PUBLIC HEALTH REPORTS

VOL. 41 OCTOBER 1, 1926 NO. 40

EXPERIMENTAL STUDIES OF WATER PURIFICATION

I. DESCRIPTION OF EXPERIMENTAL WATER-PURIFICATION PLANT

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In July, 1924, an experimental water-purification plant was put into operation on the grounds of the stream pollution investigations laboratory at Cincinnati, Ohio, and has been operated continuously since then up to the time of this writing, April 28, 1926. It is the purpose of this article to give a brief engineering description of this plant, which presents some interesting features and, it is believed, may serve as an example of the possibilities which exist for constructing highly efficient water-purification plants for small communities of less than 2,000 inhabitants.

The primary object of constructing and operating this experimental plant was to provide a means whereby a detailed study could be made of the limits of raw-water pollution which are consistent with the production of effluents conforming to accepted standards of bacterial quality, having reference to water-purification plants of the type found along the Ohio River and on other similar inland river systems of the country serving as sources of purified municipal water supplies. Studies of stream pollution, which were begun actively by the Public Health Service in 1913, had shown the vital importance of establishing some scientific basis for fixing the permissible limits of pollution of streams at the various sources from which raw-water supplies are taken for purification. Prior to the construction of the experimental plant two series of observations bearing on this question had been made at selected groups of municipal water-filtration plants located in various parts of the Eastern and Middle Western States. The results of these observations [1] had indicated that a need existed for a further study of the problem under conditions subject to experimental control, such as are not obtainable at full-scale municipal plants, for obvious reasons. The experimental plant described in this article was designed chiefly with this purpose in view, though it also was intended for use in studying other problems having a bearing on the limitations in respect to bacterial efficiency existing in water-purification processes in general.

The construction of the experimental plant was authorized by the Surgeon General in December, 1922, as a result of the recommenda-

[1] For a description of these observations and a discussion of their results, see Reprint No. 737 from the Public Health Reports, Mar. 31, 1922, and Reprint No. 987 from the Public Health Reports, Jan. 30, 1925.

tion of the consultants [2] in stream-pollution investigations. Following preliminary studies and the preparation of detailed plans and specifications, a contract was let in June, 1923, and the plant was constructed during the following autumn and winter.[3] After a rather thorough series of preliminary tests, the plant was put into regular operation on August 1, 1924.

FEATURES OF DESIGN

The plant is of the rapid sand type, similar in its main features to most of the full-scale plants found along the Ohio River and on other inland streams of the United States. It comprises the usual sedimentation basin, with means for coagulating the water chemically before delivery to the basin; two rapid sand filters of the gravity-flow type; clear-water storage facilities; and a continuous-feed chlorinator. Its output capacity at a normal rate of filtration (2 gallons per square foot of filter surface per minute) is 160,000 gallons per 24 hours, which would be sufficient in amount to supply a community of 1,600 people with 100 gallons per capita daily. The plant actually is larger than some small community installations in active service.

EXPERIMENTAL FEATURES

Although every effort was made to have the plant conform to current practice in its design, in order that the results obtained from its operation might be fairly representative of those to be expected from full-scale plants of similar type, it exhibits some features, designed especially for experimental purposes, which are unusual to municipal plants engaged in the active service of supplying water to domestic consumers. These features may be briefly indicated as follows:

1. Provisions for delivering to the plant a continuous supply of Ohio River water, domestic sewage, or clear dilution water, or mixtures of these components in any desired proportions, thus giving a raw water varying over a wide range in its composition, both physically and bacterially.

2. Parallel division of the plant into two independently functioning halves, which permits the making of parallel observations, under exactly similar conditions, with two different methods of treatment, applied continuously.

3. An unusual flexibility in the arrangement and interconnection of the various units, whereby any particular unit may be operated in conjunction with any other unit, or may be by-passed entirely, if desired.

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[2] The consultants are Dr. Stephen A. Forbes, Dr. Edwin O. Jordan, Mr. Langdon Pearse, and Prof. Earle B. Phelps.

[3] The construction contract work was performed by F. B. Leopold, of Pittsburgh, with the Ferro-Concrete Construction Co., of Cincinnati, as subcontractor for the concrete and masonry work.

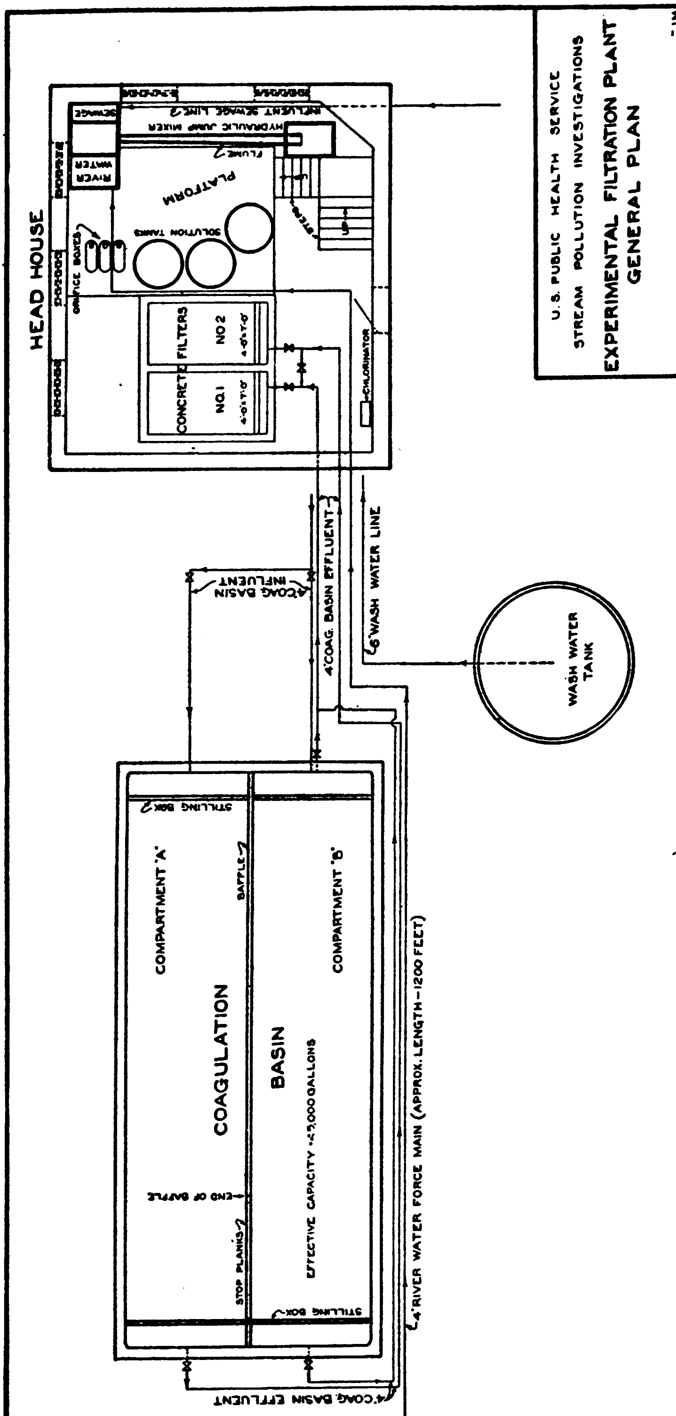
U.S. PUBLIC HEALTH SERVICE
STREAM POLLUTION INVESTIGATIONS
EXPERIMENTAL FILTRATION PLANT
GENERAL PLAN
HEAD HOUSE
SEWAGE
RIVER WATER
HYDRAULIC JUMP MIXER
INFLUENT SEWAGE LINE
FLUME
PLATFORM
SOLUTION TANKS
ORIFICE BOXES
CONCRETE FILTERS
NO.1
NO.2
CHLORINATOR
4" COAG. BASIN INFLUENT
4" COAG. BASIN EFFLUENT
6" WASH WATER LINE
WASH WATER TANK
COAGULATION
BASIN
COMPARTMENT 'A'
COMPARTMENT 'B'
STILLING BOX
BAFFLE
END OF BAFFLE
STOP PLANKS
EFFECTIVE CAPACITY
4" RIVER WATER FORCE MAIN (APPROX. LENGTH - 1200 FEET)
4" COAG. BASIN EFFLUENT

FIG. 1

DESCRIPTION OF THE PLANT

In the text which follows the main features of each separate division of the plant will be described, particular attention being given to those features which are concerned more especially with its use for experimental purposes. Dimensions and capacities of the various units will be given wherever they bear on the design of the plant. In this connection reference is made to Figure 1, showing a general plan of the plant proper, and to Figure 2, containing a diagrammatic profile of the entire installation, including the river intake and raw-water force main, which are not shown in Figure 1.

Intake.—The intake, which is located in the Ohio River, differs considerably from that found in connection with the average large-scale installation, as the funds available for the work and the comparatively limited period over which it was expected to operate did not warrant extensive construction. A steel, screw-joint pipe, about 150 feet long, 30 feet of which is below the normal pool level [4] of the river, serves as the intake pipe. The lower end of this pipe is at an elevation corresponding to a river stage of 6.5 feet (Cincinnati Weather Bureau gauge), and the upper end of it is connected to the force main at an elevation corresponding to a river stage of about 60 feet. For use in priming the river water pump the lower end of the intake pipe is provided with a foot valve, and the connection to the force main is made with a check valve and by-pass connection. The intake pipe is provided with eight 4 by 3 inch tees located every 15 feet, each carrying an outstanding 3-inch hose valve and seven 4-inch gate valves inserted at mid-points between the hose valves. With this arrangement of valves, by connecting the pump suction with one of the hose valves, the discharge with the next higher hose valve, and closing the gate valve between these two connections, the intake pipe serves as a combined suction and discharge pipe for the river-water pump. The large number of hose connections and gate valves in the intake pipe are necessary because of the wide fluctuations in the stage of the Ohio River.

River-water pump.—The river-water pumping unit comprises a two-stage centrifugal pump, with a 3-inch suction and a 2½-inch discharge, direct connected to a 15-horsepower induction motor, and has a capacity of 175 gallons per minute against a head of 150 feet. This unit is mounted on a small flat car equipped with two narrow-gauge trucks and is suitably housed for protection against the weather.

Parallel to and about 1 foot from the intake pipe is a narrow-gauge industrial track, supported on 6 by 6 inch stringers resting directly on small concrete piers spaced every 10 feet. The lower part of the

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[4] Normal pool level corresponds to a river stage approximating 12 feet, as measured on the United States Weather Bureau gauge at Cincinnati.

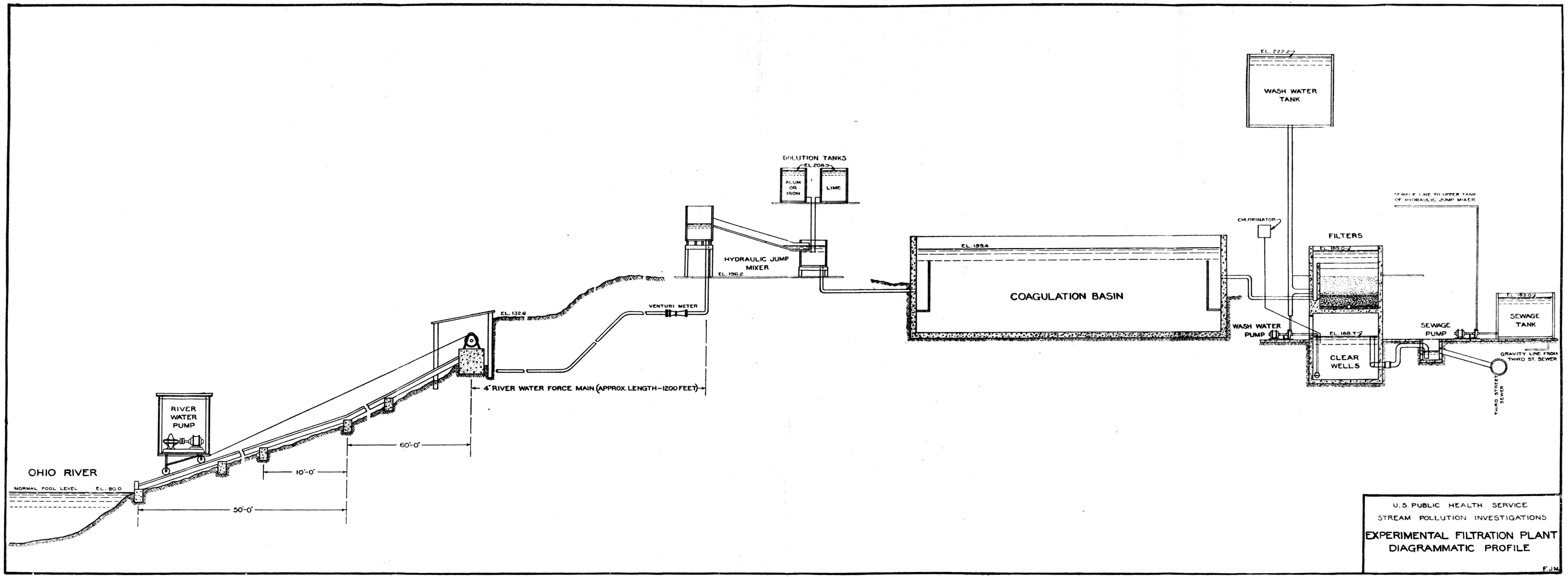

FIG. 2

9273°—26. (Face p. 2124.)

track and intake pipe is laid on a grade of 18.5° and the upper part on a grade of 27.4°, the change in grade being made at an elevation corresponding to a river stage of about 28 feet. The use of two grades was necessary in order that the track and intake pipe might conform to the slope of the river bank. In order that the river-water pump may be level on both grades of the inclined track, the lower truck of the flat car may be adjusted in such a manner as to permit changing the angle of the platform with reference to the track. The car on which the pumping unit is mounted is shifted up and down the inclined track, depending upon the stage of the river, by means of a 3/8-inch flexible wire cable connected to the winding drum of a hand winch located at the top of the river bank.

Force main.—Connecting the intake pipe with the plant is the river-water force main, consisting of a 4-inch screw-joint steel pipe about 1,200 feet long, laid at a minimum depth of 4 feet. This part of the construction work was beset with difficulties, owing to the necessity of laying the pipe under two paved streets having a very heavy traffic and under the main tracks of the Pennsylvania Railroad. (See fig. 2.)

Sewage and dilution water.—As previously noted, provision is made for continuous supplies of sewage, and likewise of filtered water for dilution purposes, thus making it possible, by mixing either one or both of these supplies with the river water, to obtain a raw water ranging from sewage to a highly diluted river water. Domestic sewage from a residential section of the city is obtained from a near-by intercepting sewer by gravity flow through a 1½-inch pipe to the basement of the plant, where it is either pumped directly to the mixing device or allowed to flow into an equalizing tank, from which it is pumped to the mixing device. The sewage-equalizing tank has a capacity of 1,200 gallons, providing approximately 18 hours of detention for the raw sewage when drawn through the tank at a rate sufficient to provide an admixture of 1 per cent with the river water. A single-stage centrifugal pump, with a 1½-inch suction and a 1-inch discharge, is used for pumping the raw sewage. This unit has a capacity of 25 gallons per minute against a working head of 40 feet. A flushing connection is located so that either the sewage influent pipe from the intercepting sewer to the pump or the section extending through the pump and to the mixing device may be flushed separately. The dilution water is pumped directly from the filtered-water reservoirs to the mixing device.

Mixing device.—For mixing the various raw-water components a device of the hydraulic-jump type is used. The hydraulic-jump mixing flume, invented by Mr. J. W. Ellms, was designed by him for this plant. The receiving tank is divided into three compartments, one of which receives river water, another sewage or dilution water, or both together, and a central compartment into which the various components of the raw water are measured by means of 90° V-notched weirs. Hook gauges are used to measure the flow of the river water, sewage, and dilution water. From the middle compartment the water flows to the inclined flume, which has a drop of 3 feet in a length of 10 feet, and in which the water attains a velocity of approximately 9 feet per second at the bottom. A submerged weir, set in the horizontal portion of the flume, builds up a standing wave, in which the components forming the river water become mixed. From the lower tank of the mixer the water flows by gravity to the coagulation basin.

Coagulation basin.—The coagulation basin is 37 feet long, 16 feet wide, and 11 feet 6 inches deep, inside dimensions. The basin proper is constructed of reinforced concrete, with a wooden longitudinal baffle extending through the middle of the tank and wooden stilling boxes at each end. The longitudinal baffle extends to within 9 feet 8 inches of the far end of the basin, leaving a clear space, 8 feet wide, between the end of the baffle and the stilling box for flow around the end of the baffle. Provision is made for closing this 8-foot space by means of stop planks, thereby dividing the basin into two separate compartments. The normal capacity of the basin is 45,000 gallons, providing a nominal detention period of slightly more than six hours. When the plant is operated at half its nominal capacity—that is, when only one filter unit is in service—the stop planks are put in position and one-half of the coagulation basin is used, or, if desired, the entire basin may be used with one filter unit, giving a nominal detention period of approximately 12 hours. Influent and effluent connections are arranged so that the two compartments into which the basin is divided may be operated either in series or in parallel. With these several combinations of tank and filter units, periods of sedimentation equal to 3, 6, or 12 hours, respectively, are available.

Filters.—There are two rapid sand filter units of reinforced concrete construction, each one providing a net filtering area equal to 4 by 7 feet, or 28 square feet. The normal rate of filtration is 2 gallons per square foot per minute. The filter sand is washed Ohio River sand, 27 inches deep, with effective size 0.42 millimeter and a uniformity coefficient of 1.50. Underlying the sand bed is a gravel layer 14 inches deep and graded in size from 1¼ inches at the bottom to less than ¼ inch at the top. A perforated pipe underdrain system is used, with 4½-inch diameter manifold and 1½-inch diameter laterals. The manifold is laid across the center of the filter, parallel to the smaller dimension, with eight laterals on each side, spaced at 6 inches on centers. The laterals are drilled with $\frac{9}{32}$-inch holes, staggered every 6 inches along the under side of the laterals in two lines at 45° with the vertical. Semicircular wash-water gutters are placed to permit high-velocity washing up to an equivalent of 25 inches vertical rise per minute. A normal wash rate of 16 inches vertical rise per minute is used. Simplex rate controllers, capable of being adjusted to carry rates of flow varying from 50 to 120 gallons per minute, are provided on each one of the filter effluent lines. Direct-reading glass-tube gauges are used for registering the loss of head, one tube being connected to a pipe through the filter wall just above the sand layer and the other to the filter-effluent line just ahead of the rate controllers.

Clear-water reservoirs.—There are two separate clear wells, one under each filter. Each clear well is 5 feet deep, providing a detention period of about 20 minutes at normal rates of operation. Connections between the filters and the clear wells permit the effluent from either one or both of the filters to be discharged into either clear well. A separate overflow for each clear well connects with a single effluent pipe provided with an integrating water meter of the "detector" type for registering the total amount of water flowing from the filters. The effluent line discharges into a "sump" overflowing into a near-by sewer.

Chlorinator.—Chlorine is applied usually to the filtered water at its entrance to the clear wells by means of a small Wallace & Tiernan chlorinator of the manually controlled, solution feed type. Provision also is made for adding chlorine to the coagulated and settled water immediately prior to its filtration, and likewise for chlorination of the raw water just before its entrance into the sedimentation basin. In the latter instance it is necessary to use an auxiliary injector in order to force the chlorine solution into the raw-water pipe against the added pressure of water at the basin level.

Wash-water storage.—For storing water for washing the filters, an elevated wooden tank is provided, 10 feet in diameter and 8 feet 6 inches deep, with a storage capacity equal to 4,800 gallons. Wash water is pumped to this tank from the filtered-water reservoirs by means of a single-stage centrifugal pump, having a 2-inch suction and a 1½-inch discharge, direct connected to a three-horsepower induction motor. This pumping unit has a capacity of 60 gallons per minute against a head of 45 feet. The wash-water pump also is used for pumping dilution water from the clear wells to the hydraulic-jump mixer.

Coagulant system.—The coagulant feed system comprises the ordinary type of solution feed apparatus, providing for the addition of alum, iron sulphate, and lime, either separately or in conjunction with each other. Three small wooden tanks, each 3 feet in diameter and 4 feet deep, of 200 gallons capacity, are used for preparing and storing the solutions of coagulating chemicals. The lime tank is equipped with a mechanical agitator, consisting of a vertical rotating shaft carrying two paddle vanes inclined at an angle of 30° with the horizontal, and connected by a belt to a ⅓-horsepower electric motor.

