PUBLIC HEALTH REPORTS

VOL. 36 AUGUST 19, 1921 No. 33

THE ESSENTIALS OF SMALLPOX VACCINATION.

By JAMES P. LEAKE, Surgeon, and JOHN N. FORCE, Special Expert, United States Public Health Service.

THE VACCINATION REACTION.

When potent vaccine virus is applied to the derma, irrespective of the method used for penetrating the epidermis, a reaction will take place, reaching a maximum which may be observed in from 1 to 10 days, depending on the degree of immunity of the subject. *Absence of this reaction indicates that the virus is incapable of protecting against smallpox, and not that the subject is immune.* Any one of the forms of this vaccination reaction, to be described below, is evidence of a successful vaccination.

If the subject has never been immunized by smallpox or by previous vaccination, the reaction will manifest itself as a primary *vaccinia*. A *papule* appears at the inoculation site on the third or fourth day following the vaccination. This becomes vesiculated on the next day, the *vesicle* being surrounded by a narrow red margin or *areola*. This vesicle increases in diameter at the rate of approximately a millimeter a day. About the seventh day, the skin outside the areola begins to turn red; and this *area* of redness rapidly extends until the ninth or tenth day, when the maximum diameters of vesicle and area are reached. After this day, the area rapidly fades and the vesicle becomes brown and crusted, though still surrounded for some days by a narrow areola. If kept dry, the *crust* will separate in approximately three weeks from the day of vaccination, leaving a red *scar*, which becomes white in several months. Accompanying the rapid development of the area (seventh to tenth days), the axillary lymph nodes are usually swollen and tender, and fever and headache are generally present. All these symptoms abate promptly when the maximum of the local reaction is reached.

If the subject retains some degree of immunity, either through previous vaccination or an attack of smallpox, the reaction will be accelerated in development, shortened in time, and decreased in severity. The papule will appear earlier, the vesicle will be smaller, and the area will be less extensive at the maximum of the reaction, which may occur at any time from the fourth to the eighth day. In this event the reaction is considered a *vaccinoid* (accelerated reaction, or secondary vaccinia).

If the immunity is very high, the acceleration may be so great that the reaction consists only of a papule and areola with the maximum diameter in from 12 to 60 hours after vaccination. In this case there is neither vesicle nor area, and the reaction is designated *reaction of immunity* (immediate reaction). The time element of this reaction is of prime importance. If the papule and areola do not appear until the third day and *there is no vesiculation*, the reaction is not that of immunity but is due to an impotent virus, and the vaccination should be repeated with a fresh lot.

NECESSITY FOR KEEPING VACCINE ON ICE.

The expiration date on a package of vaccine virus indicates its expectancy of potency under favorable conditions. Vaccine virus can not be kept too cold; it deteriorates rapidly even at room temperature. The freshest possible vaccine should be obtained; and this can be done by arranging for small and frequent shipments. The packages should be kept in water-tight containers in constant contact with ice. Large quantities may be placed in metal boxes, small quantities in fruit jars. For use in the field, large quantities should be transported in ice-cream freezers, small quantities in rubber-stoppered test tubes, packed with shaved ice in the inner compartments of vacuum bottles.

PREPARATION OF THE SITE FOR VACCINATION.

The skin of the upper arm in the region of the depression formed by the insertion of the deltoid muscle should be thoroughly cleansed with acetone on sterile gauze or cotton and wiped dry. Acetone is suggested as a cleansing agent rather than alcohol for the following reasons:

1. It is a more efficient cleanser.
2. It is cheaper.
3. It is not denatured with substances which may possibly affect the vaccination result.
4. It evaporates more rapidly.
5. Approximately 200 vaccinations recently performed after the use of acetone and alcohol on alternate subjects resulted in more successful vaccinations with acetone than with alcohol.

METHODS OF VACCINATING.

1. *The method of incision or linear abrasion.*—As practically all the packages of vaccine virus distributed in this country contain sterile needles, this is the method of choice for occasional vaccinations.

In each package of capillary tubes there will be found a perforated rubber bulb with a diaphragm across the interior of the neck. Push

an unbroken capillary tube through the neck of the bulb until about half of the capillary tube appears beyond the bulb. Break the tip which has been pushed through and withdraw the tube until the broken end lies in the neck of the bulb. With sterile gauze, break the other tip of the capillary tube and drop the contents on the spot to be vaccinated by squeezing the bulb with the finger over the perforation.

The underside of the arm is then grasped with the vaccinator's left hand, in order to stretch the skin where the virus has been dropped. This tension is maintained while the virus is being inserted. With the point of a sterile needle pressed through the drop of virus, "*a very slight scratch, not exceeding the eighth part of an inch*" (Jenner), is made down the arm. With the side of the needle or the flat end of a sterile toothpick, the virus is then gently rubbed across the scratch for at least 15 seconds.[1] The scratch should penetrate the epidermis, but not draw blood. The friction across the scratch may cause a slight oozing of blood-tinged serum, but this should not be sufficient to wash the virus out of the scratch.

2. *The drill method.*—In the drill method the epidermis is perforated by a small drill with a sharp cutting edge 2 mm. in width. The drill is made of carbon steel and the tip can be sterilized without affecting the temper of the cutting edge by dipping into alcohol and burning off the surface. The drill method is preferable for the rapid vaccination of large groups, because of the uniformity of perforation of the epidermis, which results in the maximum exposure of the derma to the virus with the minimum resulting lesion. The method is particularly advantageous where vaccine in vials can be used.

If in capillary tubes the virus is prepared for insertion as previously described, but is not dropped on the skin until after the derma has been exposed. The skin is tightly drawn and the drill pressed against it perpendicularly. A single rotary turn is then made without altering the pressure. This will detach a small flake of epidermis, which should be brushed off with the edge of the drill. This exposes a circle of derma about 2 mm. in diameter and, if skillfully done, should cause no bleeding. The virus is dropped on this circle of exposed derma and rubbed in with a sterile toothpick, as described under the method of incision.

If the number of persons being vaccinated is large enough to warrant the expenditure of all the virus in a vial vaccine container at one clinic period, the vaccine may be transferred directly to the arm with the sterile toothpick.

[1] This recommendation is based on the results of a series of tests with different viruses.

NUMBER OF INSERTIONS.

Multiple insertions should be used under the following conditions:

1. In case of exposure to smallpox.
2. In case of failure of previous vaccinations.
3. In case there is any doubt as to the full potency of the virus on account of possible adverse conditions of transportation or storage.
4. In case the subject is not likely to return for revaccination in the event of failure.

When multiple insertions are used, they should be made not less than 2.5 cm. apart. A capillary tube should be used to each insertion.

PRECAUTIONS.

The vaccination site should not be exposed to direct sunlight until dry. *Dressings are unnecessary and are harmful if permitted to remain on the arm.* The small vesicles produced by either of the above methods are reasonably tough and will dry without rupturing unless macerated by the excessive heat and moisture present under a vaccination shield or other nonmobile covering. This maceration is not prevented by the presence of openings in the vaccination shield.

All vaccinations should be observed at the end of 7 and 11 days, and revaccinations should, in addition, be observed after 48 hours, in order to detect a possible reaction of immunity. *The vaccination of persons who have been exposed to smallpox should be considered successful as soon as this reaction of immunity appears.* Reporting for observation may, however, be more readily insured by attaching a small piece of adhesive tape, stamped with the observation date below the vaccinated area.

Small insertions are insisted upon because the diameter of the lesion is dependent upon the amount of epithelium removed, and the rapidity of healing is dependent upon the size of the lesion.

THE VACCINATION CERTIFICATE.

The result of the vaccination should be indicated on the vaccination certificate by noting the day of greatest extent of redness. This may be done conveniently by checking the day on the following diagram:

	Reaction of immunity.	Vaccinoid.	Vaccinia.
Days.....	1 2 3	4 5 6 7 8	9 10 11

Encircle the number of the day after vaccination on which the greatest extent of redness was observed.

The number of successful insertions, the lot number of the virus, and the expiration date should also appear on the certificate.

SMALLPOX IN TWENTY STATES, 1915–1920.

By JOHN N. FORCE, Special Expert, and JAMES P. LEAKE, Surgeon, United States Public Health Service.

The increase in the prevalence of smallpox in the United States during recent years has been marked and definite. The accompanying table and figures were prepared, abstracts of the vaccination laws and regulations were made, and correspondence was carried on with the State health officers in order to determine the geographical distribution of this increase and its relation to vaccination, especially of school children.

The data were secured for 19 States and the District of Columbia. It is realized that other States have as accurate statistics on smallpox as do these 20 (the District of Columbia being considered as a State); but in view of the differences in reporting, only those were included which have reported cases of smallpox for each year from 1915 to 1920, inclusive, according to the tables published in the Public Health Reports.

The population estimates for the intercensal years were made by the usual method of successively subtracting one-tenth of the intercensal increase from the 1920 census figures. The number of cases was obtained from the annual morbidity tables in the Public Health Reports, with the exception of the 1920 figures, which were obtained personally from the Division of Sanitary Reports and Statistics, United States Public Health Service.

The average rate for each State was obtained by the formula

$$R = \frac{1{,}000\ T}{6\ P - 15\ D},$$

in which T represents the total number of cases for the six-year period, P the 1920 population, D the annual increase (one-tenth of the intercensal difference), and R the rate per thousand of population. The annual and average rates for groups of States were similarly obtained. The States, listed in ascending order of average rates, are as follows:

New York	0.026	Virginia	0.68
New Jersey	.027	Michigan	.82
Connecticut	.09	Ohio	.96
Maryland	.10	Wisconsin	1.01
District of Columbia	.14	Minnesota	1.18
South Carolina	.22	Mississippi	1.36
Vermont	.28	Indiana	1.40
California	.44	Oregon	1.48
Louisiana	.54	Washington	1.72
Alabama	.55	Kansas	2.00

A glance at Figure 1, obtained by plotting the annual rates in the groups of States indicated in Table I, shows two interesting tendencies. The first of these is the remarkably constant low rate in the Eastern States. At no point does the curve vary strikingly from the average rate of 0.04. The curves for the Central and Southern States, in spite of fluctuations, show a decided upward

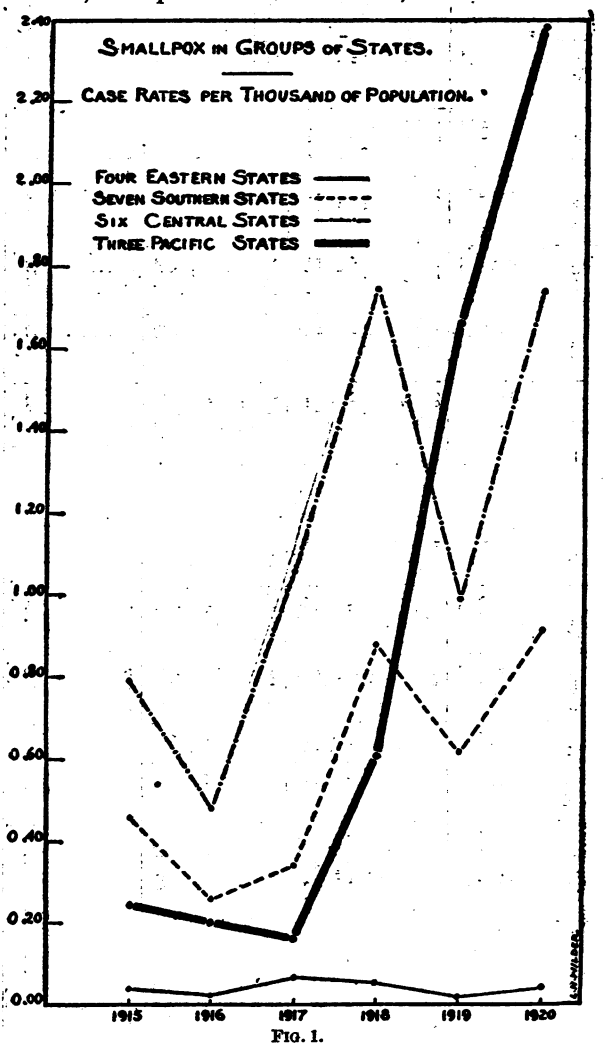


FIG. 1.

tendency, though the Central States maintain a level almost twice as high as that of the Southern States. The second interesting tendency is the extraordinary increase of smallpox on the Pacific coast, an increase which has carried the curve from 0.16 to 2.38 during the last three years and converted an average rate (0.2) comparing favorably with that of the Eastern States to one (1.6) in excess of that of the central group.

TABLE I.—*Smallpox in twenty States: Cases and case rates per thousand of population, 1915–1920, inclusive.*

State.	Population.		1915		1916		1917		1918		1919		1920		Average case rates, 1915–1920, inclusive.
	1920	Increase, 1910–1920.	Cases.	Rate.	Cases.	Rate.	Cases.	Rate.	Cases.	Rate.	Cases.	Rate.	Cases.	Rate.	
Connecticut	1,380,631	265,875	22	0.02	175	0.14	423	0.32	94	0.07	6	0.00	2	0.00	0.09
New Jersey	3,155,900	618,733	152	.05	9	.00	6	.00	65	.02	109	.04	149	.05	.027
New York	10,384,829	1,271,215	155	.02	30	.00	333	.03	535	.05	191	.02	307	.03	.026
Vermont	352,428	−3,528	214	.60	152	.43	66	.19	55	.16	5	.01	104	.30	.28
Total for 4 Eastern States			543	.04	366	.02	828	.06	749	.05	311	.02	563	.04	.04
Alabama	2,348,174	210,081	775	.34	157	.07	636	.28	3,647	1.58	935	.40	1,394	.59	.55
District of Columbia	437,571	106,502	15	.04	4	.01	11	.03	48	.12	173	.41	89	.20	.14
Louisiana	1,798,509	142,121	350	.20	819	.47	835	.48	950	.54	1,226	.69	1,564	.87	.54
Maryland	1,449,661	154,315	94	.07	69	.05	98	.07	219	.15	229	.16	167	.12	.10
Mississippi	1,790,618	−6,496	2,461	1.37	1,401	.78	1,530	.85	3,601	2.01	2,502	1.40	3,143	1.78	1.36
South Carolina	1,683,724	168,324	394	.24	93	.06	114	.07	214	.13	304	.18	1,077	.64	.22
Virginia	2,309,187	247,575	1,097	.50	399	.18	726	.32	1,605	.71	1,972	.86	3,468	1.50	.68
Total for 7 Southern States			5,186	.46	2,942	.26	3,950	.34	10,284	.88	7,341	.62	10,907	.92	.58
Indiana	2,930,390	229,514	3,456	1.23	1,158	.41	4,593	1.60	5,582	1.93	3,833	1.33	5,775	1.97	1.41
Kansas	1,769,257	78,308	2,861	1.65	2,085	1.20	2,623	1.50	7,130	4.00	2,437	1.38	3,900	2.20	2.00
Michigan	3,668,412	858,239	918	.27	1,365	.40	2,929	.85	4,417	1.26	2,460	.68	4,845	1.32	.82
Minnesota	2,387,125	311,417	1,708	.76	1,270	.56	2,718	1.18	2,252	.97	2,448	1.04	5,895	2.46	1.18
Ohio	5,759,394	992,273	3,221	.61	1,921	.36	5,242	.96	10,227	1.82	4,107	.73	7,159	1.24	.96
Wisconsin	2,632,067	298,207	1,817	.73	887	.35	1,250	.49	2,592	1.01	3,288	1.26	5,603	2.16	1.01
Total for 6 Central States			13,981	.79	8,666	.48	19,355	1.06	32,200	1.75	18,573	.99	33,242	1.74	1.14
California	3,426,861	1,049,312	336	.12	234	.08	329	.11	1,069	.33	2,002	.60	4,474	1.30	.44
Oregon	783,389	110,624	570	.79	119	.16	122	.16	493	.65	2,629	3.40	2,765	3.53	1.48
Washington	1,356,621	214,631	254	.20	637	.50	390	.30	1,676	1.27	4,390	3.29	6,027	4.44	1.72
Total for 3 Pacific States			1,160	.24	990	.20	841	.16	3,238	.61	9,021	1.66	13,266	2.38	.01

These tendencies will be better appreciated after a consideration of the curves for the individual States comprising the groups. Figure 2 presents these curves arranged in order of their average rates. It will be necessary, however, to interpret these curves in terms of the status of vaccination in the respective States. The following statements are based on the State laws and regulations published annually in reprints from and supplements to the Public Health Reports, confirmed in each instance by correspondence with the State health officers. The quotations are from this correspondence. Without the helpful comments of these officials the interpretation of the rates in terms of the published laws would not have been possible.

Following the name of each State below are the average, the maximum, and the minimum rate per thousand of population for the years 1915 to 1920, inclusive.

1. NEW YORK.

Average rate per 1,000 population	0.026
Maximum rate	.05
Minimum rate	.003

The law provides that vaccination shall be a condition of school attendance in cities of the first and second classes and in other parts of the State when smallpox has been declared epidemic by the State commissioner of health. The cost of vaccination directed by local health authorities is a charge on the municipality. It is estimated that 100 per cent of school children are vaccinated in the first and second class cities; and in a canvass of 1,400 school children outside these cities 28 per cent were found to be vaccinated.

The sanitary code provides that smallpox contacts must be vaccinated within 3 days following exposure or be quarantined for 20 days. There is little evidence of hostility toward vaccination.

2. NEW JERSEY.

Average rate per 1,000 population	0.027
Maximum rate	.05
Minimum rate	.002

The law provides that boards of education may prohibit the school attendance of any unvaccinated child. This prohibition is consistently enforced in some of the cities, and in others only in the presence of smallpox. The low rate is believed to be due to this enforcement as well as to vaccination campaigns instituted by the State department of health in communities where smallpox appears. These campaigns generally produce good results, as high as 80 per cent of the entire community being vaccinated in some instances.

