301 gm. of arsenic trioxide (reagent grade) in 25 ml. of 10 percent sodium hydroxide solution, make the solution slightly acid with sulfuric acid (1:6), and dilute to 1 liter. One milliliter of this stock standard solution contains 0.25 mg. of arsenic.

The above stock solution is diluted 1 to 5, as needed, to prepare a solution of proper strength for preparing the color standards. In using the direct molybdenum blue pro-

cedure it is convenient to prepare this dilute standard solution with its arsenic oxidized. To 20 ml. of the stock standard arsenious oxide solution in a small Erlenmeyer flask add 10 ml. of sodium hypobromite solution (same strength as given under B.2), mix, and hold for a few minutes. Then add 2 ml. of dilute sulfuric acid (2.11), boil until the color of bromine disappears, cool, and dilute to 100 ml. One ml. of the dilute standard is equivalent to 0.05 mg. of oxidized arsenic.

1.12 Ammonium molybdate solution. Dissolve 25 gm. ammonium molybdate in 300 ml. water. Dilute 75 ml. of concentrated sulfuric acid to 200 ml. with water and add to the ammonium molybdate solution.

1.13 Stock stannous chloride solution. Dissolve 40 gm. C. P. arsenic free $SnCl_2.2H_2O$ in 100 ml. of concentrated HCl.

1.14 Diluting hydrochloric acid solution. Add 40 ml. concentrated HCl to 1 liter of water.

1.15 Dilute stannous chloride solution. Take 10 ml. of solution 1.13 and add 150 ml. of solution 1.14. Prepare a fresh dilute stannous chloride solution every 2 weeks from 1.13 and 1.14.

1.16 Hydrazine sulfate solution, half saturated (alternate reagent for the dilute stannous chloride). Shake excess hydrazine sulfate with 50 ml. of water until no more dissolves, filter, and dilute with an equal volume of water. For the best results this solution should be prepared fresh each day that it is to be used.

1.2 *Procedure.*

The permanganate treated sample needs no further acid adjustment, but an acid digested sample should be neutralized by adding 25 percent NaOH solution from a burrette using phenolphthalein as an indicator. Transfer the neutralized sample or an aliquot to a Nessler tube (100 ml. long form tubes are preferable) and add 2½ ml. of dilute sulfuric acid (A. 2. 11).[2]

After proper acid adjustment, add 1 ml. of ammonium molybdate solution and mix, then add 1 ml. of stannous chloride (or hydrazine sulfate) solution, mix again, and make up to volume. At the same time prepare a series of arsenic standards with quantities of dilute

[2] The amount of acid present is very important and must be closely controlled. Too much acid inhibits color formation and too little permits the reduction of ammonium molybdate with color formation in the blank. Two and one-half ml. of the dilute sulfuric is the correct amount for a 100 ml. tube and about 2 ml. must be present in a 50 ml. tube. If there is any doubt, add increasing amounts of acid to a series of blanks and by completing the addition of the other reagents determine the minimum amount of acid necessary to inhibit color formation.

standard arsenic solution from 0.1 to 1.0 ml. by adding the dilute acid and other reagents as above and dilute to volume. When stannous chloride is used in the sample and standards as described, the color readings should be made within 5 to 10 minutes. With hydrazine sulfate 30 minutes or longer may be necessary for full color development.

B. 2. Gutzeit generation followed by molybdenum blue method (*9*).

Procedure.[3]

A Gutzeit generator is prepared in the usual way, but in place of the tube containing the mercuric bromide paper, attach a tube

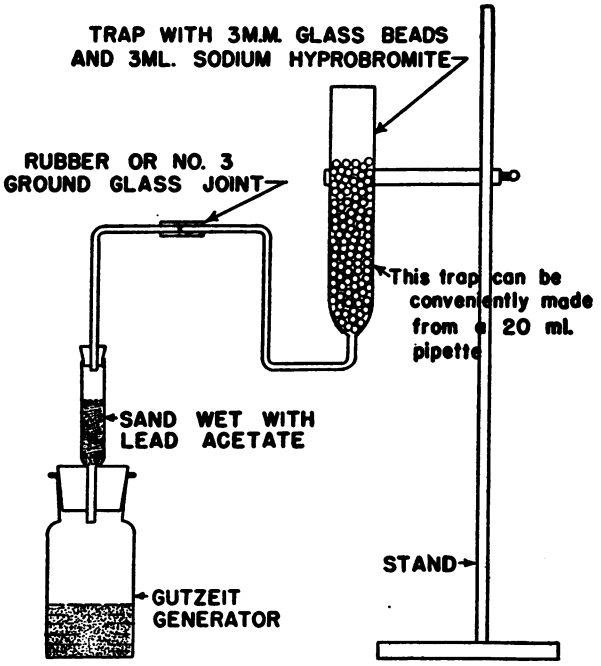

FIGURE 1.—Apparatus for the Gutzeit arsine generation molybdenum blue method.

leading the generated gases to a trapping device containing 3 ml. of sodium hypobromite solution (3 ml. of half saturated bromine water plus 1 ml. 0.5 N NaOH solution) as shown in the accompanying figure. It is better to have two trapping devices in series; the second need contain only water. Treat the arsenic test solution in the same way as in the Gutzeit method.

Allow the generation of arsine to proceed as directed under the Gutzeit method. After generation is complete, transfer the contents of the traps to a graduated colorimeter tube, Nessler tube, or volumetric flask. Wash the trap with six 2 ml. portions of water using an

[3] The Chaney method (J. Ind. and Eng. Chem., Anal. Ed., 12: 691 (1940)) is a modification of the molybdenum blue method which requires a special glass digestor and still. Where this equipment is available the procedure is very satisfactory.

aspirator to blow the wash solution out of the bead traps. Add 2½ ml. of dilute sulfuric acid and continue as directed under B. 1.2 using hydrazine sulfate solution as the reductant.[4]

B. 3. The Gutzeit official AOAC method (*10*).

Reagents.

3.10 Stannous chloride solution. Dissolve 40 gm. of As—free $SnCl_2.2H_2O$ in HCl and make up 100 ml. with same strength acid.

3.11 Zinc. Use 20 to 30 mesh, As—free granulated zinc which needs no preliminary treatment.

3.12 Potassium iodide solution. Dissolve 15 gm. KI in H_2O and dilute to 100 ml.

3.13 Sand. Clean 30 mesh (through 30 but not 40 mesh) white sea sand by washing successively with hot 10 percent NaOH solution, hot concentrated HNO_3, and hot distilled H_2O. Dry the clean sand.

3.14 Mercuric bromide paper. Use commercial arsenic papers cut from paper of uniform weight and texture into strips exactly 2.5 mm. wide and about 12 cm. long. (Uniformity in width and texture of paper is of great importance in this comparison method. Irregular texture produces irregular impregnation, with consequent inaccurate results.) To sensitize, soak strips 1 hour or longer in 3 to 6 percent (optimum 5 percent) solution of filtered $HgBr_2$ in alcohol, according to quantity, character, and activity of zinc used. (Attenuated, unsatisfactory stains, due to overrapid evolution of arsine, can be shortened and intensified by increasing concentrations of $HgBr_2$ and vice versa.) If the strips are in sheets, cut off two sides before soaking and leave strips attached at ends. After sensitization remove strips and dry individual ones on glass and groups by waving in the air. Place strips when nearly dry between clean sheets of paper and subject them to pressure long enough to take out bends and curls. Store in dry, dark place. (Aging of paper usually results in markedly fainter and longer stains. Desirable types of stains result from use of impregnated strips not over 2 days old.) When ready to use, cut individual strips off squarely ½ inch from one end and insert this end in the narrow tube of the apparatus. Handle sheets by the paper attached to either end and cut

[4] If stannous chloride is to be used as a reductant the hypobromite must be destroyed first. This may be done by transferring the solution and washings from the trap to a small Erlenmeyer flask and, after acidifying, boiling for a few minutes until all bromine is removed. The cooled solution may be transferred to a Nessler tube and the procedure continued as usual. As the destruction of hypobromite is not necessary with hydrazine sulfate this reductant is more convenient to use following the arsine generation procedure.

in half just before use. Strips must be clean and free from any contamination.

3.15 Standard arsenic solution. Dissolve 1 gm. As_2O_3 in 25 ml. 20 percent NaOH. Saturate solution with CO_2 and dilute to 1 liter with recently boiled distilled water. One ml. of this solution contains 1 mg. As_2O_3. Dilute 40 ml. of this solution to 1 liter. Make 50 ml. of the diluted solution to 1 liter and use to prepare standard stains. A solution containing 0.001 mg. As_2O_3 may also be prepared. Prepare fresh dilute solution at frequent intervals.

Apparatus.