Three cast-iron porcelain-lined orifice boxes are used for measuring the chemical solutions. The orifice boxes are provided with float-regulated inlet valves, adjusted to maintain a constant level of solution in the box for any given rate of flow. Each box also is equipped with an adjustable slotted orifice, with tight-jointed sliding cover plate actuated by an adjusting spindle and graduated head. All bends in the chemical piping are made of "tees" with their open ends screw plugged, and provision is made for a flushing-water connection on each one of the distributing lines. The chemicals are usually applied to the raw water just at the end of the flume in the lower tank of the hydraulic-jump mixer. Additional chemical distribution lines are provided, permitting the addition of coagulant solution to the water at the mid-point of its travel through the coagulation basin, and also as the water leaves the coagulation basin just prior to its application to the filters.

Piping.—All piping throughout the plant is 4 inches in diameter, with the following exceptions: (*a*) Wash-water delivery main, wash-water drain, and clear-well overflows, which are 6 inches in diameter; (*b*) wash-water suction pipe, 2 inches; (*c*) chemical drain pipes, and sewage-equalizing tank influent, effluent, and drain pipes, 1½ inches; (*d*) chemical distribution piping, 1 inch; and (*e*) flushing-water lines, ¾ inch.

Operation schedule.—The plant is operated usually during 24 hours each day and 6 days every week. Three attendants are employed, working in three shifts of eight hours each. Complete operation records are kept, gauges and meters being read hourly. A monthly summary of daily operations and laboratory results is prepared, giving, in addition to the data taken directly from the operating and laboratory records, certain special information bearing on the interpretation of the data secured from the various experiments. Any unusual or abnormal occurrences are fully recorded in a diary, in which also is maintained a detailed description of the experiments.

Sample collections.—The routine collection of water samples is carried out on a more extensive scale than is customary at a majority of full-scale plants, the total number of samples examined daily ranging from 20 to 36. In each routine collection, of which from 4 to 6 are made daily, samples are taken of the river water, of sewage, if it is being used, of the raw water, of the applied water, of the filtered water, and of the chlorinated water. The samples of filtered and chlorinated water are taken from sample cocks located in the respective effluent lines, and the other samples are taken by dipping the sample bottle into the water to be sampled.

Laboratory control.—The laboratory examinations are mainly bacteriological, but routine tests are made of turbidity, alkalinity, and the pH of the various samples. Bacteriological examinations include the 37° C. agar count, and the usual quantitative tests for the presence of members of the *B. coli* group. For the determination of the *B. coli* index in the filtered and disinfected water, 5 standard portions of 10 cubic centimeters each are inoculated from each sample, in accordance with the procedure recommended in testing conformant to the Treasury Department standard. Additional single portions of 1 cubic centimeter and 0.1 cubic centimeter of samples from these two sources are likewise tested for *B. coli.*

At the present writing the experimental plant has been operated on a regular schedule for 20 months, of which time 15 months have been devoted primarily to a study of the efficiencies of bacterial removal obtainable under varying conditions with respect to raw-water pollution. At the present time increased attention is being given, and in the immediate future will be given, to problems of a special nature closely allied with the main objectives of these studies.

In planning and carrying out the experimental studies, the constant advice and assistance of Mr. Joseph W. Ellms, of Cleveland, Ohio, who has served as a special consultant for this work, have been most generously given to the personnel having these studies in hand. Mr. Ellms's aid, based on his long experience, both in the practical management of water-purification plants and in extensive research work concerned with their operation, has been a valuable asset in this connection.

II. PRELIMINARY REVIEW OF RESULTS OF PRIMARY EXPERIMENTS

By H. W. Streeter, Sanitary Engineer, United States Public Health Service

In the preceding article of this series a description has been given of an experimental water-purification plant which has been constructed and is now being operated by the United States Public Health Service on the grounds of the laboratory of stream pollution investigations at Cincinnati, Ohio. In the present article it is proposed to give a preliminary review of the experimental work thus far undertaken at this plant and to discuss briefly some of the more outstanding results of that part of the experiments which has been concerned more especially with the primary objective of these studies.

The primary objective in question, as stated by Mr. Moss, was "that of providing a means whereby a detailed study could be made of the limits of raw-water pollution which are consistent with the production of effluents conforming to accepted standards of bacterial quality, having reference to water-purification plants of the type found along the Ohio River and on other similar river systems of the country serving as sources of purified municipal water supplies." It also has been noted in the paper by Mr. Moss that, prior to the construction of the experimental plant, two series of observations bearing on this question had been made at selected groups of municipal water-purification plants located in various parts of the Eastern and Middle Western States. The results of these observations having indicated a need for a further study of the problem under conditions subject to experimental control, the experimental plant was constructed chiefly with this end in view, though it also was intended for a secondary purpose, which may be described briefly as follows:

The secondary objective in question, for which the experimental plant is well adapted, has been an evaluation of the different factors, subject to the control of the plant operator, which influence, directly or indirectly, the cost and bacterial efficiency of water purification. The purpose of these observations is to provide a basis for judgment as to the possibilities which may exist for securing, at a reasonable cost, an increased efficiency of bacterial removal by plants in current service without entailing any radical changes in their design or construction. On this question hinges that of whether it may be necessary ultimately to revise any permissible limits of raw-water pollution which may be established from observations made under present conditions of plant operation, on which the portion of this study concerned with the primary objective above stated has been based. These secondary experiments having been in progress but a short time at the present writing, no discussion of their results is justified in this paper, which, as previously noted, is concerned wholly with the experiments having reference to the primary objective of the studies.

In conducting these primary experiments it was desired to reproduce, as nearly as practicable, conditions of operation of the plant such as are found at the average full-scale municipal plant in routine service. With this end in view, the experimental plant has been operated throughout the entire 24 hours of each working day, as noted in the paper by Mr. Moss, and care has been taken to follow normal operating practice closely in every detail; likewise, to produce an effluent comparable, both physically and chemically, with effluents as ordinarily delivered by municipal plants along the Ohio River and other rivers of similar type.

In view of the fact that it is necessary to discontinue operation of the plant every Sunday, it has been convenient to regard the six working days of each week as the unit of time for the experiments, which have been divided, accordingly, into a series of weekly "runs," each one of which has constituted virtually an individual experiment.

The procedure followed in making the individual experiments, though governed to some extent by circumstances, has been aimed, in general, to facilitate, as far as practicable, a direct observation of the relations existing between the bacterial quality of the raw water and the resulting quality of the effluents produced at successive stages of treatment. This relationship, it will be noted, provides the basis for determining the limiting densities of raw-water bacteria which are consistent with producing effluents of specified bacterial quality.

Theoretically, an ideal procedure would consist in starting a given experiment with a raw water polluted bacterially to a relatively slight degree, such that the quality of the effluent produced from it were better by a considerable margin than the limit fixed by the assumed standard. From this initial condition the bacterial content of the raw water would be increased gradually until the quality of the effluent became deteriorated decidedly below the standard, noting the corresponding changes occurring progressively in the quality of raw water and effluent throughout the period of the observations. If a definite relationship existed between the density of bacteria in the raw water and in the effluent, the raw-water condition at which overburden occurred would be indicated by the abscissa of a point on the relationship curve the ordinate of which exactly equaled the limiting bacterial content of the effluent as fixed by the particular standard assumed.

In following the procedure described it originally was intended to increase the bacterial content of the raw water at intervals of every few hours, holding it constant during these periods and noting the effect produced on the quality of the effluent in consequence of each successive raw-water change, making due allowance for the time of passage of water through the plant. This procedure, however, was found to be subject to numerous difficulties, owing chiefly to sudden and unexpected changes occurring in the bacterial content of the river water during the periods in which it was desired to hold it constant.[1] The method finally adopted in a majority of the experiments was similar to the one above described, except that the character of the raw water was adjusted at intervals usually of one or two days and the results of the observations averaged by days, rather than considered individually. In this manner it has been possible to minimize unbalanced errors in the observations due to uncontrollable variations in the character of the raw water occurring during a given day.

[1] The only reasonable explanation assignable as to the cause of these sharp changes is afforded by the fact that considerable volumes of sewage are discharged into the river at several points located along the Cincinnati shore and not far upstream from the intake. The sewage from these sources is known to undergo hourly changes, sometimes erratic in character, both in its flow and in its composition. It is entirely probable that these variations are frequently communicated directly to the river water at the intake.

In order to cover a sufficiently wide range of raw-water bacterial content, it has been necessary to repeat the individual experiments several times under each condition of season and raw-water turbidity encountered during the period of the observations, the experiments made under each condition having been planned, as far as practicable, to cover a series of different but slightly overlapping ranges of bacterial densities. It was expected originally that the required range of variation in this respect could be secured by adding sewage to the river water whenever necessary to augment the normal fluctuations in the composition of the latter. Owing, however, to the high degree of pollution of the river water at the plant intake by sewage discharged into the river at points immediately upstream, it was found necessary frequently to dilute the river water with filtered water from the municipal supply in order to reduce its bacterial density sufficiently to bring it within the desired range.

RESULTS OF PRIMARY EXPERIMENTS

The results of the primary experiments may be considered advantageously from the following standpoints: (*a*) The crude relationships indicated as existing between the bacterial quality of the raw water and the corresponding quality of the effluents produced at successive stages of treatment; (*b*) the manner and extent to which this relationship is shown to be affected by variations in certain factors, notably by variations in raw-water turbidity and in temperature and other seasonal conditions; (*c*) the extent to which the efficiency of bacterial purification shown by the experimental plant has been found to agree with the corresponding efficiency of full-scale municipal plants of the same type under similar conditions of raw-water pollution; and (*d*) the indicated limits of bacterial pollution of the raw water consistent with the production of effluents conforming to given standards of bacterial quality. Each one of these four points will be discussed separately and in the order above given.

RELATIONS BETWEEN BACTERIAL QUALITY OF RAW WATER AND CORRESPONDING QUALITY OF EFFLUENTS

For the purpose of combining the results of the observations in such a manner as to show the average relations existing between the degree of bacterial pollution of the raw water and the corresponding bacterial quality of the effluents produced at various stages of treatment, the statistical method found to be most suitable was the same one which previously had been followed in analyzing a more extensive series of data obtained from the two collective studies of municipal plants to which reference has been made. This method, which has been described in a previous article,[2] has consisted in grouping the

[2] Reprint No. 737 from the Public Health Reports, Mar. 31, 1922, p. 4.

data according to the numbers of bacteria observed in the raw water and averaging, for each group, the numbers observed coincidently in the raw water and in the effluent from each successive stage of treatment. The results obtained from thus grouping and averaging the daily means, expressed both in terms of the bacteria growing at 37° C. and of members of the *B. coli* group in terms of the usual *B. coli* index, are given in Table 1, in which are also given the corresponding residual percentages of plate growers and of *B. coli*, referred both to the raw water and to the influent water of each stage.

TABLE 1.—*Relations between numbers of bacteria observed in the raw water and corresponding numbers observed at successive stages of treatment, as obtained by grouping the results according to numbers of raw-water bacteria falling within specified ranges*

[Derived from daily averages October, 1924, to December, 1925, inclusive]

Raw-water count range	Number of items	Average turbidity (raw)	Average numbers				Residual per cent of raw			Residual per cent of influent	
			Raw	Applied	Filtered	Chlorinated	Applied	Filtered	Chlorinated	Filtered	Chlorinated
24-HOUR BACTERIAL COUNT PER CUBIC CENTIMETER											
0-1,000	21	20	625	381	16.0	(1)	60.9	2.6	-------	4.2	-------
1,001-2,000	61	61	1,500	559	36.0	0.73	37.4	2.4	0.049	6.0	2.0
2,001-3,000	48	84	2,510	636	24.0	2.2	25.4	.96	.088	3.8	9.2
3,001-5,000	55	74	3,830	1,050	50.0	2.2	27.4	1.3	.057	4.8	4.4
5,001-10,000	42	82	7,360	1,650	114.0	3.9	22.4	1.5	.053	6.9	3.4
10,001-25,000	53	141	15,300	2,350	176.0	6.5	15.4	1.2	.042	7.5	3.7
Over 25,000	39	191	61,300	3,970	219.0	21.0	6.5	.26	.034	5.5	9.6
B. COLI INDEX PER 100 CUBIC CENTIMETERS											
0-5,000	67	77	2,450	1,050	10.9	0.48	42.9	0.44	0.020	1.0	4.4
5,001-10,000	102	78	7,690	3,020	29.9	1.1	39.3	.39	.014	.99	3.7
10,001-50,000	76	93	33,100	7,980	137.0	3.1	24.1	.41	.009	1.7	2.3
50,001-100,000	39	105	68,800	14,400	151.0	11.4	20.9	.22	.017	1.0	7.5
Over 100,000	36	175	898,000	90,800	455.0	54.3	10.1	.05	.006	.5	11.9

[1] No results available.

A mere inspection of Table 1 is sufficient to indicate the existence of a decided correlation between the density of bacteria of both classes, as observed in the raw water and the corresponding densities in the effluent from each successive stage of treatment. In Figure 1, in which the *B. coli* data given in Table 1 have been plotted on logarithmic scales (the raw-water counts being plotted as abscissæ and the corresponding effluent counts as ordinates), the relationship is shown to approach very closely the form of a power function, which may be represented by the simple equation: $E=cR^n$, in which R denotes the bacterial content of the raw water, E the corresponding content of the effluent, and c and n empirical constants, the value of which has been found to vary with the type of purification process, the class or kind of bacteria, and the number of intermediate stages of treatment between the source of raw (or influent) water and the particular effluent considered. Though not here given, a similar plot of the 37° C. plate count figures in Table 1 can readily be shown to follow the same trend as that of the *B. coli* data.

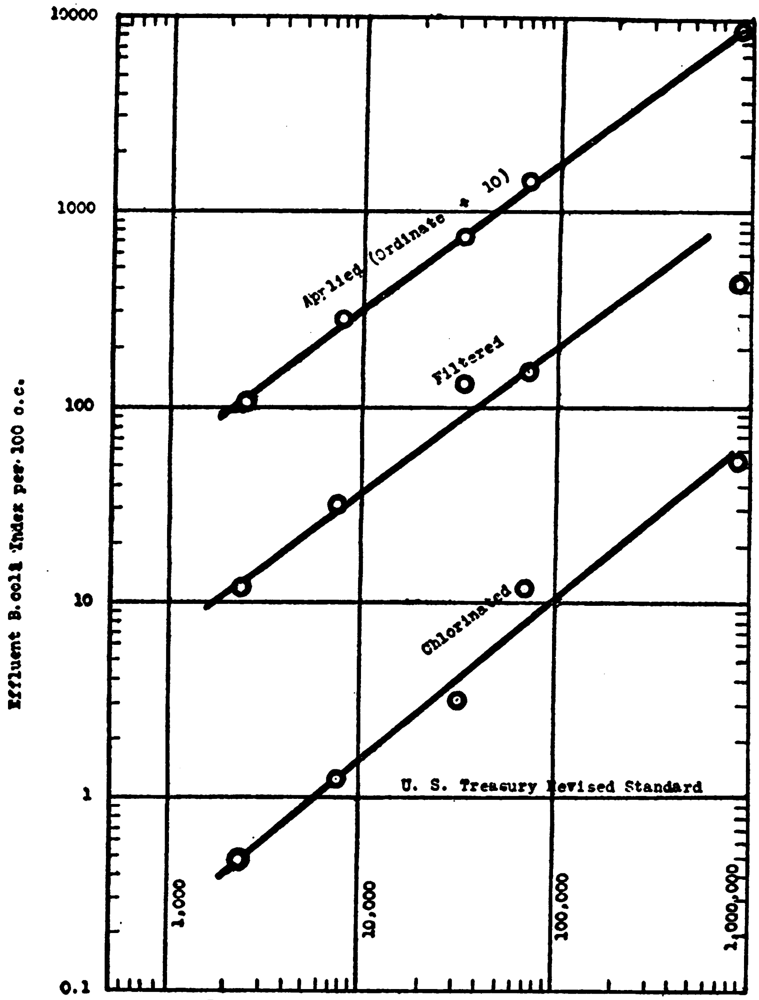

FIG. 1.—Relations between *B. coli* index of raw water and corresponding index of effluents from successive stage of treatment. (Plot of data given in Table 1)

The values of c and n, as derived from plots of the data such as are given in Table 1, may be tabulated as follows:

	24-hour count, 37° C.		*B. coli* index	
	c	n	c	n
Applied water	11.0	0.55	0.34	0.75
Filtered water	.32	.61	.029	.77
Chlorinated water	.0011	.91	.0008	.82

From a study of these data the following indications of interest may be noted:

1. That the correlation observed between the *B. coli* index of the raw water and that of the various effluents is slightly smoother than the corresponding correlation as observed between the numbers of bacteria growing on agar plates at 37° C.

2. That the values of *c*, as derived from the *B. coli* relationships, are of a lower order of magnitude than those derived from the corresponding plate-count data.

3. That the values of *n* derived from the two series of plots are of a similar order of magnitude, but differ in that they are more uniform in their values as derived from the *B coli* data.

4. That the residual percentages of plate growers and of *B. coli*, as referred to the raw water, show a tendency toward a progressive diminution with increasing raw-water content, but that this trend is due largely to the effect of coagulation and sedimentation, as is evidenced by the fact that the residual percentages in the unchlorinated and chlorinated filter effluents when referred, in each instance, to the influent water of the immediately preceding stage, do not show a similar trend.

In addition, it may be noted that a rather decided tendency is shown toward decreasing efficiency of *B. coli* removal by chlorination coincidently with increasing densities of *B. coli*, both in the raw water and in the unchlorinated filter effluent. Whether or not this tendency is due to the presence of larger amounts of organic matter in the filter effluent coinciding with higher numbers of bacteria is a question requiring further study. The efficiency of filtration with respect to the removal of both classes of bacteria enumerated is shown to remain practically constant, irrespective of the numbers present either in the raw water or the filter influent water.

INFLUENCE OF CHANGES IN SEASON AND VARIATIONS IN RAW-WATER TURBIDITY ON FOREGOING RELATIONSHIPS

The influence exerted by seasonal changes and variations in raw-water turbidity on the foregoing relationships may best be gauged by analyzing the results of the observations covering 12 consecutive months, comprising a complete seasonal cycle. For the 12 months extending from October 1, 1924, to September 30, 1925, inclusive, covering the first full year of routine operation of the plant, the effect of changes in season on these relationships may be considered according to three periods: (*a*) December to March, inclusive, representing winter conditions; (*b*) June to September, inclusive, representing summer conditions; and (*c*) the remaining four months of the year, representing intermediate seasonal conditions. These periods have been selected arbitrarily, chiefly for convenience in separating the data, and it is realized that they afford only a rough basis for a seasonal classification of the material at hand.

In analyzing the data from the standpoint named the conclusions to be derived from such an analysis may be clarified by noting that a simple index of the effect of a given factor, such as change in season, on the relations existing between the bacterial content of the raw water and that of a particular effluent is afforded by comparing the residual percentages of bacteria observed in the effluent for each separate condition assumed (in this case the three seasonal periods), when the average turbidity and bacterial content of the raw water are of about the same magnitude in each instance. Thus, if the residual percentages of bacteria observed during the three seasonal periods named were approximately the same, when the average turbidity and the bacterial content of the raw water were of similar magnitude in each one of the three periods, it would be concluded that the relation existing between the bacterial content of the raw water and that of the effluent were relatively unaffected by seasonal changes. This is true for the reason that any change in the relationship between the two given variables, if one of them remain constant, is necessarily reflected by a corresponding change in the ratio existing between them.

For the purpose at hand the proper method of classifying the data statistically would consist in making, for each seasonal period, a primary separation of the material according to raw-water turbidity, and, secondarily, a classification of the material in each turbidity group according to raw-water bacterial content, the method of separation in each instance being similar to that which has been described in explaining the derivation of Table 1. This procedure would thus provide a basis for comparing the residual percentages of bacteria observed in the three seasonal periods under approximately the same conditions with respect to raw-water turbidity and bacterial content.