3. CONNECTICUT.

Average rate per 1,000 population	0.09
Maximum rate	.32
Minimum rate	.001

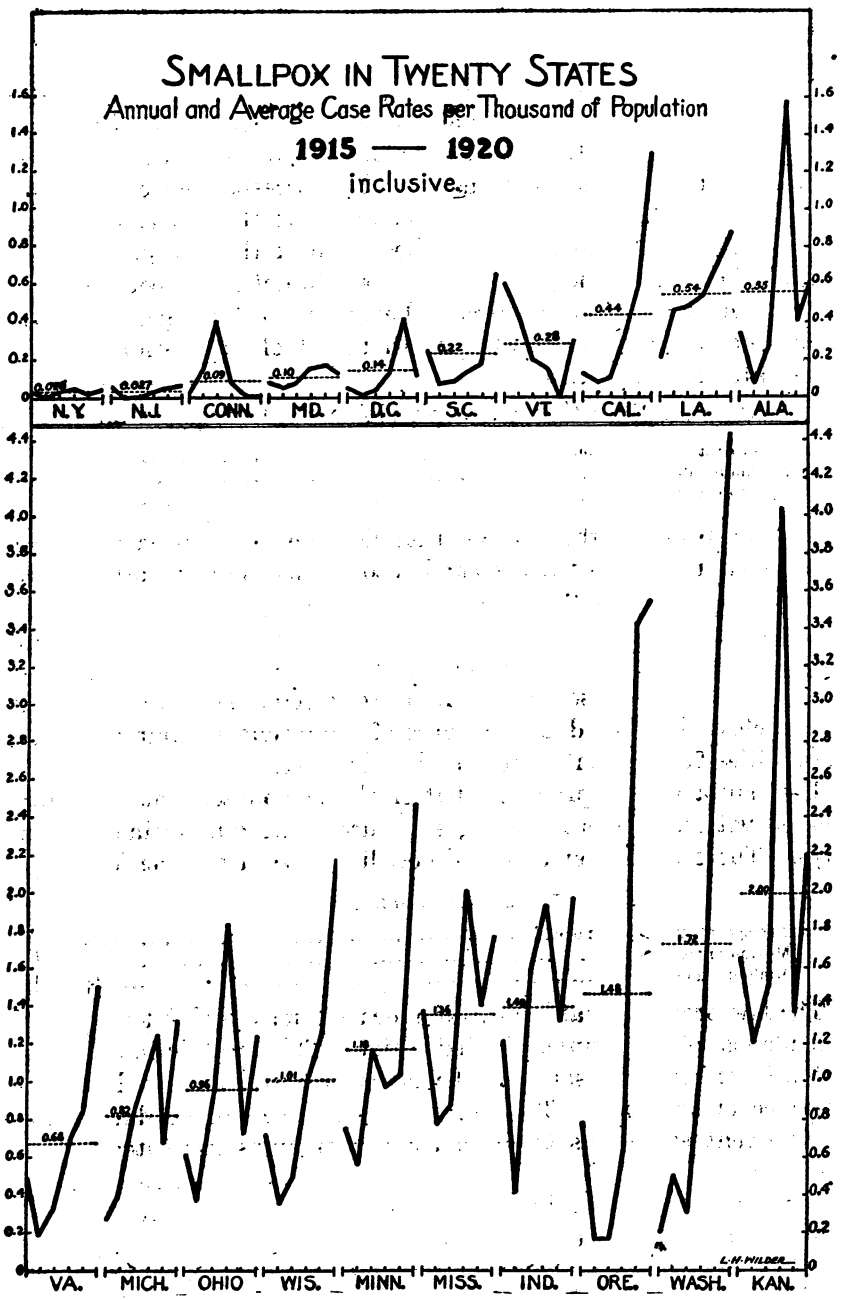

SMALLPOX IN TWENTY STATES
Annual and Average Case Rates per Thousand of Population
1915 — 1920
inclusive.
N.Y.
N.J.
CONN.
MD.
D.C.
S.C.
VT.
CAL.
LA.
ALA.
VA.
MICH.
OHIO
WIS.
MINN.
MISS.
IND.
ORE.
WASH.
KAN.
L.H. WILDER

FIG. 2.

The law provides that boards of education may require vaccination as a condition of school attendance. This law does not apply to private schools and is only sporadically carried out in communities under 75,000 population. Boards of health may provide at public expense for a general vaccination to prevent the introduction or to arrest the spread of smallpox. Persons refusing to be vaccinated when ordered by local health authorities are subject to fine.

The attitude of the citizens of the State is favorable toward vaccination, and in every instance where smallpox has appeared and vaccination has been urged there has been little opposition to it.

4. MARYLAND.

Average rate per 1,000 population	0.10
Maximum rate	.16
Minimum rate	.05

The law provides that every physician shall vaccinate all children in his practice within one year after birth. No teacher shall receive any unvaccinated child into school. "There is a small tendency to evasion of this law; indifference is shown now and then; and there s opposition which can be dignified as popular. These disturbances are small, local, and do not count heavily against the immunization of Maryland school children." Private schools are sometimes negligent of vaccination. The low rate is believed to be due to the vaccination law.

5. DISTRICT OF COLUMBIA.

Average rate per 1,000 population	0.14
Maximum rate	.41
Minimum rate	.01

The law provides that no child shall be admitted into the public schools who shall not have been duly vaccinated or otherwise protected against smallpox. Persons exposed to smallpox must be vaccinated or stand prosecution in the court. All persons in the District must be vaccinated whenever the commissioners of the District make proclamation that such action is necessary for the public health. The commissioners are authorized to provide free vaccination. The general attitude of the people is favorable toward vaccination.

6. SOUTH CAROLINA.

Average rate per 1,000 population	0.22
Maximum rate	.64
Minimum rate	.06

The law provides that councils of incorporated cities and towns may pass ordinances requiring the vaccination of all citizens and fixing penalties for failure to comply. The State board of health has the power to supervise vaccination in these cities and to make regulations for the vaccination of persons in unincorporated territory. In case of the failure of a city to pass a vaccination ordinance, the State board of health shall promulgate vaccination regulations

for that city and, in case of danger from smallpox, shall enforce such regulations at the expense of the city. The law further provides that no school authority shall admit a child who has not been vaccinated in accordance with the local ordnance or regulations of the State board of health. These regulations provide for vaccination during the first, sixth, and fifteenth years of age, and after exposure to smallpox.

The State health officer estimated that nearly 100 per cent of school children in cities are vaccinated, and 80 per cent in rural districts. The attitude of the citizens is favorable, and there is very little trouble in enforcing vaccination in the presence of smallpox. Reliance is placed on vaccination rather than on quarantine. The State distributed 183,000 tubes of free vaccine virus during the six months ending March 31, 1921. The fee for vaccination is fixed by law at 10 cents.

7. VERMONT.

Average rate per 1,000 population	0.28
Maximum rate	.60
Minimum rate	.01

Vermont has the highest average rate in the group of Eastern States, being also higher than three States of the southern group. The rate for Vermont is approximately seven times the average rate for its group.

The law provides that the health officer shall furnish virus approved by the State board of health, and during the existence of smallpox in a town shall provide thorough and safe vaccination of all persons who may need the same. It has been impossible to obtain a compulsory vaccination law in the State on account of organized opposition. During smallpox epidemics, unvaccinated children are excluded from school and free vaccination is offered. In times of epidemic the citizens seem willing to be vaccinated.

8. CALIFORNIA.

Average rate per 1,000 population	0.44
Maximum rate	1.30
Minimum rate	.08

Previous to 1911, California had a law providing for the vaccination of children as a condition of school entrance. In that year a new law was passed exempting children whose parents filed with the school authorities a certificate of opposition to the practice of vaccination. The law further provides that school authorities shall keep forms for these certificates on hand for the use of parents. The effect of this law has been to build up a population group of school children only 15 to 20 per cent vaccinated. The great increase of smallpox in the State in the last three years has been due to the presence of this group of nonimmune persons.[1]

[1] For further discussion of this singular law see Epidemiological Study of Smallpox in California. By John N. Force. Am. Jour. Pub. Health, 1921, 11, 119.

The regulations of the State board of health provide that contacts shall be quarantined for 12 days or be vaccinated and kept under observation until evidence of immunity (vaccinia, vaccinoid, or reaction of immunity) is secured.

General free vaccination clinics are held by the State board in communities where smallpox appears, and, since unvaccinated children are excluded from school during a smallpox epidemic, the number of vaccinated school children has been increased to 80 per cent in these circumstances, thus showing that the true conscientious objectors constitute only 20 per cent of the parents. An attempt to prevent the exclusion of unvaccinated school children in time of epidemics of smallpox, by abolishing vaccination as a condition of school entrance, was defeated at the last election by a substantial majority.

9. LOUISIANA.

Average rate per 1,000 population	0.54
Maximum rate	.87
Minimum rate	.20

The law provides that vaccination of public school children is required only in parishes where smallpox has been declared to be prevalent, but, in addition, a majority of the board of health must recommend such compulsory vaccination. Contacts shall be vaccinated or shall submit to domiciliary quarantine. Nothing in the act shall be construed to render vaccination compulsory. The citizens are hostile or indifferent toward vaccination rather than favorable. "It is for this reason that the regulations read as they do."

10. ALABAMA.

Average rate per 1,000 population	0.55
Maximum rate	1.58
Minimum rate	.07

Under the law, county boards of education have the right to require vaccination as a prerequisite for school attendance, but "there is no such thing as compulsory vaccination in Alabama." The State registrar estimates that about 25 per cent of the population over 6 years of age have been vaccinated.[1] The citizens are indifferent except during an epidemic, when there is little difficulty in securing practically universal vaccination of the affected locality. The law provides for the isolation in their homes of contacts until successfully vaccinated.

11. VIRGINIA.

Average rate per 1,000 population	0.68
Maximum rate	1.50
Minimum rate	.18

[1] Under date of June 29, 1921, the State health officer estimated that between 30 and 40 per cent of the children over seven years of age were vaccinated. He also stated that the reported incidence of smallpox is probably unreliable except that for the last three years.

The law provides that every child entering school must present a certificate of successful vaccination, but this requirement may be suspended by the school board of any city or county. Councils and boards of supervisors may cause persons in their jurisdiction to be vaccinated when occasion requires. The population of the larger cities, it is stated, is very well vaccinated, and most of the smallpox arises in the rural sections, where compulsory vaccination can not be enforced because of the strong sentiment against it.

12. MICHIGAN.

Average rate per 1,000 population	0.82
Maximum rate	1.32
Minimum rate	.27

The law provides that health officers may offer free vaccination to every child not previously vaccinated and to all other persons who have not been vaccinated within the preceding five years. Since the law is permissive, not mandatory, vaccination can not be made a condition precedent to school attendance in the absence of smallpox in the community. If a case develops in school, the school is "closed for the vaccination of the children, and they are not permitted to return until successfully vaccinated; and in the event that they refuse vaccination, they are quarantined 16 days." Contacts are either vaccinated and observed for 16 days or, if vaccination is refused, are quarantined for 16 days.

The general attitude toward vaccination is one of indifference in most communities. In some communities there has been considerable opposition, which usually succumbs to the alternative of quarantine.

13. OHIO.

Average rate per 1,000 population	0.96
Maximum rate	1.82
Minimum rate	.36

The law provides that boards of health may take measures to provide for, and offer inducements and facilities for, gratuitous vaccination. Boards of education may make and enforce rules and regulations to secure the vaccination of, and prevent the spread of smallpox among, pupils attending schools in their districts.

The State health officer believes that vaccination is being well enforced in the schools of most of the large cities and has been generally practiced in a number of country districts where smallpox has prevailed during the past few years.

There is an open and vigorous organized opposition to vaccination throughout the State.

14. WISCONSIN.

Average rate per 1,000 population	1.01
Maximum rate	2.16
Minimum rate	.35

The law provides that local boards of health may prohibit the school attendance of unvaccinated children for 25 days after the appearance of smallpox in the community. Free vaccination of children may also be provided during an epidemic of smallpox. About 50 per cent of the children of school age are estimated to be vaccinated. The opposition to vaccination in late years has been very strong. The assembly recently passed, by a vote of 46 to 27, a bill repealing the statutory provision requiring vaccination as a condition of school attendance.

15. MINNESOTA.

Average rate per 1,000 population	1.18
Maximum rate	2.46
Minimum rate	.56

The law provides that no rule shall compel the vaccination of any child, or shall exclude, except during epidemics of smallpox, a child from the public schools for the reason that such child has not been vaccinated. During epidemics of smallpox unvaccinated children must be excluded for three weeks or until vaccinated. Contacts refusing vaccination shall be isolated for 21 days. It is estimated that two-thirds of the children of school age have never been vaccinated. There is much opposition to vaccination and violent quarrels when attempts are made to exclude unvaccinated children from school. In many places the people are indifferent on account of the present mild character of the disease.

16. MISSISSIPPI.

Average rate per 1,000 population	1.36
Maximum rate	2.01
Minimum rate	.78

The law provides that supervisors in counties where smallpox exists are empowered to pass ordinances to provide for compulsory vaccination. If the State can not furnish vaccine, it shall be a charge on the county.

17. INDIANA.

Average rate per 1,000 population	1.41
Maximum rate	1.97
Minimum rate	.41

It is lawful for health officers to order compulsory vaccination of school children upon pain of exclusion from school. The State board of health, however, advises health officers not to make such orders on account of the opposition created. Contacts are quarantined 14 days unless submitting to vaccination.

18. OREGON.

Average rate per 1,000 population	1.48
Maximum rate	3.53
Minimum rate	.16

The law provides that school boards may prohibit attendance of any unvaccinated child. "There has been more or less slackness in regard to this law. Many school boards have failed to prohibit the attendance of unvaccinated children." When smallpox exists in a community, the regulations of the State board of health provide for the exclusion of unvaccinated school children.

19. WASHINGTON.

Average rate per 1,000 population	1.72
Maximum rate	4.44
Minimum rate	.20

The smallpox rate in Washington rose from 0.30 in 1917 to 4.44 in 1920, the highest rate in any of the 20 States considered. Previous to 1919, a law was in force enabling school directors to require vaccination as a condition of school attendance. This act was repealed in 1919. Contacts are vaccinated or quarantined for 16 days. Free vaccination is offered when smallpox exists in a community.

20. KANSAS.

Average rate per 1,000 population	2.00
Maximum rate	4.00
Minimum rate	1.20

Kansas has the highest average rate of the 20 States considered, being separated from the other members of the central group by two of the Pacific States.

The rules of the State board of health provide that unvaccinated children shall be excluded from school for 25 days after the appearance of smallpox in a community. There is no compulsory vaccination. Contacts shall be quarantined for 21 days unless successfully vaccinated. Even in some progressive districts, approximately 80 per cent of the school children have not been vaccinated.

Conclusions.

From a study of these statistics and procedures, it is evident that smallpox in this country is dependent on the popular vote. In general, the people obey laws which they have made. If popular sentiment in a State is behind a strong centralized compulsory vaccination act, smallpox is negligible in that State. If local authorities are given discretionary powers in the matter of vaccination enforcement, the rate tends to rise, even in the most favored sections of the country, whereas in the absence of compulsory features in the law, or where there is no law at all, smallpox reaches a high rate.

A CONSIDERATION OF ARSPHENAMINE AND CERTAIN OTHER ORGANIC ARSENIC COMPOUNDS USED IN THE TREATMENT OF SYPHILIS.[1]

By GEORGE B. ROTH, M. D., Pharmacologist, Hygienic Laboratory, United States Public Health Service, Washington, D. C.

The organic arsenic compound arsphenamine, formerly known as "salvarsan," which is used so extensively in the treatment of syphilis to-day, was discovered by Ehrlich and Bertheim in 1910, after many painstaking and systematic researches, it being the 606th compound which they synthesized. The advent of arsphenamine into therapeutics, therefore, was in no way accidental, but was the result of methodical chemical and biological study.

The treatment of syphilis by means of arsenic was not new when arsphenamine was originated, arsenic in the inorganic form having been used intermittently since the time of Fallopius. In order to comprehend clearly the nature of the better known antisyphilitic agents containing organic arsenic as their main active constituent, I shall briefly sketch their chemical relationships without attempting, however, to arrange the compounds with any strict reference to the chronological order of their introduction.

Leaving out of consideration, therefore, the inorganic compounds of arsenic represented by the highly toxic trivalent compounds of arsenious acid and the less toxic pentavalent compounds of arsenic acid, we can satisfactorily arrange most of the antisyphilitic agents containing arsenic as their main active constituent into three groups, namely, (*a*) the cacodylates, (*b*) the arsanilates, and (*c*) the arsenobenzols, all of which contain arsenic in the organic form.

(*a*) *Cacodylates.*—The cacodylates are aliphatic compounds containing arsenic in the pentavalent form and are close derivatives of arsenic acid.

By substituting two methyl groups for two hydroxyl groups in arsenic acid, cacodylic acid is formed; and by further substitution of sodium for the hydrogen of the remaining hydroxyl group, one obtains sodium cacodylate.

Another closely related salt of cacodylic acid, which differs from sodium cacodylate in having one of its methyl groups replaced by an NaO group, was introduced into therapeutics as "arrhenal."

Mention should perhaps be made at this point of the recently introduced homologue of cacodylic acid, namely, disodium ethyl arsonate, which appears under the trade name of "mon-arsone." This homologue differs from "arrhenal" in having the methyl group of the latter substance replaced by an ethyl group.

[1] Address delivered at the quarterly conference of clinic directors and physicians, Boston, Mass., Apr. 13, 1921.

The relation of these compounds to arsenic acid and to each other may be seen from the following structural formulæ:

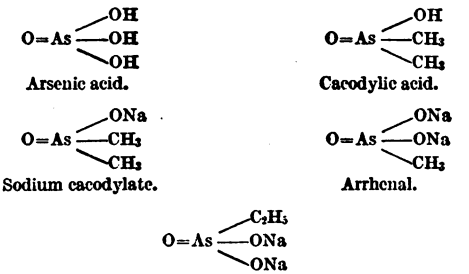


CHART 1.

The announcement by Ehrlich in 1910 that arsphenamine was curative in syphilis, led Murphy, a well-known clinician,[2] who was unable to secure Ehrlich's remedy, to try sodium cacodylate for this disease. He was surprised to find that excellent results were obtained with sodium cacodylate in healing primary chancres and certain other manifestations of syphilis. The cacodylates immediately met with favor in the United States in the treatment of syphilis, and in spite of later evidence that their popularity was unjustified, they are still used in certain quarters as antisyphilitic agents.

The effects of the cacodylates are considered to be due principally to the partial reduction of these compounds in the body; but since the reduction occurs slowly, the toxic effects are not pronounced. A large percentage of the cacodylate compounds is eliminated unchanged. The amount which may be reduced varies in different individuals and conditions, so that the cacodylates may not always act as harmless agents.