3.20 Generators and absorption tubes. Use 2 oz. wide-mouthed bottles of uniform capacity and design as generators and fit each by means of perforated stoppers with a glass tube 1 cm. in diameter and 6 to 7 cm. long, with an additional constricted end to facilitate connection. Place small wad of glass wool in constricted bottom end of tube and add 3.5 to 4 gm. of the 30 mesh cleaned sand, taking care to have the same quantity in each tube. Moisten sand with 10 percent Pb acetate solution and remove excess by light suction. Clean sand when necessary by treatment (do not remove sand from tube) with HNO_3 followed by H_2O rinse and suction. Treat with Pb acetate solution. If sand has dried through disuse, clean, and remoisten it as directed. Connect tube by means of rubber stoppers with narrow glass tube 2.6 to 2.7 mm. in internal diameter and 10 to 12 cm. long, and introduce the clean end of the strip of $HgBr_2$ paper. (A 3 mm. bore allows the paper to curl, which results in an uneven stain and poor end point.) Clean and dry tube before inserting bromide paper. (An ordinary pipe cleaner may be used.)

3.21 Water bath. Use any constant temperature water bath. If no water bath is available, use any flat-bottomed container of suitable depth and capacity. (A deep water bath is suggested to insure uniform conditions during evolution and absorption of arsine.)

3.30 *Determinations.*

3.31 Determine the acid by titration in a definite aliquot of the digested sample solution. Place aliquot containing 0.01 mg. to 0.03 mg. As_2O_3 (0.020 to 0.025 mg. is optimum) and not larger than 30 ml. in Gutzeit generator. If arsenic in aliquot taken is outside limits specified, repeat with proper aliquot. On the basis of the acidity titration,

neutralize the sulfuric acid in the aliquot with a 25 percent solution of sodium hydroxide, cool, and add exactly 5 ml. of concentrated HCl. Cool when necessary and add 5.0 ml. KI reagent and 4 drops of the $SnCl_2$. Prepare standards corresponding to 0.01, 0.02, and 0.03 mg. As_2O_3 from reagent (3.15). Since standards must contain same kind and amounts of acid as samples, add 5 ml. of HCl, and, as H_2SO_4 has been neutralized, add an equivalent quantity As—free Na_2SO_4 to standards. Mix and allow to stand 30 minutes at not less than 25° C. or 5 minutes at 90° C. Dilute with H_2O to 40 ml.

3.32 Prepare generator as directed under 2 and center strip of $HgBr_2$ paper carefully in narrow tube. According to activity of zinc, add 2 to 5 gm. granulated zinc adding same quantity to each generator.

3.33 Immerse the apparatus within 1 inch of top of narrow tube in water bath (constant temperature of 20° to 25° C.), allow evolution to proceed 1.5 hours. Compare strips or prepare graph from standard strips.

REFERENCES

(1) Sartori, Mario: War Gases; Chemistry and Analysis. Trans. from the 2d enl. Italian ed. Van Nostrand, New York, 1939.
(2) Great Britain Ministry of Home Security and Air Raid Precautions. Detection and Identification of War Gases. Chemical Publishing Co., Brooklyn, 1940.
(3) Jacobs, M. B.: Analytical Chemistry of Industrial Poisons, Hazards and Solvents. Interscience Publishers, Inc., New York, 1941.
(4) Public Health Service Drinking Water Standards and manual of recommended water sanitation practice. Pub. Health Rep., 58: 69–111 (1943).
(5) Merck's Index. Fourth ed. Merck & Co., Rahway, 1930.
(6) Pharmacopoeia of the United States.
(7) McNally, W. D.: Toxicology. Industrial Medicine, Chicago, 1937.
(8) Wyllie, J.: An investigation of the source of arsenic in a well water. Canad. Pub. Health J., 28: 128–135 (1937).
(9) Jacobs, M. B., and Nagler, J.: Colorimetric microdetermination of arsenic. Ind. and Eng. Chem., Anal. Ed., 14: 442–444 (1942).
(10) Official and tentative methods of analysis of the Association of Official Agricultural Chemists, Inc. Washington, 1940.

SMALLPOX IN RELATION TO STATE VACCINATION LAWS AND REGULATIONS

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Although smallpox has been on the wane in the United States in recent years, the fact that cases are still occurring annually in many States is ample evidence that the infection is being actively maintained in this country. The prevention of the disease assumes greater im-

portance during the war emergency, because of the necessity of eliminating every possible hindrance to the war effort. The movement of population, especially the migration of susceptible workers to the centers of war industry, provides an excellent opportunity for the development of epidemics.

It is obvious to all health authorities, or should be so, that the amount of smallpox in a State or community is determined largely by their vaccination requirements and procedures and the effectiveness with which their requirements are applied. In this country, these measures, and apparently the incidence of smallpox in the States, are dependent upon the popular vote. In a previous study of smallpox in a group of 20 States during the period 1915–20,[1] the incidence of the disease was shown to be closely related to the status of vaccination requirements in the respective States, as revealed by the then existing laws and regulations and correspondence with the State health officers.

During the period covered by that report, the increasing incidence of smallpox in the United States was marked and definite. In 1920 a total of more than 96,000 cases was reported in 34 States, with 508 deaths, while in 1921 a total of more than 103,000 cases was reported in the same States, with 641 deaths. The incidence of smallpox in the United States has decreased sharply since 1931, especially during 1940, 1941, and 1942, when only 2,795, 1,368, and 864 cases, respectively, were reported. There still remains, however, a significant inverse correlation between the incidence of the disease and the rigorousness of the provisions of law or regulations regarding vaccination. This correlation is especially marked when the incidence rates are compared by States grouped according to the positiveness of their vaccination requirements.

The correlation presented here is based on the numbers of cases of smallpox reported by the States to the Public Health Service for the 4 years 1938–41, inclusive,[2] and the provisions of law and regulation regarding smallpox vaccination, especially with reference to directive, permissive, and prohibitory provisions.[3] No attempt was made to secure information regarding the actual practice in States with authorizing or permissive provisions. Even the thoroughness with which directive provisions are carried out may vary greatly between different States or between different parts of the same State. For this reason the correlation between smallpox incidence and the actual extent of vaccination of school children may be even more exact than the correlation here presented.

[1] Force, John N., and Leake, James P.: Smallpox in twenty States, 1915–20. Pub. Health Rep., 36: 1979–1989 (Aug. 19, 1921). (Reprint No. 687.)

[2] Years which include the 1940 Census population enumeration and for which, therefore, the population estimates for intercensal years are most nearly accurate.

[3] Fowler, William: Principal provisions of smallpox vaccination laws and regulations in the United States. Pub. Health Rep., 56: 167–189 (Jan. 31, 1941). (Reprint No. 2227.)

The rates are computed on the total numbers of smallpox cases reported to the United States Public Health Service by the State departments of health during the 4-year period 1938–41 and the aggregate populations for those years. The enumerated populations of the 1940 Census were used for that year, and the figures for the other years are Bureau of the Census estimates based on the 1930–40 arithmetical intercensal changes. These rates are for the total period, and, consequently, if applied to the respective total annual populations, they give the total cases actually reported during the period.

As the most important vaccination provisions relate to the vaccination of children as a prerequisite to school attendance, varying types of these provisions (directive, permissive, and prohibitive) form the basis of the group classifications used here. It is impracticable to group the States according to vaccination requirements under such simple and unqualified headings as "those which require vaccination" and "those which do not require vaccination" because of the variation in the requirements of the various State laws and regulations. Some States have unqualified directive provisions, others have directive requirements under certain conditions, and still others have permissive or discretionary provisions.

The States have been grouped in the following six classifications with respect to smallpox vaccination requirements:

1. States in which vaccination is a prerequisite to school attendance, regardless of the presence or absence of smallpox.
2. States in which vaccination of pupils may be required at all times.
3. States having various permissive provisions regarding smallpox vaccination.
4. States having varying provisions which direct or authorize the exclusion of unvaccinated persons from school only when smallpox is present or threatened.
5. States for which no important provisions of law or regulations were found regarding vaccination.
6. States having various prohibitive provisions.

It will be noted that some States are included in two groups because of overlapping provisions. For example, Minnesota is found in both group 4 and group 6. While a Minnesota regulation requires successful vaccination of employees in State institutions who come in contact with wards of such institutions, and a statute provides that the State board of health may control assembling, during smallpox epidemics, with other persons not vaccinated, there is also a statutory provision which prohibits requiring the vaccination of a child, or exclusion, except during smallpox epidemics, of a child from public schools because the child is not vaccinated. For similar reasons it was found necessary to include a few other States in two groups. This, however, does not invalidate the correlations between vaccination requirements and smallpox incidence in the groups as the same factor is included in each group.

The various persons referred to in the laws and regulations include, among others, "pupils," "child," "children," "pupils and teachers," "pupils, teachers, and employees," and "pupils and persons"; and among the various schools mentioned are included "public schools," "public and private schools," "public, private, parochial, and other schools," "any school in the State" (South Carolina), and "schools in cities having 50,000 or more inhabitants" (New York).

Vaccination is a prerequisite to school attendance, regardless of the presence or absence of smallpox, in 12 States and the District of Columbia; 5 States have statutes empowering school authorities to make vaccination a condition precedent to school attendance, and the statute of 1 State (Ohio) authorizes regulations by district boards of education to secure the vaccination of pupils, under which statute a regulation requiring vaccination has been upheld by the courts. Ten States have various permissive provisions regarding vaccination; they pertain to such matters as free vaccination, vaccination officers or physicians, records and reports, vaccination certificates, and the preparation, procuring, distribution, sale, storage, use, etc., of vaccine. There are 12 States which have varying provisions requiring or authorizing the exclusion of unvaccinated persons from school only when smallpox is present or threatened; 6 of these States require exclusion, while 6 have provisions authorizing exclusion under the circumstances mentioned. There are 9 States for which no important provisions of law or regulation were found relating to vaccination. Seven States have various prohibitive provisions.