In the present instance, however, no effort will be made to show the results obtained except as derived from a simple classification of the material, first, according to season, and, second, according to raw-water bacterial content, which classification appears to have brought out the essential points fully as well, for all practical purposes, as the more elaborate one above described. The results obtained from the first step of the classification are given in Table 2 and, from the second step, in Table 3. From these two tables the following broad conclusions may be drawn:

1. That the over-all efficiency of bacterial removal, including chlorination, as regards both the plate growers and the *B. coli*, appears to be relatively little affected by seasonal changes, this being especially true of the *B. coli*.

Table 2.—*Comparative average numbers of bacteria and corresponding numbers and residual percentages of bacteria observed, respectively, in the raw water and in the effluents from successive stages of treatment during three different seasonal periods of four months each, during the year October, 1924, to September, 1925, inclusive*

BACTERIAL COUNT, 24 HOURS, 37° C.

	Winter (December-March)	Mid-season (other months)	Summer (June-September)
Bacterial count per cubic centimeter (24 hours, 37° C.):			
Raw	22,800.0	8,730.0	14,200.0
Applied	1,150.0	1,630.0	2,470.0
Filtered	30.0	65.0	235.0
Chlorinated	7.6	6.0	5.6
Per cent of raw-water count:			
Applied	5.0	18.7	17.4
Filtered	.13	.75	1.7
Chlorinated	.033	.069	.039
Per cent of influent water count:			
Applied	5.0	18.7	17.4
Filtered	2.6	4.0	9.5
Chlorinated	25.3	9.2	2.4

B. COLI INDEX PER 100 CUBIC CENTIMETERS

	Winter (December-March)	Mid-season (other months)	Summer (June-September)
B. coli index per 100 cubic centimeters:			
Raw	331,000.0	47,900.0	65,900.0
Applied	31,400.0	15,100.0	7,890.0
Filtered	216.0	38.0	177.0
Chlorinated	24.9	3.5	4.0
Per cent of raw-water index:			
Applied	9.5	31.5	12.0
Filtered	.65	.79	.27
Chlorinated	.008	.007	.006
Per cent of influent water index:			
Applied	9.5	31.5	12.0
Filtered	.69	.25	2.2
Chlorinated	11.5	9.2	2.3

2. That the bacterial efficiency of separate stages of treatment is influenced to a measurable extent by seasonal changes, that of filtration apparently being higher in winter than in summer and that of chlorination vice versa. The *B. coli*, however, appear to be less affected in this respect than do the bacteria growing on plates at 37° C.

The second point to be considered in this connection is the effect, if any, exerted on the efficiency of bacterial removal by variations in raw-water turbidity. The method of analyzing and presenting the data from this standpoint has been the same as that followed in studying the effect of seasonal changes, except that the primary classification of the material, instead of being made according to three seasonal periods, has been made according to raw-water turbidities falling within the three arbitrary groups 0 to 10, 11 to 100, and over 100, representing, respectively, a relatively clear, a moderately turbid, and a decidedly turbid raw water. In this, as in the preceding instance, a simple classification of the material, first, according to raw-water turbidity, and, second, according to raw-water

bacterial content, appears to have brought out all of the essential points concerning the influence on bacterial efficiency exerted by variations in raw-water turbidity.

TABLE 3.—*Comparative average numbers of bacteria and corresponding numbers and residual percentages of bacteria observed, respectively, in the raw water and in the effluents from successive stages of treatment during the same three seasonal periods as indicated in Table 2 and coinciding with raw-water numbers falling within specified ranges*

[W=Winter months. M=Mid-season. S=Summer season]

BACTERIAL COUNT, 24 HOURS, 37° C.

Raw-water count range	Seasonal periods	Average bacterial count per cubic centimeter				Per cent of raw water			Per cent of influent		
		Raw	Applied	Filtered	Chlorinated	Applied	Filtered	Chlorinated	Applied	Filtered	Chlorinated
0–2,000	W	1,610	246	3.0	0.92	15.3	0.19	0.057	15.3	1.2	30.0
	M	1,530	640	25.0	.42	41.8	1.6	.027	41.8	3.9	1.7
	S	1,560	918	139.0	1.0	59.0	8.9	.064	59.0	15.1	.72
2,001–3,000	W	2,570	356	6.6	3.4	13.9	.26	.13	13.9	1.9	51.5
	M	2,500	766	28.0	1.3	30.6	1.1	.052	30.6	3.7	4.6
	S	2,530	778	97.0	.83	30.8	3.8	.033	30.8	12.5	.86
3,001–5,000	W	3,650	308	14.0	3.0	8.4	.38	.082	8.4	4.5	21.4
	M	3,890	1,290	45.0	1.9	33.2	1.2	.049	33.2	3.5	4.2
	S	4,240	1,260	125.0	1.1	29.7	2.9	.026	29.7	9.9	.88
5,001–10,000	W	8,260	1,530	54.0	5.4	18.5	.65	.065	18.5	3.5	10.0
	M	7,410	1,940	76.0	7.8	26.2	1.0	.105	26.2	3.9	10.3
	S	7,310	1,620	157.0	2.0	22.2	2.1	.027	22.2	9.7	1.3
10,001–25,000	W	18,800	1,360	28.0	3.8	7.2	.15	.020	7.2	2.1	13.6
	M	12,300	3,650	259.0	24.0	29.6	2.1	.195	29.6	7.1	9.3
	S	14,400	2,560	228.0	3.6	17.8	1.6	.025	17.8	8.9	1.6
Over 25,000	W	68,000	2,660	74.0	20.0	3.9	.11	.029	3.9	2.8	27.1
	M	92,600	7,310	202.0	18.0	7.9	.22	.019	7.9	2.8	8.9
	S	36,100	4,990	491.0	19.0	13.8	1.4	.053	13.8	9.8	3.9

B. COLI INDEX

Raw-water count range	Seasonal periods	Average B. coli index per 100 cubic centimeters				Per cent of raw water			Per cent of influent		
		Raw	Applied	Filtered	Chlorinated	Applied	Filtered	Chlorinated	Applied	Filtered	Chlorinated
0–5,000	W	3,140	914	4.7	0.44	29.1	0.15	0.014	29.1	0.51	9.4
	M	3,490	1,360	6.1	.46	39.0	.17	.013	39.0	.45	7.5
	S	2,170	[1] 2,800	73.6	.63	100+	3.4	.029	100+	2.6	.86
5,001–10,000	W	7,770	2,180	10.2	.95	28.1	.13	.012	28.1	.47	9.3
	M	7,860	3,330	26.8	.78	42.4	.34	.001	42.4	.80	2.9
	S	8,490	4,960	127.0	2.7	58.4	1.5	.032	58.4	2.6	2.1
10,001–50,000	W	33,100	3,920	209.0	4.8	11.8	.63	.014	11.8	5.3	2.3
	M	32,500	10,200	41.9	1.8	31.4	.13	.006	31.4	.41	4.8
	S	34,000	8,600	195.0	3.1	25.3	.57	.009	25.3	2.3	1.6
50,001–100,000	W	73,000	27,500	147.0	26.0	37.7	.20	.036	37.7	.53	17.7
	M	72,100	13,900	24.3	1.3	19.3	.034	.002	19.3	.17	5.3
	S	65,300	8,400	193.0	5.4	12.9	.30	.008	12.9	2.30	2.8
Over 100,000	W	1,130,000	92,600	563.0	71.0	8.2	.050	.006	8.2	.61	12.6
	M	1,000,000	316,000	390.0	52.0	31.6	.039	.005	31.6	.12	13.3
	S	283,000	11,000	200.0	7.6	3.9	.071	.003	3.9	1.8	3.8

[1] Based on one observation

The results obtained from an analysis of the data from this standpoint are given in Tables 4 and 5. From these tables the following general conclusions may be drawn:

TABLE 4.—*Comparative average numbers of bacteria and corresponding numbers and residual percentages of bacteria observed, respectively, in the raw water and in the effluents from successive stages of treatment during periods of the year, October, 1924, to September, 1925, inclusive, in which the raw-water turbidity fell within the three respective ranges, 0 to 10, 11 to 100, and over 100*

BACTERIAL COUNT, 24 HOURS, 37° C.

	Raw-water turbidity, P. P. M.		
	0–10	11–100	Over 100
Bacterial count per cubic centimeter (24 hours, 37° C.):			
Raw	5,960.0	11,400.0	23,700.0
Applied	2,020.0	1,700.0	1,590.0
Filtered	93.0	107.0	101.0
Chlorinated	15.0	3.2	8.9
Per cent of raw-water count:			
Applied	33.9	14.9	6.7
Filtered	1.6	.94	.43
Chlorinated	.25	.028	.038
Per cent of influent water count:			
Applied	33.9	14.9	6.7
Filtered	4.6	6.3	6.4
Chlorinated	16.1	3.0	8.8

B. COLI INDEX

	0–10	11–100	Over 100
B. coli index per 100 cubic centimeters:			
Raw	35,300.0	84,500.0	275,000.0
Applied	7,100.0	12,800.0	30,600.0
Filtered	37.0	84.0	227.0
Chlorinated	1.8	3.6	24.0
Per cent of raw-water index:			
Applied	20.1	15.1	11.1
Filtered	.10	.099	.082
Chlorinated	.0051	.0043	.0087
Per cent of influent water index:			
Applied	20.1	15.1	11.1
Filtered	.52	.66	.74
Chlorinated	4.9	4.3	10.6

TABLE 5.—*Comparative average numbers of bacteria and corresponding numbers and residual percentages of bacteria observed, respectively, in the raw water and in the effluents from successive stages of treatment during periods in which the raw-water turbidity fell within the three ranges indicated in Table 4 and coinciding with raw-water bacterial numbers falling within the different ranges specified*

BACTERIAL COUNT, 24 HOURS, 37° C

Raw-water count range	Turbidity, P. P. M.	Average bacterial count per cubic centimeter				Per cent of raw water			Per cent of influent water		
		Raw	Applied	Filtered	Chlorinated	Applied	Filtered	Chlorinated	Applied	Filtered	Chlorinated
0–2,000	0–10	1,630	1,150	69.0	(1)	70.5	4.2	------	70.5	6.0	------
	11–100	1,490	328	12.0	0.8	22.0	.81	0.054	22.0	3.7	6.7
	Over 100	1,630	276	3.6	.6	16.9	.22	.037	16.9	1.3	16.7
2,001–3,000	0–10	2,270	1,240	34.0	1.7	54.6	1.5	.075	54.6	2.7	5.0
	11–100	2,570	663	52.0	1.1	25.8	2.0	.043	25.8	7.8	2.1
	Over 100	2,560	358	9.7	3.4	14.0	.38	.13	14.0	2.7	35.1
3,0001–5,000	0–10	4,050	1,390	48.0	4.5	34.3	1.2	.11	34.3	3.5	9.4
	11–100	3,810	1,210	67.0	2.3	31.8	1.8	.06	31.8	5.5	3.4
	Over 100	3,820	464	18.0	1.0	12.2	.47	.026	12.2	3.9	5.5
5,001–10,000	0–10	7,810	2,050	84.0	7.7	26.3	1.1	.099	26.3	4.1	9.2
	11–100	7,010	1,770	148.0	2.0	25.2	2.1	.029	25.2	8.4	1.4
	Over 100	7,680	1,070	106.0	4.7	13.9	1.4	.061	13.9	9.9	4.4
10,001–25,000	0–10	13,100	5,260	180.0	24.0	40.2	1.4	.18	40.2	3.4	13.3
	11–100	14,000	2,760	212.0	3.8	19.7	1.5	.027	19.7	7.7	1.8
	Over 100	[2] 17,600	1,539	126.0	8.6	8.8	.71	.049	8.8	8.2	6.8
Over 25,000	0–10	31,000	8,180	624.0	67.0	26.4	2.0	.22	26.4	7.6	10.7
	11–100	[2] 55,200	3,760	132.0	11.0	6.8	.24	.020	6.8	3.5	8.3
	Over 100	[2] 66,700	3,740	228.0	22.0	5.6	.34	.033	5.6	6.1	9.6

[1] Dilution water period. [2] Large proportion of observations made when sewage was being added.

TABLE 5.—*Comparative average numbers of bacteria and corresponding numbers and residual percentage of bacteria observed, respectively, in the raw water and in the effluents from successive stages of treatment during periods in which the raw-water turbidity fell within the three ranges indicated in Table 4 and coinciding with raw-water bacterial numbers falling within the different ranges specified*—Con.

B. COLI INDEX

Raw-water count range	Turbidity P. P. M.	Average B. coli index per 100 cubic centimeters				Per cent of raw water			Per cent of influent water		
		Raw	Applied	Filtered	Chlorinated	Applied	Filtered	Chlorinated	Applied	Filtered	Chlorinated
0-5,000	0-10	2,500	4,000	8	-------	100+	0.32	-------	100+	0.2	------
	11-100	3,120	1,550	25	0.7	49.7	.80	0.022	49.7	1.6	2.8
	Over 100	3,410	828	6.3	.4	24.3	.18	.012	24.3	.76	6.3
5,001-10,000	0-10	8,300	3,870	47	.7	46.6	.57	.008	46.6	1.2	1.5
	11-100	7,660	3,610	19	1.2	47.1	.25	.016	47.1	.53	6.3
	Over 100	7,840	2,080	47	1.2	26.5	.60	.015	26.5	2.3	2.6
10,001-50,000	0-10	35,500	10,500	18	3.4	29.6	.051	.010	29.6	.17	18.9
	11-100	33,200	9,210	91	1.3	27.7	.27	.004	27.7	.99	1.4
	Over 100	32,300	3,530	217	8.6	10.9	.67	.027	10.9	6.1	4.0
50,001-100,000	0-10	69,700	13,300	29	1.1	19.1	.042	.002	19.1	.22	3.8
	11-100	65,200	12,000	121	4.9	18.4	.19	.008	18.4	1.01	4.0
	Over 100	73,400	18,100	268	27.0	24.7	.37	.037	24.7	1.5	10.1
Over 100,000	0-10	505,000	10,000	100	5.0	2.0	.02	.001	2.0	1.0	5.0
	11-100	733,000	71,500	270	22.0	9.9	.04	.003	9.9	.38	8.1
	Over 100	985,000	102,000	546	71.0	10.4	.06	.007	10.4	.54	13.0

1. That the over-all efficiency of removal of bacteria growing on agar plates at 37° C. is influenced decidedly by variations in raw-water turbidity, chiefly, however, because of the effect of this factor on the bacterial efficiency of preliminary coagulation-sedimentation.

2. That the over-all efficiency of *B. coli* removal is influenced in no orderly manner and to a very slight, if any, extent by variations in raw-water turbidity.

3. That the only separate stage of treatment the bacterial efficiency of which appears to be affected in any consistent manner by variations in raw-water turbidity, is that of preliminary coagulation-sedimentation, which becomes higher with increased turbidity. This statement does not apply, however, to the efficiency of *B. coli* removal, which does not appear to be influenced in any consistent direction or to any material extent at any stage of treatment by variations in raw-water turbidity.

Perhaps the most significant general conclusion to be derived from the foregoing data is that the efficiency of *B. coli* removal, whether considered in reference to the purification process as a whole or to any given stage of it, has not been evidenced as being influenced consistently or measurably either by changes in season or by variations in raw-water turbidity. This finding, which confirms that of the previous collective study of a group of full-scale municipal plants, is of basic importance, owing to the sanitary significance of the *B. coli* group of bacteria and to the indication which it gives that the relations existing between the *B. coli* content of the raw water and that of the effluents from various stages of treatment is virtually unaffected by either of the two factors considered. In view of this indication, the *B. coli* relationship shown in Table 1 and illustrated in Figure 1 may be regarded as being of basic significance, in so far as the results of this study are concerned.

COMPARABILITY OF EXPERIMENTAL RESULTS WITH THOSE OF FULL-SCALE PLANTS OF SIMILAR TYPE

The extent to which the efficiency of bacterial purification shown by the experimental plant has been found to agree with the corresponding efficiency of full-scale municipal plants of the same type under similar conditions of raw-water pollution is a question of basic importance in the current studies, as the applicability of conclusions derived from the experimental studies to conditions of full-scale operation depends, to a large extent, on the degree of accordance existing between the performance of the experimental plant from this standpoint, as compared with that of full-scale plants under the same conditions.

In order to make a proper comparison in this respect, it has been desirable, for obvious reasons, to select for the purpose, laboratory data only from full-scale plants at which the conditions as regards the type and elaboration of treatment, the character and density of pollution of the raw water treated, and the physical operation of the plant closely parallel those existing at the experimental plant. It is desirable, moreover, to consider in this connection only plants supplying laboratory data fairly comparable with those obtained from the experimental plant.

For the purpose at hand the most suitable data for comparison with those of the experimental plants are the results obtained from observations made at 10 municipal filtration plants located on the Ohio River, in connection with the collective survey to which reference has been made. Five of these ten plants have single-stage coagulation and sedimentation, which was the kind of preliminary treatment used in the experiments discussed in this paper. In Table 6 are given, in parallel columns, the averages of the yearly mean 37° C. bacterial counts and *B. coli* indices observed in the raw waters and effluents of these five plants, together with corresponding averages of the experimental results obtained during periods in which the bacterial content of the raw water fell within the range of magnitude coinciding most nearly with the average range of the five raw waters in question.[3] In the right-hand section of the table are given the

[3] The range in question included all *B. coli* results observed in the raw water and the corresponding results observed in the various effluents for days on which the mean raw-water *B. coli* index was equal to or less than 10,000 per 100 cubic centimeters.

corresponding residual percentages of plate-growing bacteria and of *B. coli*, referred both to the raw water and to the influent water of each separate stage.

TABLE 6.—*Averages of numbers of bacteria and of B. coli in raw waters and effluents of five Ohio River filtration plants having single-stage coagulation and sedimentation, as compared with corresponding averages of numbers observed at experimental plant in most nearly coincident ranges of raw-water numbers*

	Average content		Residual per cent of raw-water content	
	Ohio River plants	Experimental plant	Ohio River plants	Experimental plant
24-hour count, 37° C. (per cubic centimeter):				
Raw	3,460.0	3,880.0		
Applied	601.0	1,050.0	17.4	27.1
Filtered	27.0	48.0	.8	1.2
Chlorinated	4.4	2.2	.12	.06
B. coli index (per 100 cubic centimeters):				
Raw	4,570.0	3,180.0		
Applied	1,030.0	1,270.0	22.5	39.9
Filtered [1]	3.5	3.9	.08	.12
Chlorinated [1]	.6	.5	.013	.016

[1] Based, in both instances, on results obtained from tests of five 10 cubic centimeter portions of all samples.

In order to make a proper comparison of the two series of *B. coli* data, it has been necessary to reduce the experimental results obtained from tests of the unchlorinated and chlorinated effluents to a basis of those derived from tests only of five 10 cubic centimeter portions of each sample, owing to the fact that this method was followed at the five Ohio River plants during the year covered by the averages. This procedure involved recalculating, in the experimental series, the *B. coli* index for each individual sample, after eliminating all results of tests of 1 cubic centimeter and 0.1 cubic centimeter portions, and reaveraging, on this basis, the results falling within the raw-water range above stated.

The figures summarized in Table 6 indicate a very fair degree of correspondence between the two series of observations, making due allowance for individual divergences to be expected in them. The only well-marked divergence between the two series appears to be in the residual percentages of both classes of bacteria observed in the water applied to the filters, which represents the product of preliminary coagulation and sedimentation. In this single instance the efficiency of bacterial removal is indicated as having averaged distinctly higher at the five Ohio River plants than as observed at the experimental plant, which difference is explainable, at least in part, by the fact that the arrangements provided for preliminary mixing of the coagulant solutions with the raw water are somewhat less highly elaborated at the experimental plant than at the five Ohio River plants. This divergence, however, is virtually offset by the greater bacterial efficiency of the filtration stage at the experimental plant, which is sufficient to deliver an over-all efficiency up to and including the unchlorinated filter effluent averaging but 0.4 per cent less than that of the five Ohio River plants as based on the removal of 37° C. plate-growing bacteria, and but 0.04 per cent less as based on the removal of *B. coli.* As far as both the unchlorinated and chlorinated filter effluents are concerned, the residual percentages given in Table 6 indicate no significant differences as existing between the bacterial efficiency of the experimental plant and that of the five Ohio River plants, considered as a group.

To summarize broadly the foregoing observations, they may be regarded as indicating that the over-all bacterial efficiency of the experimental plant, both with and without the aid of chlorination, agrees very closely with the corresponding average efficiency of the five Ohio River municipal plants having the same degree of elaboration as regards the treatment given the water and under similar conditions of raw-water pollution. Inasmuch as the five Ohio River plants in question may be taken as fairly representing the average plant of the same type treating water similar to that of the Ohio River, the results obtained from the experimental plant in the respect named should be capable of application to normal conditions of full-scale operation without any substantial modification.