Comparative tests made with certain of the cacodylates and arsphenamine show that the cacodylates are decidedly inferior to arsphenamine, both in experimental syphilis and in human cases. As regards the homologue of cacodylic acid, disodium ethyl arsonate or "mon-arsone," little can as yet be stated with certainty. The clinical reports of its use in syphilis, though on the whole favorable to the compound, are still too meager to permit one to state positively whether it will rank with arsphenamine as an effective antisyphilitic agent; but, as in the case of the cacodylates, the results in experimental syphilis have been disappointing.

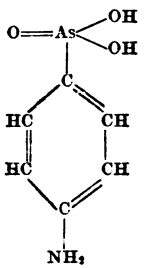
(*b*) *Arsanilates.*—The arsanilates differ from the cacodylates in being aromatic type derivatives of arsenic acid, and are made by

[2] Murphy, J. B. Jour. Am. Med. Assoc., 1910, vol. 55, p. 1113.

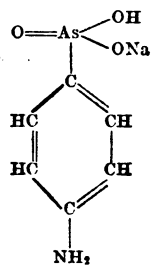
combining arsenic acid with aniline in the presence of an alkali. They may be regarded as close chemical forerunners of arsphenamine. Although Béchamp in 1860 found that aniline and arsenic acid could be combined, it remained for Ehrlich and Bertheim in 1907 to determine the true nature of the compound and to establish it as being arsanilic acid. The sodium salt of arsanilic acid, sodium arsanilate, was introduced as an especially nontoxic agent for the treatment of syphilis under the name of "atoxyl."

Sodium acetyl arsanilate, a compound closely allied to "atoxyl," was introduced as "arsacetin."

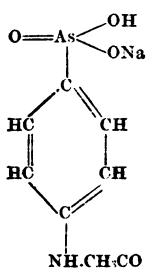
The structures of the above-described arsanilates are given below:



Arsanilic acid.



Sodium arsanilate (*atoxyl*).



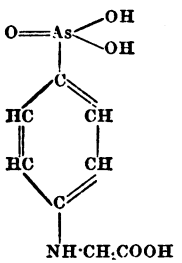
Sodium acetyl arsanilate (*arsacetin*).

CHART 2.

"Atoxyl" proved to be of considerable value in the treatment of syphilis; but, after thorough trial, it was found to be much more toxic than it was first supposed to be, causing permanent blindness in a considerable number of instances. Ehrlich found that "atoxyl" had no effect on trypanosomes outside of the body and, hence, explained its effects in syphilis by its reduction in the body, from the pentavalent to the trivalent form. The decomposition products, however, have never been isolated. It is decomposed very readily in the gastro-intestinal tract, forming more toxic products; therefore it is not given by mouth.

"Arsacetin" was found to be quite dangerous and no more effective than "atoxyl" in syphilis.

The explanation given by Ehrlich to account for the parasiticidal action of "atoxyl," namely, that it was reduced from the comparatively inactive pentavalent to the more active trivalent form, led him to study other aromatic arsenic compounds in which the arsenic is trivalent.



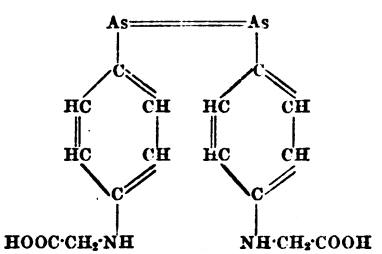
Phenyl glycine p arsinic acid.

CHART 3.

His investigation led to the discovery of phenyl glycine p arsinic acid. Chemically phenyl glycine p arsinic acid is an important derivative of arsanilic acid and is distinguished from "atoxyl" mainly by its decreased toxicity.

(*c*) *Arsenobenzols.*—Phenyl glycine p arsinic acid, on reduction with sodium hydrosulphite, yields arseno phenyl p glycine, a trivalent compound which is very important from the standpoint of therapeutics, and which represents the third or arsenobenzol type. In this type two arsenic atoms are linked together by a double bond, and each to the benzol nucleus by a single linkage.

The relation of arseno phenyl p glycine to arsphenamine is very close, as seen from its structure given below:



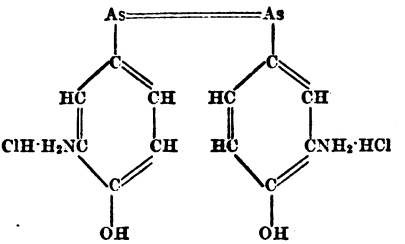
Arseno phenyl p glycine.

CHART 4.

Arseno phenyl p glycine was found by Ehrlich to have a marked influence on the course of relapsing fever in mice. Its sodium salt, sodium arseno phenyl p glycinate, 418 in Ehrlich's series, appeared under the name of "spirasyl."

By varying and changing the position and kind of sidechains, Ehrlich found that the most beneficial results were obtained, not

only in mice infected with relapsing fever but in human syphilis, with the dihydrochloride of 3.3′ diamino, 4.4′ dihydroxy arsenobenzene, 606 in Ehrlich's series, or "salvarsan," now known officially as arsphenamine.

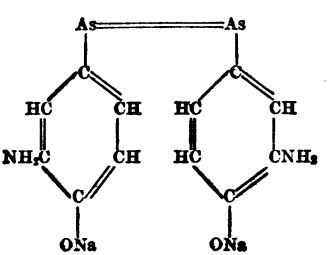


Arsphenamine.

CHART 5.

Ehrlich considered that this compound embodied the virtues which a compound that was to be used in syphilis should have, namely, a marked parasiticidal action with little or no deleterious action on the host. All previous compounds which possessed parasiticidal properties were also quite destructive to the host, so that in arsphenamine Ehrlich's desires seemed to be realized.

Aqueous solutions of arsphenamine are quite strongly acid and should not be used in therapeutics on account of their high toxicity. For this reason, arsphenamine should always be properly alkalinized before its administration. The disodium salt of arsphenamine which is thus formed upon the addition of the proper amount of sodium hydroxide, is less stable than arsphenamine and, hence, was not considered as a commercial possibility until quite recently. The commercial product now appears under the official name of sodium arsphenamine (1206 of Ehrlich's series). Although it can be prepared for administration by the simple addition of water, and in this respect is treated like neoarsphenamine, it should be administered according to the rules formulated for arsphenamine. Structurally, it is essentially the same as arsphenamine.

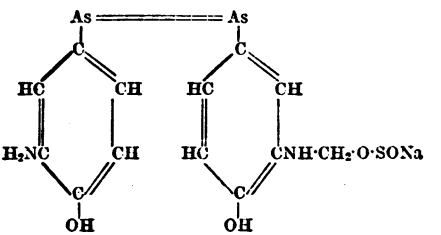


Sodium arsphenamine.

CHART 6.

The discovery that arsphenamine possessed marked parasiticidal properties led Ehrlich to the further investigation of various derivatives of arsenobenzol, and, in seeking to obtain a preparation which could be used clinically without preliminary treatment with an alkali, he discovered that by treating arsphenamine with sodium formaldehyde sulphoxylate the following condensation product was formed, namely, sodium, 3.3′-diamino-4.4′-dihydroxy-arseno-benzene-N-methylene sulphinate.

This product is known as 914 in Ehrlich's series, and, later, was given the name of "neosalvarsan." It is now known officially in the United States as neoarsphenamine. The following structure has been generally assigned to it, perhaps without sufficient evidence:



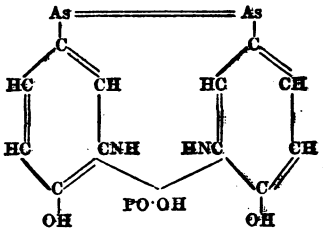
Neoarsphenamine.

CHART 7.

The curative properties of neoarsphenamine in syphilis need not be mentioned, except to say that it seems to be the leading arsenical to-day in the treatment of this disease.

Since the advent of arsphenamine and neoarsphenamine into therapeutics, a great amount of research has been directed toward improving these compounds of the arsenobenzol type, and, as a result, many new compounds have been discovered. None of these newer compounds, however, has supplanted, nor has even closely rivaled, arsephenamine and neoarsphenamine in favor. After numerous investigations the Treasury Department of the Federal Government officially recognized by license only two compounds in addition to arsphenamine, sodium arsphenamine, and neoarsphenamine. The first of these additional compounds is an arsphenamine derivative containing phosphorus, and is 4.4′ dihydroxy arsenobenzene 3.3′ phosphamic acid (No. 1116 of Mouneyrat's series). It is licensed under the official name of phospharsenamine,

its trade name being "galyl." Its structure is given by Morgan,[3] as follows:

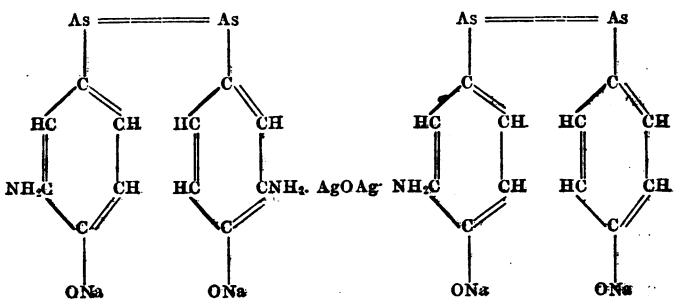


Phospharsenamine (galyl.).

CHART 8.

Phospharsenamine is an acidic substance, insoluble in water, and dissolves in aqueous sodium carbonate. It is put up in sealed ampules containing the dry sodium carbonate, so that it will readily dissolve upon the addition of water. Solutions made in this way are yellow, or greenish yellow, the greenish color rapidly deepening upon standing.

The second additional compound is an arsphenamine derivative containing silver. Its chemical composition is not definitely known. It is officially known as silver arsphenamine, and is thought to have the following structure:



Silver arsphenamine.

CHART 9.

Silver arsphenamine dissolves readily in water, forming a black or brownish-black solution. Both the phosphorus and silver compound of arsphenamine are considered to be improvements over arsphenamine; but as they have been but recently officially licensed by the Federal Government, adequate clinical reports of their use in this country are unavailable at present. Both are enjoying considerable reputation abroad.

In conjunction with the official name, arsphenamine appears in the United States under the trade names of "salvarsan," "arseno-

[3] Morgan, Gilbert T., Organic Compounds of Arsenic and Antimony. 1918.

benzol," "diarsenol," and "arsaminol"; sodium arsphenamine as "sodium diarsenol" and "salvarsan sodium"; neoarsphenamine as "neosalvarsan," "neodiarsenol," and "neoarsaminol"; silver arsphenamine as "silver salvarsan" and "silver diarsenol," and finally, phospharsenamine as "galyl."[4]

The behavior, both inside and outside of the body, of compounds of the arsenobenzol type used in the treatment of syphilis, is of extreme interest and also of great practical importance, since they are used so extensively in the disease. Unfortunately, too little is known concerning their chemical nature and their behavior in the organism. In making this last statement I do not wish to disparage the work of Ehrlich and his coworkers. Their names will undoubtedly always be associated with the greatest of epochs in the history of therapeutic agents. However, when one considers that the vast amount of work which has already been done has not given us even a chemical method for determining a toxic from a non-toxic preparation of arsphenamine, we can the more readily realize that much is still to be learned regarding this active type of compounds.

During the past few years I have had the opportunity, in the Hygienic Laboratory of the United States Public Health Service, of examining for toxicity over 2,000 samples of arsphenamine and neoarsphenamine, and in this manner I have been permitted to observe the behavior of these compounds, both *in vitro* and *in vivo*, under carefully controlled conditions. As a result of these observations certain studies were made and certain data compiled which were of value in conducting the biological tests required by the Federal Government before these compounds could be sold in interstate traffic. The clinical bearing of these studies will be obvious from the description of the several experiments which appear later in this paper.

The official method for testing arsphenamine requires that white rats weighing from 100 to 150 grams should tolerate per kilo of body weight, 100 mgm. of the drug for 48 hours when given intravenously as a 2 per cent alkaline aqueous solution, 0.9 c.c. of normal sodium hydroxide being used to alkalinize 100 mgm. of arsphenamine. Neoarsphenamine is also required to be tested in white rats, the dose to be tolerated for 7 days being 200 mgm. per kilo when given intravenously as a 4 per cent aqueous solution. The rate of injection must be 12 to 15 seconds for each 0.1 c.c. of either solution.

One of the first observations, which has been repeatedly confirmed during the past three years, is that there is a quite marked individual susceptibility in animals to both arsphenamine and neoarsphenamine. An extreme instance is illustrated by reference to some experiments

[4] Solutions of each of the licensed arsphenamines, put in hermetically sealed glass ampules, appear commercially as solutions of arsphenamine.

on rabbits (Roth, 1918, Hyg. Lab. Bulletin No. 113). In working with a sample of arsphenamine which killed 75 per cent at 100 mgm. per kilo and 50 per cent of the rabbits at 80 mgm. per kilo within two weeks, an animal was found which tolerated 175 mgm. per kilo for one month. Quite similar results were obtained with neoarsphenamine on rats.

The impression was early obtained that arsphenamine and neoarsphenamine were not as similar in action as they are usually thought to be, many clinicians even at the present time, regarding neoarsphenamine merely as arsphenamine in a form convenient for administration. The following observations demonstrate that arsphenamine and neoarsphenamine are quite unlike biologically.

As stated above, according to the official regulations, the maximal tolerated dose of arsphenamine must be 100 mgm., and for neoarsphenamine, 200 mgm. per kilo when given to white rats intravenously. These dosages are not far below the minimal lethal dose of perhaps the majority of preparations. Now, when these compounds are administered to rats in the official dosage, the time of death of the animals treated with arsphenamine is totally unlike that observed after administration of neoarsphenamine.

Statistics compiled from the above official tests showed that after administration of arsphenamine a little over 80 per cent of the rats which died within 14 days died within 24 hours after administration, and that almost 90 per cent died within 48 hours; whereas the rats which received neoarsphenamine rarely died within the first day, and the majority died after the third day. The time of death is shown in the following table:

Total number dying:	Per cent.
Within the first day	5
Within the first two days	15
Within the first three days	30
Within the first four days	60
Within the first five days	(about) 75

The following additional differences were observed:

(*a*) Neoarsphenamine rarely causes immediate symptoms in rats, whereas arsphenamine usually causes pronounced depression in the standard test doses.

(*b*) Rats injected intravenously with neoarsphenamine bleed profusely, whereas those injected with arsphenamine bleed but little, thus showing a difference in the effect on the coagulability of blood *in vivo*.

(*c*) The necropsy findings in arsphenamine-treated rats usually show marked pulmonary changes and slight kidney changes, whereas those dying from neoarsphenamine show marked degenerative

changes in the kidney and relatively slight pulmonary changes. These differences are so constant that one can almost always tell from the necropsy findings what substance was administered.

(*d*) Arsphenamine was found to be relatively more stable than neoarsphenamine, the latter being frequently described in the laboratory as the more "tricky" compound of the two.

It was previously stated that acid solutions of arsphenamine were observed to be much more toxic than solutions properly alkalinized, so that failure to alkalinize may give rise to very disastrous results. This was pointed out by Ehrlich in his early studies. Strange to say, there are certain clinicians who still give unalkalinized solutions of arsphenamine. Studies made on rats showed conclusively that arsphenamine in acid solution is at least two to four times as toxic as a solution made alkaline with the proper amount of sodium hydroxide. If the arsphenamine is given as a dilute acid solution, it is less toxic than when given in concentrated solution. This fact may account for the apparent nontoxicity of acid solutions reported by certain clinicians. It was further shown in experiments with white rats that a properly alkalinized solution of arsphenamine is slightly less toxic as a 0.5 per cent than as a 2 per cent aqueous alkaline solution.

In our earliest experiments at the Hygienic Laboratory the method advocated by Ehrlich was followed in alkalinizing arsphenamine; that is, a 15 per cent solution of sodium hydroxide was added to the aqueous solution of arsphenamine, drop by drop, until the precipitate which formed was redissolved. An additional drop or two of the 15 per cent sodium hydroxide solution was then added before making the alkalinized arsphenamine up to the desired concentration. Such solutions were shown to be relatively unstable in air, becoming turbid within a half hour in many cases. It has been shown by others that solutions alkalinized according to the method of Ehrlich are more prone to produce reactions clinically than those made more alkaline. By using Ehrlich's method, the monosodium salt of arsphenamine is mainly formed, whereas when using one-third more alkali than is required to clear the solutions of the precipitate which forms, the disodium salt is formed.

That a solution of arsphenamine consisting mainly of the monosodium salt is more toxic than a solution of the disodium salt has been confirmed in experiments which we have carried out on rats. The details of these experiments appear in Table I. The addition of 0.65 to 0.7 c. c. normal sodium hydroxide per 100 mgm. of arsphenamine mainly forms the monosodium salt, 0.9 c. c., the disodium salt.

TABLE I.—*The influence of the degree of alkalization of arsphenamine on toxicity in white rats when given intravenously as a 2 per cent alkaline aqueous solution. (Inadequately and adequately alkalinized solutions were injected alternately.)*[1]

Group.	Inadequate alkalization.				Adequate alkalization.			
	0.65 to 0.7 c. c. normal sodium hydroxide per 100 mgm. of arsphenamine.				0.9 c. c. normal sodium hydroxide per 100 mgm. of arsphenamine.			
	Number injected.	Number died within 48 hours.	Number died within 14 days.	Number lived 14 days.	Number injected.	Number died within 48 hours.	Number died within 14 days.	Number lived 14 days.
AA	5	4	4	1	5	0	0	5
BB	5	[2]5	5	0	5	2	3	2
CC	5	2	2	3	5	0	0	5
DD	5	4	4	1	5	1	1	4
EE	5	4	4	1	5	1	1	4
FF	5	5	5	0	5	3	3	2
Total	30	24	24	6	30	7	8	22
Per cent	.....	80	80	20	.....	22	27	73

[1] Animals received 100 mgm. per kilo.
[2] Two were pregnant.

It will be noticed that in our experiments both the monosodium and disodium salt are made with normal sodium hydroxide (about 4 per cent) instead of using the 15 per cent solution as advocated by Ehrlich. However, the underlying principle affecting the two methods is the same. In fact, many clinicians to-day rationally use various strengths of sodium hydroxide solution. They ascertain by trial that it requires a certain amount of a sodium hydroxide solution to clear a certain amount of arsphenamine solution. To the arsphenamine solution thus cleared one-third more alkali is added, thus forming the disodium salt.[5]

The quality of the sodium hydroxide used in alkalinizing arsphenamine was also found to have a distinct influence on toxicity in white rats; none but pure sodium hydroxide should be used. Unfortunately it is very difficult generally to obtain sodium hydroxide which is free from impurities. We have lately encountered a so-called "chemically pure" sodium hydroxide, which, when made up as a normal solution, deposited, after standing several days, a considerable amount of a light-brown gelatinous material. No chemical examination was made of this material, but experiments on rats showed that arsphenamine alkalinized with the bottom portion of the sodium hydroxide solution containing the deposit was considerably more toxic than a solution made alkaline with the top or clear portion of the sodium hydroxide solution. Details of the experiment appear in Table II.