The following table presents the smallpox incidence rates during the years 1938–41 by groups of States classified by vaccination requirements provided by law or regulation:

TABLE 1.—*Average smallpox case rates, 1938–41*

Group and States included	Annual case rate per 100,000 population
1. States (13, including the District of Columbia) requiring vaccination of pupils as a prerequisite to school attendance, regardless of the presence or absence of smallpox (Arkansas, Kentucky, Maryland, Massachusetts, New Hampshire, New Mexico, New York, Pennsylvania, Rhode Island, South Carolina, Virginia, West Virginia, District of Columbia)	0.8
2. States (6) in which vaccination of pupils may be required at all times (Connecticut, Georgia, Maine, New Jersey, Ohio, Oregon)	3.0
3. States (10) having various permissive provisions regarding vaccination (Alabama, Colorado, Connecticut, Georgia, Kansas, Michigan, Mississippi, North Carolina, Tennessee, Wyoming)	3.6
4. States (12) having varying provisions which direct or authorize the exclusion of unvaccinated persons from school only when smallpox is present or threatened (Arizona, Iowa, Kansas, Louisiana, Minnesota, Montana, Nebraska, New York, North Carolina, Oregon, Texas, Wisconsin)	6.3
5. States (9) which have no important laws or regulations promoting or efficacious in achieving the application of vaccination of the population (Delaware, Florida, Idaho, Illinois, Indiana, Missouri, Nevada, Oklahoma, and Vermont)	11.1
6. States (7) having various prohibitive provisions regarding the requirement of smallpox vaccination (Arizona, California, Minnesota, North Dakota, South Dakota, Utah, Washington)	13.2

If these States are regrouped, combining groups 1, 2, 3, and 4, i. e., those States which have some type of provision requiring, authorizing, or permitting the vaccination of pupils, the rate is 3.4, as compared with 11.1 for those having no important vaccination provisions, and with 13.2 for States having some type of prohibitive provision.

Included in group 5 are two States, Delaware and Vermont, which are in areas that include States having the most effective vaccination provisions. Such contiguity is probably of great importance. They are the only States in group 5 reporting no cases of smallpox during the 4-year period.

Without knowledge of the actual vaccination procedures which obtain in those States which require or authorize the exclusion of pupils only when smallpox is present or threatened (group 4), and in those which have varying permissive provisions (group 3), no explanation can be offered for the lower rate in group 3 other than to assume a more regular application of preventive measures in this group.

It has been suggested that, aside from legal requirements, public health education is a factor in the reduction of smallpox, and that a high incidence of the disease stimulates education and promotes widespread vaccination, which is followed by a decline in incidence. It was pointed out that, in 1939, seven of the Mountain and Pacific States reported 1,530 cases, with case rates ranging from 3.1 per 100,000 population in Utah to 29.1 in Colorado, whereas, in marked contrast, there were only 152 cases in these States during the first 9 months of 1940, with case rates ranging from 0 in Colorado to 2.3 in Oregon.[4]

The total smallpox incidence rates for all 11 of the Mountain and Pacific States in 1939, 1940, and 1941 were 13.1, 3.5, and 1.2 per 100,000 population, respectively. The percentage decreases in the numbers of smallpox cases in these States in 1940 and 1941, as compared with 1939, were 73 and 90 percent, respectively. It may be pointed out, however, that during this period there was a similar decline in smallpox incidence for the country as a whole from 9,877 cases in 1939 to 2,795 in 1940 and 1,368 in 1941. These figures represent a decrease of 72 percent in 1940 and of 86 in 1941 as compared with 1939.

With all due regard for the need and effectiveness of general popular health education in the control of disease, and for the stimulative effect of a high incidence of smallpox in promoting a temporary interest in vaccination in a State or community, it would appear that the best method of control of the disease is some type of directive law or regulation which requires the vaccination of children as a prerequisite to school attendance, regardless of the presence or absence of

[4] Dr. William P. Shepard in the American Journal of Public Health, January 1941, page 86.

smallpox. This provides for a continuing protective procedure and prevents the building up, intermittently, of a large reservoir of susceptibles.

CONCLUSION

The difference in the incidence of smallpox in the different areas of the United States is apparently related to the various provisions of law or regulation, especially with reference to the requirement of vaccination as a prerequisite to school attendance, the permitting of discretionary powers to local authorities, and prohibitive provisions. As was stated in a previous report, it is apparent that smallpox is lowest in those jurisdictions which have some type of universal routine vaccination requirements.

TABLE 2.—*States in which vaccination is a prerequisite to school attendance, regardless of the presence or absence of smallpox (group 1)*

State	Number of cases, 1938–41	Total years of life, 1938–41	Annual case rate per 100,000 population
Arkansas	498	7,784,009	6.4
Kentucky	615	11,351,198	5.4
Maryland	0	7,259,714	—
Massachusetts	0	17,283,164	—
New Hampshire	0	1,962,395	—
New Mexico	104	2,113,268	4.9
New York	51	53,793,637	.1
Pennsylvania	1	39,558,563	.003
Rhode Island	0	2,843,785	—
South Carolina	27	7,577,465	.4
Virginia	10	10,676,823	.1
West Virginia	45	7,584,679	.6
District of Columbia	0	2,629,793	—
Total	1,351	172,418,493	.8

TABLE 3.—*States in which vaccination of pupils may be required at all times (group 2)*

State	Number of cases, 1938–41	Total years of life, 1938–41	Annual case rate per 100,000 population
Connecticut	6	6,822,709	0.1
Georgia	108	12,465,315	.9
Maine	0	3,381,951	—
New Jersey	0	16,622,214	—
Ohio	1,023	27,591,879	3.7
Oregon	987	4,340,827	22.7
Total	2,124	71,224,895	3.0

TABLE 4.—*States having various permissive provisions regarding smallpox vaccination (group 3)*

State	Number of cases, 1938–41	Total years of life, 1938–41	Annual case rate per 100,000 population
Alabama	161	11,306,077	1.4
Colorado	841	4,481,287	18.8
Connecticut	6	6,822,709	.1
Georgia	102	12,465,315	.8
Kansas	764	7,216,633	10.6
Michigan	835	20,881,709	4.0
Mississippi	176	8,711,571	2.0
North Carolina	60	14,233,294	.4
Tennessee	517	11,623,475	4.4
Wyoming	89	999,608	8.9
Total	3,551	98,741,678	3.6

TABLE 5.—*States having varying provisions requiring or authorizing the exclusion of unvaccinated persons from school only when smallpox is present or threatened (group 4)*

State	Number of cases, 1938–41	Total years of life, 1938–41	Annual case rate per 100,000 population
Arizona	466	1,988,661	23.4
Iowa	2,753	10,142,462	27.1
Kansas	764	7,216,633	10.6
Louisiana	56	9,420,729	.6
Minnesota	1,896	11,138,273	17.0
Montana	381	2,234,610	17.0
Nebraska	462	5,276,467	8.8
New York	51	53,793,637	.1
North Carolina	60	14,233,294	.4
Oregon	987	4,340,827	22.7
Texas	1,306	25,580,068	5.1
Wisconsin	719	12,522,836	5.7
Total	9,901	157,888,497	6.3

TABLE 6.—*States for which no important provisions in law or regulations were found regarding vaccination (group 5)*

State	Number of cases, 1938–41	Total years of life, 1938–41	Annual case rate per 100,000 population
Delaware	0	1,062,278	—
Florida	28	7,516,682	0.4
Idaho	689	2,089,071	33.0
Illinois	1,610	31,548,828	5.1
Indiana	3,152	13,684,579	23.0
Missouri	1,954	15,115,984	12.9
Nevada	6	438,498	1.4
Oklahoma	1,719	9,356,385	18.4
Vermont	0	1,436,483	—
Total	9,158	82,248,788	11.1

TABLE 7.—*States having various prohibitive provisions regarding the requirement of smallpox vaccination (group 6)*

State	Number of cases, 1938–41	Total years of life, 1938–41	Annual case rate per 100,000 population
Arizona	466	1,988,661	23.4
California	2,094	27,470,006	7.6
Minnesota	1,896	11,138,273	17.0
North Dakota	597	2,576,293	23.2
South Dakota	1,026	2,588,177	39.6
Utah	62	2,195,462	2.8
Washington	1,097	6,921,688	15.8
Total	7,238	54,878,560	13.2

INCIDENCE OF HOSPITALIZATION, OCTOBER 1943

Through the cooperation of the Hospital Service Plan Commission of the American Hospital Association, data on hospital admissions among about 8,000,000 members of Blue Cross Hospital Service Plans are presented monthly. These plans provide prepaid hospital service. The data cover about 60 hospital service plans scattered throughout the country mostly in large cities.