INDICATED LIMITS OF RAW-WATER POLLUTION CONSISTENT WITH PRODUCING EFFLUENTS CONFORMING TO GIVEN STANDARDS OF BACTERIAL QUALITY

On referring to Figure 1 it will be noted that the abscissa of each plot corresponding to a given ordinate defines the average *B. coli* index of the raw water consistent with producing an effluent having a specified *B. coli* index. Similarly, a plot of the 37° C. plate-count data given in Table 1 would show the limiting bacterial pollution of the raw water, expressed in these terms, which was found to be consistent with producing an effluent having any assumed bacterial content, as expressed in the same terms. An alternative method of determining these limiting raw-water values would consist in substituting into the general equation, $E=cR^n$, values of c and n as given on page 2134 and calculating, for an assumed value of E, the corresponding raw-water content, R.

In this connection it is of particular interest to determine the limiting average *B. coli* index of the raw water which is indicated as being consistent with producing unchlorinated and chlorinated filter effluents, respectively, conforming to the revised United States Treasury Department *B. coli* standard. By transposing the equation above given it may be written thus: $R=\left(\frac{E}{c}\right)^{\frac{1}{n}}$. Referring to page 2134, the values of c and n given for the relationship between the *B. coli* index of the raw water and that of the unchlorinated filter effluent are 0.029 and 0.77, respectively. The value of E, as defined by the revised United States Treasury Department standard and expressed in terms of the *B. coli* index, is 1 per 100 cubic centimeters. Substituting these values into the transposed equation, we have

$$R=\left(\frac{1}{0.029}\right)^{\frac{1}{0.77}}=(34.5)^{1.30}=100 \text{ per } 100 \text{ c. c.}$$

Similarly, the value of R consistent with producing a chlorinated effluent conforming to the same standard may be computed thus, taking as c and n the values given on page 2134:

$$R=\left(\frac{1}{0.0008}\right)^{\frac{1}{0.82}}=(1{,}250)^{1.22}=6{,}000 \text{ per } 100 \text{ c. c.}$$

On referring to the plots given in Figure 1, these computed values are approximately confirmed, the former by extrapolating the graph until its ordinate becomes equal to the value 1, representing the revised Treasury Department standard limit.

For comparison with these results, there are available two corresponding raw-water maxima derived from the analysis of an extensive series of data secured from the collective survey of the group of municipal plants which previously has been noted in this paper. From an analysis of these data, made in accordance with the same procedure as has been described, the maximum *B. coli* index of the raw water consistent with producing unchlorinated effluents conforming to the revised Treasury Department standard was indicated as being 60 per 100 cubic centimeters, and the maximum index consistent with producing chlorinated effluents meeting the same standard, 5,000 per 100 cubic centimeters. Making due allowance for observational errors and the "spread" of statistical data of this kind, the agreement between the two series of results is strikingly close. From these results it may be concluded tentatively that the limiting figures above stated are fairly representative of the maximum densities of raw-water *B. coli* which will permit the delivery, by efficiently operated plants treating Ohio River water, of unchlorinated and chlorinated effluents meeting the standard in question. It should be noted in this connection that these criteria refer to averages taken over periods of considerable length, such as a month or a year. It also should be emphasized that the raw-water maxima stated are merely observational ones and are not intended as working standards of raw-water pollution, which, if ultimately developed and applied, must necessarily provide proper factors of safety to take account of short-time fluctuations, both in the degrees of pollution of different classes of raw waters and in the efficiency of bacterial removal effected by various types of purification processes. Data bearing on this question, which have been collected from the surveys of municipal plants and from the current experimental studies, will be presented and discussed in a later paper of this series.

SUMMARY AND CONCLUSIONS

The primary series of experiments in water purification described in this paper have been designed to test experimentally the maximum degrees of raw-water bacterial pollution which are consistent with the production of effluents conforming to given standards of bacterial quality. These experiments, which were carried on over a continuous period of 15 months, embraced all conditions with respect to temperature, season, and character of raw water which are normally encountered in the treatment of Ohio River water and other waters of similar type. The experimental plant, which has been described in the first article of this series, was arranged so as to permit the bacterial content and, to some extent, the physical character of the raw water to be varied at will over a wide range. The general method of procedure in conducting the experiments consisted in varying over different ranges the bacterial and physical character of the raw water and observing the resultant effects produced on the quality of the effluents as delivered through successive stages of treatment.

The results of these observations, only the more outstanding features of which are presented in this paper, have indicated—

1. That a consistent, orderly relationship exists between the bacterial quality of the raw water and that of the effluents produced from it at successive stages of treatment.

2. That this relationship is a simple power function, which can be expressed by the general equation, $E=cR^n$.

3. That the value of c and, to a considerably less extent, of n depends on the kind of bacteria, on the type of process, and on the number of stages of treatment between the source of raw water and that of the particular effluent considered.

4. That the efficiency of *B. coli* removal, and hence the relationship above described, when expressed in these terms, is virtually unaffected by seasonal changes or by variations in raw-water turbidity and is influenced by the density of *B. coli* only at the preliminary stage of coagulation-sedimentation.

5. That the results of observations obtained from the experimental plant may be applied without substantial modification to full-scale municipal plants of the same type and degree of elaboration and treating raw waters of approximately the same physical character and bacterial density.

6. That the indicated maximum limits of raw-water *B. coli*, consistent with producing unchlorinated and chlorinated effluents con-

forming to the revised United States Treasury Department standard, are 100 and 6,000 *B. coli* per 100 cubic centimeter, respectively, as expressed in terms of the *B. coli* index.

7. That these indicated maxima agree closely with corresponding maxima derived from previous collective studies of full-scale municipal plants, of the same type and treating raw waters of the same character, under conditions of their routine operation.

A general conclusion reached thus far from the experimental study has been that its results have confirmed, in every major respect, those of the observations made at full-scale municipal plants under the parallel conditions above stated. In the series of experiments in progress at this writing it is planned to devote further study both to the secondary objective which has been described in this paper and to determining, as far as is possible with the facilities at hand, the effects which are produced on the foregoing relationships by fairly wide differences in the physical character of the raw water. The results thus far secured from the observations made of certain of these effects appear to indicate, as far as is shown in Table 5, that the efficiencies of bacterial purification attained in the treatment of relatively clear raw water are not as widely divergent from those shown in the treatment of turbid water, all other things being equal, as had been anticipated prior to these experiments. Any conclusions drawn from these observations must be regarded, however, as being subject to qualification pending further studies of other factors which have a decided bearing, on the problems to be met in the treatment of clear waters, as found along the Great Lakes and in various impounded sources of supply, in contrast with those which are involved in the purification of turbid river waters, such as exist in the inland streams of the United States. The facilities available at the present location of the experimental plant of the Public Health Service are hardly adequate for reproducing all of these factors; nevertheless, they may be utilized for the purpose of showing broadly the differences and the similarities existing between these two classes of water-purification problems. In subsequent papers of this series it is proposed to discuss more fully both the foregoing and other questions having a bearing on the final conclusions to be reached from these studies.

PUBLIC HEALTH ENGINEERING ABSTRACTS

Report of the Malaria Survey of the Jalpaiguri Duars.—Public Health Department of the Government of Bengal, Calcutta, 1926. (Abstract by L. D. Fricks.)

This report is published in pamphlet form and contains 67 pages. The object of the survey was to determine what improvement in the malaria situation had followed measures put into operation for the control of mosquito production on the Meenglas Tea Estate, Jalpaiguri Duars, Bengal. Based on the assumption that the surest method of abolishing malaria in the long run is reduction or eradication of malaria-carrying mosquitoes, and because of the difficulty of controlling the human factor, coolie labor, extensive antimosquito measures were adopted at Meenglas. These measures consisted of underground drainage of streams, periodic flushing of streams, oiling of streams and pools, deepening, straightening and cleaning of streams. The topography of the locality surveyed is rolling, adjoining as it does the foothills of the Himalayas, and a rapid run-off of storm water takes place. Excellent results were reported in taking care of residual water by means of underground or subsoil drains. The internal dimensions of the subsoil drains varied from 6 inches by 9 inches at the intake to 12 inches by 15 inches at the outlet. The drains were constructed of four sets of sized blocks of stone, one forming the base, two forming the sides, and the fourth the top of the drain, these being covered with dirt and turf. The gradient of these drains was 1 in 60 to 1 in 100, which was found sufficient to increase the velocity of water flow. The drains did not choke, except on rare occasions following the displacement of the top stone, and were found adequate to take care of drainage between floods. During heavy rains the storm water usually overflowed the drains. Antimosquito measures were first undertaken on the Meenglas estate in 1917. The system of subsoil drainage was completed in 1919. Oiling of surface water was added in 1919. The survey which is here reported was made in 1925. This survey comprised ten tea gardens or estates, in addition to the one on which antimosquito measures had been carried on for eight years.

The most important conclusions of the surveying party were as follows: (1) Antimosquito operations on the Meenglas Tea Estate had been entirely successful as shown by lower spleen rates observed; (2) unless antimosquito measures are undertaken over a comparatively large area in a highly malarious region, there may be no reduction in malaria because of the influx of mosquitoes from the outside; (3) subsoil drains once constructed require very little further attention; (4) oiling is cheaper than draining, but it requires greater attention to be made to work efficiently

The Disappearance of Malaria in a Village in France due to the Improvement of the Economic Condition of the Inhabitants. Et. Sergent, J. Chassaing and G. Fabiani, *Arch. de L'Institut Past. d' Algerie*, Vol. 3, No. 2, 1925, pp. 127–131. (Abstract by M. A. Barber.)

Fifty years ago, Menet, a village of Haute-Auvergne, was malarious, but it is now healthful. The breeding of *Anopheles* there continues to be abundant, no mechanical protection against them has been practiced, and there has been no change in the number of domestic animals for sixty years; no quinine treatment other than that which is general in France has been employed. The writers attribute the disappearance of malaria to improvement in the "well-being, the comfort, and the prosperity" of the people. They believe that these factors have been as effective in other parts of France, formerly malarious, as in the region described. They state that it is their conviction that one of the most powerful measures practicable in a malarious region is to amend the "Reservoir of virus" constituted by the inhabitants of the region.

A List of the Fishes of Algeria Suitable for Use in the Destruction of Mosquito Larvæ. M. le Commandant Cauvet. *Arch. de L'Inst. Past. d'Algerie*, Vol. 3, No. 2, 1925, pp. 146–154. (Abstract by M. A. Barber.)

A list with illustrations is given of the fishes of Algeria suitable for antimalaria work. The most effective species is *Phoxinellus chaignoni*, which is preferred for the following reasons: It is adaptable to a great variety of waters; it may withstand temperatures over 30° C; it reproduces rapidly; it feeds at all depths of water; and through its great activity, it is more capable than other fishes of escaping its enemies.

Menace of Cross Connections in a Public Water Supply. R. F. Goudey, Resident Engineer, State Board of Health, Los Angeles, Calif. *Journal American Water Works Association*, Vol. 15, No. 5, May, 1926, pp. 472–480. (Abstract by Sol Pincus.)

Another forceful discussion is presented of the serious consequences of cross connections in water supply practice. The author shows the great dangers that exist from the presence of such connections, even with check valves and gate valves, which he does not hold are safe and reliable protections. The numerous kinds and varieties of cross connections are referred to. Reference is also made to the many typhoid fever outbreaks attributed to cross connections.

The only remedy to be considered, according to the author, is the total discontinuance of every cross connection with a polluted supply. The author seems to indicate that the cities of Lowell and Philadelphia and the States of Washington and Minnesota are the only localities requiring complete separation of the two supplies; and that these two States with Ohio, Pennsylvania, and California are the only States having regulations controlling cross connections. He claims that the limited attention to this matter is due to the lack of appreciation of the importance of the dangers. (Abstractor's Note: The author's list is very incomplete. Action regulating cross connections has been taken by the cities of Hartford, Chicago, New York, and by the States of Connecticut, New York, Indiana, and Kansas, to cite some additional places.)

DEATHS DURING WEEK ENDED SEPTEMBER 18, 1926

Summary of information received by telegraph from industrial insurance companies for week ended September 18, 1926, and corresponding week of 1925. (From the Weekly Health Index, September 22, 1926, issued by the Bureau of the Census, Department of Commerce)

	Week ended Sept. 18, 1926	Corresponding week 1925
Policies in force	65, 301, 677	61, 025, 105
Number of death claims	11, 485	11, 147
Death claims per 1,000 policies in force, annual rate	9. 2	9. 5

Deaths from all causes in certain large cities of the United States during the week ended September 18, 1926, infant mortality, annual death rate, and comparison with corresponding week of 1925. (From the Weekly Health Index, September 22, 1926, issued by the Bureau of the Census, Department of Commerce)

City	Week ended Sept. 18, 1926		Annual death rate per 1,000 corresponding week, 1925	Deaths under 1 year		Infant mortality rate, week ended Sept. 18, 1926 [2]
	Total deaths	Death rate [1]		Week ended Sept. 18, 1926	Corresponding week, 1925	
Total (65 cities)	6, 048	10. 9	10. 8	847	894	[3] 66
Akron	28			1	10	11
Albany [4]	26	11. 4	10. 6	2	3	42
Atlanta	61			9	8	
White	27			3		
Colored	34	(5)		6		
Baltimore [4]	191	12. 3	13. 0	25	35	73
White	142			19		68
Colored	49	(5)		6		97
Birmingham	49	12. 1	12. 7	11	7	
White	27			4		
Colored	22	(5)		7		
Boston	160	10. 6	10. 9	20	26	56
Bridgeport	31			3	1	51
Buffalo	122	11. 7	12. 8	10	30	42
Cambridge	18	7. 7	9. 2	2	1	33
Camden	18	7. 2	6. 5	6	8	101
Canton	20	9. 5	3. 9	5	0	111
Chicago [4]	606	10. 4	9. 2	91	85	81
Cincinnati	114	14. 5	13. 9	19	14	118
Cleveland	177	9. 6	9. 8	17	40	44
Columbus	59	10. 8	13. 0	9	13	83
Dallas	48	12. 5	10. 5	11	8	
White	43			8		
Colored	5	(5)		3		
Dayton	38	11. 2	8. 1	9	4	141
Denver	75	13. 7	14. 3	11	10	
Des Moines	27	9. 6	9. 6	5	2	83
Detroit	252	10. 2	11. 2	50	53	80
Duluth	22	10. 2	11. 8	1	4	23
El Paso	25	12. 0	10. 9	5	1	
Erie	15			2	8	38
Fall River [4]	22	8. 8	9. 7	4	4	58
Flint	29	11. 0	6. 0	13	5	215
Fort Worth	22	7. 2	9. 2	4	7	
White	16			3		
Colored	6	(5)		1		
Grand Rapids	32	10. 7	9. 8	6	4	87
Houston	51			8	6	
White	35			5		
Colored	16	(5)		3		
Indianapolis	81	11. 5	11. 9	18	7	132
White	69			16		135
Colored	12	(5)		2		110
Jersey City	56	9. 2	8. 6	5	11	35
Kansas City, Mo	109	15. 2	13. 1	18	11	
Los Angeles	192			15	19	42
Louisville	85	14. 3	9. 5	17	5	146
White	62			13		130
Colored	23	(5)		4		251
Lowell	26			3	4	56

(See footnotes at end of table)

Deaths from all causes in certain large cities of the United States during the week ended September 18, 1926, infant mortality, annual death rate, and comparison with corresponding week of 1925—Continued.

City	Week ended Sept. 18, 1926		Annual death rate per 1,000 corresponding week, 1925	Deaths under 1 year		Infant mortality rate, week ended Sept. 18, 1926
	Total deaths	Death rate		Week ended Sept. 18, 1926	Corresponding week, 1925	
Lynn	28	14.0	9.1	4	1	100
Memphis	62	18.3	20.0	7	7	
White	31			4		
Colored	31	(5)		3		
Milwaukee	82	8.3	8.1	7	13	32
Minneapolis	75	9.0	8.7	9	10	50
Nashville [4]	54	20.6	24.9	6	13	
White	35			4		
Colored	19	(5)		2		
New Bedford	25			6	6	104
New Haven	21	6.0	4.7	6	2	82
New Orleans	155	19.3	17.2	20	24	
White	87			9		
Colored	68	(5)		11		
New York	1,130	9.9	9.8	134	151	54
Bronx Borough	139	8.1	8.1	12	7	40
Brooklyn Borough	381	8.9	8.3	53	60	54
Manhattan Borough	477	13.3	13.0	53	68	59
Queens Borough	108	7.4	7.1	14	14	63
Richmond Borough	25	9.1	13.6	2	2	35
Newark, N. J	103	11.7	9.1	17	12	81
Norfolk	39	11.7	9.6	7	6	130
White	14			1		30
Colored	25	(5)		6		298
Oakland	52	10.4	10.9	8	2	93
Oklahoma City	26			2	3	
Omaha	67	16.2	11.3	7	5	73
Paterson	23	8.4	7.4	5	2	87
Philadelphia	401	10.4	11.6	59	70	78
Pittsburgh	148	12.1	13.5	29	32	96
Portland, Oreg	49			2	4	20
Providence	56	10.6	9.7	9	6	75
Richmond	51	14.1	12.3	12	12	151
White	30			5		98
Colored	21	(5)		7		245
Rochester	49	8.0	12.3	3	11	24
St. Louis	179	11.2	11.0	16	23	
St. Paul	56	11.8	11.7	3	4	27
Salt Lake City [4]	28	11.0	10.8	4	3	55
San Antonio	60	15.3	14.2	14	10	
San Diego	37	17.5	14.8	0	3	0
San Francisco	113	10.4	12.2	3	8	18
Schenectady	12	6.7	9.0	1	3	29
Seattle	71			2	3	19
Somerville	18	9.4	6.3	1	2	26
Spokane	30	14.4	10.1	4	0	94
Springfield, Mass	30	10.8	9.9	0	3	0
Syracuse	51	14.5	10.0	6	3	76
Tacoma	15	7.4	9.5	1	2	23
Toledo	52	9.2	11.6	9	11	87
Trenton	25	9.7	10.7	2	5	33
Utica	34	17.2	9.8	3	4	66
Washington, D. C	119	11.8	13.2	15	9	85
White	78			9		74
Colored	41	(5)		6		109
Waterbury	13			3	1	64
Wilmington, Del	27	11.4	9.4	5	5	117
Worcester	41	11.1	9.8	11	8	127
Yonkers	16	7.2	11.0	1	3	22
Youngstown	26	8.2	7.8	5	8	64

[1] Annual rate per 1,000 population.
[2] Deaths under 1 year per 1,000 births. Cities left blank are not in the registration area for births.
[3] Data for 63 cities.
Deaths for week ended September 17, 1926.
[5] 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, Forth Worth 14, Houston 25, Indianapolis 11, Louisville 17, Memphis 38, Nashville 30, New Orleans 26, Norfolk 38, 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 Week Ended September 25, 1926

ALABAMA

	Cases
Cerebrospinal meningitis	1
Chicken pox	2
Dengue	1
Diphtheria	51
Influenza	15
Lethargic encephalitis	2
Malaria	133
Measles	10
Mumps	7
Ophthalmia neonatorum	1
Pellagra	6
Pneumonia	25
Scarlet fever	14
Smallpox	1
Tuberculosis	41
Typhoid fever	101
Typhus fever	6
Whooping cough	18

ARIZONA

Diphtheria	1
Measles	1
Scarlet fever	5
Tuberculosis	2

ARKANSAS

Chicken pox	16
Hookworm disease	1
Influenza	21
Malaria	99
Measles	4
Mumps	14
Paratyphoid fever	1
Pellagra	6
Scarlet fever	3
Smallpox	7
Tuberculosis	15
Typhoid fever	32
Whooping cough	21

CALIFORNIA

	Cases
Cerebrospinal meningitis:	
Los Angeles	1
San Francisco	1
Chicken pox	75
Diphtheria	165
Influenza	22
Leprosy—Los Angeles	1
Lethargic encephalitis—San Francisco	2
Measles	326
Mumps	84
Poliomyelitis:	
Los Angeles	2
Los Angeles County	2
Scarlet fever	97
Smallpox	4
Tuberculosis	130
Typhoid fever	10
Whooping cough	69