[5] The Surgeon General of the United States Public Health Service has advised the use of 0.9 c. c. of normal sodium hydroxide (approximately 4 per cent) for each 0.1 gram of drug (Reprint No. 529 from Public Health Reports), since it has been shown that this amount will form the disodium salt, regardless of the brand of commercial arsphenamine used.

TABLE II.—*The effect on toxicity of alkalinizing arsphenamine with a solution of sodium hydroxide containing sediment as shown by its intravenous administration to white rats as a 2 per cent aqueous solution.*

Sample of arsphenamine.	A. Arsphenamine alkalinized with *top* portion of *clear* sodium hydroxide solution containing no gelatinous material.[1]				B. Arsphenamine alkalinized with *bottom* portion of sodium hydroxide solution containing gelatinous material.[1]			
	Number injected.	Number died within 48 hours.	Number died within 14 days.	Number lived 14 days.	Number injected.	Number died within 48 hours.	Number died within 14 days.	Number lived 14 days.
L and B	5	2	2	3	5	3	3	2
D R L	5	0	0	5	5	2	3	2
M	5	0	1	4	5	2	3	2
Total	15	2	3	12	15	7	9	6
Per cent		13	20	80		47	60	40

[1] A and B were made from the same sodium hydroxide solution. These arsphenamine solutions were injected alternately in each group of 10 rats, in dosage of 100 mgm. per kilo.

The influence of rate of injection on toxicity of properly alkalinized solutions of arsphenamine was ascertained in both rats and guinea pigs, and it was shown that with certain lots increasing the rate of injection increased the toxicity in both species, the effects being more marked in guinea pigs than in rats.

The effect of increasing the rate of injection in the guinea pig was shown not only by the above-mentioned increase in mortality, but by the additional observation that all guinea pigs receiving the solution rapidly were more greatly depressed immediately after the injection than those injected slowly. The results of the experiments in rats are shown in Table III.

TABLE III.—*Influence of the rate of injection of arsphenamine in white rats when given intravenously as a 2 per cent alkaline aqueous solution. (Alternately injected at rapid and slow rate. Animals received 100 mgm. per kilo.)*

Group.	Rapid injection.				Slow injection.			
	Number injected.	Number died within 48 hours.	Number died within 14 days.	Number lived 14 days.	Number injected.	Number died within 48 hours.	Number died within 14 days.	Number lived 14 days.
AX	5	4	4	1	5	1	2	3
BX	5	3	3	2	5	2	4	1
CX	5	2	3	2	5	1	1	4
DX	5	2	2	3	5	0	0	5
EX	5	2	2	3	5	3	3	2
Total	25	13	14	11	25	7	10	15
Per cent		52	56	44		28	40	60

Arsphenamine in alkaline solution is generally regarded as a very unstable substance, and the probability of a change in toxicity occurring while in solution previous to its administration must be considered in investigations dealing with the toxicity of arsphenamine. Ehrlich (Soziale Kultur und Volkswohlfahrt, 1913) found that arsphenamine in solution (presumably alkaline) increased in toxicity so rapidly that after six hours its toxicity was more than doubled, the increase in toxicity being attributed to the formation of 3-amino-4-hydroxy-phenyl-arsenoxide, or so-called "arsenoxide." However, it was shown in the Hygienic Laboratory (Roth, 1918, Hygienic Lab. Bull. No. 113) that an aqueous alkaline solution of arsphenamnie could be kept in a glass cylinder in which only a small surface was exposed to the air, for at least five hours without any increase in toxicity. Since these experiments were reported, some striking data have been collected which demonstrate clearly that alkaline solutions of arsphenamine may at first decrease slightly in toxicity on standing, provided only a small amount of surface is exposed to the air.

Tabulations made of the time of death in each set of five rats used in the official testing of all arsphenamine from three different manufacturers received during a period of one year, showed that when tested in the official manner, at the dosage of 100 mgm. per kilo, the first rat of the set was more likely to die than any of the others, and that the collective mortality was much less in the fifth rat than in the first. In other words, during the conduct of the test there was a gradual decrease in the toxicity of alkaline arsphenamine solution when exposure to the air was relatively slight, as was the case in these tests, the only surface exposed being that permitted by a 10 c. c. glass cylinder having a diameter of about 13 mm. Table IV shows the collective results in detail. Only those sets were included in which not more than 4 nor less than 1 rat died in each set. The time elapsing between the injection of the first rat and the completed injection of the fifth rat averaged about 20 minutes.

TABLE IV.—*Time of death of the rats in each set of 5 rats used in the official testing of arsphenamine. (Sets in which not less than 1 nor more than 4 died in each set.)*

Manufacturer.	Number of sets injected.	Dose in mgm. per kilo.	Total number died within 48 hours, in order of their injection.				
			1	2	3	4	5
M	41	100	34	22	17	9	13
A	55	100	25	16	17	13	10
D	34	100	19	11	5	2	5
Total	130	.....	78	49	39	24	28
Per cent died, based on total number of deaths	.....	.....	36	22	18	11	13

It is noted that the first rat of each set of five is almost three times more likely to die than is the fifth; two times more likely to die than the third; and about 1.6 times more likely to die than the second. [6]

The shaking of aqueous alkaline solutions of arsphenamine and aqueous solutions of neoarsphenamine in the presence of air was found to materially increase the toxicity of solutions of each compound. [7] For example, shaking a 4 per cent aqueous solution of high-grade neoarsphenamine in the presence of air for one minute will convert it into a dangerous solution; that is, instead of being tolerated in rats in dosage of 420 mgm. per kilo for 7 days, as was the case when not shaken, it killed 40 per cent of the animals in dosage of 200 mgm. per kilo. If a border line preparation is used—that is, one which is tolerated by rats receiving the standard test dose of 200 mgm. per kilo but fails at a 20 per cent higher dosage—we find that shaking for 1 minute will cause it to kill every rat injected at the standard test dose.

Quite similar results were produced by shaking properly alkalinized arsphenamine solutions for a similar period of time. The increase in toxicity is presumed to be due to the formation of the more toxic oxidation product, 3-amino-4-hydroxy-phenyl-arsenoxide more commonly called "arsenoxide," since air was found to be essential to the production of increased toxicity.

The keeping qualities of market samples of arsphenamine and neoarsphenamine while in sealed ampules were found to be wholly unlike. During the last two years numerous samples of arsphenamine and neoarsphenamine were submitted by clinicians to the Laboratory for reexamination. The reexamination failed to disclose any positive evidence of deterioration in the arsphenamines submitted, whereas a large number of the neoarsphenamine samples were shown to have deteriorated while in the ampule. It was found that certain lots of neoarsphenamine changed in sealed ampules, after an indefinite period, in (1) color, (2) mobility in ampule, (3) solubility, (4) toxicity, and (5) odor.

The change in color amounted in some instances to only a slight deepening of the original golden yellow color, while in other cases a change to a brick red occurred, such as takes place when the powder is exposed to the air for a day or more. The lots which showed marked changes in color were usually in the form of a solid, and therefore not freely mobile in ampule. The change in solubility

[6] These experiments were completed before Dr. G. C. Lake of the Hygienic Laboratory had called my attention to this phenomenon.

Hunt (Jour. Am. Med. Assoc., 1921, vol. 76, p. 854) observed this phenomenon in some alkaline solutions of arsphenamine, but not in others. The tabulation above indicates that it occurs in many if not all lots representing three commercial domestic products.

[7] Reprint No. 612 from the Public Health Reports, vol. 35, No. 38, Sept. 17, 1920.

varied, as shown by their behavior when made up in 4 per cent aqueous solution, certain lots producing only a slightly turbid solution, others producing a fine flocculent, or coarse suspension. Filtration of the coarse suspension showed that only about 10 per cent of the material was soluble in water at room temperature within a half hour. This coarse suspension, as such, however, was not shown to be toxic for rats in all cases. Likewise, an increase in toxicity could not be demonstrated in each lot of neoarsphenamine which had undergone slight changes in solubility. Although we were unable to detect an increase in toxicity in certain lots of incompletely soluble or difficultly soluble neoarsphenamine, the samples submitted were reported to have produced very grave symptoms in man, and occasionally death, so that it would appear that relatively insoluble preparations should never be used clinically. These changes in neoarsphenamine are not confined to one product, but some products show them more frequently than others. Strangely, the changes in solubility do not bear any definite relation to the date of manufacture; in one instance a lot became insoluble within 48 hours after being tested at the factory. Experiments on incubating neoarsphenamine at 37° C. while in ampule, showed that solubility can be decreased in some lots by being held at 37° C. for about nine months. Such lots emit a rather strong garlicky odor on opening the ampule.

Controls kept at a temperature of 18–20° C. for a similar period were completely soluble in water when made up as a 4 per cent solution.

Summary.

The above observations on the behavior of arsphenamine and neoarsphenamine may be summarized as follows:

(1) There is a well-marked individual variation in the susceptibility of animals to both arsphenamine and neoarsphenamine.

(2) Neoarsphenamine is so unlike arsphenamine in its biological behavior that it should not be regarded as arsphenamine in a form convenient for administration.

(3) Acid solutions of arsphenamine are at least two to four times as toxic as properly alkalinized solutions, the toxicity increasing directly with the concentration.

(4) The toxicity of properly alkalinized solutions of arsphenamine is slightly less toxic as a 0.5 per cent than as a 2 per cent solution.

(5) The Ehrlich method of alkalinizing arsphenamine, in which the monosodium salt is formed, produces a more toxic solution than the present method used in the United States, in which the disodium salt is formed.

(6) The use of impure sodium hydroxide should be avoided in making arsphenamine solutions.

(7) Increasing the rate of injection of properly alkalinized arsphenamine greatly increases its toxicity.

(8) Properly alkalinized arsphenamine solutions in many cases are more highly toxic immediately after their preparation than after the lapse of about 20 minutes.

(9) Shaking alkaline aqueous solutions of arsphenamine and aqueous solutions of neoarsphenamine in the presence of air increases their toxicity markedly.

(10) Neoarsphenamine is a relatively unstable compound in sealed ampule and after an indefinite period may show changes in (1) color, (2) mobility in ampule, (3) solubility, (4) toxicity, and (5) odor.

(11) Difficultly or incompletely soluble preparations of neoarsphenamine may be highly toxic and should not be used clinically.

(12) In some cases neoarsphenamine in ampule may be rendered insoluble by incubation at 37° C. for about a year.

The above findings point out the importance of clearly distinguishing between what might be termed the "primary toxicity" of arsphenamine and allied compounds; that is, the toxicity as determined at laboratory examination, and the "secondary toxicity," or toxicity as influenced by such factors as the method of making the solution or the manner of administration.

In concluding, it should be borne in mind that the margin of safety between the therapeutic and lethal dose of arsphenamine, for example, is extremely narrow in man as compared with certain other potent agents, and that this extremely narrow margin of safety of itself makes it necessary to regard arsphenamine as a potentially dangerous therapeutic agent, even though every precaution is taken to handle it properly.

DIGEST OF COMMENTS ON THE PHARMACOPŒIA AND THE NATIONAL FORMULARY.

Review of Hygienic Laboratory Bulletin No. 129.

"Digest of Comments on the Pharmacopœia of the United States of America and on the National Formulary for the Calendar Year Ending December 31, 1919," is the title of Bulletin No. 129 issued by the Hygienic Laboratory, United States Public Health Service.

This bulletin is the fifteenth number of the series of Digest of Comments and, like the preceding numbers, it embodies a more or less complete review of the literature for the current year dealing with the items included in the two official drug standards of the United States of America, namely, the Pharmacopœia and the National Formulary. In addition to abstracts bearing directly on these two official works, comments having an indirect interest have

also been included, i. e., the more important comments on food and drug laws, poison laws, narcotic laws, drug inspection work, drug and plant cultivation, chemotherapy, and foreign pharmacopœias.

In view of the variety of the subjects covered, this bulletin should be of value, not only to those interested in the revision of the Pharmacopœia and the National Formulary, but to pharmacists and physicians in general, manufacturers of, and dealers in chemicals and pharmaceutical products, drug and food inspectors, chemists, pharmacognocists, and public health officials.

PREVALENCE OF POLIOMYELITIS.

The following table gives the number of cases of poliomyelitis (infantile paralysis) reported to the Public Health Service by State health officers from May 29 to August 13, 1921, inclusive. These reports are preliminary and necessarily incomplete.

Poliomyelitis (infantile paralysis)—Number of cases of poliomyelitis occuring in various States, as reported to the Public Health Service by the State health officers in weekly telegraphic or mail reports.

[States omitted are those from which no reports have been received or which have reported no poliomyelitis during the period covered. Leaders indicate that reports were received but no cases of poliomyelitis were reported.]

State.	Week ended (1921)—										
	June.				July.					Aug.	
	4	11	18	25	2	9	16	23	30	6	13
Arkansas	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
California	1	1	2	5	.....	3	3	6	10	4	9
Colorado [1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Connecticut	.....	.....	.....	6	2	3	2	4	5	1	4
District of Columbia	.....	.....	.....	.....	.....	3	4	3	7	3	.....
Florida	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Georgia	.....	1	1	.....	1	.....	.....	.....	.....	.....	.....
Illinois	.....	2	4	5	10	12	15	24	39	38	27
Indiana	.....	.....	2	1	1	1	.....	6	8	5	2
Iowa	.....	.....	.....	.....	1	1	3	1	1	7	6
Kansas	.....	1	.....	.....	.....	2	2	.....	1	.....	1
Kentucky	.....	1	.....	.....	1	2	2	1	.....	.....	(2)
Louisiana	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....
Maine	.....	3	.....	.....	.....	.....	1	.....	1	.....	.....
Maryland	.....	1	2	3	4	1	4	8	7	6	10
Massachusetts	1	2	.....	1	4	3	6	4	10	10	12
Minnesota	.....	1	1	2	10	1	3	5	101	81	48
Mississippi	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Missouri	.....	.....	(2)	6	.....	(2)	8	3	4	5	3
Montana	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Nebraska	.....	1	.....	.....	3	.....	1	2	2	.....	4
New Jersey	.....	2	1	1	2	(2)	3	1	6	7	6
New York [3]	.....	.....	.....	1	.....	3	4	10	15	24	27
North Carolina	1	.....	3	.....	4	3	1	.....	.....	1	2
Ohio	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	27	(2)	(2)
South Dakota	.....	.....	.....	.....	.....	.....	3	.....	.....	2	.....
Texas	.....	.....	.....	.....	.....	.....	.....	(2)	3	.....	.....
Vermont	.....	.....	.....	.....	.....	3	1	.....	3	3	2
Virginia	.....	(2)	(2)	1	.....	(2)	2	1	2	(2)	(2)
West Virginia	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	3
Wisconsin	2	.....	.....	.....	1	4	9	14	12	21	16

[1] Exclusive of Denver. [2] No report received. [3] Exclusive of New York City.

PELLAGRA—ALEXANDRIA, LA.—A CORRECTION.

The report of 16 cases of pellagra in Alexandria, La., during the week ended June 25, 1921 (Public Health Reports, July 15, 1921, p. 1644), was an error. No cases of pellagra were reported from Alexandria during that week.

DEATHS DURING WEEK ENDED AUG. 6, 1921.

Summary of information received by telegraph from industrial insurance companies for week ended Aug. 6, 1921, and corresponding week, 1920. (From the Weekly Health Index, Aug. 9, 1921, issued by the Bureau of the Census, Department of Commerce.)

	Week ended Aug. 6, 1921.	Corresponding week, 1920.
Policies in force	47,285,282	44,280,116
Number of death claims	7,649	6,647
Death claims per 1,000 policies in force	8.4	7.8

Deaths from all causes in certain large cities of the United States during the week ended Aug. 6, 1921, infant mortality, annual death rate, and comparison with corresponding week of preceding years. (From the Weekly Health Index, Aug. 9, 1921, issued by the Bureau of the Census, Department of Commerce.)