Item	October	
	1942	1943
1. Number of plans supplying data	61	65
2. Number of persons eligible for hospital care	9,057,776	10,473,984
3. Number of persons admitted for hospital care	81,908	89,070
4. Incidence per 1,000 persons, annual rate, during current month (daily rate×365)	106.4	100.1
5. Incidence per 1,000 persons, annual rate for the 12 months ended October 1943	107.8	105.0

DEATHS DURING WEEK ENDED NOVEMBER 20, 1943

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

	Week ended Nov. 20, 1943	Corresponding week, 1942
Data for 89 large cities of the United States:		
Total deaths	8,888	9,135
Average for 3 prior years	8,515	
Total deaths, first 46 weeks of year	412,318	384,588
Deaths under 1 year of age	617	594
Average for 3 prior years	542	
Deaths under 1 year of age, first 46 weeks of year	29,458	26,562
Data from industrial insurance companies:		
Policies in force	66,046,335	65,252,281
Number of death claims	11,418	12,092
Death claims per 1,000 policies in force, annual rate	9.0	9.7
Death claims per 1,000 policies first 46 weeks of year, annual rate	9.7	9.1

COURT DECISION ON PUBLIC HEALTH

Swine—keeping for feeding on swill, etc., brought from without town where animals are kept.—(Rhode Island Supreme Court; *Kane et al.* v. *Lapre*, 33 A.2d 218; decided July 15, 1943.) A statute of Rhode Island forbade the keeping in any town of swine "to be fed on swill, offal or other decaying substances, brought from any other town, except in such place therein as shall be designated by the town council thereof." The members of a town council, in their collective official capacity as such town council, brought a bill in equity to enjoin the respondent from keeping swine in the town in violation of such statute.

One of the points decided by the State supreme court, on an appeal by the respondent from a decree of the lower court granting an injunction, related to the proper construction to be given to the statute. The construction contended for by the respondent was that the law required the town council first to designate a place in the town where such business could be located before it could enforce the prohibition. The appellate court's view, however, was that the law prohibited the keeping in any town of swine to be fed on swill brought from any other town unless and until the town council designated a place for such purpose but that the council could not arbitrarily refuse to so designate, upon application, a particular place in such town.

The respondent admitted that he was keeping swine in the town to be fed on swill brought from without and that the place where he was keeping them had not been designated by the town council but contended that, because he had been continuously keeping swine in such manner without interruption for over 10 years, the town council was chargeable with laches in seeking to interfere with his business at this late day and argued also that the town council's inaction constituted an implied license to him to continue to conduct his business in his customary manner as though his place had been designated by the council. The court pointed out that obviously the respondent could not prove an implied license by acquiescence of the town council because he not only had never received any permission to conduct his business at a particular location but had been expressly denied such permission on two occasions when he had applied therefor in 1937. "But regardless of this fact," said the court, "we are of the opinion that the defense of laches is not available to respondent in a proceeding under the statute here involved."

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 NOVEMBER 27, 1943

Summary

A decline occurred in the incidence of meningococcus meningitis. A total of 195 cases was reported for the current week, as compared with 265 last week, 223 for the next preceding week, and a 5-year (1938–42) median of 35. Decreases were recorded in all of the 9 geographic areas except the West South Central.

While the current incidence remains high as compared with prior years, the total for the week is lower than for either of the past 2 weeks, and, with one exception, lower than for any of the past 6 weeks. The total for the past 4 weeks, 876, is only 23 more than for the preceding 4-week period. The cumulative total for the year to date is 16,256, as compared with 3,196 for the same period last year and a 5-year median of 1,827. The total reported since the beginning of the fourth quarter of the year is 1,792, as compared with a 5-year median of 268.

Of the current total of influenza cases reported, 2,465, as compared with 1,734 for the preceding week and a 5-year median of 1,854, which was also the number reported for the corresponding week last year, 80 percent occurred in 6 States, as follows (last week's figures in parentheses): Minnesota 270 (1), Missouri 149 (3), Virginia 259 (168), South Carolina 331 (295), Texas 807 (716), and Arizona 155 (163).

A total of 150 cases of poliomyelitis was reported for the week, as compared with 221 for the preceding week. The current incidence, however, is above the corresponding 5-year median of 118. The largest numbers of cases were reported in California, 29, Oregon, 17, and New York, 11. Only 6 other States reported more than 6 cases each.

Reports for the week showed increased incidence for only 2 (influenza and measles) of the 9 common communicable diseases included in the following table.

Deaths recorded in 89 large cities of the United States totaled 8,621 for the current week, as compared with 8,888 last week and a 3-year (1940–42) average of 8,413. The accumulated total to date this year is 420,939, as compared with 393,088 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended November 27, 1943, and comparison with corresponding week of 1942 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 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	Nov. 27, 1943	Nov. 28, 1942		Nov. 27, 1943	Nov. 28, 1942		Nov. 27, 1943	Nov. 28, 1942		Nov. 27, 1943	Nov. 28, 1942	
NEW ENGLAND												
Maine	4	0	1	31	------	------	70	0	47	0	7	0
New Hampshire	0	0	0	------	2	------	5	48	3	3	1	0
Vermont	1	0	0	------	2	------	23	103	12	0	0	0
Massachusetts	6	0	4	------	------	------	158	285	197	11	4	1
Rhode Island	0	0	1	------	------	------	38	2	2	1	3	0
Connecticut	3	0	0	1	3	3	3	176	60	6	0	0
MIDDLE ATLANTIC												
New York	15	14	14	[1] 3	[1] 9	[1] 7	321	257	257	24	9	5
New Jersey	2	2	6	7	12	6	269	27	15	6	7	1
Pennsylvania	11	9	16	1	4	------	204	407	332	16	6	2
EAST NORTH CENTRAL												
Ohio	8	20	20	12	14	9	1,434	34	28	10	2	1
Indiana	9	5	17	3	3	8	111	13	13	0	1	0
Illinois	9	17	30	6	15	12	40	35	30	10	5	1
Michigan	12	8	12	1	1	1	364	62	62	8	4	1
Wisconsin	3	0	1	19	31	21	328	38	91	5	1	0
WEST NORTH CENTRAL												
Minnesota	17	0	1	270	------	------	352	3	59	5	0	0
Iowa	1	6	6	------	2	2	23	39	33	0	0	0
Missouri	6	9	10	149	3	3	5	7	7	8	1	1
North Dakota	6	6	2	5	------	1	222	1	1	0	0	0
South Dakota	2	11	6	------	------	------	9	14	2	0	0	0
Nebraska	9	5	4	3	------	------	14	81	5	2	0	0
Kansas	7	6	6	5	3	3	7	20	20	1	0	0
SOUTH ATLANTIC												
Delaware	0	0	1	------	------	------	11	1	2	1	0	0
Maryland [2]	11	6	9	6	4	4	16	22	22	12	6	1
District of Columbia	2	1	1	4	1	------	4	2	2	0	3	0
Virginia	13	41	51	259	344	129	372	17	17	6	6	2
West Virginia	3	10	10	5	18	13	20	1	14	3	1	1
North Carolina	24	35	59	7	2	3	55	3	132	0	2	1
South Carolina	4	17	15	331	435	291	27	2	4	2	1	0
Georgia	12	21	21	30	6	16	25	1	5	0	0	1
Florida	8	3	8	7	1	1	17	8	8	2	0	0
EAST SOUTH CENTRAL												
Kentucky	6	10	16	1	3	10	32	18	18	2	2	1
Tennessee	11	9	18	56	15	27	24	11	13	6	0	1
Alabama	21	15	34	54	27	52	62	3	10	1	1	1
Mississippi [2]	11	7	15	------	------	------	------	------	------	4	1	1
WEST SOUTH CENTRAL												
Arkansas	4	15	17	89	60	62	23	7	6	0	2	1
Louisiana	9	4	8	1	3	6	1	1	1	2	0	0
Oklahoma	8	11	13	74	29	47	3	0	2	1	0	0
Texas	37	43	54	807	539	295	27	5	5	7	4	1
MOUNTAIN												
Montana	0	0	2	6	5	6	97	13	16	0	0	0
Idaho	0	0	0	------	------	------	8	15	15	0	1	0
Wyoming	0	0	0	2	96	1	12	15	1	0	1	0
Colorado	3	10	7	12	43	17	80	13	21	1	1	1
New Mexico	2	0	1	4	1	1	1	3	3	1	0	0
Arizona	5	0	4	155	52	87	5	6	6	0	0	0
Utah [2]	0	0	0	------	3	7	2	313	25	2	0	0
Nevada	0	0	0	------	------	------	0	16	0	0	0	0
PACIFIC												
Washington	6	2	2	1	1	------	15	238	48	1	2	0
Oregon	2	1	1	11	26	18	43	202	23	5	0	0
California	42	20	25	27	36	36	70	60	149	20	8	1
Total	375	399	642	2,465	1,854	1,854	5,052	2,648	2,464	195	93	35
47 weeks	12,296	13,851	14,545	98,408	96,491	162,712	566,993	483,286	483,286	16,256	3,196	1,827

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended November 27, 1943, and comparison with corresponding week of 1942 and 5 year median—Continued