COLORADO

Chicken pox	2
Diphtheria	20
Impetigo contagiosa	1
Measles	7
Mumps	2
Pneumonia	1
Scarlet fever	14
Smallpox	6
Tuberculosis	17
Typhoid fever	12
Whooping cough	5

CONNECTICUT

Cerebrospinal meningitis	2
Chicken pox	6
Diphtheria	10
German measles	1
Malaria	2

CONNECTICUT—continued

	Cases
Measles	4
Mumps	3
Pneumonia (broncho)	9
Pneumonia (lobar)	11
Poliomyelitis	2
Scarlet fever	20
Septic sore throat	1
Tuberculosis (all forms)	33
Typhoid fever	10
Whooping cough	25

DELAWARE

Diphtheria	1
Poliomyelitis	1
Scarlet fever	3
Tuberculosis	1
Typhoid fever	3
Whooping cough	2

FLORIDA

Chicken pox	1
Diphtheria	7
Malaria	4
Measles	4
Scarlet fever	3
Smallpox	4
Tuberculosis	6
Typhoid fever	6
Typhus fever	1
Whooping cough	2

GEORGIA

Diphtheria	50
Dysentery	10
Hookworm disease	1
Influenza	18
Malaria	77
Measles	6
Mumps	6
Paratyphoid fever	3
Pellagra	2
Pneumonia	13
Poliomyelitis	1
Scarlet fever	9
Septic sore throat	7
Smallpox	6
Tuberculosis	6
Typhoid fever	74
Whooping cough	11

IDAHO

Chicken pox	1
Diphtheria	7
Measles	1
Mumps	1
Pneumonia	1
Scarlet fever	6
Tuberculosis	2
Typhoid fever	11

ILLINOIS

Chicken pox	39
Diphtheria	80
Influenza	5
Measles	62
Mumps	23
Pneumonia	97

ILLINOIS—continued

	Cases
Poliomyelitis:	
Cook County	3
Edgar County	1
Franklin County	2
Johnson County	1
Piatt County	1
Wayne County	2
Whiteside County	1
Winnebago County	1
Scarlet fever	110
Smallpox	14
Tuberculosis	292
Typhoid fever	99
Whooping cough	162

INDIANA

Cerebrospinal meningitis	1
Diphtheria	53
Influenza	15
Measles	30
Poliomyelitis	1
Scarlet fever	39
Smallpox	3
Tuberculosis	24
Typhoid fever	51
Whooping cough	29

IOWA

Chicken pox	3
Diphtheria	5
Measles	4
Mumps	1
Scarlet fever	19
Smallpox	5
Tuberculosis	9
Typhoid fever	6
Whooping cough	6

KANSAS

Cerebrospinal meningitis—Garfield	1
Chicken pox	11
Diphtheria	16
Influenza	6
Lethargic encephalitis—Alamota	1
Measles	11
Mumps	5
Pneumonia	8
Poliomyelitis:	
Hutchinson	1
Redwing	1
Rabies	1
Scarlet fever	36
Tuberculosis	47
Typhoid fever	33
Whooping cough	54

LOUISIANA

Cerebrospinal meningitis	1
Diphtheria	12
Malaria	37
Pneumonia	32
Poliomyelitis	2
Scarlet fever	5
Smallpox	7
Tuberculosis	46
Typhoid fever	35

MAINE

	Cases
Chicken pox	9
Diphtheria	2
Influenza	4
Measles	28
Paratyphoid fever	1
Pneumonia	2
Scarlet fever	19
Tetanus	1
Tuberculosis	11
Typhoid fever	12
Vincent's angina	2
Whooping cough	15

MARYLAND [1]

Chicken pox	1
Diphtheria	17
Dysentery	8
German measles	1
Impetigo contagiosa	1
Influenza	2
Malaria	2
Measles	1
Mumps	6
Paratyphoid fever	3
Pneumonia (broncho)	8
Pneumonia (lobar)	7
Poliomyelitis	4
Scarlet fever	21
Septic sore throat	1
Tuberculosis	56
Typhoid fever	72
Whooping cough	69

MASSACHUSETTS

Anthrax	1
Cerebrospinal meningitis	5
Chicken pox	23
Conjunctivitis (suppurative)	2
Diphtheria	46
Dysentery	2
German measles	8
Influenza	12
Lethargic encephalitis	1
Measles	18
Mumps	32
Ophthalmia neonatorum	30
Pellagra	1
Pneumonia (lobar)	40
Poliomyelitis	16
Scarlet fever	80
Septic sore throat	3
Tetanus	1
Trachoma	2
Tuberculosis (pulmonary)	86
Tuberculosis (other forms)	26
Typhoid fever	16
Whooping cough	98

MICHIGAN

Diphtheria	111
Measles	9
Pneumonia	25
Scarlet fever	88
Smallpox	5
Tuberculosis	84
Typhoid fever	49
Whooping cough	133

[1] Week ended Friday.

MINNESOTA

	Cases
Chicken pox	14
Diphtheria	46
Influenza	2
Measles	15
Scarlet fever	103
Tuberculosis	50
Typhoid fever	8
Whooping cough	20

MISSISSIPPI

Diphtheria	21
Scarlet fever	6
Smallpox	1
Typhoid fever	23

MISSOURI

(Exclusive of Kansas City and St. Louis)

Chicken pox	1
Diphtheria	9
Epidemic sore throat	3
Influenza	1
Malaria	2
Measles	13
Poliomyelitis	2
Scarlet fever	41
Smallpox	6
Tuberculosis	4
Typhoid fever	29
Whooping cough	7

MONTANA

Cerebrospinal meningitis	1
Chicken pox	2
Diphtheria	6
Measles	4
Mumps	1
Smallpox	9
Typhoid fever	2
Whooping cough	6

NEBRASKA

Chicken pox	3
Diphtheria	10
Mumps	2
Scarlet fever	9
Smallpox	4
Tuberculosis	15
Typhoid fever	5
Whooping cough	12

NEW JERSEY

Cerebrospinal meningitis	1
Chicken pox	18
Diphtheria	59
Dysentery	1
Influenza	1
Measles	7
Paratyphoid fever	1
Pneumonia	30
Poliomyelitis	3
Scarlet fever	49
Typhoid fever	35
Whooping cough	100

NEW MEXICO

	Cases
Chicken pox	1
Conjunctivitis	1
Diphtheria	1
Malaria	6
Measles	1
Mumps	1
Paratyphoid fever	1
Pellagra	1
Pneumonia	1
Puerperal septicemia	1
Rabies (in animals)	1
Scarlet fever	4
Tuberculosis	40
Typhoid fever	16
Whooping cough	8

NEW YORK

(Exclusive of New York City)

Cerebrospinal meningitis	1
Chicken pox	42
Diphtheria	33
Dysentery	2
German measles	17
Influenza	4
Malaria	1
Measles	59
Mumps	29
Pneumonia	75
Poliomyelitis	41
Scarlet fever	60
Septic sore throat	4
Smallpox	1
Typhoid fever	62
Vincent's angina	11
Whooping cough	184

NORTH CAROLINA

Cerebrospinal meningitis	1
Chicken pox	5
Diphtheria	135
Dysentery (bacillary)	3
Malaria	28
Measles	11
Poliomyelitis	1
Scarlet fever	68
Septic sore throat	4
Smallpox	7
Typhoid fever	55
Whooping cough	229

OKLAHOMA

(Exclusive of Oklahoma City and Tulsa)

Diphtheria	28
Influenza	15
Malaria	144
Measles	6
Pellagra	4
Pneumonia	8
Poliomyelitis	5
Scarlet fever	16
Typhoid fever	122
Whooping cough	10

[3] Deaths.

OREGON

	Cases
Chicken pox	7
Diphtheria	6
Influenza	10
Malaria	1
Measles	7
Mumps	11
Pneumonia	[3] 4
Scarlet fever	29
Smallpox	2
Tuberculosis	[3] 3
Typhoid fever	9
Whooping cough	1

PENNSYLVANIA

Cerebrospinal meningitis—Philadelphia	1
Chicken pox	45
Diphtheria	94
German measles	4
Impetigo contagiosa	14
Lethargic encephalitis—Allegheny County	1
Measles	102
Mumps	11
Ophthalmia neonatorum—Philadelphia	4
Pneumonia	14
Poliomyelitis:	
Bucks County	1
Indiana County	1
Philadelphia	1
Seward	1
Wyoming County	1
Scabies	7
Scarlet fever	126
Tetanus:	
Reading	1
York County	1
Tuberculosis	92
Typhoid fever	87
Whooping cough	247

RHODE ISLAND

Diphtheria	5
German measles	2
Measles	3
Mumps	1
Scarlet fever	3
Tuberculosis	4
Whooping cough	5

SOUTH DAKOTA

Diphtheria	2
Measles	41
Pneumonia	1
Poliomyelitis	1
Scarlet fever	21
Typhoid fever	1
Whooping cough	3

TENNESSEE

Cerebrospinal meningitis—Dyer County	1
Chicken pox	6
Diphtheria	56
Dysentery	6
Influenza	11
Malaria	95

TENNESSEE—continued

	Cases
Measles	7
Mumps	1
Ophthalmia neonatorum	1
Pellagra	1
Pneumonia	8
Poliomyelitis:	
Bedford County	1
Crockett County	1
Hamilton County	1
Hickman County	1
Rabies	1
Scarlet fever	32
Tuberculosis	41
Typhoid fever	223
Whooping cough	70

TEXAS

	Cases
Chicken pox	1
Diphtheria	18
Measles	1
Mumps	1
Pneumonia	4
Scarlet fever	9
Smallpox	1
Tuberculosis	15
Typhoid fever	29
Whooping cough	11

UTAH

	Cases
Chicken pox	8
Diphtheria	7
Measles	13
Mumps	2
Scarlet fever	6
Typhoid fever	2
Whooping cough	8

VERMONT

	Cases
Chicken pox	2
Measles	15
Mumps	2
Scarlet fever	5
Whooping cough	27

WASHINGTON

	Cases
Cerebrospinal meningitis—Lewis County	1
Chicken pox	8
Diphtheria	27
German measles	2
Measles	6
Mumps	14

WASHINGTON—continued

	Cases
Poliomyelitis	1
Scarlet fever	24
Smallpox	11
Tuberculosis	21
Typhoid fever	19
Whooping cough	16

WEST VIRGINIA

	Cases
Chicken pox	3
Diphtheria	20
Influenza	7
Measles	17
Scarlet fever	27
Smallpox	8
Tuberculosis	15
Typhoid fever	42
Whooping cough	56

WISCONSIN

	Cases
Milwaukee:	
Chicken pox	3
Diphtheria	8
Measles	3
Mumps	4
Pneumonia	9
Scarlet fever	11
Tuberculosis	8
Typhoid fever	1
Whooping cough	60
Scattering:	
Chicken pox	5
Diphtheria	13
German measles	3
Influenza	30
Measles	51
Mumps	5
Pneumonia	2
Poliomyelitis	1
Scarlet fever	35
Smallpox	4
Tuberculosis	10
Typhoid fever	5
Whooping cough	101

WYOMING

	Cases
Chicken pox	8
Diphtheria	1
German measles	2
Measles	4
Scarlet fever	13
Typhoid fever	1
Whooping cough	1

Reports for Week Ended September 18, 1926

DISTRICT OF COLUMBIA	Cases
Chicken pox	7
Diphtheria	11
Influenza	1
Pellagra	1
Pneumonia	11
Scarlet fever	1
Tuberculosis	29
Typhoid fever	7
Whooping cough	10

NORTH DAKOTA	Cases
Diphtheria	4
German measles	1
Measles	5
Mumps	4
Pneumonia	1
Poliomyelitis	2
Scarlet fever	30
Smallpox	18
Tuberculosis	1
Typhoid fever	3
Whooping cough	24

SOUTH CAROLINA	Cases
Chicken pox	8
Diphtheria	43
Hookworm disease	41
Influenza	146
Malaria	699
Measles	5
Paratyphoid fever	5

SOUTH CAROLINA—continued	Cases
Pellagra	44
Scarlet fever	11
Smallpox	1
Tuberculosis	85
Typhoid fever	101
Whooping cough	24

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	Cerebrospinal meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
August, 1926										
Alabama	1	57	26	374	69	52	3	43	25	479
Colorado	0	85	5	1	25	--------	3	31	2	64
Illinois	3	204	185	7	499	1	19	297	18	215
Kansas	5	46	14	6	42	1	12	85	11	134
Louisiana	0	56	40	125	3	28	3	17	33	163
Maine	0	7	6	--------	98	--------	0	63	0	13
Maryland	3	46	8	5	67	1	10	31	0	168
Massachusetts	2	127	10	4	200	3	75	290	0	74
Michigan	0	326	2	--------	241	--------	16	268	43	73
Minnesota	0	148	14	--------	95	--------	5	320	7	38
Missouri	4	81	4	10	60	1	3	121	22	218
New York	16	548	65	39	825	--------	181	305	22	303
North Carolina	3	149	--------	60	171	--------	27	89	129	377
North Dakota	--------	16	1	--------	62	--------	0	101	6	9
Ohio	12	348	9	2	131	--------	36	271	37	224
Oklahoma [1]	9	36	127	539	56	62	0	40	1	518
South Carolina	0	76	228	1,557	11	343	7	23	35	588
Vermont	0	14	--------	--------	35	--------	0	5	0	7
West Virginia	1	65	61	--------	106	--------	1	68	13	128
Wyoming	0	3	--------	--------	8	--------	0	17	0	4

[1] Exclusive of Tulsa and Oklahoma City.

RECIPROCAL NOTIFICATIONS

Notifications regarding communicable diseases sent during the month of August, 1926, to other State health departments by departments of health of certain States

Referred by—	Measles	Scarlet fever	Smallpox	Tuberculosis	Typhoid fever
California	--------	--------	--------	3	--------
Connecticut	--------	2	--------	--------	--------
Illinois	1	--------	--------	31	4
Minnesota	--------	2	--------	29	4
New York	--------	1	1	4	3

GENERAL CURRENT SUMMARY AND WEEKLY REPORTS FROM CITIES

Diphtheria.—For the week ended September 11, 1926, 36 States reported 832 cases of diphtheria. For the week ended September 12, 1925, the same States reported 1,039 cases of this disease. Ninety-nine cities, situated in all parts of the country and having an aggregate population of nearly 30,000,000, reported 438 cases of diphtheria for the week ended September 11, 1926. Last year for the corresponding week they reported 523 cases. The estimated expectancy for these cities was 613 cases. The estimated expectancy is based on the experience of the last nine years, excluding epidemics.

Measles.—Thirty-five States reported 635 cases of measles for the week ended September 11, 1926, and 290 cases of this disease for the week ended September 12, 1925. Ninety-nine cities reported 152 cases of measles for the week this year, and 126 cases last year.

Poliomyelitis.—The health officers of 35 States reported 118 cases of poliomyelitis for the week ended September 11, 1926. The same States reported 255 cases for the week ended September 12, 1925.

Scarlet fever.—Scarlet fever was reported for the week as follows: Thirty-six States—this year, 831 cases; last year, 801 cases; 99 cities—this year, 334 cases; last year, 290 cases; estimated expectancy, 302 cases.

Smallpox.—For the week ended September 11, 1926, 36 States reported 147 cases of smallpox. Last year for the corresponding week they reported 81 cases. Ninety-nine cities reported smallpox for the week as follows: 1926, 11 cases; 1925, 31 cases; estimated expectancy, 20 cases. No deaths from smallpox were reported by these cities for the week this year.

Typhoid fever.—One thousand two hundred and thirty-four cases of typhoid fever were reported for the week ended September 11, 1926, by 36 States. For the corresponding week of 1925, the same States reported 1,231 cases of this disease. Ninety-nine cities reported 255 cases of typhoid fever for the week this year, and 230 cases for the corresponding week last year. The estimated expectancy for these cities was 241 cases.

Influenza and pneumonia.—Deaths from influenza and pneumonia were reported for the week by 93 cities, with a population of more than 29,200,000, as follows: 1926, 311 deaths; 1925, 361 deaths.

City reports for week ended September 11, 1926

The "estimated expectancy" given for diphtheria, poliomyelitis, scarlet fever, smallpox, and typhoid fever is the result of an attempt to ascertain from previous occurrence how many cases of the disease under consideration 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 week 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 nonepidemic years.

If reports have not been received for the full nine years, data are used for as many years as possible, but no year earlier than 1917 is included. In obtaining the estimated expectancy, the figures are smoothed when necessary to avoid abrupt deviations 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	Population July 1, 1925, estimated	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
			Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
NEW ENGLAND									
Maine:									
Portland	75,333	1	1	0	0	0	0	0	1
New Hampshire									
Concord	22,546	0	0	0	0	0	3	0	0
Manchester	83,097	0	2	0	0	0	0	0	2
Vermont:									
Barre	10,008	0	0	0	0	0	0	1	0
Burlington	24,089	0	1	0	0	0	0	0	0
Massachusetts:									
Boston	779,620	8	32	11	0	0	5	9	7
Fall River	128,993	1	2	0	0	0	2	0	1
Springfield	142,065	0	2	1	0	0	0	0	0
Worcester	190,757	1	4	1	0	0	3	0	1
Rhode Island:									
Pawtucket	69,760	0	0	0	0	0	0	0	0
Providence	267,918	0	3	0	0	0	1	0	1
Connecticut:									
Bridgeport	([1])	0	4	3	0	0	0	0	1
Hartford	160,197	0	4	0	0	0	0	0	4
New Haven	178,927	2	2	0	0	0	1	0	1
MIDDLE ATLANTIC									
New York:									
Buffalo	538,016	0	14	3		0	0	2	4
New York	5,873,356	12	99	67	4	5	9	15	72
Rochester	316,786	0	4	3		1	2	0	1
Syracuse	182,003	0	4	1		0	5	0	4
New Jersey:									
Camden	128,642	1	1	1	0	0	0	0	2
Newark	452,513		8						
Trenton	132,020	0	3	0	0	0	0	0	4
Pennsylvania:									
Philadelphia	1,979,364	5	37	25		1	2	1	26
Pittsburgh	631,563	1	16	2		1	3	0	15
Reading	112,707	0	3	0		0	0	0	1
EAST NORTH CENTRAL									
Ohio:									
Cincinnati	409,333	0	8	6	0	0	2	1	2
Cleveland	936,485	3	23	25	0	1	0	2	11
Columbus	279,836	0	3	1	0	0	1	0	2
Toledo	287,380	0	7	1	0	0	0	0	1
Indiana:									
Fort Wayne	97,846	0	2	1	0	0	0	0	1
Indianapolis	358,819	0	6	4	0	0	0	0	3
South Bend	80,091	1	1	1	0	0	2	0	0
Terre Haute	71,071	0	1	0	0	0	0	0	0
Illinois:									
Chicago	2,995,239	8	64	24	6	3	11	1	17
Peoria	81,564	0	1	0	0	0	0	0	0
Springfield	63,923	1	1	0	0	0	2	0	0
Michigan:									
Detroit	1,245,824	3	30	36	2	0	0	0	10
Flint	130,316	0	5	2	0	0	0	0	0
Grand Rapids	153,698	1	2	1	0	0	1	0	0

[1] No estimate made.