City.	Estimated population, July 1, 1921.	Week ended Aug. 6, 1921.		Average annual death rate per 1,000.[2]	Deaths under 1 year.		Infant mortality rate, week ended Aug. 6, 1921.[3]
		Total deaths.	Death rate.[1]		Week ended Aug. 6, 1921.	Previous year or years.[2]	
Akron, Ohio	229,195	25	5.7	[4]11.7	8	[4]7	77
Albany, N. Y.	115,071	25	11.3	C 11.4	1	C 1	22
Atlanta, Ga.	207,473	53	13.3	C 11.3	5	C 4	.....
Baltimore, Md.	752,863	175	12.1	A 17.9	35	A 59	98
Birmingham, Ala.	186,133	52	14.6	A 20.8	5	A 11	.....
Boston, Mass.	757,634	158	10.9	A 15.0	28	A 36	76
Bridgeport, Conn.	149,967	23	8.0	A 17.6	6	A 14	76
Buffalo, N. Y.	519,608	100	10.0	C 10.4	19	C 12	73
Cambridge, Mass.	110,444	23	10.9	A 11.2	6	A 6	107
Camden, N. J.	119,672	27	11.8	.....	6	.....	90
Chicago, Ill.	2,780,655	496	9.3	A 13.6	97	A 171	.....
Cincinnati, Ohio.	403,418	95	12.3	C 11.4	21	C 9	139
Cleveland, Ohio.	831,138	162	10.2	C 9.1	34	C 18	91
Columbus, Ohio.	245,358	51	10.8	C 7.6	7	C 4	81
Dallas, Tex.	165,282	44	13.9	A 12.1	2	A 2	.....
Dayton, Ohio.	158,119	32	10.6	C 7.1	6	C 4	98
Denver, Colo.	263,152	51	10.1	A 10.6	3	.....	.....
Detroit, Mich.	1,070,450	170	8.3	C 10.0	42	C 44	79
Fall River, Mass.	120,668	32	13.8	C 10.4	12	C 5	180
Grand Rapids, Mich.	141,197	31	11.4	C 8.6	4	C 5	68
Houston, Tex.	144,340	34	12.3	.....	1	.....	.....
Indianapolis, Ind.	325,215	71	11.4	C 13.1	8	C 13	62
Jersey City, N. J.	302,788	55	9.5	C 11.1	20	C 13	138
Kansas City, Kans.	103,884	20	10.0	C 15.3	3	C 8	72
Kansas City, Mo.	336,157	73	11.3	C 10.2	11	C 8	.....
Los Angeles, Calif.	611,921	151	12.9	A 12.5	14	A 11	66
Louisville, Ky.	236,083	51	11.3	C 8.2	6	C 3	69
Lowell, Mass.	113,757	26	11.9	A 18.1	8	A 13	129
Memphis, Tenn.	165,389	32	10.1	C 14.0	3	C 5	.....
Milwaukee, Wis.	468,386	50	5.6	A 12.2	7	A 16	31
Minneapolis, Minn.	392,815	64	8.5	C 10.2	8	C 8	46
Nashville, Tenn.	122,036	40	17.1	C 19.3	7	C 7	.....
New Bedford, Mass.	125,012	20	8.3	A 19.9	7	A 17	108
New Haven, Conn.	167,007	28	8.7	C 8.6	7	C 9	83
New Orleans, La.	394,657	136	18.0	A 18.1	16	A 18	.....
New York, N. Y.	5,751,867	1,107	10.0	C 10.3	228	C 231	89
Newark, N. J.	424,885	88	10.8	C 10.6	31	C 21	138
Norfolk, Va.	121,269	30	12.9	.....	5	.....	89
Oakland, Calif.	226,472	41	9.4	A 10.4	2	A 4	25
Omaha, Nebr.	197,066	54	14.3	.....	5	.....	58
Paterson, N. J.	137,463	34	12.9	.....	1	.....	17
Philadelphia, Pa.	1,866,212	362	10.1	[4]17.0	62	[4]134	75
Pittsburgh, Pa.	602,452	125	10.8	C 13.3	36	C 41	128
Portland, Oreg.	264,259	55	10.8	A 8.6	6	A 3	60
Providence, R. I.	239,645	51	11.1	C 11.8	12	C 11	98
Richmond, Va.	175,686	47	13.9	C 19.6	11	C 13	134
Rochester, N. Y.	305,229	77	13.2	C 9.6	13	C 13	101
St. Louis, Mo.	786,164	153	10.1	C 10.3	15	C 22	.....
St. Paul, Minn.	237,781	38	8.3	C 9.1	1	C 4	10
Salt Lake City, Utah	121,595	21	9.0	A 10.8	2	.....	31
San Francisco, Calif.	520,546	155	15.5	C 10.8	6	C 12	35
Seattle, Wash.	327,227	51	8.1	A 7.6	2	A 4	17
Springfield, Mass.	135,877	21	8.1	C 11.1	3	C 3	45
Syracuse, N. Y.	177,265	26	7.6	C 11.4	3	C 5	36
Toledo, Ohio.	253,696	43	8.8	A 16.1	6	A 13	60
Trenton, N. J.	122,760	21	8.9	A 17.7	8	A 12	122
Washington, D. C.	454,026	90	10.3	A 17.5	16	A 22	93
Wilmington, Del.	113,408	16	7.4	C 15.0	2	.....	.....
Worcester, Mass.	184,972	37	10.4	C 8.6	4	C 6	43
Yonkers, N. Y.	103,324	11	5.6	A 14.9	2	A 6	45

[1] Annual rate per 1,000 population.
[2] "A" indicates data for the corresponding week of the years 1913 to 1917, inclusive "C" indicates data for the corresponding week of the year 1920.
[3] Deaths under 1 year per 1,000 births—an annual rate based on deaths under 1 year for the week and estimated births for 1920. Cities left blank are not in the registration area for births.
[4] Data based on statistics of 1915, 1916, and 1917.

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 STATE SUMMARIES.

Telegraphic Reports for Week Ended Aug. 13, 1921.

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

ALABAMA.

	Cases.
Cerebrospinal meningitis	1
Diphtheria	18
Hookworm disease	268
Malaria	15
Measles	2
Pellagra	13
Pneumonia	2
Scarlet fever	13
Smallpox	11
Tuberculosis	21
Typhoid fever	53
Whooping cough	4

CALIFORNIA.

Cerebrospinal meningitis:	
Los Angeles	1
San Francisco	1
Influenza	2
Lethargic encephalitis:	
Oakland	1
Sacramento	2
San Francisco	2
Pellagra	1
Poliomyelitis:	
Los Angeles	1
Sacramento	1
San Francisco	5
San Joaquin County	1
San Luis Obispo County	1
Smallpox:	
Sutter County	8
Scattering	12
Typhoid fever	26

COLORADO.

(Exclusive of Denver.)

Chicken pox	1
Diphtheria	47
Measles	2
Mumps	1
Scarlet fever	7
Smallpox	5
Tuberculosis	25
Typhoid fever	11
Whooping cough	1

CONNECTICUT.

Chicken pox	1
Diphtheria	19
Dysentery (bacillary)	2
German measles	1
Influenza	1
Malaria	2
Measles	12
Mumps	5
Paratyphoid fever	1
Pneumonia (lobar)	5
Poliomyelitis	4
Scarlet fever	19
Trachoma	1
Tuberculosis (all forms)	37
Typhoid fever:	
Enfield	10
Scattering	9
Typhus fever	1
Whooping cough	27

FLORIDA.

Diphtheria	13
Influenza	93
Leprosy	1
Lethargic encephalitis	1
Malaria	64
Pneumonia	5
Scarlet fever	3
Smallpox	8
Typhoid fever	32
Whooping cough	10

GEORGIA.

	Cases.
Chicken pox	2
Diphtheria	20
Dysentery (bacillary)	3
Hookworm disease	22
Influenza	3
Malaria	46
Mumps	3
Paratyphoid fever	2
Pellagra	1
Pneumonia	2
Scarlet fever	20
Septic sore throat	4
Smallpox	19
Tuberculosis (pulmonary)	8
Typhoid fever	50
Whooping cough	11

IDAHO.

Chicken pox	1
Diphtheria	4
Measles	1
Scarlet fever	2
Typhoid fever	2

ILLINOIS.

Cerebrospinal meningitis:	
Chicago	2
Rockford	2
Diphtheria:	
Chicago	103
Scattering	50
Influenza	3
Pneumonia	73
Poliomyelitis:	
Carlinville	1
Champaign	1
Chandlerville	1
Chicago	6
Coles County—Lafayette Township	1
Greenville	1
Jacksonville	1
Kewanee	1
Lamoile	1
McHenry County—Burton Township	1
McLean County—Hudson Township	1
Macoupin County—Polk Township	1
Moultrie County—Lovington Township	1
Nokomis	1
Odell	1
Quincy	1
Rock Falls	1
Rock Island County—Edgington Township	1
Sangamon County—Chatham Township	1
Shipman	1
Springfield	1
Waverly	1
Scarlet fever:	
Chicago	22
Scattering	30
Smallpox	3
Typhoid fever:	
Chicago	11
Freeport	15
Scattering	56

INDIANA.

	Cases.
Cerebrospinal meningitis:	
Henry County	1
Vanderburg County	1
Diphtheria	54
Poliomyelitis:	
Laporte County	1
Marion County	1
Scarlet fever	54
Smallpox	7
Typhoid fever	48
Howard County—Epidemic.	

IOWA.

Cerebrospinal meningitis	2
Diphtheria	6
Poliomyelitis:	
Bedford	1
Center Junction	1
Eldridge	1
Iowa City	1
Moscow	1
Walcott	1
Scarlet fever	15
Smallpox	1

KANSAS.

Cerebrospinal meningitis	2
Chicken pox	1
Diarrhea and enteritis	1
Diphtheria	37
Dysentery (bacillary)	2
Malaria	2
Measles	1
Mumps	3
Pneumonia	4
Poliomyelitis	1
Scarlet fever	51
Smallpox	10
Trachoma	2
Tuberculosis	47
Typhoid fever	100
Whooping cough	27

LOUISIANA.

Cerebrospinal meningitis	1
Diphtheria	10
Pellagra	[1] 41
Smallpox	4
Trachoma	3
Typhoid fever	23
Whooping cough	11

MAINE.

Chicken pox	3
Diphtheria	9
Measles	6
Mumps	3
Scarlet fever	4
Smallpox	3
Tuberculosis	15
Typhoid fever	4

[1] The dates of onset for many of these cases occurred in prior weeks.

MARYLAND.

	Cases.
Cerebrospinal meningitis	1
Chicken pox	2
Diphtheria	22
Dysentery	4
Influenza	3
Lethargic encephalitis	1
Malaria	19
Measles	22
Mumps	4
Ophthalmia neonatorum	2
Paratyphoid fever	1
Pneumonia (all forms)	16
Poliomyelitis	10
Scarlet fever	8
Septic sore throat	1
Trachoma	1
Tuberculosis	69
Typhoid fever	80
Whooping cough	80

MASSACHUSETTS.

Cerebrospinal meningitis	2
Chicken pox	9
Conjunctivitis (suppurative)	11
Diphtheria	118
Dysentery	1
German measles	4
Lethargic encephalitis	1
Measles	46
Mumps	12
Ophthalmia neonatorum	18
Pneumonia (lobar)	18
Poliomyelitis	12
Scarlet fever	42
Septic sore throat	1
Tetanus	3
Tuberculosis (all forms)	150
Typhoid fever	32
Whooping cough	85

MISSISSIPPI.

Diphtheria	24
Scarlet fever	3
Typhoid fever	19

MISSOURI.

Diphtheria	51
Epidemic sore throat	5
Glanders	1
Influenza	1
Measles	2
Mumps	2
Ophthalmia	1
Poliomyelitis	3
Scarlet fever	18
Smallpox	11
Trachoma	4
Tuberculosis	36
Typhoid fever	39
Whooping cough	32

MONTANA.

Diphtheria	8
Poliomyelitis—Wisdom	2
Scarlet fever	1
Smallpox	8
Typhoid fever	16

NEBRASKA.

	Cases.
Cerebrospinal meningitis:	
Omaha	1
Scattering	2
Diphtheria:	
Omaha	23
Scattering	2
Poliomyelitis:	
Omaha	1
Scattering	3
Scarlet fever	9
Smallpox	12
Tuberculosis	3
Typhoid fever	11
Whooping cough	14

NEW JERSEY.

Cerebrospinal meningitis	2
Chicken pox	6
Diphtheria	84
Influenza	3
Malaria	3
Measles	36
Pneumonia	27
Poliomyelitis	6
Scarlet fever	45
Trachoma	2
Typhoid fever	45
Whooping cough	122

NEW MEXICO.

Diphtheria	14
German measles	1
Measles	1
Mumps	1
Scarlet fever	1
Tuberculosis	236
Typhoid fever	5
Whooping cough	1

NEW YORK.

(Exclusive of New York City.)

Diphtheria	125
Influenza	1
Lethargic encephalitis	2
Measles	78
Pneumonia	49
Poliomyelitis:	
Utica	7
Scattering	20
Scarlet fever	75
Smallpox	9
Typhoid fever	30
Whooping cough	182

NORTH CAROLINA.

Cerebrospinal meningitis	2
Chicken pox	7
Diphtheria	96
Measles	14
Poliomyelitis	2
Scarlet fever	59
Septic sore throat	1
Smallpox	7
Typhoid fever	121
Whooping cough	81

Week onded Friday.

SOUTH DAKOTA.

	Cases.
Diphtheria	14
Pneumonia	1
Scarlet fever	6
Smallpox	6
Tuberculosis	10
Typhoid fever	7

TEXAS.

Diphtheria	24
Pneumonia	16
Smallpox	8
Typhoid fever	21
Whooping cough	8

VERMONT.

Chicken pox	7
Diphtheria	3
Measles	14
Mumps	1
Poliomyelitis	2
Scarlet fever	12
Typhoid fever	2
Whooping cough	15

WASHINGTON.

Chicken pox	13
Diphtheria	20
Measles	12
Mumps	1
Scarlet fever	10
Smallpox	23
Typhoid fever	10
Whooping cough	20

WEST VIRGINIA.

	Cases.
Diphtheria	10
Measles	10
Poliomyelitis:	
Charleston	1
Clarksburg	1
Montgomery	1
Scarlet fever	3
Typhoid fever	17

WISCONSIN.

Milwaukee:	
Chicken pox	1
Diphtheria	21
Lethargic encephalitis	1
Measles	2
Pneumonia	1
Poliomyelitis	4
Scarlet fever	4
Smallpox	1
Tuberculosis	25
Typhoid fever	1
Whooping cough	14
Scattering:	
Chicken pox	1
Diphtheria	23
Influenza	18
Measles	10
Ophthalmia neonatorum	1
Pneumonia	1
Poliomyelitis	12
Scarlet fever	27
Smallpox	5
Tuberculosis	18
Typhoid fever	16
Whooping cough	59

Reports for Week Ended Aug. 6, 1921.

CALIFORNIA.

	Cases.
Cerebrospinal meningitis:	
Bishop	1
Los Angeles	1
San Diego	1
San Francisco	2
Influenza	16
Lethargic encephalitis—San Francisco	4
Poliomyelitis:	
San Francisco	3
Tracy	1
Smallpox	33
Typhoid fever	28

DELAWARE.

Diphtheria	1
Malaria	1
Mumps	1
Scarlet fever	2
Tuberculosis	13
Typhoid fever	7
Whooping cough	3

DISTRICT OF COLUMBIA.

Diphtheria	1
Influenza	1
Measles	2
Pellagra	1
Poliomyelitis	3

DISTRICT OF COLUMBIA—continued.

	Cases.
Smallpox	1
Tuberculosis	25
Typhoid fever	15
Whooping cough	20

KENTUCKY.

Chicken pox	1
Diphtheria	21
Dysentery	14
Influenza	3
Measles:	
Jefferson County	14
Nelson County	1
Pellagra	8
Pneumonia	3
Scarlet fever	10
Septic sore throat	2
Smallpox	1
Tonsillitis	3
Tuberculosis	25
Typhoid fever:	
Christian County	8
Jackson County	14
Jefferson County	24
Knox County	16
Taylor County	11
Scattering	60
Whooping cough	14

SUMMARY OF CASES REPORTED MONTHLY BY 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.
1921.										
Connecticut (July)	11	146	2	3	140	.....	13	132	.....	53
District of Columbia (July)	1	14	1	.....	116	.....	17	10	1	30
Hawaii (March)	1	17	66	.....	132	.....	.....	1	.....	6
Hawaii (April)	9	7	10	.....	16	.....	.....	1	.....	5
Hawaii (June)	2	22	.....	.....	17	.....	.....	5	1	10
Massachusetts (July)	14	441	4	8	866	.....	26	251	.....	62
Nebraska (July)	2	44	.....	.....	20	.....	5	86	92	28
New Mexico (July)	1	88	.....	4	5	1	.....	10	6	27
North Dakota (March)	2	66	.....	.....	182	.....	1	107	300	3
North Dakota (April)	.....	43	.....	.....	94	.....	.....	82	197	15
North Dakota (May)	.....	49	.....	.....	47	.....	.....	57	215	7
North Dakota (June)	1	29	.....	.....	32	.....	2	33	96	7
Oklahoma (April)	.....	19	8	5	100	.....	.....	22	185	23
Oklahoma (May)	1	38	6	.....	93	3	1	32	215	31
Vermont (July)	1	22	.....	.....	255	.....	8	51	3	5

PLAGUE.[1]

HUMAN CASES OF PLAGUE REPORTED.

Place.	Period covered.	Cases.	Deaths.	Remarks.
California:	1921.			
San Benito County	Feb. 7	.....	1	
	June 11	1	.....	

[1] A summary of the reports received of the occurrence of plague and the finding of plague-infected rodents in the United States during 1920 was published in Public Health Reports, Jan. 7, 1921, p. 15.

PLAGUE-INFECTED RODENTS.

Place.	Period covered.	Rodents found plague infected.
California:	1921.	
San Benito County	May 22 to June 4	[1]8
Florida:		
Pensacola	Jan. 1 to Apr. 18	5
	Apr. 19 to Aug. 13	0
Louisiana:		
New Orleans	Jan. 1 to May 26	38
	May 27 to Aug. 13	0
Texas:		
Galveston	Jan. 1 to May 28	1
	May 29 to Aug. 13	0

[1] Ground squirrels, *Citellus beecheyi*.

TYPHUS FEVER.

Monroe County, Ohio, Aug. 2, 1921.

One death suspected of being from typhus fever occurred in Seneca Township, Monroe County, Ohio, August 2, 1921.

CITY REPORTS FOR WEEK ENDED JULY 30, 1921.

ANTHRAX.

City.	Cases.	Deaths.
New York:		
New York	1	1

CEREBROSPINAL MENINGITIS.

The column headed "Median for previous years" gives the median number of cases reported during the corresponding weeks of the years 1915 to 1920, inclusive. In instances in which data for the full six years are incomplete, the median is that for the number of years for which information is available.

City.	Median for previous years.	Week ended July 30, 1921.		City.	Median for previous years.	Week ended July 30, 1921.	
		Cases.	Deaths.			Cases.	Deaths.
California:				Missouri:			
San Francisco	0	.....	1	St. Louis	0	1	1
Georgia:				Nebraska:			
Atlanta	0	.....	1	Omaha	0	1	.....
Illinois:				New Jersey:			
Chicago	1	.....	1	Jersey City	0	1	1
Maryland:				New York:			
Baltimore	0	1	1	New York	4	2	5
Massachusetts:				Oregon:			
Boston	1	1	.....	Portland	0	1	1
Fall River	0	1	1	Tennessee:			
Haverhill	0	1	1	Memphis	0	.....	1
Lynn	0	1	.....	Virginia:			
Worcester	0	1	.....	Danville	0	.....	1
Michigan:				Washington:			
Detroit	1	2	1	Seattle	0	1	.....
Minnesota:				Wisconsin:			
Duluth	0	1	1	Milwaukee	1	1	.....

DIPHTHERIA.

See p. 2020; also Telegraphic weekly reports from States, p. 2009, and Monthly summaries by States, p. 2013.

INFLUENZA.

City.	Cases.	Deaths.	City.	Cases.	Deaths.
California:			New York:		
San Francisco	1	.....	New York	11	1
District of Columbia:			Pennsylvania:		
Washington	.....	1	Philadelphia	1	1
Georgia:			Texas:		
Atlanta	1	.....	Dallas	1	.....
Illinois:					
Chicago	1	.....			
Freeport	.....	1			

LETHARGIC ENCEPHALITIS.