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [3]		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	Nov. 27, 1943	Nov. 28, 1942		Nov. 27, 1943	Nov. 28, 1942		Nov. 27, 1943	Nov. 28, 1942		Nov. 27, 1943	Nov. 28, 1942	
NEW ENGLAND												
Maine	0	0	0	30	8	13	0	0	0	0	0	0
New Hampshire	2	0	0	5	17	7	0	0	0	0	0	0
Vermont	1	0	0	14	3	7	0	0	0	0	1	0
Massachusetts	4	0	0	158	183	119	0	0	0	1	0	1
Rhode Island	0	0	0	7	5	5	0	0	0	0	1	0
Connecticut	8	0	1	51	25	29	0	0	0	2	0	2
MIDDLE ATLANTIC												
New York	11	3	3	257	122	216	0	0	0	9	3	6
New Jersey	1	1	1	63	62	77	0	0	0	0	2	2
Pennsylvania	3	2	7	158	153	210	0	0	0	11	7	9
EAST NORTH CENTRAL												
Ohio	1	1	2	237	367	213	0	1	1	3	3	2
Indiana	0	0	2	55	37	105	0	4	3	1	1	2
Illinois	10	3	3	168	141	242	10	2	2	2	3	3
Michigan	3	1	2	147	104	115	0	1	3	0	2	2
Wisconsin	4	2	3	139	206	145	0	0	2	3	0	0
WEST NORTH CENTRAL												
Minnesota	0	4	8	6	63	70	0	0	6	0	1	0
Iowa	2	1	1	59	56	59	0	0	1	0	0	1
Missouri	1	3	3	58	58	80	0	2	1	0	0	2
North Dakota	1	0	0	13	6	11	0	0	0	0	0	0
South Dakota	0	0	0	23	29	29	0	0	0	0	0	0
Nebraska	1	2	2	27	16	16	0	0	0	0	0	0
Kansas	4	2	2	92	68	89	1	0	0	0	3	3
SOUTH ATLANTIC												
Delaware	0	0	0	3	6	7	0	0	0	0	0	0
Maryland [2]	0	0	0	55	28	34	0	0	0	0	0	2
District of Columbia	0	0	0	21	21	14	0	0	0	1	1	0
Virginia	1	2	2	57	61	61	0	0	0	2	11	6
West Virginia	0	0	0	65	49	68	0	0	0	1	1	4
North Carolina	0	4	2	96	95	89	0	0	0	0	3	2
South Carolina	0	0	0	9	16	14	0	0	0	1	4	1
Georgia	0	0	0	18	40	37	0	0	0	0	1	5
Florida	0	1	0	9	12	7	0	0	0	2	2	1
EAST SOUTH CENTRAL												
Kentucky	2	0	2	69	57	85	0	0	0	6	2	4
Tennessee	2	3	3	64	92	98	0	0	0	4	1	3
Alabama	0	0	1	20	30	35	0	0	0	0	1	2
Mississippi [2]	2	0	0	9	17	17	0	0	0	0	2	2
WEST SOUTH CENTRAL												
Arkansas	0	0	1	1	15	15	0	0	0	1	2	7
Louisiana	1	0	0	7	4	8	0	0	0	5	1	4
Oklahoma	8	0	1	75	17	23	0	0	0	2	0	4
Texas	9	17	1	75	26	68	0	1	1	7	2	6
MOUNTAIN												
Montana	3	2	1	32	14	28	0	1	1	1	0	0
Idaho	0	0	1	27	5	6	0	0	0	0	0	1
Wyoming	0	0	0	2	3	4	0	0	0	0	0	0
Colorado	1	0	1	37	29	28	0	0	0	1	0	2
New Mexico	1	0	0	4	5	7	0	0	0	0	1	1
Arizona	0	0	0	5	4	5	0	0	0	1	1	1
Utah [2]	7	0	0	93	13	12	0	0	0	1	2	1
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	10	0	1	66	29	21	0	0	0	0	1	2
Oregon	17	2	2	43	18	25	0	0	0	2	0	1
California	29	13	5	201	160	160	0	0	1	0	5	5
Total	150	69	118	2,930	2,595	2,642	11	12	26	70	71	127
47 weeks	11,993	3,902	6,911	124,926	113,154	140,753	687	719	2,202	5,155	6,374	9,038

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended November 27, 1943, and comparison with corresponding week of 1942 and 5 year median—Continued

Division and State	Whooping cough			Week ended Nov. 27, 1943								
	Week ended—		Median 1938–42	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	Nov. 27, 1943	Nov. 28, 1942			Amebic	Bacillary	Unspecified					
NEW ENGLAND												
Maine	3	66	29	0	0	0	0	0	0	0	0	0
New Hampshire	2	9	6	0	0	0	0	0	0	0	0	0
Vermont	31	44	44	0	0	0	0	0	0	0	0	0
Massachusetts	95	205	179	0	0	0	4	0	0	0	0	0
Rhode Island	26	22	18	0	0	0	0	0	0	0	0	0
Connecticut	23	73	77	0	0	1	0	1	0	0	0	0
MIDDLE ATLANTIC												
New York	284	439	465	0	2	19	0	2	0	0	0	0
New Jersey	90	189	189	0	1	0	0	0	0	0	0	0
Pennsylvania	127	344	344	1	0	0	0	1	0	0	1	0
EAST NORTH CENTRAL												
Ohio	133	211	211	0	0	0	1	0	0	0	0	0
Indiana	18	25	26	0	0	0	0	0	0	0	0	0
Illinois	132	163	163	0	0	1	0	0	0	0	1	0
Michigan	222	286	279	0	1	4	0	0	0	0	1	0
Wisconsin	172	215	215	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	41	26	56	0	3	0	0	0	0	0	0	0
Iowa	28	12	20	0	0	0	0	0	0	0	0	0
Missouri	16	13	20	0	0	0	1	0	0	0	0	0
North Dakota	5	5	9	0	0	0	0	0	0	0	0	0
South Dakota	8	3	3	0	0	0	0	0	0	0	1	0
Nebraska	27	2	5	0	0	0	0	0	0	0	0	0
Kansas	39	48	48	0	0	0	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	11	14	14	0	0	0	0	0	0	0	0	0
Maryland [2]	53	82	52	0	0	0	2	0	0	0	0	0
District of Columbia	3	20	12	0	0	0	0	0	0	0	0	0
Virginia	109	37	37	0	0	0	0	0	0	0	3	1
West Virginia	17	26	26	0	0	0	0	1	0	0	0	0
North Carolina	190	77	102	0	0	0	0	0	0	1	0	2
South Carolina	50	31	22	0	0	2	0	0	0	0	0	6
Georgia	4	24	15	0	0	3	0	0	0	0	0	36
Florida	4	9	9	0	3	0	1	0	0	0	0	9
EAST SOUTH CENTRAL												
Kentucky	91	20	41	0	0	0	0	0	0	0	0	0
Tennessee	25	55	27	0	0	0	1	1	0	0	2	4
Alabama	11	17	30	0	0	0	0	0	0	0	0	35
Mississippi [2]	-------	-------	-------	0	0	0	0	0	0	0	0	1
WEST SOUTH CENTRAL												
Arkansas	8	27	15	0	0	0	0	0	0	0	0	0
Louisiana	7	4	4	0	3	10	0	0	0	1	0	5
Oklahoma	2	5	7	0	0	0	0	0	0	1	0	0
Texas	89	128	41	0	34	468	0	1	0	0	0	34
MOUNTAIN												
Montana	16	16	16	0	0	0	0	0	0	0	0	0
Idaho	3	0	2	0	0	0	0	0	0	0	0	0
Wyoming	1	5	5	0	0	0	0	0	0	0	0	0
Colorado	33	12	12	0	0	0	0	0	0	0	0	0
New Mexico	4	2	3	0	0	5	3	1	0	0	0	0
Arizona	23	4	4	0	0	0	3	0	0	0	0	0
Utah [2]	14	14	20	0	0	0	0	0	0	0	1	0
Nevada	1	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	32	28	28	0	0	0	0	0	0	0	0	0
Oregon	15	2	16	0	0	0	0	0	0	0	0	0
California	117	184	152	0	2	13	0	2	0	0	0	1
Total	2,455	3,243	3,555	1	49	526	16	10	0	3	10	134
47 weeks	166,704	162,372	162,372	62	1,946	15,802	3,997	633	27	435	717	4,065
47 weeks, 1942	-------	-------	-------	73	1,094	11,536	6,155	532	43	451	791	3,355

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Including paratyphoid fever cases reported separately as follows: South Carolina, 1; Florida 2.

NOTIFIABLE DISEASES, THIRD QUARTER 1943[1]

The figures in the following table are the totals of the monthly morbidity reports received from the State health authorities for July, August, and September 1943, and are preliminary and therefore incomplete. The comparisons made are with similar preliminary reports. Each State health officer has been requested to include in the monthly report for his State all diseases that are required by law or regulation to be reported in the State. The lists of diseases required to be reported are not the same for each State, although the common communicable diseases are notifiable in all the States. Certain diseases, however, may be a health problem in some States but not in others. There are variations among the States also in the degree of completeness of reporting of cases. As compared with the deaths, incomplete case reports are obvious for such diseases as malaria, pellagra, pneumonia, and tuberculosis, while in many States other diseases, such as puerperal septicemia and Vincent's infection, are not reportable.