City reports for week ended September 11, 1926—Continued

Division, State, and city	Population July 1, 1925, estimated	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
			Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
EAST NORTH CENTRAL—continued									
Wisconsin:									
Kenosha	50,891	0	1	0	0	0	2	0	0
Madison	46,385	0	1	3	0	0	0	0	0
Milwaukee	509,192	7	12	9	0	2	5	3	7
Racine	67,707	0	1	0	0	0	2	1	1
Superior	39,671	0	0	5	0	0	1	0	0
WEST NORTH CENTRAL									
Minnesota:									
Duluth	110,502	5	2	0	0	0	2	0	0
Minneapolis	425,435	2	18	13	0	0	0	0	1
St. Paul	246,001	6	14	5	0	0	0	0	5
Iowa:									
Davenport	52,469	0	1	1	0		0	0	
Sioux City	76,411	0	1	1	0		1	0	
Waterloo	36,771	0	0	0	0		0	0	
Missouri:									
Kansas City	367,481	0	5	1	0	0	1	1	5
St. Joseph	78,342	0	1	2	0	0	0	0	0
St. Louis	821,543	2	19	13	0	0	1	0	
North Dakota:									
Fargo	26,403	0	0	0	0	0	0	1	0
Grand Forks	14,811	0	0	0	0		0	0	
South Dakota:									
Aberdeen	15,036	0	1	0	0		0	0	
Nebraska:									
Lincoln	60,941	0	0	0	0	0	0	1	0
Omaha	211,768	0	10	1	0	0	0	0	2
Kansas:									
Topeka	55,411	0	0	0	0	0	0	0	0
Wichita	88,367	1	1	1	0	0	0	0	1
SOUTH ATLANTIC									
Delaware:									
Wilmington	122,049	0	1	2	0	0	0	0	0
Maryland:									
Baltimore	796,296	5	14	21	1	0	2	1	11
Cumberland	33,741	0	0	2	0	0	0	0	0
Frederick	12,035	0	0	0	0	0	0	0	0
District of Columbia:									
Washington	497,906	0	5	11	0	0	0	0	5
Virginia:									
Lynchburg	30,395	0	1	2	0	0	0	0	0
Norfolk	(1)	0	0	0	0	0	0	0	0
Richmond	186,403	0	12	15	0	0	3	0	1
Roanoke	58,208	6	4	0	0	0	0	0	0
West Virginia:									
Charleston	49,019	0	2	0	0	0	0	0	0
Huntington	63,485	0	1	0	0		0	0	
Wheeling	56,208	2	1	0	0	0	0	0	1
North Carolina:									
Raleigh	30,371	0	2	2	0	0	0	0	0
Wilmington	37,061	0	1	0	0	0	0	0	1
Winston-Salem	69,031	0	2	1	0	0	0	0	1
South Carolina:									
Charleston	73,125	0	0	1	4	0	0	0	0
Columbia	41,225	0	1	0	0	0	0	0	0
Greenville	27,311		1						
Georgia:									
Atlanta	(1)	0	5	10	2	0	1	0	2
Brunswick	16,809	0	0	0	0	0	1	0	0
Savannah	93,134	0	1	0	0	0	0	1	0
Florida:									
Miami	69,754	0		1	0	0	1	0	2
St. Petersburg	26,847		0			0			0
Tampa	94,743	0	1	5	0	0	3	0	0

[1] No estimate made.

City reports for week ended September 11, 1926—Continued

Division, State, and city	Population July 1, 1925, estimated	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
			Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
EAST SOUTH CENTRAL									
Kentucky:									
Covington	58,309	0	0	1	0	0	0	0	1
Louisville	305,935	0	5	3	0	0	0	0	4
Tennessee:									
Memphis	174,533	0	5	1	0	0	0	0	1
Nashville	136,220	0	2	10	0	0	0	0	1
Alabama:									
Birmingham	205,670	0	4	1	1	0	3	0	1
Mobile	65,955	0	1	1	0	0	0	0	0
Montgomery	46,481	0	1	3	0	0	0	0	0
[1] No estimate made.									
WEST SOUTH CENTRAL									
Arkansas:									
Fort Smith	31,643	0	0	0	0		0	0	
Little Rock	74,216	0	0	0	0	0	0	0	1
Louisiana:									
New Orleans	414,493	0	7	8	3	3	1	0	7
Shreveport	57,857	0	1	2	0	0	0	0	0
Oklahoma:									
Oklahoma City	(1)	0	2	0	0	0	0	0	2
Texas:									
Dallas	194,450	2	4	4	2	1	0	0	1
Galveston	48,375	0	0	0	0	0	0	0	1
Houston	164,954	0	2	5	0	0	0	0	10
San Antonio	198,069	0	1	1	0	0	0	0	2
MOUNTAIN									
Montana:									
Billings	17,971	1	1	1	0	0	0		0
Great Falls	29,883	0	0	0	0	0	0	0	2
Helena	12,037	0	0	0	0	0	0	0	0
Missoula	12,668	0	0	0	0	0	0	1	0
Idaho:									
Boise	23,042	0	0	0	0	0	0	2	0
Colorado:									
Denver	280,911	1	10	13		3	7	0	8
Pueblo	43,787	0	5	1	0	0	0	0	0
New Mexico:									
Albuquerque	21,000	0	0	1	0	0	1	0	1
Arizona:									
Phoenix	38,669	0	0	0	0	0	0	0	0
Utah:									
Salt Lake City	130,948	3	2	4	0	1	4	1	2
Nevada:									
Reno	12,665	0	0	0	0	0	0	0	0
PACIFIC									
Washington:									
Seattle	(1)	4	3	1	0		2	4	
Spokane	108,897	1	1	2	0		0	0	
Tacoma	104,455	1	2	4	0	0	0	0	1
Oregon:									
Portland	282,383	4	4	1	0	0	1	1	3
California:									
Los Angeles	(1)	5	22	15	3	0	8	4	8
Sacramento	72,260	0	2	6	0	0	1	3	3
San Francisco	557,530	21	13	6	0	0	48	3	4

[1] No estimate made.

City reports for week ended September 11, 1926—Continued

Division, State, and city	Scarlet fever: Cases, estimated expectancy	Scarlet fever: Cases reported	Smallpox: Cases, estimated expectancy	Smallpox: Cases reported	Smallpox: Deaths reported	Tuberculosis, deaths reported	Typhoid fever: Cases, estimated expectancy	Typhoid fever: Cases reported	Typhoid fever: Deaths reported	Whooping cough, cases reported	Deaths, all causes
NEW ENGLAND											
Maine:											
Portland	1	1	0	0	0	0	1	0	0	3	17
New Hampshire:											
Concord	0	0	0	0	0	0	0	0	0	0	3
Manchester	0	2	0	0	0	1	0	0	0	0	33
Vermont:											
Barre	0	0	0	0	0	0	0	0	0	0	3
Burlington	0	0	0	0	0	1	0	0	0	5	7
Massachusetts:											
Boston	13	19	0	0	0	9	5	2	1	29	163
Fall River	1	0	0	0	0	2	2	0	0	18	35
Springfield	2	0	0	0	0	3	1	0	0	6	26
Worcester	2	8	0	0	0	2	0	1	0	3	-------
Rhode Island:											
Pawtucket	0	0	0	0	0	0	0	0	0	0	13
Providence	2	0	0	0	0	5	1	0	0	0	46
Connecticut:											
Bridgeport	2	4	0	0	0	0	1	0	0	1	27
Hartford	2	1	0	0	0	1	2	1	0	2	36
New Haven	2	1	0	0	0	0	4	3	0	2	25
MIDDLE ATLANTIC											
New York:											
Buffalo	6	4	0	0	0	8	3	0	0	7	120
New York	27	28	0	0	0	[1] 80	46	48	3	40	1,143
Rochester	3	2	0	0	0	3	1	1	1	4	55
Syracuse	3	1	0	0	0	0	2	1	0	4	31
New Jersey:											
Camden	1	0	0	0	0	0	1	1	1	0	30
Newark	4	-------	0	-------	-------	-------	2	-------	-------	-------	-------
Trenton	0	1	0	0	0	4	2	0	1	0	35
Pennsylvania:											
Philadelphia	17	19	0	0	0	27	13	5	2	25	395
Pittsburgh	12	5	0	0	0	11	4	4	0	20	116
Reading	1	0	0	0	0	0	2	2	0	5	27
EAST NORTH CENTRAL											
Ohio:											
Cincinnati	4	3	0	1	0	7	2	5	0	23	117
Cleveland	10	8	0	0	0	10	5	6	1	29	144
Columbus	2	10	0	0	0	2	2	2	0	19	63
Toledo	5	3	0	0	0	0	3	1	0	25	52
Indiana:											
Fort Wayne	1	2	0	0	0	0	2	0	0	0	26
Indianapolis	3	2	0	1	0	2	3	2	0	8	62
South Bend	1	1	0	0	0	3	0	0	0	0	12
Terre Haute	1	1	0	0	0	0	0	0	0	3	11
Illinois:											
Chicago	31	23	1	0	0	27	8	5	3	72	508
Peoria	2	1	0	0	0	1	0	0	0	4	16
Springfield	0	1	1	0	0	1	1	0	0	1	17
Michigan:											
Detroit	25	17	2	0	0	27	5	4	2	55	263
Flint	3	4	0	1	0	1	1	0	0	1	18
Grand Rapids	3	6	1	0	0	3	0	1	0	2	26
Wisconsin:											
Kenosha	0	0	1	0	0	1	0	0	0	19	6
Madison	1	1	0	0	0	0	0	0	0	1	9
Milwaukee	11	11	1	0	0	7	1	1	0	75	103
Racine	2	0	0	0	0	1	0	3	0	0	9
Superior	1	1	0	0	0	1	0	0	0	0	13

[1] Pulmonary tuberculosis only.

City reports for week ended September 11, 1926—Continued

Division, State, and city	Scarlet fever: Cases, estimated expectancy	Scarlet fever: Cases reported	Smallpox: Cases, estimated expectancy	Smallpox: Cases reported	Smallpox: Deaths reported	Tuberculosis, deaths reported	Typhoid fever: Cases, estimated expectancy	Typhoid fever: Cases reported	Typhoid fever: Deaths reported	Whooping cough, cases reported	Deaths, all causes
WEST NORTH CENTRAL											
Minnesota:											
Duluth	4	4	0	0	0	0	0	0	0	0	13
Minneapolis	12	13	1	0	0	3	2	1	0	3	59
St. Paul	5	12	1	0	0	2	2	5	0	6	51
Iowa:											
Davenport	1	0	0	0	-------	-------	0	0	-------	0	-------
Sioux City	1	0	0	0	-------	-------	0	0	-------	1	-------
Waterloo	0	2	0	0	-------	-------	1	0	-------	2	-------
Missouri:											
Kansas City	3	1	0	0	0	4	3	1	1	3	65
St. Joseph	1	1	0	0	0	0	1	0	0	0	24
St. Louis	11	9	1	0	0	9	7	15	2	17	166
North Dakota:											
Fargo	0	1	0	0	0	0	0	1	0	4	3
Grand Forks	1	4	0	0	-------	-------	0	2	-------	0	-------
South Dakota:											
Aberdeen	2	0	0	0	-------	-------	0	0	-------	2	-------
Nebraska:											
Lincoln	0	0	0	0	0	0	0	0	0	4	6
Omaha	2	1	0	1	0	3	1	1	0	0	46
Kansas:											
Topeka	2	1	0	0	0	1	1	0	0	10	11
Wichita	1	1	0	0	0	1	2	1	0	4	28
SOUTH ATLANTIC											
Delaware:											
Wilmington	1	1	0	0	0	1	0	0	0	1	19
Maryland:											
Baltimore	6	7	0	0	0	4	10	11	4	81	189
Cumberland	0	0	0	0	0	1	1	0	0	0	10
Frederick	0	0	0	0	0	0	0	0	0	0	3
District of Columbia:											
Washington	4	6	0	0	0	5	5	1		1	98
Virginia:											
Lynchburg	0	1	0	0	0	0	1	1	0	2	9
Norfolk	1	0	0	0	0	2	1	5	0	18	-------
Richmond	4	2	0	0	0	2	3	3	0	0	44
Roanoke	0	2	0	0	0	1	2	0	0	0	16
West Virginia:											
Charleston	1	0	1	0	0	0	2	11	0	1	16
Huntington	1	0	0	0	-------	-------	0	0	-------	0	-------
Wheeling	2	0	0	0	0	0	2	3	0	1	13
North Carolina:											
Raleigh	0	2	0	0	0	0	0	1	1	7	12
Wilmington	0	4	0	0	0	0	0	0	0	6	11
Winston - Salem	0	0	0	0	0	0	2	3	0	3	15
South Carolina:											
Charleston	0	0	0	0	0	1	3	7	1	0	17
Columbia	0	1	0	0	0	0	1	0	0	0	-------
Greenville	0	-------	0	-------	-------	-------	0	-------	-------	-------	-------
Georgia:											
Atlanta	4	3	0	0	0	6	4	6	2	2	74
Brunswick	0	0	0	0	0	0	0	0	0	0	3
Savannah	0	0	0	1	0	4	1	0	0	0	24
Florida:											
Miami	-------	1	-------	0	0	0	-------	1	0	4	31
St. Petersburg	0	-------	0	-------	0	0	0	-------	0	-------	4
Tampa	0	1	0	0	0	2	0	4	1	0	20
EAST SOUTH CENTRAL											
Kentucky:											
Covington	1	1	0	0	0	1	0	2	0	0	12
Louisville	1	7	0	0	0	10	6	10	1	33	76
Tennessee:											
Memphis	1	5	0	0	0	5	6	20	1	11	62
Nashville	2	2	0	0	0	1	6	19	2	15	46
Alabama:											
Birmingham	4	5	0	0	0	3	6	2	2	11	59
Mobile	1	1	1	0	0	1	1	2	0	0	14
Montgomery	0	0	0	0	0	0	1	0	0	0	11

City reports for week ended September 11, 1926—Continued

Division, State, and city	Scarlet fever: Cases, estimated expectancy	Scarlet fever: Cases reported	Smallpox: Cases, estimated expectancy	Smallpox: Cases reported	Smallpox: Deaths reported	Tuberculosis, deaths reported	Typhoid fever: Cases, estimated expectancy	Typhoid fever: Cases reported	Typhoid fever: Deaths reported	Whooping cough, cases reported	Deaths, all causes
WEST SOUTH CENTRAL											
Arkansas:											
Fort Smith	1	0	0	0			0	0		8	
Little Rock	1	1	0	0	0	1	2	1	0	0	
Louisiana:											
New Orleans	1	2	0	0	0	12	5	3	0	0	128
Shreveport	0	2	0	0	0	3	5	0	0	0	28
Oklahoma:											
Oklahoma City	1	1	1	0	0	0	2	1	1	0	27
Texas:											
Dallas	1	2	0	0	0	3	3	1	0	0	43
Galveston	0	1	0	0	0	2	1	0	0	0	12
Houston	0	1	1	0	0	3	1	3	2	0	60
San Antonio	1	2	0	0	0	10	0	1	0	0	56
MOUNTAIN											
Montana:											
Billings	0	0	0	0	0	0	0	0	0	1	2
Great Falls	0	0	1	0	0	0	0	1	0	0	6
Helena	0	0	0	0	0	0	0	0	0	0	3
Missoula	0	1	0	0	0	0	1	0	0	0	4
Idaho:											
Boise	0	0	0	0	0	0	0	0	0	1	5
Colorado:											
Denver	3	6	2	0	0	5	4	1	0	0	70
Pueblo	0	0	0	0	0	0	1	0	0	0	8
New Mexico:											
Albuquerque	0	0	0	0	0	7	2	0	0	0	17
Arizona:											
Phoenix		1	0	0	0	6	0	0	0	0	21
Utah:											
Salt Lake City	1	1	0	0	0	2	2	0	0	8	33
Nevada:											
Reno	0	0	0	0	0	0	0	0	0	0	2
PACIFIC											
Washington:											
Seattle	4	7	0	0			2	4		1	
Spokane	4	5	1	0			0	0		1	
Tacoma	2	1	1	4	0	1	1	0	0	0	27
Oregon:											
Portland	3	8	3	2	0	2	1	0	0	1	53
California:											
Los Angeles	6	14	2	1	0	29	5	2	0	6	186
Sacramento	1	0	0	1	0	1	1	3	0	0	16
San Francisco	5	6	1	0	0	8	2	1	2	1	122

Division, State, and city	Cerebrospinal meningitis: Cases	Cerebrospinal meningitis: Deaths	Lethargic encephalitis: Cases	Lethargic encephalitis: Deaths	Pellagra: Cases	Pellagra: Deaths	Poliomyelitis (infantile paralysis): Cases, estimated expectancy	Poliomyelitis (infantile paralysis): Cases	Poliomyelitis (infantile paralysis): Deaths
NEW ENGLAND									
Massachusetts:									
Boston	0	0	2	0	0	0	2	1	0
Fall River	1	0	0	0	0	0	1	0	0
Springfield	0	0	0	0	0	0	0	7	0
Worcester	0	0	0	0	0	0	0	4	0
Rhode Island:									
Providence	0	0	0	1	0	0	1	2	0
Connecticut:									
Hartford	0	0	1	1	0	0	0	2	0

City reports for week ended September 11, 1926—Continued

Division, State, and city	Cerebrospinal meningitis		Lethargic encephalitis		Pellagra		Poliomyelitis (infantile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, estimated expectancy	Cases	Deaths
MIDDLE ATLANTIC									
New York:									
Buffalo	0	0	0	0	0	0	1	14	1
New York	2	0	4	0	0	1	10	8	3
Rochester	0	0	0	0	0	0	0	1	0
Syracuse	0	0	0	0	0	0	1	7	0
EAST NORTH CENTRAL									
Ohio:									
Cleveland	1	1	0	0	0	0	1	0	0
Toledo	0	0	2	0	0	0	1	0	0
Illinois:									
Chicago	1	0	1	0	0	0	5	0	0
Peoria	0	1	0	0	0	0	0	0	0
Michigan:									
Detroit	0	0	1	1	0	0	1	1	0
Wisconsin:									
Milwaukee	2	0	0	0	0	0	1	0	0
WEST NORTH CENTRAL									
Nebraska:									
Omaha	0	0	0	0	0	0	1	1	0
SOUTH ATLANTIC									
Maryland:									
Baltimore	1	0	1	2	0	0	1	2	1
District of Columbia:									
Washington	0	0	0	0	2	1	0	0	0
Virginia:									
Roanoke	0	0	0	0	0	0	0	1	0
South Carolina:									
Charleston [1]	0	0	0	0	1	0	0	0	0
Columbia	0	0	0	0	0	0	0	1	0
Georgia:									
Atlanta	0	0	0	0	1	0	0	0	0
Savannah	0	0	0	0	0	1	0	0	0
Florida:									
Tampa	0	0	0	0	0	0	0	1	0
EAST SOUTH CENTRAL									
Kentucky:									
Louisville	0	0	0	0	0	1	0	0	0
Tennessee:									
Memphis	0	0	0	0	1	0	0	0	0
Nashville	0	0	0	0	0	1	0	0	0
Alabama:									
Birmingham	0	0	0	0	1	1	0	0	0
WEST SOUTH CENTRAL									
Arkansas:									
Little Rock	0	0	0	0	0	1	0	0	0
Texas:									
Dallas	0	0	0	0	2	2	1	0	0
MOUNTAIN									
Montana:									
Missoula	1	0	0	0	0	0	0	0	0
PACIFIC									
Washington:									
Seattle	1	0	0	0	0	0	0	0	0
Spokane	1	0	0	0	0	0	0	0	0
California:									
Los Angeles	0	0	0	0	-	0	1	3	0
San Francisco	0	0	0	0	0	0	0	1	0

[1] Dengue: 2 cases at Charleston, S. C.

The following table gives the rates per 100,000 population for 101 cities for the five-week period ended September 11, 1926, compared with those for a like period ended September 12, 1925. The population figures used in computing the rates are approximate estimates as of July 1, 1925, and 1926, respectively, authoritative figures for many of the cities not being available. The 101 cities reporting cases had an estimated aggregate population of nearly 30,000,000 in 1925 and nearly 30,500,000 in 1926. The 95 cities reporting deaths had more than 29,200,000 estimated population in 1925 and more than 29,730,000 in 1926. The number of cities included in each group and the estimated aggregate populations are shown in a separate table below.