California:				Massachusetts:		
San Francisco	.....	1		Northampton	1	.....
Connecticut:				New Jersey:		
Norwalk	-1	1		Morristown	1	1

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

MALARIA.

City.	Cases.	Deaths.	City.	Cases.	Deaths.
Arkansas:			New Jersey:		
Hot Springs		1	New Brunswick	1	
Little Rock	8		Trenton	1	1
North Little Rock	5		New York:		
Georgia:			New York	5	
Atlanta	3		Ohio:		
Brunswick	14	1	Cleveland	1	
Illinois:			Tennessee:		
Chicago	1		Memphis	10	
Mattoon		1	Texas:		
Louisiana:			Austin		1
New Orleans	2		Dallas	11	
Massachusetts:			Galveston		1
Boston	1		Virginia:		
Newton	1		Richmond	4	

MEASLES.

See p. 2020; also Telegraphic weekly reports from States, p. 2009, and Monthly summaries by States, p. 2013.

PELLAGRA.

Alabama:			South Carolina:		
Montgomery	2		Charleston		1
Arkansas:			Tennessee:		
Fort Smith	1		Memphis	1	
Little Rock	2		Nashville		1
Louisiana:			Texas:		
New Orleans	1	1	Dallas		1
North Carolina:					
Raleigh		1			

PNEUMONIA (ALL FORMS).

Alabama:			Indiana:		
Birmingham		3	Indianapolis		4
California:			Kokomo		1
Long Beach	2	1	Kansas:		
Los Angeles	7	4	Kansas City	1	
Oakland	1	1	Topeka	1	
Pasadena	4	2	Wichita		2
Sacramento		2	Kentucky:		
San Diego	4	4	Covington		1
San Francisco	7	5	Lexington		1
Colorado:			Louisville		2
Colorado Springs		1	Louisiana:		
Denver		3	New Orleans		4
Greeley		1	Maine:		
Connecticut:			Lewiston		2
Hartford		1	Maryland:		
Meriden	1		Baltimore	12	9
Milford	1	1	Cumberland	1	
New Haven		1	Massachusetts:		
New London		1	Boston		5
Waterbury	2		Brockton	1	
District of Columbia:			Cambridge		1
Washington		5	Everett	1	1
Georgia:			Framingham		1
Atlanta		2	Holyoke		1
Savannah		1	Methuen		1
Illinois:			Newton	1	1
Chicago	56	17	Quincy	1	
Decatur		1	Saugus	1	
Jacksonville		1	Springfield	1	
Peoria		3	Taunton		1
Rockford		1	Wakefield	1	1
Springfield	2		Worcester	1	4

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

PNEUMONIA (ALL FORMS)—Continued.

City.	Cases.	Deaths.
Michigan:		
Detroit	13	6
Grand Rapids		1
Hamtramck		1
Highland Park	1	
Kalamazoo	1	
Minnesota:		
Minneapolis	1	
St Paul		1
Missouri:		
Kansas City	1	2
St Joseph		2
Springfield		1
Nebraska:		
Omaha		2
New Jersey:		
Bloomfield	1	
Elizabeth		1
Garfield	1	
Hackensack	1	
Hoboken		1
Jersey City		8
Montclair	1	
Newark	18	3
Orange	1	
Paterson	1	
Trenton	5	
New Mexico:		
Albuquerque	1	
New York:		
Buffalo	2	
Cohoes	1	
Elmira	4	1
Glens Falls	1	
Lackawanna	1	
Mount Vernon	3	2
New York	191	53
North Tonawanda		1
Rochester		2
Rome	1	1
Syracuse	3	
Yonkers	1	1
North Carolina:		
Greensboro		1
Ohio:		
Akron	1	
Bucyrus	1	1
Cincinnati		6
Cleveland	14	
Dayton	2	
Hamilton		1
Lima		1
Lorain	1	1
Niles	1	1
Springfield		1
Toledo		2
Youngstown		1
Oregon:		
Portland		2
Pennsylvania:		
Philadelphia	14	10
Rhode Island:		
Pawtucket		2
Providence		2
South Carolina:		
Spartanburg		1
Tennessee:		
Memphis		1
Nashville		1
Texas:		
Austin		1
Waco		1
Utah:		
Salt Lake City		1
Virginia:		
Alexandria	1	
Norfolk		1
Richmond		2
West Virginia:		
Charleston		1
Huntington		1
Wisconsin:		
Oshkosh		1
Racine		1
Wyoming:		
Cheyenne	2	2

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

POLIOMYELITIS (INFANTILE PARALYSIS).

The column headed "Median for previous years" gives the median number of cases reported during the corresponding weeks of the years 1915 to 1920, inclusive. In instances in which data for the full six years are incomplete, the median is that for the number of years for which information is available.

City.	Median for previous years.	Week ended July 30, 1921.	
		Cases.	Deaths.
California:			
Oakland	0	1	
Sacramento	0	1	
San Francisco	0	6	2
Connecticut:			
Greenwich		1	
Norwalk		1	
District of Columbia:			
Washington	0	7	
Illinois:			
Chicago	5	5	1
Jacksonville	0	3	
Springfield	0	3	1
Indiana:			
South Bend	0	1	
Iowa:			
Cedar Rapids	0	1	
Muscatine	0	1	
Kansas:			
Wichita	0	1	
Maryland:			
Baltimore	1	1	1
Massachusetts:			
Adams		1	
Boston	0	2	
Haverhill	0	2	1
Lawrence	0	1	
Norwood		2	
Springfield	0	1	
Michigan:			
Alpena	0	2	
Detroit	0	7	2
Flint	0	1	
Pontiac	0	1	
Minnesota:			
Duluth	0	1	
Minneapolis	0	4	3
St. Paul	0	1	
Missouri:			
St. Louis	0	2	2
New Jersey:			
Elizabeth	0	1	1
Montclair	0	1	
Paterson	0	5	
New York:			
New York	5	13	1
Port Chester		1	
Yonkers	0	1	
Ohio:			
Akron	0	1	
Chillicothe	0	1	1
Cleveland	1	5	
Columbus	0	1	1
Youngstown	0	1	1
Pennsylvania:			
Harrisburg	0	1	
Philadelphia	1	2	
Texas:			
El Paso	0	1	
Virginia:			
Norfolk	0	1	
Richmond	0	1	
West Virginia:			
Charleston	0	1	1
Wisconsin:			
Milwaukee	0	2	
Wausau	0	4	

RABIES IN ANIMALS.

City.	Cases
California:	
Los Angeles	3
Missouri:	
Kansas City	3
North Carolina:	
Winston-Salem	1
Ohio:	
Ironton	2

RABIES IN MAN.

City.	Cases.	Deaths.
Massachusetts:		
Boston	1	1
New York:		
New York	1	1

SCARLET FEVER.

See p. 2020; also Telegraphic weekly reports from States, p. 2009, and Monthly summaries by States, p. 2013.

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

SMALLPOX.

The column headed "Median for previous years" gives the median number of cases reported during the corresponding weeks of the years 1915 to 1920, inclusive. In instances in which data for the full six years are incomplete, the median is that for the number of years for which information is available.

City.	Median for previous years.	Week ended July 30, 1921.	
		Cases.	Deaths.
Alabama:			
Birmingham	1	7	
Mobile	0	2	1
California:			
Bakersfield	0	2	
Long Beach	0	1	
Los Angeles	0	11	
San Diego	0	7	
San Francisco	0	7	
Colorado:			
Denver	3	10	
Pueblo	0	1	
District of Columbia:			
Washington	0	1	
Georgia:			
Atlanta	4	2	
Macon	0	1	
Indiana:			
Bloomington	0	1	
Elkhart	1	2	
Evansville	1	2	
Indianapolis	1	1	
Iowa:			
Des Moines	0	1	
Muscatine	0	1	
Kansas:			
Topeka	0	2	
Michigan:			
Ishpeming	0	1	
Minnesota:			
Duluth	1	1	
St. Paul	3	2	
Montana:			
Billings	0	2	
Great Falls	0	6	
Nebraska:			
Omaha	3	1	
Ohio:			
Columbus	0	1	
Newark	0	2	
Oregon:			
Portland	4	4	
Tennessee:			
Chattanooga	0	1	
Utah:			
Salt Lake City	1	5	
Washington:			
Everett	0	1	
Seattle	5	7	
Spokane	5	5	
Tacoma	1	4	
West Virginia:			
Bluefield	1	1	
Fairmont	0	2	

TETANUS.

City.	Cases.	Deaths.
California:		
Santa Barbara		1
Connecticut:		
Bridgeport	1	
Waterbury	1	1
Georgia:		
Savannah		1
Illinois:		
Chicago	1	1
Indiana:		
Hammond		1
Indianapolis		1
Louisiana:		
New Orleans		1
Maryland:		
Cumberland		1
Missouri:		
St. Louis	1	
New Jersey:		
Bloomfield	1	
Jersey City		1
New York:		
New York	2	
Ohio:		
Columbus		1
Pennsylvania:		
Philadelphia		2
Rhode Island:		
Providence		1
South Carolina:		
Charleston		2
West Virginia:		
Charleston		1

TUBERCULOSIS.

See p. 2020; also Telegraphic weekly reports from States, p. 2009.

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

TYPHOID FEVER.

The column headed "Median for previous years" gives the median number of cases reported during the corresponding weeks of the years 1915 to 1920, inclusive. In instances in which data for the full six years are incomplete, the median is that for the number of years for which information is available.

City.	Median for previous years.	Week ended July 30, 1921.	
		Cases.	Deaths.
Alabama:			
Anniston	1	1	
Birmingham	25	6	3
Mobile	0	1	
Montgomery	3	2	
Arizona:			
Tucson	0		1
Arkansas:			
Little Rock	1	5	
North Little Rock	1	2	
California:			
Long Beach	0	2	
Los Angeles	4	1	1
Oakland	1	5	
Sacramento	0	1	
San Bernardino	0	1	
San Francisco	2	2	1
Colorado:			
Denver	1	1	1
Pueblo	0		1
Trinidad	0	2	
Connecticut:			
Bridgeport	0	1	
Hartford	0	2	
New Haven	2	3	
District of Columbia:			
Washington	7	9	2
Georgia:			
Atlanta	2	2	
Brunswick	0	1	
Savannah	1	4	
Valdosta		1	
Illinois:			
Aurora	0	1	
Blue Island		1	
Centralia	0	1	
Chicago	9	4	
Cicero		2	
Decatur	0	2	
Freeport	0	2	
Galesburg	0	1	
Oak Park	0	1	
Rockford	0	1	
Indiana:			
Evansville	1		1
Fort Wayne	1		1
Hammond	1	1	
Indianapolis	2	3	
Kokomo	0	2	
La Fayette	0	1	
Muncie	0	1	
Terre Haute	1	1	
Iowa:			
Waterloo		2	
Kansas:			
Coffeyville	2	2	
Kansas City	1	4	
Lawrence	0	1	
Parsons	0	1	
Salina		3	
Wichita	3	6	1
Kentucky:			
Covington	1	1	
Lexington	0	3	1
Louisville	10	6	1
Paducah	1	1	
Louisiana:			
New Orleans	4	2	
Maine:			
Bangor	0	2	
Maryland:			
Baltimore	17	13	3
Massachusetts:			
Adams	0	2	
Boston	6	1	1
Brockton	0	2	
Chicopee	0	1	
Fall River	1	2	
Lawrence	1		1
Lynn	1	1	
New Bedford	0	1	
Springfield	1	2	
West Springfield		1	
Worcester	1	3	
Michigan:			
Detroit	15	10	1
Flint	1	3	1
Muskegon	0	7	
Minnesota:			
Minneapolis	1	4	
St. Paul	1	13	3
Missouri:			
Kansas City	2	2	1
St. Louis	7	3	1
Montana:			
Great Falls	1	1	
Nebraska:			
Lincoln	0	5	
New Hampshire:			
Manchester	0	1	
New Jersey:			
Elizabeth	0	1	
Newark	0	3	1
Perth Amboy	0	2	
Trenton	0	1	1
New York:			
Albany	1	1	
Buffalo	1	1	
Ithaca	0	3	
Lockport	0	2	
New York	31	33	5
Niagara Falls	0	2	
North Tonawanda	1	1	
Rochester	2	1	
Schenectady	0	1	1
Syracuse	0	1	
North Carolina:			
Charlotte	9	1	
Durham	1	2	
Winston-Salem	4	1	
Ohio:			
Akron	0	3	
Barberton	0	1	
Canton	1		1
Chillicothe	0	2	
Cleveland	5	6	
Columbus	2	1	
Dayton	1	8	
East Cleveland	0	1	
Ironton	1	1	
Kenmore		1	
Lorain	0	1	
Niles		2	
Toledo	2	1	1
Youngstown	1	2	1
Oklahoma:			
Oklahoma City	2	2	
Pennsylvania:			
Altoona	3	1	
Bethlehem	0	3	

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

TYPHOID FEVER—Continued.

City.	Median for previous years.	Week ended July 30, 1921. Cases.	Deaths.
Pennsylvania—Contd.			
Canonsburg	.....	1	.....
Carnegie	0	1	.....
Chambersburg	0	5	.....
Harrisburg	0	2	.....
Jeanette	.....	2	.....
Johnstown	1	3	.....
North Braddock	0	1	.....
Philadelphia	12	17	2
Pittsburgh	2	9	.....
Reading	1	2	.....
Shamokin	0	1	.....
Sharon	0	1	.....
Woodlawn	.....	1	.....
York	1	1	.....
South Carolina:			
Charleston	5	.....	1
Columbia	1	1	.....
Tennessee:			
Knoxville	7	3	1
Memphis	5	1	.....
Nashville	13	12	.....
Texas:			
Beaumont	0	.....	1
Corpus Christi	2	1	.....
Dallas	2	1	.....
El Paso	0	2	.....
Fort Worth	9	4	.....
Utah:			
Salt Lake City	1	3	.....
Virginia:			
Alexandria	0	1	.....
Danville	0	1	.....
Lynchburg	1	5	.....
Norfolk	4	4	.....
Petersburg	2	5	.....
Richmond	4	4	.....
Roanoke	1	5	.....
Washington:			
Everett	0	1	.....
Seattle	1	3	.....
West Virginia:			
Bluefield	0	1	.....
Charleston	1	3	.....
Fairmont	5	4	.....
Huntington	0	5	1
Martinsburg	1	2	.....
Morgantown	0	3	.....
Parkersburg	0	1	1
Wheeling	1	1	1
Wisconsin:			
Beloit	0	1	.....
La Crosse	0	1	.....
Marinette	0	2	.....
Milwaukee	1	1	.....
Wausau	0	1	.....

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS.

City.	Population Jan. 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria. Cases.	Diphtheria. Deaths.	Measles. Cases.	Measles. Deaths.	Scarlet fever. Cases.	Scarlet fever. Deaths.	Tuberculosis. Cases.	Tuberculosis. Deaths.
Alabama:										
Anniston	17,734	.....	.....	.....	.....	.....	.....	.....	1	.....
Birmingham	178,270	60	1	1	.....	.....	.....	.....	7	1
Mobile	60,151	17	.....	.....	.....	.....	.....	.....	.....	1
Montgomery	43,464	.....	1	.....	.....	.....	.....	.....	1	.....
Tuscaloosa	11,996	.....	1	.....	.....	.....	.....	.....	1	.....
Arizona:										
Tucson	20,292	13	.....	.....	.....	.....	.....	.....	.....	3
Arkansas:										
Fort Smith	23,811	.....	2	.....	.....	.....	.....	.....	.....	.....
Hot Springs	11,695	6	.....	.....	.....	.....	.....	.....	.....	1
Little Rock	64,997	.....	1	.....	.....	.....	.....	.....	.....	.....
North Little Rock	14,048	.....	3	.....	.....	.....	.....	.....	.....	.....
California:										
Alameda	23,806	5	1	.....	.....	.....	.....	.....	.....	.....
Bakersfield	18,633	10	.....	.....	.....	.....	1	.....	1	.....
Eureka	12,923	3	.....	.....	.....	.....	.....	.....	1	1
Long Beach	55,593	15	2	.....	.....	.....	.....	.....	2	.....
Los Angeles	576,673	125	47	1	3	.....	5	.....	97	16
Oakland	216,361	47	11	.....	.....	.....	2	.....	2	3
Pasadena	45,354	12	.....	.....	1	.....	1	.....	2	2
Richmond	16,843	1	.....	.....	.....	.....	1	.....	.....	.....
Riverside	19,341	3	.....	.....	.....	.....	.....	.....	1	.....
Sacramento	65,857	18	6	.....	.....	.....	4	.....	4	2
San Bernardino	18,721	4	.....	.....	.....	.....	.....	.....	.....	1
San Diego	74,683	24	.....	.....	9	.....	.....	1	9	3
San Francisco	503,410	122	17	.....	.....	.....	4	.....	18	7
Santa Barbara	19,441	3	.....	.....	.....	.....	.....	.....	.....	.....
Santa Cruz	10,917	2	.....	.....	.....	.....	.....	.....	.....	.....
Vallejo	21,107	3	.....	.....	.....	.....	.....	.....	.....	.....