In spite of these known deficiencies, however, these monthly reports, which are published quarterly and annually in consolidated form, have proved of value in presenting early information regarding the reported incidence of a large group of diseases and in indicating a trend by providing a comparison with similar preliminary figures for prior years. To some extent they also give a picture of the geographic prevalence of certain diseases, as the States are arranged by geographic location.

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

Consolidated monthly State morbidity reports for July, August, and September 1943

Division and State	Anthrax	Chickenpox	Diphtheria	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria	Measles	Meningitis, meningococcus	Mumps	Ophthalmia neonatorum	Pellagra	Pneumonia, all forms	Poliomyelitis
NEW ENGLAND																		
Maine		224	3				2	57		2	2	396	30	70			28	9
New Hampshire	2	7	1					98		1		38	7	17				3
Vermont		114	6					69				256	6	71				13
Massachusetts	1	635	29	1	39		9	600			40	2,003	153	531	45		283	147
Rhode Island		34	2					9		2	1	506	38	35			15	127
Connecticut		242	11	4	102		1	173		15	8	576	61	293			339	206
MIDDLE ATLANTIC																		
New York	2	928	61	28	808		16	[2] 270		[2] 14	21	5,735	332	636	34		2,581	424
New Jersey	2	501	18	7	3		3	491		29	5	3,027	90	1,759	2		520	57
Pennsylvania	6	867	95	1	104		6			7		1,226	198	1,039	15		528	67
EAST NORTH CENTRAL																		
Ohio		343	73	1	28		2	214		35	14	1,269	94	408	149	1	466	117
Indiana		69	64	2	14			44		57	88	443	35	103			182	69
Illinois		409	81	7	15		21	152	1	62	101	1,902	155	642	113		1,262	1,226
Michigan		675	39	4	103		1	177		13	68	4,330	111	562	4		394	81
Wisconsin		1,049	29	1			2	647		129	18	3,561	40	1,012			264	103
WEST NORTH CENTRAL																		
Minnesota		278	76	19	2	2	3			8	2	895	19				58	113
Iowa		49	51	3	1		1	16		2	7	297	33	150			31	145
Missouri		43	25	16			5			8	60	285	75	87	2		152	157
North Dakota		48	17	2			5			20	1	464	2	74			157	11
South Dakota		20	20	1	2		3				2	259	4	35		1	14	10
Nebraska		35	40							13	1	114	2	136			9	107
Kansas		85	37	1	1		11	21	1	16	20	259	21	188			124	623

SOUTH ATLANTIC																		
Delaware	1	6	5				1			1		32	14	7			2	6
Maryland		78	20	2	44	66	2	67		12	1	368	62	163	1		311	13
District of Columbia		18	5		27					3	4	194	23	105			148	5
Virginia		111	74	2		3,759				717	66	523	91	311		10	516	26
West Virginia		35	49		6		1			9		222	26	81			5	13
North Carolina		68	251	5	121					57	60	349	73			8	167	21
South Carolina		88	479		256			45	263	1,752	4,752	180	37	375	8	221	553	7
Georgia		27	170	9	142	16			917	177	205	171	25	204		14	234	13
Florida		18	42	62	26			14	943	96	44	82	38	148	3	1	383	10
EAST SOUTH CENTRAL																		
Kentucky		10	44	2	69			26		14	43	95	24	44			67	93
Tennessee		30	87	1		119	1	24	3	61	108	181	40	125	7	16	248	8
Alabama		43	115	1			2	34		207	1,380	317	36	118		19	406	16
Mississippi		399	75	355	4,597				1,235	4,388	10,978	576	28	755	24	864	1,493	15
WEST SOUTH CENTRAL																		
Arkansas	1	19	45	37	320		1	29		57	715	127	18	149		21	242	53
Louisiana		9	69	6	114		1	5	14	61	112	85	28	73		3	277	42
Oklahoma	1	17	38		79		1		11	93	550	73	21	107		22	86	429
Texas	1	408	261	437	4,379		27			3,368	3,431	845	56	463	13	251	1,483	939
MOUNTAIN																		
Montana		121	20			1	2			12	4	459	7	173			[3] 246	18
Idaho		30	1					8		7		82	4	42			19	11
Wyoming		27	5			1	1	14		34		124	4	72			18	11
Colorado		114	65	2	101		10			164	13	188	12	202			215	200
New Mexico		11	11	2	46	51	1	10		7	4	30	3	25		4	98	47
Arizona		21	18	3		376	3	37		443	49	132	18	108	1		245	42
Utah		407					7	89		5	98	257	14	264			319	265
Nevada		22	1		3		1			1	4	64	5	18			23	14
PACIFIC																		
Washington		500	72		2	5	9	200		19		499	34	468			175	159
Oregon		261	51	9			1			29	8	345	33	291			90	139
California		2,214	195	24	161		112	1,144		288	743	2,108	226	2,038			732	1,666
1943	17	11,767	3,046	1,057	11,715	4,396	275	4,784	3,388	12,515	23,831	36,549	2,506	15,677	421	1,456	16,208	8,186
1942	22	11,170	3,101	713	10,745	6,038	186	3,409	3,955	10,223	27,192	21,471	660	19,197	232	1,564	14,409	2,186
Median, 1938–42	18	11,170	3,441	885	9,918	572	452	[4] 3,126	5,091	10,097	34,272	24,405	382	10,243	274	2,530	13,081	4,178
Alaska		34						4		29		215	1	19			21	
Hawaii Territory		95	8	3	18		1	22	14	7,383	145	20	11	420			31	3
Panama Canal Zone [5]		43	37	11	4						513	15		410			[6] 51	

[1] For reports for first and second quarters of 1943, see PUBLIC HEALTH REPORTS for June 11, 1943, page 928, and October 8, 1943, page 1521.
[2] New York City only.
[3] Includes delayed reports.
[4] 3-year (1940–42) average.
[5] Includes the cities of Colon and Panama.
[6] In the Canal Zone only.

Consolidated monthly State morbidity reports for July, August, and September 1943—Continued

Division and State	Puerperal septicemia	Rabies in animals	Rabies in man	Rocky Mountain spotted fever	Scarlet fever	Septic sore throat	Smallpox	Tetanus	Trachoma	Trichinosis	Tuberculosis, all forms	Tuberculosis, respiratory	Tularemia	Typhoid and paratyphoid fever	Paratyphoid fever	Typhus fever	Undulant fever	Vincent's infection	Whooping cough
NEW ENGLAND																			
Maine					101	4					159	142		7	1		20	24	253
New Hampshire				1	27	1					62			2					18
Vermont					23						52			6			11	6	213
Massachusetts					1,085	20		8	2	5	776	705	2	82	71		14		904
Rhode Island		1			63	3			1		322	314		6	2		3	1	625
Connecticut					175	38		2		1	322	314		13	3		24		304
MIDDLE ATLANTIC																			
New York		22		17	1,017	63		21		5	3,280	3,058	1	103	32	7	91		3,191
New Jersey				12	203	12		5		4	903			40	13		18		1,925
Pennsylvania		1	1	4	577					3	1,151		2	128		1	14		2,692
EAST NORTH CENTRAL																			
Ohio		21	1	8	923	29	2	10			1,644	1,601	2	179	5		29	26	2,365
Indiana			1	5	172	3	4		1		526	412	1	44			21	62	675
Illinois		117		9	550	49	25	15	27		2,520	2,410	7	64	7		111	121	2,242
Michigan					440	86	2	2			1,767			107	60		34	71	3,108
Wisconsin				1	603	3	1				344		3	17		1	59		3,329
WEST NORTH CENTRAL																			
Minnesota					242	8	1	2			561		7	3			107	4	870
Iowa		7		1	213	3	2				121	121		15	4		99		539
Missouri				2	181			4	161		614		6	78			23	10	476
North Dakota				1	35		1		148		88	83	2	10	5		4	15	381
South Dakota				1	81		5	1	2	1	97		1	1			24	1	120
Nebraska					84						39			1			3		182
Kansas		3			336	5		2		1	195	190	4	28	3	2	62	87	601
SOUTH ATLANTIC																			
Delaware				9	15						55	55		2			2		36
Maryland				24	178	15		5			851	826	2	22	1		2	7	1,123
District of Columbia		36			59						668	655		11	1				327
Virginia				42	196	164					943	943	10	93	7	10	14		1,222
West Virginia			1	11	323	3					349		1	77	1	2	3		722
North Carolina				28	505	13					334	327	1	61		27	4		1,902
South Carolina		26		1	69	52		1			197		2	74	15	79	1		1,198
Georgia				2	173	46		22	1		631	631	16	131	21	541	35	86	301
Florida					42	11		9			299			25	4	102	12	76	253
EAST SOUTH CENTRAL																			
Kentucky			2	3	151	21	1		19		617	610	3	137	1		5		474