Summary of weekly reports from cities, August 8 to September 11, 1926—Annual rates per 100,000 population, compared with rates for the corresponding period of 1925 [1]

DIPHTHERIA CASE RATES

	Week ended—									
	Aug. 15, 1925	Aug. 14, 1926	Aug. 22, 1925	Aug. 21, 1926	Aug. 29, 1925	Aug. 28, 1926	Sept. 5, 1925	Sept. 4, 1926	Sept. 12, 1925	Sept. 11, 1926
101 cities	77	[2] 69	68	[3] 68	[4] 72	[2] 65	[5] 70	74	92	[6] 76
New England	89	31	50	47	41	50	43	26	74	38
Middle Atlantic	78	62	73	59	63	56	61	59	89	[7] 53
East North Central	68	[2] 101	51	[2] 87	68	[2] 75	57	101	70	80
West North Central	108	56	100	83	117	81	100	66	143	75
South Atlantic	69	49	60	60	[4] 68	62	106	69	119	[4] 137
East South Central	32	57	58	21	37	57	32	42	74	104
West South Central	48	26	57	[8] 66	92	34	31	60	119	86
Mountain	157	73	74	146	166	73	305	91	194	173
Pacific	80	105	110	62	105	92	[5] 76	135	75	92

MEASLES CASE RATES

	Aug. 15, 1925	Aug. 14, 1926	Aug. 22, 1925	Aug. 21, 1926	Aug. 29, 1925	Aug. 28, 1926	Sept. 5, 1925	Sept. 4, 1926	Sept. 12, 1925	Sept. 11, 1926
101 cities	46	[2] 57	30	[3] 41	[4] 27	[2] 27	[5] 22	25	22	[6] 26
New England	125	69	93	52	86	38	50	33	91	35
Middle Atlantic	57	33	38	27	34	15	25	17	25	[7] 11
East North Central	35	[2] 77	21	[2] 60	20	[2] 32	20	30	16	18
West North Central	25	66	6	28	4	20	6	10	4	10
South Atlantic	40	81	33	36	[4] 23	15	23	9	21	[4] 19
East South Central	16	31	5	36	11	36	0	31	0	16
West South Central	9	4	9	[8] 9	0	4	0	0	4	4
Mountain	18	64	28	18	28	27	0	36	9	100
Pacific	19	94	11	78	6	94	[5] 26	92	8	159

SCARLET FEVER CASE RATES

	Aug. 15, 1925	Aug. 14, 1926	Aug. 22, 1925	Aug. 21, 1926	Aug. 29, 1925	Aug. 28, 1926	Sept. 5, 1925	Sept. 4, 1926	Sept. 12, 1925	Sept. 11, 1926
101 cities	57	[2] 51	51	[3] 48	[4] 45	[2] 55	[5] 54	51	51	[6] 58
New England	81	69	89	73	67	54	46	59	62	80
Middle Atlantic	36	30	23	29	27	32	30	25	31	[7] 31
East North Central	54	[2] 56	54	[2] 47	45	[2] 55	58	59	57	62
West North Central	131	119	145	119	110	133	123	131	102	93
South Atlantic	38	30	40	39	[4] 39	58	56	38	54	[4] 57
East South Central	37	47	32	36	26	62	131	57	110	109
West South Central	66	22	48	[8] 18	18	26	35	26	31	47
Mountain	92	36	65	36	28	64	74	82	37	73
Pacific	83	86	41	78	66	75	[5] 50	70	36	89

[1] 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, 1925, and 1926, respectively.
[2] Madison, Wis., not included.
[3] Madison, Wis., and Fort Smith, Ark., not included.
[4] Greenville, S. Car., not included.
[5] Spokane, Wash., not included.
[6] Newark, N. J., and Greenville, S. Car., not included.
[7] Newark, N. J., not included.
[8] Fort Smith, Ark., not included.

Summary of weekly reports from cities, August 8 to September 11, 1926—Annual rates per 100,000 population, compared with rates for the corresponding period of 1925

SMALLPOX CASE RATES

	Week ended—									
	Aug. 15, 1925	Aug. 14, 1926	Aug. 22, 1925	Aug. 21, 1926	Aug. 29, 1925	Aug. 28, 1926	Sept. 5, 1925	Sept. 4, 1926	Sept. 12, 1925	Sept. 11, 1926
101 cities	7	[2] 7	6	[3] 2	[4] 8	[2] 4	[5] 5	2	5	[6] 2
New England	0	0	0	0	0	0	0	0	0	0
Middle Atlantic	0	0	0	1	1	0	0	1	0	[7] 0
East North Central	3	[2] 1	2	[2] 2	8	[2] 7	5	0	2	2
West North Central	16	4	6	4	4	0	4	0	0	2
South Atlantic	2	11	4	6	[4] 12	9	2	9	12	[4] 2
East South Central	21	26	37	5	53	0	11	10	21	0
West South Central	9	22	4	[8] 0	13	9	4	4	4	0
Mountain	9	73	9	0	9	0	9	0	18	0
Pacific	64	32	41	5	28	13	[5] 38	13	41	16

TYPHOID FEVER CASE RATES

101 cities	46	[2] 35	55	[3] 41	[4] 45	[2] 40	[5] 38	40	41	[6] 44
New England	38	17	31	17	26	19	29	12	34	17
Middle Atlantic	33	24	44	34	30	39	29	34	27	[7] 32
East North Central	17	[2] 19	29	[2] 17	26	[2] 18	17	20	20	20
West North Central	55	24	47	48	35	42	22	42	57	50
South Atlantic	86	100	104	94	[4] 89	56	58	92	48	[4] 106
East South Central	200	140	168	187	163	233	168	176	226	285
West South Central	97	47	128	[8] 44	106	39	167	43	70	39
Mountain	102	73	102	73	111	18	28	9	129	18
Pacific	41	30	61	24	52	38	[5] 29	46	28	27

INFLUENZA DEATH RATES

95 cities	2	[2] 1	2	[2] 3	[4] 3	[2] 3	2	3	4	[6] 4
New England	0	0	0	0	0	0	0	0	2	0
Middle Atlantic	3	1	2	1	3	3	3	2	3	[7] 4
East North Central	3	[2] 0	1	[2] 3	4	[2] 3	3	4	7	4
West North Central	0	2	0	2	2	8	2	4	0	0
South Atlantic	0	0	0	2	[4] 2	2	2	0	0	[4] 0
East South Central	5	10	11	0	5	0	0	16	5	0
West South Central	0	14	10	28	15	5	5	9	5	19
Mountain	9	0	9	0	9	18	18	9	28	36
Pacific	0	0	7	7	0	0	0	0	4	0

PNEUMONIA DEATH RATES

95 cities	60	[2] 50	53	[2] 54	[4] 61	[2] 48	70	51	61	[6] 52
New England	29	31	38	40	41	33	53	50	50	40
Middle Atlantic	73	62	65	58	65	56	84	59	68	[7] 67
East North Central	47	[2] 35	40	[2] 34	50	[2] 38	59	34	46	37
West North Central	43	25	30	49	54	42	32	36	36	30
South Atlantic	73	56	60	86	[4] 80	58	54	64	60	[4] 42
East South Central	58	52	74	36	63	47	131	52	142	42
West South Central	82	113	77	71	106	76	73	52	82	104
Mountain	55	82	65	82	74	73	83	64	37	64
Pacific	80	39	47	78	62	21	95	78	91	57

[2] Madison, Wis., not included.
[3] Madison, Wis., and Fort Smith, Ark., not included.
[4] Greenville, S. C., not included.
[5] Spokane, Wash., not included.
[6] Newark, N. J., and Greenville, S. C., not included
[7] Newark, N. J., not included.
[8] Fort Smith, Ark., not included.

Number of cities included in summary of weekly reports, and aggregate population of cities in each group, approximated as of July 1, 1925 and 1926, respectively

Group of cities	Number of cities reporting cases	Number of cities reporting deaths	Aggregate population of cities reporting cases		Aggregate population of cities reporting deaths	
			1925	1926	1925	1926
Total	101	95	29, 900, 058	30, 427, 598	29, 221, 531	29, 733, 613
New England	12	12	2, 176, 124	2, 206, 124	2, 176, 124	2, 206, 124
Middle Atlantic	10	10	10, 346, 970	10, 476, 970	10, 346, 970	10, 476, 970
East North Central	16	16	7, 481, 656	7, 655, 436	7, 481, 656	7, 655, 436
West North Central	12	10	2, 550, 024	2, 589, 131	2, 431, 253	2, 468, 448
South Atlantic	21	21	2, 716, 070	2, 776, 070	2, 716, 070	2, 776, 070
East South Central	7	7	993, 103	1, 004, 953	993, 103	1, 004, 953
West South Central	8	6	1, 184, 057	1, 212, 057	1, 078, 198	1, 103, 695
Mountain	9	9	563, 912	572, 773	563, 912	572, 773
Pacific	6	4	1, 888, 142	1, 934, 084	1, 434, 245	1, 469, 144

FOREIGN AND INSULAR

BOLIVIA

Influenza—July, 1926.—Influenza was reported extensively diffused in Bolivia during the month of July, 1926. At La Paz schools were closed from July 15 to 25. Hospital records showed 19 deaths from influenza during the month.

BRAZIL

Smallpox—Rio de Janeiro—January 1–August 14, 1926.—During the period January 1 to August 14, 1926, 1,908 cases of smallpox with 945 deaths were reported. Population, 1,543,212.

CANADA

Communicable diseases—Two weeks ended September 11, 1926.—The Canadian Ministry of Health reports cases of certain communicable diseases in seven Provinces of Canada for the weeks ended September 4 and September 11, 1926, as follows:

WEEK ENDED SEPTEMBER 4

Disease	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	Total
Cerebrospinal fever				1		5		6
Influenza	9				2			11
Smallpox				5	2	11	1	19
Typhoid fever	1	7	13	18	12		4	55

WEEK ENDED SEPTEMBER 11

Disease	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	Total
Cerebrospinal fever					3	6		9
Influenza	5							5
Poliomyelitis				4				4
Smallpox				7	4		2	13
Typhoid fever	2	10	38	18	5		4	77

CEYLON

Health conditions, year 1925.—Disease prevalence was reported in the Island of Ceylon during the year 1925 as follows: *Smallpox*—28 cases, three deaths, as compared with the preceding year with 49 cases, nine deaths; and with 1923 with 280 cases, 39 deaths. The 22 cases reported at Colombo during the year were all from vesssels calling at the port. In 1924 the number of cases from vessels was four. The absence of spread from the imported cases in 1925 was attributed to efficient preventive measures on the part of port authorities. *Cholera*—Cases, 305, deaths, 186. A number of outbreaks were attributed to cholera carriers. Comparison with previous years shows for 1924 only 17 cases with 14 deaths, and in 1923 no reported cases.

CHOSEN

Cholera—Shingishu.—A report received from Seoul, Chosen, shows cholera present at Shingishu and in vicinity, September 13, 1926.

ECUADOR

Plague—Summary, January-June, 1926.—Information has been received under date of July 31, 1926, showing the prevalence of plague in Ecuador during the period January to June, inclusive, 1926, as follows:

Province	Cases	Deaths	Number of localities
Chimborazo	9	2	At four localities.
Guayas	74	29	At Guayaquil.
Leon	43	19	At two localities.
Loja	176	75	In two cantons.
Tungurahua	83	29	At Ambato, Huachi, and Picayhua.

Rats taken—Found infected.—In the Province of Chimborazo, 766 rats were reported taken at four localities; in the Province of Guayas, at Guayaquil, 124,453 rats, of which 697 were found infected; in the Province of Tungurahua, 1,542 rats were taken at three localities.

Plague—Guayaquil—August, 1926.—During the month of August, 1926, seven cases of plague with one death were reported at Guayaquil, Ecuador.

Plague-infected rats.—During the period under report 21,155 rats were reported taken and 37 rats found infected.

GERMANY

Poliomyelitis (infantile paralysis)—Magdeburg—Nordhausen.—Under date of September 7, 1926, the occurrence of poliomyelitis (infantile paralysis) was reported in central Germany. At Nordhausen 17 cases were reported and at Magdeburg the disease was stated to be present.

GREAT BRITAIN

Further relative to plague—Liverpool.[1]—Information received under date of September 8, 1926, relative to plague reported present at Liverpool with several cases and one death, September 6, 1926,

[1] Public Health Reports, Sept. 17, 1926, p. 2056.

shows that the occurrence was in a father and son, a boy of 10 years, who died of the disease, and that the father was employed at the Liverpool South End Docks.

LATVIA

Communicable diseases—July, 1926.—During the month of July, 1926, communicable diseases were reported in the Republic of Latvia as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	2	Mumps	8
Diphtheria	34	Paratyphoid fever	6
Dysentery	20	Puerperal fever	2
Erysipelas	30	Scarlet fever	176
Leprosy	3	Trachoma	20
Malaria	1	Typhoid fever	61
Measles	52	Whooping cough	77

Population, estimated, 1,850,000.

MADAGASCAR

Plague—June 16 to 30, 1926.—During the period June 16 to 30, 1926, 43 cases of plague with 31 deaths were reported in the island of Madagascar. The occurrence was distributed in five Provinces as follows: Antisirabi, cases, 4; Itasy, cases, 17; Majunga, cases, 10; Mananjary, 1 case; Tananarive, cases, 10. The urban occurrence was: Tamatave (port), 1 case; Tananarive (interior), 1 case. According to type the distribution was: Bubonic, 10 cases; pneumonic, 30; septicemic, 3.

MALTA

Communicable diseases—July, 1926.—Communicable diseases were reported in the island of Malta during the month of July, 1926, as follows:

Disease	Cases	Disease	Cases
Broncho-pneumonia	3	Pneumonia	5
Chicken pox	9	Scarlet fever	2
Diphtheria	7	Trachoma	46
Erysipelas	6	Tuberculosis	16
Malta fever	91	Typhoid fever	42
Measles	68	Whooping cough	8

PANAMA CANAL

Communicable diseases—July, 1926.—During the month of July, 1926, communicable diseases were reported in the Canal Zone, and at Colon and Panama, as follows:

Disease	Canal Zone		Colon		Panama		Infected in other localities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chicken pox					1				1	
Diphtheria	2				12				14	
Dysentery		1			1				1	1
Hookworm				1	33				33	1
Leprosy			1		1				2	
Malaria	220		15		6	1	41		282	1
Measles	1		1		10				12	
Meningitis				1						1
Pneumonia [1]				6		11				17
Poliomyelitis			1						1	
Tuberculosis [1]		1		9		15		2		27
Whooping cough			1	1	1				2	1

[1] Only deaths reported.

PERU

Mortality from gastroenteritis—Lima—May and June, 1926.—During the months of May and June, 1926, 38 and 32 deaths, respectively, from gastroenteritis, were reported at Lima, Peru.

Influenza.—During the same months, 10 and 7 deaths, respectively, from influenza were reported at Lima. The total number of deaths reported for the month of May was 365; for the month of June, 349. Population, estimated, 200,000.

SAMOA

Epidemic influenza—Apia.—Under date of August 21, 1926, epidemic influenza in a mild but highly infectious form was reported present at Apia, Samoa, and vicinity. The infected area was stated to extend along the coast. The estimated number of cases was 200. No mortality was reported.

Bacillary dysentery—Measles.—During the week ended July 31, 1926, two cases of bacillary dysentery were reported in the Government hospital; during the week ended August 21, 1926, 13 cases of measles were reported at a village in vicinity of Apia, with no other infected area noted.

VENEZUELA

Proposed water-supply system—Maracaibo.—A report of the preliminary work on the aqueduct system at Maracaibo to July 15, 1926, has been received. It is estimated that the supply of water furnished will give each inhabitant 172 liters of water daily on a basis of 100,000 population. The source of the supply is the Rio Palmar, which is estimated to have a flow of 3,860 liters per second and to be sufficient to supply water for 19 cities of the size of Maracaibo. The water is stated to be of fine quality.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

The reports contained in the following tables must not be considered as complete or final as regards either the lists of countries included or the figures for the particular countries for which reports are given.

Reports Received During Week Ended October 1, 1926 [1]

CHOLERA

Place	Date	Cases	Deaths	Remarks
Ceylon				Year, 1925: Cases, 305; deaths, 186. Previous year: Cases, 17; deaths, 14.
China:				
Canton	June 1-30	38	14	
Tsingtao	Aug. 8-14	3	2	
Chosen:				
Shingishu	Sept. 13	19		Including places in vicinity.
India				July 18-24, 1926: Cases, 2,002; deaths, 1,268.
Calcutta	Aug. 8-14	17	17	
Rangoon	Aug. 1-7	1	1	

PLAGUE

Place	Date	Cases	Deaths	Remarks
Ecuador				Jan.-June, 1926: Cases, 385; deaths, 154.
Province—				
Chimborazo	Jan.-June	9	2	Localities, 4. Rats taken, 766.
Guayas—				
Guayaquil	do	74	29	Rats taken, 124,453; found infected, 697
Do	Aug. 1-31	7	1	Rats taken, 21,155; found infected, 37.
Leon	Jan.-June	43	19	Localities, 2.
Loja	do	176	75	Cantons, 2.
Tungurahua	do	83	29	At Ambato, Huachi, and Picayhua. Rats taken, 1,542.
Great Britain:				
Liverpool	Aug. 29-Sept. 4	2	1	Previously reported; corrected statement.
Greece:				
Patras	Aug. 8-14	1	1	
India				July 18-24, 1926: Cases, 234; deaths, 130.
Madras Presidency	July 25-31	58	31	
Rangoon	Aug. 1-14	16	13	
Java:				
Batavia	July 24-Aug. 6	3	3	Province.
Madagascar				June 16-30, 1926: Cases, 43; deaths, 31.
Province—				
Antisirabi	June 16-30	4	4	Bubonic, 1; pneumonic, 3.
Itasy	do	17	10	Bubonic, 2; pneumonic, 13; septicemic, 2 cases.
Majunga	do	10	6	Bubonic, 3; pneumonic, 7 cases.
Mananjary	do	1	1	Bubonic.
Turkey:				
Constantinople	Aug. 15-28	2	1	

SMALLPOX

Place	Date	Cases	Deaths	Remarks
Algeria:				
Algiers	Aug. 11-20	1		
Brazil:				
Bahia	Aug. 1-14	27	9	
Para	do	4	3	
Pernambuco	July 18-31	4		
Rio de Janeiro	Aug. 1-14	529	256	Jan. 1-Aug. 14, 1926: Cases, 1908; deaths, 945.
Canada:				
Alberta	Aug. 29-Sept. 11	3		
Calgary	Sept. 5-11	1		
Manitoba	Aug. 29-Sept. 11	6		
Ontario	do	12		
Toronto	Sept. 5-11	1		
Saskatchewan	Aug. 29-Sept. 4	11		
Egypt:				
Alexandria	Aug. 6-19	3	4	
India				July 18-24, 1926: Cases, 2,504 deaths, 849.
Calcutta	Aug. 8-14	2	1	
Karachi	Aug. 15-21		1	
Madras	Aug. 15-21	3	1	

[1] From medical officers of the Public Health Service, American consuls, and other sources.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

Reports Received During Week Ended October 1, 1926—Continued

SMALLPOX—Continued

Place	Date	Cases	Deaths	Remarks
Java:				
Batavia	July 24-30	1		Province.
Surabaya	July 18-24	15	1	
Portugal:				
Lisbon	Aug. 16-22		1	

TYPHUS FEVER

Place	Date	Cases	Deaths	Remarks
Algeria:				
Algiers	Aug. 1-10	1		
Chile:				
Valparaiso	Aug. 14-21	1		
Chosen:				
Chemulpo	July 1-31	7	2	
Egypt:				
Alexandria	Aug. 13-19	1		
Port Said	Aug. 13-19	1		
Mexico:				
Mexico City	Aug. 29-Sept. 4	3		Including municipalities in Federal district.
Palestine:				
Halalal	Aug. 17-23	1		
Haifa	do	2		
Yavniel	do	1		
Union of South Africa:				
Cape Province	Aug. 1-7			Outbreaks in two districts.
Natal—				
Durban	July 25-Aug. 7	9	1	One case imported.
Transvaal	Aug. 1-7			Outbreak in Potchefstroom district, on farm.

Reports Received from June 26 to September 24, 1926 [1]

CHOLERA

Place	Date	Cases	Deaths	Remarks
Ceylon				Apr. 18-May 29, 1926; Cases, 31; deaths, 29.
China:				
Nanking	July 25-Aug. 7			Present.
Shanghai	Reported July 20	35	8	
Do	July 25-Aug. 14	20	257	Cases, foreign; deaths, native and foreign.
Swatow	July 11-Aug. 7	20	63	
Tsingtao	do		1	
French settlements in India				Mar. 7-June 26, 1926: Cases, 31; deaths, 30.
India				Apr. 25-June 26, 1926: Cases, 18,526; deaths, 11,531. June 27-July 17, 1926: Cases, 5, 123; deaths, 3,094.
Bombay	May 30-June 5	1	1	
Do	July 18-31	2	2	
Calcutta	Apr. 4-May 29	478	418	
Do	June 13-26	73	69	
Do	June 27-Aug. 7	215	189	
Madras	May 16-June 5	2	1	
Do	Aug. 1-7	1	1	
Rangoon	May 9-June 26	67	44	
Do	June 27-July 31	27	26	
Indo-China:				
Saigon	May 2-15	52	48	
Do	May 22-June 26	42	32	
Do	June 27-July 24	28	17	
Japan:				
Yokohama	Aug. 25	1		
Philippine Islands:				
Manila	May 18-24	2	2	
Do	June 27-July 31	5	2	
Provinces—				
Albay	Apr. 18-24	1	1	
Mindoro	Feb. 21-Mar. 6	3	3	
Romblon	Dec. 14-31	42	43	
Do	Jan. 2-23	16	12	

[1] From medical officers of the Public Health Service, American consuls, and other sources.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

Reports Received from June 26 to September 24, 1926—Continued

CHOLERA—Continued

Place	Date	Cases	Deaths	Remarks
Siam:				
Bangkok	May 2-June 12	1,325	736	
Do	June 20-26	56	26	
Do	June 27-July 31	69	26	
Straits Settlements:				
Singapore	July 4-17	2	1	
On vessel:				
Steamship Macedonia	Aug. 5	1		At Yokohama, Japan. Vessel sailed from Singapore, July 18, 1926.