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population Jan. 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Colorado:										
Colorado Springs	30,105	14	1	1	.....	.....	.....	.....	7	3
Denver	256,369	54	5	.....	.....	.....	1	.....	.....	9
Greeley	10,883	2	.....	.....	.....	.....	.....	.....	.....	.....
Pueblo	42,908	17	5	2	.....	.....	.....	.....	.....	1
Connecticut:										
Bridgeport	143,538	24	7	2	1	.....	6	1	9	1
Bristol	20,620	2	.....	.....	.....	.....	.....	.....	.....	.....
Derby	11,238	3	.....	.....	.....	.....	.....	.....	.....	.....
Fairfield (town)	11,475	.....	.....	.....	.....	.....	.....	.....	1	.....
Greenwich (town)	22,123	.....	.....	.....	.....	.....	.....	.....	.....	1
Hartford	138,036	42	4	.....	11	.....	3	.....	3	.....
Manchester (town)	18,370	3	.....	.....	.....	.....	1	.....	.....	.....
Meriden (town)	34,739	.....	.....	.....	.....	.....	.....	.....	2	.....
Milford (town)	10,193	2	2	.....	.....	.....	.....	.....	2	.....
New Britain	59,316	15	2	.....	.....	.....	.....	.....	.....	.....
New Haven	162,519	43	3	1	.....	.....	1	.....	1	5
New London	25,688	8	1	.....	.....	.....	1	.....	.....	.....
Norwalk	27,700	5	.....	.....	.....	.....	.....	.....	1	.....
Norwich (town)	29,685	4	.....	.....	.....	.....	.....	.....	1	.....
Stamford (town)	40,057	.....	.....	.....	.....	.....	.....	.....	2	.....
Stonington (town)	10,236	2	.....	.....	.....	.....	.....	.....	.....	1
Waterbury	91,410	27	1	.....	2	.....	2	.....	7	2
District of Columbia:										
Washington	437,571	118	4	.....	8	.....	1	.....	32	6
Georgia:										
Atlanta	200,616	63	6	1	.....	.....	1	.....	.....	4
Brunswick	14,413	3	.....	.....	.....	.....	.....	.....	.....	2
Macon	52,995	23	3	1	.....	.....	.....	.....	.....	1
Savannah	83,252	26	2	2	.....	.....	1	.....	.....	.....
Valdosta	10,783	2	.....	.....	.....	.....	.....	.....	.....	.....
Idaho:										
Boise	21,393	4	.....	.....	.....	.....	2	.....	.....	.....
Illinois:										
Alton	24,682	2	.....	.....	.....	.....	.....	.....	.....	.....
Aurora	36,397	11	1	.....	1	.....	.....	.....	.....	1
Bloomington	28,725	5	.....	.....	.....	.....	.....	.....	1	.....
Blue Island	11,424	4	1	.....	1	.....	.....	.....	.....	.....
Centralia	12,491	2	1	.....	1	.....	.....	.....	.....	.....
Chicago	2,701,705	544	80	2	21	.....	30	3	204	48
Cicero	44,995	6	1	.....	.....	.....	1	.....	.....	1
Danville	33,750	8	.....	.....	.....	.....	.....	.....	.....	.....
Decatur	43,818	9	.....	.....	.....	.....	.....	.....	.....	1
East St. Louis	66,740	11	.....	.....	.....	.....	.....	.....	1	1
Elgin	27,454	6	1	.....	.....	.....	.....	.....	1	1
Evanston	37,215	10	2	.....	.....	.....	2	.....	.....	.....
Forest Park	10,768	1	1	.....	.....	.....	.....	.....	.....	.....
Freeport	19,669	7	2	.....	.....	.....	.....	.....	1	.....
Galesburg	23,834	3	1	.....	.....	.....	1	.....	.....	.....
Jacksonville	15,713	11	.....	.....	.....	.....	1	.....	.....	1
Kewanee	16,026	4	.....	.....	1	.....	.....	.....	.....	.....
La Salle	13,050	.....	.....	.....	.....	.....	.....	.....	.....	1
Oak Park	39,830	7	2	.....	.....	.....	.....	.....	1	.....
Peoria	76,121	19	2	.....	.....	.....	3	.....	1	.....
Rockford	65,651	12	2	.....	.....	.....	2	.....	.....	.....
Rock Island	35,177	10	1	.....	.....	.....	.....	.....	2	1
Springfield	59,183	17	1	.....	.....	.....	1	.....	.....	2
Indiana:										
Bloomington	11,595	5	.....	.....	.....	.....	.....	.....	1	.....
Crawfordsville	10,139	5	.....	.....	.....	.....	.....	.....	.....	.....
Elkhart	24,277	4	.....	.....	.....	.....	.....	.....	.....	.....
Evansville	85,264	16	1	.....	.....	.....	.....	.....	.....	.....
Fort Wayne	36,549	15	3	.....	.....	.....	.....	.....	.....	.....
Frankfort	11,585	1	.....	.....	.....	.....	1	.....	.....	.....
Gary	55,378	15	2	.....	.....	.....	.....	.....	.....	1
Hammond	36,004	12	4	.....	.....	.....	.....	.....	.....	.....
Indianapolis	314,194	68	7	2	1	.....	3	.....	11	4
Kokomo	30,067	10	.....	.....	.....	.....	.....	.....	.....	1
La Fayette	22,486	6	2	.....	.....	.....	1	.....	1	.....
Logansport	21,626	6	1	.....	.....	.....	1	.....	.....	.....
Marion	23,747	5	.....	.....	.....	.....	.....	.....	.....	1
Mishawaka	15,195	6	.....	.....	.....	.....	.....	.....	.....	.....
Muncie	36,624	14	1	.....	.....	.....	2	.....	.....	3
South Bend	70,983	10	.....	.....	.....	.....	.....	.....	.....	2
Terre Haute	66,083	20	1	.....	.....	.....	1	.....	.....	1

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population Jan. 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Iowa:										
Burlington	24,057	8								
Cedar Rapids	45,566						1			
Davenport	56,727						1			
Des Moines	126,468		3				1			
Dubuque	39,141		1							
Iowa City	11,267		1							
Mason City	20,065	6								
Muscatine	16,068	10					1			
Kansas:										
Atchison	12,630		3				1		1	
Coffeyville	13,452	4	3				3		2	
Fort Scott	10,693	2							2	
Kansas City	101,177		1				2		7	
Lawrence	12,456	2								
Leavenworth	16,912		2							
Parsons	16,028	5								
Salina	15,085	6	1							
Topeka	50,022	5	3				1		4	
Wichita	72,128	24	9		1		3		3	1
Kentucky:										
Covington	57,121	19	3						1	1
Lexington	41,534	20								1
Louisville	234,891	75			7				4	6
Louisiana:										
Monroe	12,675	7								2
New Orleans	387,219	105	3						11	7
Maine:										
Auburn	16,985	3	1							
Bangor	25,978						2		1	
Biddeford	18,008	7								1
Lewiston	31,791	14			1		3			
Portland	69,272	14	3		1		1			
Sanford	10,691	1								
Waterville	13,351		1							
Maryland:										
Baltimore	733,826	195	13	1	8		6		45	16
Cumberland	29,837	13	3	1			1			
Massachusetts:										
Adams	12,967	3								
Amesbury	10,036	1	2							
Attleboro	19,731	3								
Belmont	10,749	2								
Beverly	22,561	6								
Boston	748,060	208	27	3	37	2	8		33	14
Braintree	10,580	4								1
Brockton	66,138	8					2		1	2
Brookline	37,748	6	1		1		1		2	1
Cambridge	109,694	28	4		1				4	2
Chelsea	43,184	4	1						2	
Chicopee	36,214	9	1						2	
Clinton	12,979	2					2		1	
Danvers	11,108								1	
Dedham	10,792	4								
Easthampton	11,261		1							
Everett	40,120	9	4						5	3
Fall River	120,485	33	3		1				3	2
Framingham	17,033	6			1					
Gardner	16,971	3			1					1
Greenfield	15,462	6	1							
Haverhill	53,884	16	1						5	
Holyoke	60,203	17	1		1				4	
Lawrence	94,270	23	4		1				5	3
Leominster	19,744	2							2	
Lowell	112,479	34	5						7	1
Lynn	99,148	13	1	1	13				3	
Malden	49,103	13			10				7	2
Medford	39,038	8	3		3				1	2
Melrose	18,204	8								
Methuen	15,139	3			2		1		2	
New Bedford	121,217	26	1				1		5	2
Newburyport	15,618	3							1	
Newton	46,054	11			1				1	
North Adams	22,282	4								1

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population Jan. 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Massachusetts—Continued.										
Northampton	21,951	8	1						1	
Norwood	12,627	0								
Peabody	19,552	4	1							
Pittsfield	41,751	5					1			
Plymouth	13,045	2								
Quincy	47,876	10	4		8				1	
Saugus	10,874	1			1					
Somerville	93,091	13	1	1	4				2	2
Southbridge	14,245	2			1		1			
Springfield	129,563	26	2		1		3		3	1
Taunton	37,137	10			2				2	
Wakefield	13,025	2	2		1					
West Springfield	13,443	2			2		1			
Westfield	18,604	6								
Winthrop	15,455	6			1					
Woburn	16,574	1								
Worcester	179,754	32	2		3		2		4	4
Michigan:										
Alpena	11,101						1			
Ann Arbor	19,516	12	1				1			1
Detroit	993,739	194	41	2	4		21	2	40	17
Flint	91,599	20	7	2			6			2
Grand Rapids	137,634	32	3				2		5	3
Hamtramck	48,615	12								
Highland Park	46,499	8	2				1			
Ishpeming	10,500	4								
Kalamazoo	48,858	17					3		1	1
Marquette	12,718	2								
Muskegon	36,570	6	1		1					
Pontiac	34,273	9	4	1			3			
Port Huron	25,944	6			1		1			
Sault Ste. Marie	12,096	0							3	
Minnesota:										
Austin	10,118	3								
Duluth	98,917	8	4						1	
Mankato	12,469	3								
Minneapolis	380,582	76	9		2		13		33	5
Rochester	13,722	23					1			
St. Cloud	15,873		4							
St. Paul	234,595	43	5	1	1		5		16	1
Winona	19,143	2			1		2			
Missouri:										
Cape Girardeau	10,252	7								
Independence	11,686	4							1	1
Joplin	29,855		1							
Kansas City	324,410	98	4				1		4	10
St. Joseph	77,939	36			3					
St. Louis	772,897	172	20				5	1	44	13
Springfield	39,631	15								1
Montana:										
Billings	15,100	4							1	
Great Falls	24,121	7	1							1
Missoula	12,668	7								
Nebraska:										
Lincoln	54,934	6					1			
Omaha	191,601	34	15		2			1		
Nevada:										
Reno	12,016	5								
New Hampshire:										
Berlin	16,104	3								
Concord	22,167	9								
Dover	13,029	1								
Keene	11,210	2					1		2	1
Manchester	78,384	15	1							1
New Jersey:										
Asbury Park	12,400	4								
Bayonne	76,754		1						1	
Belleville	15,660				1					
Bloomfield	22,019		2		6					
Clifton	26,470	2	3				2			1
Elizabeth	95,662		5	1	2		4		1	
Englewood	11,627	3	1				1			
Garfield	19,381	1								

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population Jan. 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
New Jersey—Continued.										
Hackensack	17,667	4	1	1					2	
Hoboken	68,166	11	3	1					5	
Irvington	25,480								1	
Jersey City	297,864	75	7	1	3		3		5	6
Montclair	28,810	5			1		1		2	
Morristown	12,548	6			2				1	1
New Brunswick	32,779									1
Newark	414,216	98	8	2	13		7		34	8
Orange	33,268	7	1		2					
Passaic	63,824	16	1		1				1	
Paterson	135,866		4		6				3	
Perth Amboy	41,707	7	4						1	
Phillipsburg	16,923	3								
Plainfield	27,700	5	1				2			2
Rahway	11,042	4					1			
Summit	10,174	3	3							
Trenton	119,289	40			8				4	4
West Hoboken	40,008	7					1	1	1	
West New York	29,926	1			3					
West Orange	15,578	0	1		1					
New Mexico:										
Albuquerque	15,157	8			1					1
New York:										
Albany	113,344		5		1				7	
Auburn	36,192	17	2							2
Buffalo	506,775	107	4	2	1		5		48	11
Cohoes	22,987	5								
Elmira	45,305	9	1		2		2			
Geneva	14,648	3		1						
Glens Falls	16,638	7								
Ithaca	17,004	2								
Jamestown	38,917	5								
Lackawanna	17,918	3	1						2	
Lockport	21,308	5								
Mount Vernon	42,726	9					1		2	2
Newburgh	30,366	6							1	2
New York	5,621,151	1,225	129	5	77	4	30	1	[1] 215	[1] 93
Niagara Falls	50,760	13					4		1	
North Tonawanda	15,452	5								
Ogdensburg	14,609	7								
Olean	20,506	6								
Peekskill	15,868	9			1				1	
Port Chester	16,573	4								
Poughkeepsie	35,000	5					1		1	
Rochester	295,750	72	6	1	2		4		10	
Rome	26,341	7	2							1
Saratoga Springs	13,181	4							1	
Schenectady	88,723	17	3		2				6	1
Syracuse	171,717	30	5		4		4		1	
Troy	72,013	17					2		2	2
Watervliet	16,073	4								
White Plains	21,031	4								
Yonkers	100,226	16	4							2
North Carolina:										
Charlotte	46,338	10							3	1
Durham	21,719	4								1
Greensboro	19,861	7								
Raleigh	24,418	13	2							1
Rocky Mount	12,742	5								1
Salisbury	13,884	0								
Winston-Salem	48,395	10	1						2	
North Dakota:										
Fargo	21,961		1				1			
Ohio:										
Akron	208,435	19	2		2		1		15	
Alliance	21,603	6	1							1
Ashtabula	22,082	4	1							
Barberton	18,811	5	1						1	
Bucyrus	10,425	3								
Canton	87,091	16	2		1		1		1	
Chillicothe	15,831	4								

[1] Pulmonary tuberculosis only.

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population Jan. 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Ohio—Continued.										
Cincinnati	401,247	98	8		1				18	7
Cleveland	796,836		22		5		10			
Columbus	237,031	64	6		1		3		2	4
Cuyahoga Falls	10,200	1					1			
Dayton	152,559	33	1				11			
East Cleveland	27,292	2								
Elyria	20,474	5								1
Fremont	12,468	1								
Hamilton	39,675	8	1	1						
Ironton	14,007	3								1
Kenmore	12,683				1		1			
Lima	41,306	8								
Lorain	37,295				2		1		1	
Mansfield	27,824	7	1							
Marion	27,891	1	1				1	1		
Middletown	23,594	3								
Newark	26,718	13								1
Niles	13,080	5	1				1			
Norwood	24,966	3								
Salem	10,305	3								1
Sandusky	22,897	7							1	
Springfield	60,840	13	6		1		1		2	1
Steubenville	28,508	8							2	
Tiffin	14,375	6								
Toledo	243,109	51	13				1			7
Youngstown	132,358		1				1			3
Zanesville	29,569	9	1							
Oklahoma:										
Oklahoma City	91,258	18	2				2		2	2
Oregon:										
Portland	258,288	37	14	2	2				2	3
Pennsylvania:										
Allentown	73,502								1	
Altoona	60,331						3			
Beaver Falls	12,802						2			
Bethlehem	50,358		1							
Charleroi	11,516						1			
Chester	58,030		1				3			
Dickson City	11,049		1						1	
Duquesne	19,011		1				6			
Erie	93,372		2						2	
Harrisburg	75,917				1					
Homestead	20,452		2				1		6	
Johnstown	67,327		1		2				1	
McKeesport	45,975		2							
McKees Rocks	16,713						1		2	
Meadville	14,568						1			
Norristown	32,319						2			
North Braddock	14,928		1							
Oil City	21,274		2				1			
Philadelphia	1,823,158	349	39	2	7		31	1	62	42
Pittsburgh	588,193		16		11		12		31	
Pottstown	17,431		1							
Reading	107,784		5		3					
Scranton	137,783		1				1			
Shenandoah	24,726		1				1			
Woodlawn	12,495		1						1	
York	47,512		1						2	
Rhode Island:										
Cranston	29,407	5								
East Providence (town)	21,793		2							
Newport	30,255	10								
Pawtucket	64,248	23	5							
Providence	237,595	47	5		6		3			
South Carolina:										
Charleston	67,957	25					2			1
Columbia	37,524						1		1	
Spartanburg	22,638	7								
South Dakota:										
Sioux Falls	25,176	6	2							

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population Jan. 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Tennessee:										
Chattanooga	57,895		3				2		1	
Knoxville	77,818								3	3
Memphis	162,351	59	4						10	5
Nashville	118,342	48			2				2	4
Texas:										
Austin	34,876	19	1							
Beaumont	40,422	4							1	
Corpus Christi	10,522	4	1							
Dallas	158,976	39	4		4				7	1
El Paso	77,543	51								10
Fort Worth	106,482		3							
Galveston	44,255	16								1
Waco	38,500	8	2							1
Utah:										
Salt Lake City	118,110	30	1	1						3
Vermont:										
Burlington	22,779	7	3							
Rutland	14,954	7								
Virginia:										
Alexandria	18,060	3								
Danville	21,539	6	4	1	2		1		1	
Lynchburg	29,956	7	1		1		1			
Norfolk	115,777						1		1	2
Petersburg	31,002	13		1	3				4	1
Richmond	171,667	47	1		4				40	3
Roanoke	50,842	17	11				1		1	2
Washington:										
Aberdeen	15,337	5							1	
Everett	27,644				2					
Seattle	315,652		3		6		4			
Spokane	104,437		1		4				1	
Tacoma	96,965		1		2				1	
Vancouver	12,637		1							
West Virginia:										
Bluefield	15,282		2							
Charleston	39,608	15	1						1	1
Fairmont	17,851		1							
Huntington	50,177	21	1							2
Martinsburg	12,515				3					
Moundsville	10,669						1			
Parkersburg	20,050	17	1							1
Wheeling	54,322	17	4		1		5			
Wisconsin:										
Appleton	19,561						3			
Beloit	21,284	6							1	
Eau Claire	20,880						1			
Fond du Lac	23,427	1	3							
Green Bay	31,017	4	2							
Janesville	18,293	3			1					
Kenosha	40,472	8								
La Crosse	30,363		1		1					
Madison	38,378	4	1	1						
Manitowoc	17,563								1	
Marinette	13,610								1	
Milwaukee	457,147		6		4		7		10	
Oshkosh	33,162	7	4						2	
Racine	55,593	9	4		2		2			1
Sheboygan	30,955						1		1	
Superior	39,624	7								
Wausau	18,661		1						1	
Wyoming:										
Cheyenne	13,829	3								

FOREIGN AND INSULAR.

ALGERIA.

Plague—District of Aumale.

Under date of August 4, 1921, five centers of plague infection were reported in the native district of Aumale, about 140 kilometers distant from Algiers, with a total of 71 cases with 22 deaths reported during the period from May 31 to July 3, 1921.

CHINA.

Chefoo—Improved Quarantine Facilities Recommended.

In view of the arrival at Chefoo, China, May 3, 1921,[1] of the Russian Volunteer Fleet steamship *Kishenev* from Vladivostok, Siberia, with two cases of plague on board, a history of a fatal case of plague occurring en route, the occurrence of 16 deaths on board up to May 6, and the subsequent escape of more than 100 contacts landed from the *Kishenev* under inadequate quarantine facilities, the consular representatives of foreign governments at Chefoo recommended, under date of May 28, 1921, the immediate establishment of adequate quarantine facilities at Chefoo.