Tennessee			1	17	217	15	2	9			1,132		23	105	11	22	8	73	616
Alabama		17		4	153		1	13			723		2	71	2	218	19		488
Mississippi	45				75				16		403	395	8	72		54	14		2,993
WEST SOUTH CENTRAL																			
Arkansas		36			45	97	3		168		304	277	17	87		3	1		323
Louisiana		25	1		44	17		3			527	522	2	108	9	93	22		103
Oklahoma				7	176	47	1	1	48		601		9	83		2	6	5	115
Texas					259	25	5		19		1,515		10	211	16	599	135		2,989
MOUNTAIN																			
Montana				4	87	8	2				110		9	8			4	45	286
Idaho				2	301	2					18	11		8	1			1	32
Wyoming				11	93	3			40		29	3	28	4			3	12	43
Colorado		2		2	199	9					362		5	25	2		20		555
New Mexico		4			23	1	2		26		233	208	1	32	5	1			91
Arizona			1		57	25		1	69		383			34	1		6		200
Utah				2	133	2			2		22	21	14	3			5		945
Nevada					16	17			1		19		3				3	74	11
PACIFIC																			
Washington					223	4	1	1			492	477	1	16	1		13	19	736
Oregon				2	123	3	1		1		140		2	13			18	79	590
California		172		1	1,014			14	5	4	2,498	2,377	1	56	15	6	61		2,471
1943	45	490	9	234	12,080	927	62	151	757	24	29,998	17,688	208	2,503	320	1,770	1,187	905	46,158
1942	73	469	2	203	10,429	818	85	135	621	48	26,207	12,874	229	2,951		1,557	903	312	46,231
Median, 1938–42	115	590	10	207	11,559	1,419	269	155	866	52	26,207	14,858	257	4,831		1,122	1,000	430	46,231
Alaska					19						97	26							1
Hawaii Territory					3	6		4	3					3	2	57	2		487
Panama Canal Zone[5]					2						[6] 15	[6] 15		6	4				[6] 3

[5] Includes the cities of Colon and Panama. [6] In the Canal Zone only.

Actinomycosis: Connecticut, 1; Michigan, 1; Minnesota, 5; Kansas, 1; Nevada, 1.
Botulism: California, 2.
Coccidioidomycosis: Arizona, 39; California, 4.
Conjunctivitis: Massachusetts, 82 (suppurative); Connecticut, 3 (infectious), Indiana, 12 (kerato); Illinois, 19 (kerato); Kansas, 2 (pink eye); Michigan, 16 (kerato), 1 (pink eye); Maryland, 13; Georgia, 6; Florida, 2; Oklahoma, 5; New Mexico, 1; Arizona, 4; Nevada, 13; Washington, 1; California, 8 (acute infectious of newborn, ophthalmia neonatorum); Hawaii Territory, 9 (follicular).
Dengue: South Carolina, 1; Florida, 4; Louisiana, 1; Texas, 57; Hawaii Territory, 309.
Diarrhea and enteritis: New Jersey, 2 (diarrhea of newborn); Ohio, 615; Illinois, 2 (diarrhea under 1 year); Michigan, 34 (diarrhea of newborn); Maryland, 126; South Carolina, 6,805 (diarrhea only); Florida, 3 (diarrhea only); New Mexico, 120; Nevada, 38 (diarrhea in children); Washington, 9 (enteritis only); California, 41 (diarrhea of newborn).
Dog bites: Illinois, 4,266 (all animals); Michigan, 2,373.
Food poisoning: Ohio, 3; Illinois, 67; Kansas, 10; Louisiana, 197; Nevada, 17; California, 137.
Granuloma: Ohio, 9 (unspecified); Missouri, 4 (inguinale); Tennessee, 5 (inguinale); Mississippi, 261 (inguinale); Louisiana, 21 (inguinale); Arizona, 5 (inguinale); Washington, 4 (inguinale).
Impetigo contagiosa: Ohio, 111; Indiana, 3; Illinois, 21; Michigan, 214; North Dakota, 4; Kansas, 33; Oklahoma, 4; Montana, 10; Washington, 20; Oregon, 114; Hawaii Territory, 32.
Jaundice: Indiana, 1; Illinois, 2 (hemorrhagic); Minnesota, 30; Florida, 9; California, 17.
Leprosy: Illinois, 1; Louisiana, 3; Texas, 2; Hawaii Territory, 7; Panama Canal Zone, 3.
Lymphogranuloma venereum: Maine, 1; Missouri, 7; Tennessee, 40; Louisiana, 60; Utah, 1.
Plague (human): California, 1; Hawaii Territory, 1.
Psittacosis: Ohio, 1.
Rat-bite fever: Minnesota, 1.
Relapsing fever: Kansas, 2; Texas, 18; Nevada, 7; Panama Canal Zone, 1.
Rheumatic fever: Illinois, 66; Michigan, 13; Missouri, 5; Georgia, 17; Idaho, 14; Wyoming, 4; Arizona, 13; Utah, 3; California, 144.
Silicosis: Ohio, 7; New Mexico, 2.
Tick paralysis: South Carolina, 1.
Weil's disease: Massachusetts, 1; Michigan, 9; Louisiana, 1; Hawaii Territory, 12.

WEEKLY REPORTS FROM CITIES

City reports for week ended November 13, 1943

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	2	0	3	0	4	0	0	5
New Hampshire:												
Concord	0	0	------	0	0	0	0	0	1	0	0	0
Vermont:												
Barre	0	0	------	0	0	0	0	0	6	0	0	0
Massachusetts:												
Boston	2	0	------	0	2	6	9	6	37	0	1	18
Fall River	0	0	------	0	0	0	0	0	3	0	0	4
Springfield	0	0	------	0	1	1	1	0	17	0	0	5
Worcester	0	0	------	0	0	2	10	0	36	0	0	10
Rhode Island:												
Providence	0	0	------	0	54	0	0	0	7	0	0	22
Connecticut:												
Bridgeport	0	1	------	0	0	0	0	0	6	0	0	1
Hartford	0	0	------	0	0	2	1	0	0	0	0	6
New Haven	0	1	------	0	0	0	1	0	1	0	0	2
MIDDLE ATLANTIC												
New York:												
Buffalo	1	0	------	0	4	1	1	1	4	0	0	6
New York	12	3	3	3	128	21	61	7	96	0	2	53
Rochester	0	0	------	0	2	1	6	0	6	0	0	12
Syracuse	0	0	------	0	0	1	4	1	5	0	0	40
New Jersey:												
Camden	1	0	------	0	0	2	1	0	0	0	0	0
Newark	0	0	3	0	8	1	5	0	4	0	0	26
Trenton	0	0	1	1	0	1	2	1	4	0	0	1
Pennsylvania:												
Philadelphia	0	0	2	1	8	9	17	0	23	0	0	29
Pittsburgh	4	0	5	6	91	3	11	0	19	0	0	7
Reading	0	0	------	0	6	0	2	0	0	0	0	2
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	6	0	------	0	23	1	1	0	23	0	0	12
Cleveland	0	0	1	0	5	1	9	0	54	0	0	45
Columbus	0	0	1	1	9	0	4	0	10	0	0	3
Indiana:												
Fort Wayne	3	0	------	0	1	0	0	0	0	0	0	0
Indianapolis	0	0	------	0	2	1	10	0	19	0	0	24
South Bend	0	0	------	0	12	1	0	0	0	0	0	0
Terre Haute	0	0	------	0	0	0	3	0	0	0	0	0
Illinois:												
Chicago	2	0	2	2	8	7	21	14	23	0	0	49
Springfield	0	0	------	0	0	0	0	0	2	0	0	0
Michigan:												
Detroit	2	0	------	0	5	16	18	2	37	0	2	53
Flint	0	0	------	0	0	0	0	0	3	0	0	1
Grand Rapids	0	0	------	1	3	0	1	0	10	1	0	9
Wisconsin:												
Kenosha	0	0	------	0	0	0	0	0	1	0	0	2
Milwaukee	0	0	1	1	4	1	0	1	29	0	0	49
Racine	0	0	------	0	0	0	0	0	2	0	0	14
Superior	0	0	------	0	115	0	0	0	0	0	0	4