PLAGUE

Place	Date	Cases	Deaths	Remarks
Algeria:				
Algiers	June 21-30	1		Under date of July 16, 2 cases reported.
Do	July 1-20	1		
Bona	Aug. 14	1		
Azores:				
Fayal Island—				
Horta	Aug. 2-8	1	1	
St. Michaels Island	May 9-June 26	4	1	
Do	June 27-July 10	3	1	
British East Africa:				
Kisumu	May 16-22	1	1	
Uganda	Mar. 1-May 31	449	356	
Canary Islands:				
Teneriffe	Aug. 2	2		
Ceylon:				
Colombo	May 29-June 5	1	1	
Chile:				
Iquique	June 20-26		1	
China:				
Amoy	Apr. 18-June 26	40	30	
Do	June 27-Aug. 7	28		
Foochow	June 6-July 31			Several cases. Not epidemic.
Nanking	May 9-Aug. 7			Prevalent.
Swatow	July 25-31	14		
Ecuador:				
Guayaquil	May 16-June 30	6		Rats taken, 30,914; found infected, 31.
Do	July 1-31	5	2	Rats taken, 20,166; found infected, 22.
Egypt				Jan. 1-Aug. 12, 1926: Cases, 115.
City—				
Alexandria	July 27-Aug. 12	4	1	
Suez	May 21-July 1	9	5	
Do	July 29	2		
Provinces—				
Behera	July 23-Aug. 15	4	1	
Beni-Suef	May 23-June 8	8	2	
Charkieh	July 27	1	1	
Gharbieh	June 2	1	1	
Minieh	July 24	1	1	
France:				
Marseille	July 8	1	1	Reported July 24.
St. Denis	Reported Aug. 2	1		Vicinity of Paris.
St. Ouen	Aug. 14	2		Suburb of Paris.
Great Britain:				
Liverpool	Reported Sept. 6		1	Several cases.
Greece:				
Athens	Apr. 1-May 31	16	4	Including Piræus.
Patras	May 27-June 12	4	1	
Do	July 25-Aug. 7	5	2	
Zante	May 17	1		
Hawaii:				
Hamakua	June 9			1 plague rodent trapped near Hamakua Mill.
Paauhau	July 18-24			Plague-infected rat trapped.
India				Apr. 25-June 16, 1926: Cases, 53,001; deaths, 41,576. June 27-July 17, 1926: Cases, 547; deaths, 367.
Bombay	May 2-June 26	16	15	
Do	July 18-31	2	2	
Karachi	May 23-June 26	15	13	
Do	July 11-17	1	1	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

Reports Received from June 26 to September 24, 1926—Continued

PLAGUE—Continued

Place	Date	Cases	Deaths	Remarks
India—Continued.				
Madras Presidency	Apr. 25–June 26	162	93	
Do	July 4–24	80	33	
Rangoon	May 9–June 26	20	15	
Do	June 27–July 31	20	15	
Indo-China:				
Saigon	May 23–June 26	8	3	
Do	July 18–24	1	1	
Iraq:				
Baghdad	Apr. 18–June 12	161	108	
Do	July 18–31	2	2	
Japan:				
Yokohama	July 2–30	9	5	
Do	Aug. 7	2		Total: July 2–Aug. 10, 1926: Cases, 9; deaths, 8.
Java:				
Batavia	Apr. 24–June 19	65	65	
Do	June 26–July 23	27	26	
Cheribon	Apr. 11–24	3	3	
East Java and Madoera	June 13–19	1	1	
Madagascar:				
Ambositra Province	May 1–15	4	4	Septicemic.
Moramanga Province	Apr. 1–15	2	2	Do.
Tananarive Province				Apr. 1–June 30, 1926: Cases, 130; deaths, 120.
Tamatave (Port)	May 16–31	1	1	
Tananarive Town	Apr. 1–June 30	7	7	
Nigeria				Feb. 1–Apr. 30, 1926: Cases, 115; deaths, 92.
Peru				May–June, 1926: Cases, 57; deaths, 16.
Departments—				
Ancash	May 1–31			Present.
Cajamarca	May 1–June 30	10	4	
Huacho	July 1–31	1		
Huaral	do	5	2	
Huarmey	do			Do.
Ica	May 1–31	1		
Libertad	do	4		Pacasmayo, cases, 2; Trujillo district, cases, 2.
Lima	May 1–June 30	29	12	
Do	July 1–31	8	2	
Haciendas	do	7	3	
Piura	June 1–30	13		In Huancabamba district.
Russia				Jan. 1–Mar. 31, 1926: Cases, 37.
Senegal				Nov. 1–30, 1926: Cases, 3; deaths, 2. Mar. 1–Apr. 30, 1926: Cases, 15; deaths, 4.
Siam:				
Bangkok	May 23–June 26	2	2	
Do	July 18–24	1	1	
Straits Settlements:				
Singapore	May 2–8	1	1	
Do	July 4–17	1	1	
Syria:				
Beirut	July 1–Aug. 10	2		
Tunisia	May 11–June 30	174		
Do	July 1–20	12		
Kairouan	June 9	3		9 cases 30 miles south of Kairouan
Turkey:				
Constantinople	Aug. 1–14	2		
Union of South Africa:				
Cape Province	May 16–22	5	3	
Calvinia District	June 13–26	12	6	
Do	June 27–July 3	1		
Williston District	June 13–26	2		
Do	June 27–July 3	1		
Orange Free State—				
Hoopstad District—				
Protestpan	May 9–22	3	3	

SMALLPOX

Place	Date	Cases	Deaths	Remarks
Algeria:				
Algiers	May 21–June 30	14		
Do	July 1–10	1		
Belgium:				
Antwerp	Aug. 1–7	1	1	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

Reports Received from June 26 to September 24, 1926—Continued

SMALLPOX—Continued

Place	Date	Cases	Deaths	Remarks
Bolivia:				
La Paz	May 1-June 30	14	7	
Do	July 1-31	2	4	
Brazil:				
Bahia	June 20-26	1		
Do	June 27-July 31	19	14	
Manaos	Apr. 1-30		5	
Para	May 16-June 26	26	25	
Do	June 27-July 31	14	8	
Pernambuco	July 11-17	1		
Rio de Janeiro	May 2-June 19	132	91	
Do	July 4-31	508	235	
Santos	Mar. 1-7		1	
British East Africa:				
Mombasa	July 5-11	5	4	
Tanganyika	May 1-31	252	46	
Uganda	Mar. 1-May 31	3		
British South Africa:				
Northern Rhodesia	May 18-24	17	6	Natives.
Do	June 8-14	5		
Canada				May 30-June 12, 1926: Cases, 46.
Alberta	May 30-June 12	3		
Do	June 27-Aug. 28	2		
British Columbia—				
Vancouver	Aug. 16-22	2		
Manitoba				May 30-June 26, 1926: Cases, 24. June 27-Aug. 28; 1926: Cases, 13.
Winnipeg	June 6-12	5	1	
Do	July 4-Sept. 4	12		
Ontario				May 30-June 26, 1926: Cases, 36. June 27-Aug. 28: Cases, 58.
Fort William	July 25-Aug. 7	2		
Kingston	May 23-June 26	5		
Do	July 11-17	2	1	
Kitchener	Apr. 26-May 29	3	1	
North Bay	May 2-22	5		
Do	July 25-31	2		
Orillia	Apr. 26-May 29	7		
Ottawa	July 18-24	1		
Packenham	do	10		
Toronto	do	7		
Waterloo	do	6		
Saskatchewan				May 30-June 26, 1926: Cases, 16. June 27-Aug. 28: Cases, 43.
Regina	July 4-10	2		
Ceylon				Mar. 14-May 29, 1926: Cases, 44; deaths, 3.
Chile:				
Antofagasta	June 6-12	1		
China:				
Amoy	May 1-June 26	4	8	
Do	July 4-10	1		
Antung	May 17-June 19	5		
Do	July 4-18	2		
Canton	May 1-31	4	2	
Chungking	May 2-Aug. 7			Present.
Foochow	do			Do.
Hongkong	May 2-June 26	19	10	
Do	June 27-July 3	1	1	
Manchuria	July 4-31	18		Railway stations.
An-shan	May 16-June 12	5		South Manchurian Railway.
Antung	May 16-June 19	5		
Changechun	May 16-June 26	6		Do.
Do	June 27-July 3	1		Do.
Dairen	Apr. 26-June 20	69	16	
Do	June 28-Aug. 8	5	3	
Fushun	May 16-June 5	4		Do.
Harbin	May 14-June 30	21		Do.
Do	July 1-28	12		
Kai-yuan	May 16-June 30	10		Do.
Kungchuling	June 13-19	1		Do.
Liao-yang	May 16-June 30	4		Do.
Mukden	do	4		Do.
Penhsihu	May 16-June 19	4		Do.
Ssupingkai	May 16-June 30	2		Do.
Teshihchiao	do	2		Do.
Wa-feng-tien	do	3		Do.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

Reports Received from June 26 to September 24, 1926—Continued

SMALLPOX—Continued

Place	Date	Cases	Deaths	Remarks
China—Continued.				
Nanking	May 8-Aug. 7			Present.
Shanghai	May 2-June 26	10	25	Cases, foreign; deaths, population of international concession, foreign and native.
Do	June 27-July 24	3	3	
Swatow	May 9-Aug. 7			Sporadic.
Tientsin	June 2-26		1	Reported by British municipality.
Wanshien	May 1			Prevalent.
Chosen				Mar. 1-May 31, 1926: Cases, 548; deaths, 206.
Fusan	May 1-31	1		
Seishun	do	2	1	
Egypt:				
Alexandria	May 15-July 1	18	3	
Do	July 23-Aug. 5	8	1	
Cairo	Jan. 29-Mar. 4	3	1	
Esthonia				May 1-June 30, 1926: Cases, 3.
France				Mar. 1-June 30, 1926: Cases, 141.
St. Etienne	Apr. 18-June 15	7	3	
French Settlements in India	Mar. 7-June 26	282	282	
Gold Coast	Mar. 1-May 31	662	13	
Great Britain:				
England and Wales				May 23-July 3, 1926: Cases, 1,068, July 4-Aug. 28, 1926: Cases, 662.
Bradford	May 23-29	1		
Newcastle-on-Tyne	June 6-12	1		
Do	July 11-17	1		
Nottingham	May 2-June 5	7		
Do	July 18-24	1		
Sheffield	June 13-19	1		
Do	July 4-Aug. 7	2		
Greece:				
Saloniki	June 1-14		3	
Guatemala:				
Guatemala City	June 1-30		2	
India				Apr. 25-June 26, 1926: Cases, 54,851; deaths, 14,771. June 27-July 17, 1926: Cases, 9,634; deaths, 2,923.
Bombay	May 2-June 26	220	134	
Do	June 27-July 31	78	41	
Calcutta	Apr. 4-May 29	171	152	
Do	June 13-26	24	18	
Do	June 27-Aug. 7	25	21	
Karachi	May 16-June 26	44	18	
Do	June 27-Aug 14	13	6	
Madras	May 16-June 26	7	4	
Do	June 27-Aug. 14	26	7	
Rangoon	May 9-June 26	10	5	
Do	July 4-24	3		
Indo-China:				
Saigon	do	2		
Iraq:				
Baghdad	May 9-June 26	8	3	
Do	July 4-10	1	1	
Basra	Apr. 18-June 22	34	25	
Italy				Mar. 28-June 26, 1926: Cases, 34.
Catania	Aug. 9-15	2		
Rome	June 14-20	4		Entire consular district, including Island of Sardinia.
Jamaica				Apr. 25-June 26, 1926: Cases, 201. (Reported as alastrim.)
Do				June 27-Aug. 28, 1926: Cases 95. (Reported as alastrim.)
Japan				Apr. 11-June 19, 1926: Cases, 641.
Kobe	May 30-June 5	1		
Nagoya	May 16-22		1	
Do	July 4-10	1		
Taiwan Island	May 11-20	24		
Do	June 1-20	23		
Do	July 11-Aug. 10	2		
Tokyo	June 26-July 17	3		
Yokohama	May 2-8	2		
Java:				
Batavia	May 15-June 25	2		Province
East Java and Madoera	Apr. 11-July 3	100	6	
Do	July 4-17	28		
Malang	Apr. 4-10	6	1	Interior.
Surabaya	May 16-22	14	1	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

Reports Received from June 26 to September 24, 1926—Continued

SMALLPOX—Continued

Place	Date	Cases	Deaths	Remarks
Latvia				Apr. 1-June 30, 1926: Cases, 5.
Mexico				Feb. 1-Apr. 30, 1926: Deaths, 982.
Aguascalientes	June 13-26		5	
Guadalajara	June 8-14		2	
Do	June 29-Aug. 30		6	
Mexico City	May 16-June 5	3		Including municipalities in Federal District.
Do	July 25-Aug. 28	4		Do.
Saltillo	July 18-24		1	
San Antonio de Arenales	Jan. 1-June 30			Present: 100 miles from Chihuahua.
San Luis Potosi	June 13-26		7	
Do	July 4-Sept. 4		10	
Tampico	June 1-10		2	
Torreon	May 1-June 30		17	
Do	July 1-Aug. 31		9	
Netherlands:				
Amsterdam	July 18-24		9	
Nigeria				Feb. 1-Apr. 30, 1926: Cases, 404; deaths, 33.
Persia:				
Teheran	Apr. 21-May 21		7	
Peru:				
Arequipa	June 1-30		1	
Poland				Mar. 28-May, 1926: Cases, 12; deaths, 1. June 27-July 24, 1926: Cases, 2; deaths, 1.
Portugal:				
Lisbon	Apr. 26-June 19	10	3	
Do	July 11-Aug. 13	20	5	
Oporto	May 23-June 5	4		
Do	July 11-24	2		
Russia				Jan. 1-Mar. 31, 1926: Cases, 2,103.
Siam:				
Bangkok	May 2-June 12	23	20	
Do	July 4-31	39	35	
Spain:				
Valencia	Aug. 22-28	1		
Straits Settlements:				
Singapore	Apr. 25-May 1	1		
Do	July 11-17	1		
Switzerland:				
Lucerne Canton	June 1-30	1		
Do	July 1-31	2		
Tripolitania	Apr. 1-30	11		
Tunisia				Apr. 1-June 30, 1926: Cases, 17.
Tunis	Aug. 11-20	2		
Union of South Africa	June 1-30	8	1	
Cape Province	June 20-26			Outbreaks.
Idutya district	May 23-29			Do.
Orange Free State	June 20-July 3			Do.
Natal	May 30-June 5			Do.
Transvaal				June 6-12, 1926: Outbreaks in Pietersburg and Rustenburg districts.
Johannesburg	May 9-June 12	5		
Do	July 11-17	1		
Yugoslavia				Apr. 15-30, 1926: Cases, 2; deaths, 1.
On vessel:				
S. S. Karapara				At Zanzibar, June 7, 1926. One case of smallpox landed. At Durban, Union of South Africa, June 16, 1926: One suspect case landed.
Steamship	July 2	1		Vessel from Glasgow, Scotland, for Canada. Patient from Glasgow; removed at quarantine on outward voyage.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

Reports Received from June 26 to September 24, 1926—Continued

TYPHUS FEVER

Place	Date	Cases	Deaths	Remarks
Algeria:				
Algiers	May 21-June 30	7	1	
Argentina:				
Rosario	Feb. 1-28	2		
Bolivia:				
La Paz	June 1-30		1	
Bulgaria				Mar. 1-June 30, 1926: Cases, 87; deaths, 14.
Chile:				
Antofagasta	May 23-June 26	4		
Do	June 27-July 3	1		
Concepcion	June 1-7		1	
Valparaiso	Apr. 29-May 5		1	
China:				
Antung	June 14-27	7	1	
Do	June 28-Aug. 15	24	1	
Canton	May 1-31	1		
Ichang			1	Reported May 1, 1926. Occurring among troops.
Wanshien				Present among troops, May 1, 1926. Locality in Chungking consular district.
Chosen				Feb. 1-May 31, 1926: Cases, 887; deaths, 91.
Chemulpo	May 1-June 30	38	2	
Gensan	June 1-30	1		
Seoul	do	8	3	
Do	July 1-31	7		
Czechoslovakia				Jan. 1-June 30, 1926: Cases, 156; deaths, 5.
Egypt:				
Alexandria	July 16-Aug. 5	2		
Port Said	June 4-24	4	1	
Do	July 9-15	3	1	
Cairo	Jan. 29-Mar. 4	74	17	
Do	July 23-Aug. 5	1		
Great Britain:				
Scotland—				
Glasgow	July 30-Aug. 21	9	1	
Ireland (Irish Free State):				
Cobh (Queenstown)	May 30-June 5	1		
Do	June 27-July 3	1	1	
Cork	June 5	1		
Kerr County—				
Dingle	June 27-July 3	1		
Italy				Mar. 28-May 8, 1926: Cases, 3.
Japan				Mar. 28-May 29, 1926: Cases, 37.
Latvia				May 1-June 30, 1926: Cases, 19.
Lithuania				Mar. 1-June 30, 1926: Cases, 199; deaths, 22.
Mexico				Feb. 1-Apr. 30, 1926: Deaths, 110.
Durango	July 1-31		1	
Mexico City	May 16-June 5	20		Including municipalities in Federal District.
Do	June 13-19	9		Do.
Do	July 25-31	3		Do.
Do	Aug. 15-28	12		Do.
San Luis Potosi	June 13-26			Present, city and country.
Morocco				Mar. 1-June 30, 1926: Cases, 426.
Palestine				Mar. 1-June 30, 1926: Cases, 14; deaths, 1. Aug. 10-16, 1926: Cases, 2.
Gaza	July 6-12	1		
Haifa	July 13-19	1		
Jaffa District	June 15-28	5		
Majdal District	July 13-Aug. 2	2		
Nazareth District	do	3		
Tiberias	Aug. 3-9	1		
Peru:				
Arequipa	Jan. 1-31		2	
Poland				Mar. 28-June 26, 1926: Cases, 1,272; deaths, 85. June 27-July 24, 1926: Cases, 147; deaths, 11.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

Reports Received from June 26 to September 24, 1926—Continued

TYPHUS FEVER—Continued

Place	Date	Cases	Deaths	Remarks
Rumania				Mar. 1-May 31, 1926: Cases, 711; deaths, 69.
Russia				Jan. 1-Mar. 31, 1926: Cases, 14,814.
Tunisia				Apr. 1-June 30, 1926: Cases, 110.
Tunis	June 11-30	3		
Turkey:				
Constantinople	June 16-22	1		
Union of South Africa				Apr. 1-May 31, 1926: Cases, 153; deaths, 19.
Cape Province				Apr. 1-May 31, 1926: Cases, 116; deaths, 15.
Do	May 31-June 30	49	5	
Glengray District	June 27-July 3			Outbreaks.
Grahamstown	do	1		Sporadic.
Natal				Apr. 1-June 30, 1926: Cases, 28. July 25-31, 1926; Cases, 11. In native compounds.
Orange Free State				Apr. 1-June 30, 1926: Cases, 24; deaths, 4.
Do	July 18-24			Outbreaks.
Transvaal				Apr. 1-June 30, 1926: Cases, 10; deaths, 5.
Walkkerstroom District	June 20-26			Outbreaks.
Wolmaransstad District	do			Do.
Yugoslavia				Apr 15-June 30, 1926: Cases, 48; deaths, 7. July 1-31, 1926: Cases, 2; deaths, 1.
Zagreb	May 15-21	1		

YELLOW FEVER

Place	Date	Cases	Deaths	Remarks
Brazil	Reported June 26			Present in interior of Bahia, Pirapora, and Minas.
Bahia	May 9-June 26	10	7	
Do	July 4-10	1		
Gold Coast	Apr. 1-May 31	6	3	

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