City reports for week ended November 13, 1943

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	-----	0	9	0	1	0	10	0	0	14
Minneapolis	5	0	-----	0	25	1	2	0	20	0	0	2
St. Paul	2	0	-----	0	42	1	4	1	6	0	0	26
Missouri:												
Kansas City	0	0	-----	0	1	0	2	1	16	0	0	4
St. Joseph	0	0	-----	0	0	1	0	0	4	0	0	0
St. Louis	0	0	3	0	1	8	8	2	5	0	1	6
Nebraska:												
Omaha	3	0	-----	0	1	0	2	2	14	0	0	0
Kansas:												
Topeka	0	0	-----	0	2	0	1	0	3	0	0	4
Wichita	0	0	-----	0	2	0	5	0	3	0	0	2
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	-----	2	6	2	6	0	1	0	0	0
Maryland:												
Baltimore	1	0	1	0	5	3	9	0	11	0	0	27
Cumberland	0	0	1	1	0	0	0	0	0	0	0	0
Frederick	0	0	-----	0	0	0	0	0	0	0	0	0
District of Columbia:												
Washington	0	0	2	1	11	2	10	0	15	0	1	15
Virginia:												
Lynchburg	0	0	-----	0	170	0	0	0	1	0	0	12
Richmond	1	0	-----	0	1	2	2	0	5	0	0	3
Roanoke	0	0	-----	0	0	0	0	0	0	0	0	0
West Virginia:												
Charleston	0	0	-----	0	3	0	0	0	5	0	0	0
Wheeling	0	0	-----	0	0	0	2	0	0	0	0	2
North Carolina:												
Winston-Salem	2	0	-----	0	1	0	0	0	2	0	0	4
South Carolina:												
Charleston	0	0	13	1	0	0	3	0	0	0	0	0
Georgia:												
Atlanta	0	0	9	0	0	0	2	0	4	0	0	0
Brunswick	0	0	-----	0	2	0	1	0	0	0	0	0
Savannah	0	0	-----	0	0	2	0	0	0	0	0	0
Florida:												
Tampa	2	0	-----	0	0	1	3	0	2	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	1	0	0	0	2	0	5	0	0	3
Nashville	0	0	-----	1	0	0	1	0	1	0	0	0
Alabama:												
Birmingham	2	0	-----	1	3	0	3	0	4	0	0	4
Mobile	1	0	-----	1	0	1	3	0	1	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	-----	0	0	0	2	0	0	0	0	7
Louisiana:												
New Orleans	3	0	-----	0	0	1	4	0	8	0	2	1
Texas:												
Dallas	1	0	-----	0	0	0	2	0	2	0	1	0
Galveston	0	0	-----	0	0	0	0	0	0	0	0	0
Houston	3	0	-----	0	0	1	7	1	0	0	0	0
San Antonio	2	0	-----	0	0	0	2	1	0	0	0	2

City reports for week ended November 13, 1943

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
MOUNTAIN												
Montana:												
Billings	1	0	------	0	0	0	0	0	0	0	0	0
Great Falls	0	0	------	0	32	0	1	0	4	0	0	0
Helena	0	0	------	0	0	0	0	0	0	0	0	0
Missoula	0	0	------	0	0	0	1	0	0	0	0	0
Idaho:												
Boise	1	0	------	0	1	0	0	0	2	0	0	0
Colorado:												
Denver	12	0	8	0	2	0	7	2	7	0	0	27
Pueblo	0	0	------	0	40	0	0	2	3	0	0	0
Utah:												
Salt Lake City	0	0	------	0	0	0	0	0	5	0	0	1
PACIFIC												
Washington:												
Seattle	8	0	------	0	5	2	7	1	2	0	0	24
Spokane	1	0	------	0	9	0	2	0	15	0	0	4
Tacoma	2	0	------	0	0	1	1	1	6	0	0	4
California:												
Los Angeles	8	0	10	1	7	2	2	8	24	0	0	7
Sacramento	0	0	------	0	1	0	1	2	0	0	0	0
San Francisco	1	0	1	0	0	3	3	14	25	0	0	8
Total	95	5	68	25	875	113	316	71	733	1	10	727
Corresponding week, 1942	87	3	92	27	481	31	354	9	712	0	11	971
Average, 1938–42	112	------	95	[1] 23	[2] 558	------	[1] 336	------	686	2	27	1,106

Dysentery, amebic.—Cases: Boston, 2; New York, 1; Camden, 1; Los Angeles, 1; San Francisco, 1.
Dysentery, bacillary.—Cases: Buffalo, 1; New York, 143; Chicago, 1; Detroit, 1; Baltimore, 1; Charleston, S. C., 1; Los Angeles, 2.
Dysentery, unspecified.—Cases: Camden, 5; Richmond, 1; San Antonio, 6.
Tularemia.—Cases: Chicago, 1.
Typhus fever.—Cases: New York, 1; Philadelphia, 1; Winston-Salem, 1; Savannah, 4; Tampa, 3; Birmingham, 3; Little Rock, 1; New Orleans, 10; Houston, 1; San Antonio, 1.

[1] 3-year average, 1940–42.
[2] 5-year median.

Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1942, 34,546,000)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	5.0	5.0	0.0	0.0	146.6	27.3	62.1	14.9	293.2	0.0	2.5	181
Middle Atlantic	8.0	1.3	6.2	4.9	110.2	17.8	49.1	4.5	71.8	0.0	0.9	78
East North Central	7.6	0.0	2.9	2.9	109.2	16.4	39.1	9.9	124.4	0.6	1.2	155
West North Central	19.8	0.0	5.9	0.0	164.2	21.8	49.4	11.9	160.2	0.0	2.0	115
South Atlantic	10.4	0.0	45.1	8.7	345.3	20.8	65.9	0.0	79.8	0.0	1.7	109
East South Central	17.8	0.0	5.9	17.8	17.8	5.9	53.5	0.0	65.3	0.0	0.0	42
West South Central	28.0	0.0	0.0	0.0	0.0	6.2	52.9	6.2	31.1	0.0	9.3	31
Mountain	112.6	0.0	64.3	0.0	602.9	0.0	72.4	32.2	168.8	0.0	0.0	225
Pacific	35.0	0.0	19.2	1.7	38.4	14.0	28.0	45.4	125.8	0.0	0.0	82
Total	14.3	0.8	10.3	3.8	132.1	17.1	47.7	10.7	110.6	0.2	1.5	110

FOREIGN REPORTS

ALGERIA

Infectious diseases—May–August 1943.—During the months of May, June, July, and August 1943, cases of certain infectious diseases were reported in Algeria as follows:

Disease	May	June	July	August
Cerebrospinal meningitis	8	5	1	1
Diphtheria	24	23	29	32
Dysentery	4	12	8	15
Erysipelas	----	2	----	1
Leprosy	----	2	----	----
Measles	39	74	13	36
Poliomyelitis	1	----	1	1
Recurrent fever	2	11	----	3
Scarlet fever	11	16	3	7
Smallpox	56	148	107	117
Tuberculosis (respiratory)	65	42	55	50
Typhoid and paratyphoid fever	71	76	122	189
Typhus fever	1,217	630	350	187
Undulant fever	----	1	----	----

BRITISH EAST AFRICA

Tanganyika Territory—Cerebrospinal meningitis.—Cerebrospinal meningitis has been reported in Tanganyika Territory, British East Africa, as follows: Weeks ended—October 9, 1943, 339 cases, 28 deaths; October 16, 1943, 246 cases, 42 deaths; October 23, 1943, 241 cases, 36 deaths. The highest incidence is reported in Lake and Western Provinces.

CANADA

Provinces—Communicable diseases—Week ended October 30, 1943.—During the week ended October 30, 1943, 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	----	5	----	203	273	60	45	39	85	710
Diphtheria	----	18	5	44	5	2	1	1	2	78
Dysentery (bacillary)	----	----	----	24	----	1	----	----	69	94
German measles	----	2	----	2	10	----	1	2	43	60
Influenza	----	----	----	----	28	----	----	----	22	50
Measles	----	22	----	315	81	18	1	25	28	490
Meningitis, meningococcus	----	----	1	4	4	----	1	----	1	11
Mumps	----	7	1	33	151	32	5	16	51	296
Poliomyelitis	----	----	----	2	1	----	----	2	2	7
Scarlet fever	----	9	9	114	110	45	28	35	45	395
Tuberculosis (all forms)	----	----	11	110	58	7	----	23	31	240
Typhoid and paratyphoid fever	----	----	----	13	2	----	----	----	12	27
Undulant fever	----	----	----	----	2	----	----	----	----	2
Whooping cough	----	14	----	113	144	13	17	6	6	313

DOMINICAN REPUBLIC

Influenza.—Influenza has been reported in the Dominican Republic as follows: Week ended September 12, 1943, 838 cases, 6 deaths; week ended September 19, 1943, 859 cases, 7 deaths.

Malaria.—During the week ended September 12, 1943, 1,766 cases of malaria with 25 deaths were reported in the Dominican Republic, and for the week ended September 19, 1943, 1,565 cases with 24 deaths were reported.

MOROCCO

Infectious diseases—May–August 1943.—During the months of May, June, July, and August 1943, cases of certain infectious diseases were reported in Morocco as follows:

Disease	May	June	July	August
Cerebrospinal meningitis	5	1	2	1
Diphtheria	3	12	22	26
Dysentery [1]	2,198	2,702	3,189	3,497
Leprosy	20	15	15	12
Measles	159	120	120	108
Plague	74	27	7	6
Poliomyelitis		9	9	10
Recurrent fever	5	11	9	4
Scarlet fever	2	4		1
Smallpox	57	28	47	60
Tuberculosis (respiratory)	840	739	714	593
Typhoid and paratyphoid fever	59	62	88	119
Typhus fever	1,921	1,225	497	155
Undulant fever			1	1

[1] Amebic and bacillary.

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

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

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

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

Smallpox

British East Africa—Kenya.—During the week ended October 23, 1943, 134 cases of smallpox were reported in Kenya, British East Africa.

British Honduras—Belize.—During the week ended November 20, 1943, 1 case of smallpox (alastrim) was reported in Belize, British Honduras.

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