JAMAICA.

Infectious Disease (Alastrim or Kaffir Pox).

During the week ended July 16, 1921, 212 new cases of alastrim or Kaffir pox were reported in the island of Jamaica.

Typhoid Fever—Kingston and Vicinity.

During the week ended July 16, 1921, 6 new cases of typhoid fever were reported in Kingston and 29 cases were reported in the surrounding country.

MEXICO.

Plague—Human Cases—Rodent Cases—Tampico.

During the week ended August 7, 1921, one case of plague was reported at Tampico, Mexico, and four deaths in previously reported cases. During the same period 20 plague-infected rats were found out of 2,200 rats taken.

[1] Public Health Reports, July 1, 1921, p. 1534, and July 15, 1921, p. 1655.

Yellow Fever—Tampico.

During the week ended July 17, 1921, three cases of yellow fever with two deaths were reported at Tampico.

PERU.

Plague—Yellow Fever.[1]

June 16–30, 1921: During the period from June 16 to 30, 1921, 1 case of plague was reported at Callao, Peru, and at Lima 3 cases with 1 death were reported.

During the period under report 11 cases of yellow fever with 4 deaths were reported in Peru, occurring in two localities of the Department of Libertad, as follows: Pacanga, 1 case with 1 death; Paijan, 10 cases with 3 deaths.

July 1–15, 1921: During the period July 1 to 15, 1921, plague was reported in Peru in the departments of Arequipa, Callao, and Lima, as follows: Department of Arequipa, 2 cases occurring at Mollendo; Department of Callao, 5 cases with 1 death occurring at Callao; Department of Lima, 2 cases with 2 deaths occurring at Lima City.

During the period under report 2 cases of yellow fever were reported in the Department of Libertad, 1 case being reported at Pacasmayo and 1 case at Paijan.

SIAM.

Mortality—Year Ended March 31, 1921.

During the year ended March 31, 1921, a total of 10,829 deaths was reported at Bangkok, Siam, representing a rate of 33.4 per 1,000 of population (population, 324,425). Mortality from cholera, plague, and smallpox, the only diseases stated to be reportable at Bangkok, was as follows: Cholera, 560; plague, 25; smallpox, 2. The death rate among infants and children was stated to have been very high on account of unfavorable environment and lack of knowledge of hygiene among the people.

UNION OF SOUTH AFRICA.

Influenza.

Outbreaks of influenza were reported at Port Elizabeth, Somerset East, and other localities in the Cape Province, Union of South Africa, during the week ended June 4, 1921. The disease was stated to be mild in form except at Somerset East, where more than 100 cases, some being of the pneumonic form, were reported.

At Uitenhage, Cape Province, 20 cases of pneumonic influenza with 7 deaths were reported during the period from May 1 to June 25, 1921.

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[1] Public Health Reports, July 29, 1921, p. 1785.

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

Reports Received During Week Ended Aug. 19, 1921.[1]

CHOLERA.

Place.	Date.	Cases.	Deaths.	Remarks.
India				May 8-14, 1921: Deaths, 4,628.
Bombay	June 12-18	6	6	
Madras	June 26-July 2	2		
Philippine Islands:				
Manila	June 19-25	2		
Straits Settlements:				
Singapore	June 12-18	1	1	

PLAGUE.

Algeria:				
Aumale district	May 31-July 3	71	22	Native district about 140 kilometers from Algiers.
India				June 12-18, 1921: Cases, 161; deaths, 128.
Bombay	June 5-18	20	15	
Karachi	June 26-July 2	1	1	
Madras Presidency	do	12	9	
Rangoon	June 5-11	13	9	
Mexico:				
Tampico	Aug. 1-7	1	4	Aug. 1-7, 1921: Plague rats found, 20.
Peru				June 16-30, 1921: Cases, 4; deaths, 1. July 1-15, 1921: Cases, 9; deaths, 3.
Callao	June 16-30	1		
Do	July 1-15	5	1	
Lima City	June 16-30	3	1	
Do	July 1-15	2	2	
Mollendo	do	2		Department of Arequipa.
Straits Settlements:				
Singapore	June 12-18		1	
Syria:				
Alexandretta	July 10-16	16	4	

SMALLPOX.

Canada:				
Manitoba—				
Winnipeg	June 19-25	1		
Do	June 26-July 16	3		
Ontario—				
Ottawa	July 24-30	5		
China:				
Foochow	June 19-25			Present.
Tientsin	do	5		
Do	June 26-July 2	5		
Colombia:				
Santa Marta	July 17-23			Do.
Cuba:				
Antilla	do	14		
India				May 8-14, 1921: Deaths, 430.
Bombay	June 5-18	30	17	
Karachi	June 26-July 2	2	2	
Madras	do	7		
Java:				
West Java—				
Batavia	June 10-16	1	2	
Buitenzorg	do	4		
Krawang	do	1		
Switzerland:				
Zurich	July 3-9	9		
Union of South Africa:				
Cape Province	May 29-June 4			Outbreaks.
Natal	June 12-18			Do.
Orange Free State	May 29-June 18			Do.
Transvaal	do			Do.

[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 Aug. 19, 1921—Continued.

TYPHUS FEVER.

Place.	Date.	Cases.	Deaths.	Remarks.
Algeria:				
Oran	July 10-20	7	7	
Chile:				
Valparaiso	June 26-July 2		2	
Egypt:				
Alexandria	July 9-15	2	1	
Mesopotamia:				
Bagdad	May 1-31	1	3	
Portugal:				
Oporto	July 12-18	1		
Russia:				
Latvia	May 1-31	208		
Union of South Africa:				
Cape Province	May 29-June 18			Outbreaks.
Venezuela:				
Maracaibo	June 21-27		1	

YELLOW FEVER.

Mexico:				
Tampico	July 11-17	3	2	
Peru				June 16-30, 1921: Cases, 11; deaths, 4. July 1-15, 1921: Cases, 2.
Department—				
Libertad—				
Pacasmayo	July 1-15	1		
Pacanga	June 16-30	1	1	
Paijan	do	10	3	
Do	July 1-15	1		

Reports Received from July 2 to Aug. 12, 1921.

CHOLERA.

Place.	Date.	Cases.	Deaths.	Remarks.
India				Mar. 6-May 7, 1921: Deaths, 24,690.
Bombay	May 1-June 4	5	4	
Calcutta	May 8-June 18	512	445	
Madras	May 15-June 25	3	2	
Rangoon	Apr. 24-June 4	15	14	
Indo-China				Jan. 1-31, 1921: Cases, 80; deaths, 15. May 29-June 12, 1921: Cases, 251; deaths, 202.
City—				
Cholon	June 6-12	5	4	
Saigon	May 9-June 12	65	44	
Provinces—				
Anam	Jan. 1-31	42		In January, 1920: No cases.
Cambodia	do	8	2	January, 1920: Cases, 27; deaths, 14.
Cochin-China	do	18	9	January, 1920: Cases, 13; deaths, 10.
Tonkin	do	12	4	January, 1920: No cases.
Philippine Islands:				
Manila	May 22-June 18	2		
Province—				
Batangas	June 12-18	2	1	
Pampanga	June 5-11	1	1	
Poland:				
Bialystok	July 25			Present.
Pinsk	do			Do.
Siam:				
Bangkok	Apr. 24-June 4	18	4	

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

Reports Received from July 2 to Aug. 12, 1921—Continued.

PLAGUE.

Place.	Date.	Cases.	Deaths.	Remarks.
Asia Minor:				
Smyrna	June 19–25	1		In suburb.
Brazil:				
Bahia	May 15–28	2	1	
Maranhao	June 28	1	1	
British East Africa:				
Kenya Colony—				
Kisumu	Apr. 24–May 21			Present.
Ceylon:				
Colombo	May 8–June 11	2	2	
China:				
Amoy	May 15–June 25	7	2	
Foochow	May 15–21			Do.
Hongkong	Apr. 24–June 25	82	59	May 1–7, 1921: Plague rat found.
Manchuria—				
Harbin	May 3–22	46		
Ecuador:				
Guayaquil	May 1–June 15	10	1	
Egypt				Jan. 1–June 30, 1921: Cases, 176; deaths, 78.
Cities—				
Alexandria	May 21–June 24	10	3	
Port Said	June 16–27	4	2	
Suez	May 20–June 30	9	5	One case pneumonic.
Provinces—				
Assiout	May 24–June 16	9	7	One case septicemic.
Gharbieh	June 2–25	7		
Minieh	May 28–June 10	2	1	
Hawaii:				
Paauhau	May 21	1		
India				May 1–June 11, 1921: Cases, 1,742; deaths, 1,343.
Bombay	May 1–June 4	260	182	
Calcutta	May 8–June 18	11	11	
Karachi	May 8–June 25	18	14	
Madras Presidency	May 22–June 25	112	72	
Rangoon	Apr. 24–June 4	71	66	
Indo-China				Jan. 1–31, 1921: Cases, 57; deaths, 51.
Saigon	May 23–June 12	4	1	May 8–15, 1921: 1 plague rat.
Madagascar:				
Tananarive	July 11			Present.
Mesopotamia:				
Bagdad	Apr. 1–30	5	2	
Mexico:				
Tampico	June 11–30	36		
Do	July 1–31	19	3	Infected rodents found, July 1–31, 1921: 71.
Peru				Mar. 1–31, 1921: Cases, 76; deaths, 44. Apr. 1–30, 1921: Cases, 43; deaths, 20. June 1–15, 1921: Cases, 10; deaths, 9.
Department—				
Arequipa	Mar. 1–31	2		At Mollendo.
Callao	do	7	1	At Callao.
Lambayeque	do	2	1	At Chiclayo.
Libertad	do	12	7	In 5 localities.
Lima	do	32	16	At Lima city, 20 cases, 13 deaths.
Piura	do	21	19	At Payta, Piura, and Sullana.
Ancachs	Apr. 1–30	4	1	At Huarmey.
Arequipa	do	3	3	At Mollendo.
Callao	do	8		At Callao.
Lambayeque	do	1	1	At Chiclayo.
Libertad	do	16	5	In 5 localities.
Lima	do	6	3	In Lima city, 3 cases, 1 death.
Piura	do	5	7	At Payta, Sullana, and Talara.
Libertad—				
Salaverry	June 1–15	1		
Trujillo	do	2	3	
Lima—				
Lima	do	2	3	
Piura—				
Piura	do	1		
Talara	do	4	3	
Porto Rico				Total plague-infected rats found from beginning of outbreak to July 9, 1921: 90.
Manati	July 17–23	1	1	
Martin Pena	July 3–9	1		Suburb coextensive with Santurce.

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

Reports Received from July 2 to Aug. 12, 1921—Continued.

PLAGUE—Continued.

Place.	Date.	Cases.	Deaths	Remarks.
Russia:				
Siberia—				
Vladivostok	May 1–31	141	145	
Senegal:				
Dakar	do	5	5	
Do	June 26–July 2	49	42	
Siam:				
Bangkok	Apr. 24–June 4	4	3	
Straits Settlements:				
Singapore	May 8–June 11	5	4	
Syria:				
Beirut	May 31–June 10	1		
On vessels:				
S. S. Kishenev	May 2	1		At Chefoo, China. Plague deaths en route. Vessel sent to quarantine, Kentucky Island, where to May 6 a total of 16 deaths was reported. (Public Health Reports, July 1, 1921, p. 1534.)
S. S. Oreland				At Genoa, Italy, June 12, 1921, from La Plata, Argentina. Two fatal cases plague in crew en route.
S. S. Ralph Moller	June 8	4	1	At Chefoo, China, from Vladivostok, Siberia. Three fatal cases en route. One case with fatal termination removed at Vladivostok.
S. S. Tenyo Maru				En route between Nagasaki and Kobe, Japan, June 28, 1921, 1 fatal case.

SMALLPOX.

Algeria:				
Algiers	May 1–June 30	3		
Asia Minor:				
Smyrna	May 22–28	1		On the s. s. Nicholas.
Australia:				
Victoria—				
Geelong	May 5	1		Mild.
Melbourne	Apr. 9–23	4	1	Mild epidemic.
Bolivia:				
La Paz	Apr. 1–30	5	4	
Brazil:				
Pernambuco	Mar. 28–May 22	28	4	
Rio de Janeiro	May 8–June 18	11	2	
British East Africa:				
Kenya Colony—				
Zanzibar	May 8–14	12	4	Origin India.
Bulgaria:				
Sofia	May 15–31	6		
Canada:				
Alberta—				
Calgary	May 26–June 18	3		
British Columbia—				
Vancouver	May 28–June 11	5		
Manitoba—				
Winnipeg	May 28–June 18	5		
New Brunswick—				
Charlotte County	July 10–16	7		
Restigouche County	June 19–25	1		
Westmoreland County	June 26–July 2	2		
Nova Scotia—				
Sydney	June 5–18	2		
Do	June 26–July 2	4		
Ontario—				
Hamilton	June 12–18	3		
Do	July 3–9	1		
Kingston	June 5–11	1		At two localities in vicinity, 2 cases.
London	June 5–25	2		
Montreal	June 12–18	1		
Do	July 17–23	1		
North Bay	June 11–25	3		
Do	June 26–July 9	2		

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

Reports Received from July 2 to Aug. 12, 1921—Continued.

SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Canada—Continued.				
Ontario—Continued.				
Ottawa	June 12-25	21		
Do	June 26-July 16	28		
Toronto	June 12-25	5		
Do	June 26-July 2	3		
Saskatchewan—				
Regina	June 5-25	3		
Do	July 10-16	3		
Saskatoon	June 7-27	3		
Chile:				
Antofagasta	May 16-June 19	228	106	
Arica	May 31	2		
Mejillones	May 30-June 5			Present. Also at interior nitrate plants.
China:				
Amoy	May 8-June 4		4	June 5-25: Present.
Antung	May 16-June 26	12	2	
Canton	Apr. 1-30			Present.
Chungking	May 1-June 25			Do.
Foochow	May 8-June 11			Do.
Hankow	May 15-21	4	1	
Hongkong	Apr. 24-June 25	99	84	
Manchuria—				
Dairen	May 9-June 19	39	4	
Harbin	May 16-June 13	5		
Mukden	May 22-June 11			Do.
Do	July 3-9			Do.
Nanking	May 8-June 18			Do.
Shanghai	June 20-26	1		
Tientsin	May 8-June 11	26		Mission hospital.
Tsingtau	May 9-June 12	4	1	
Chosen (Korea):				
Chemulpo	May 1-31	7	2	
Fusan	do	11	3	
Gensan	do	5	2	
Seoul	do	1		
Colombia:				
Santa Marta	June 5-25			Present.
Do	June 26-July 16			Do.
Cuba:				
Antilla	June 5-25	7		
Do	June 26-July 16	29		
Cienfuegos	do	1		
Matanzas	June 12-18	1	1	
Do	July 3-9	1		
Nuevitas	July 4-10	6		
Santiago	June 1-30	28	2	
Do	July 1-10	9	1	
Ecuador:				
Guayaquil	May 1-June 15	30		
Egypt:				
Cairo	Mar. 19-Apr. 29	2	1	
Port Said	Apr. 2-May 20	10		
Finland	May 1-15	1		
France:				
Brest	May 22-June 4	18		
Rouen	May 1-29	2		
Germany				Apr. 24-May 28, 1921: Cases, 12. Additional, Apr. 17-May 7, 1921: Cases, 57; deaths, 7.
Great Britain:				
Nottingham	May 29-June 4	1		
Southampton	June 26-July 2	1		
Greece:				
Saloniki	June 6-12		1	
Haiti:				
Cape Haitien	June 19-25	24	2	
Do	June 26-July 16	49	2	
India				Mar. 20-May 7, 1921: Deaths, 2,464.
Bombay	May 1-June 4	49	29	
Calcutta	May 8-June 11	7	7	
Karachi	May 29-June 25	25	17	
Madras	May 8-June 25	33	11	
Rangoon	Apr. 24-June 4	20	3	

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

Reports Received from July 2 to Aug. 12, 1921—Continued.

SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Indo-China				Jan. 1–31, 1921: Cases, 102; deaths, 15.
City—				
Saigon	May 9–15	2	1	
Provinces—				
Anam	Jan. 1–31	35		January, 1920: Cases, 16; deaths, 3.
Cambodia	do	21	3	January, 1920: Cases, 139; deaths, 54.
Cochin-China	do	19	12	January, 1920: Cases, 8; deaths, 1.
Tonkin	do	27		January, 1920: Cases, 224; deaths, 43.
Italy:				
Catania				Province: June 6–20, 1921: Cases, 5.
Genoa	Apr. 1–May 31	11		
Messina	May 23–June 26	2	1	
Palermo	May 18–June 14	6	1	
Milan	Apr. 1–30	2		
Japan:				
Kobe	May 24–June 26	3		
Nagasaki	May 23–June 26	6	1	
Java:				
West Java—				
Bandoeng	May 27–June 3	1		
Batavia	May 6–June 9	10	7	
Buitenzorg	Apr. 29–June 9	11		
Garoet	May 6–12	1		
Krawang	Apr. 29–June 3	28	2	
Lebak	Apr. 29–May 26	12	2	
Pandeglang	June 3–9	1		
Jugoslavia				May 7–13, 1921: Cases, 83; deaths, 20.
Mesopotamia:				
Bagdad	Apr. 1–30	3	1	
Mexico:				
Tampico	July 11–20	1		
Chihuahua	May 23–June 27		3	
Mexico City	May 15–June 25	246		
Do	June 26–July 2	25		
San Luis Potosi	July 17–23		1	
Vera Cruz	June 13–19		1	
Do	July 11–17		1	
Panama				Jan. 1–June 10, 1921: Cases, 192; of which 32 were nonresidents.
Canal Zone	Jan. 1–June 10	2		
Colon	do	111		
Panama	do	47		
Poland				Mar. 1–Apr. 30, 1921; Cases, 1,117; deaths, 142.
District—				
Bialystok	Mar. 1–Apr. 30	3		
Cracovia	do	56	6	
Kielce	do	180	26	
Leopol	do	52	16	
Lodz	do	72	9	
Lubin	do	397	30	
Posen	do	26	2	
Silesia	do	10		In Teschen.
Stanislawow	do	30	5	
Tarnopol	do	156	31	
Warsaw	do	26	4	
Warsaw City	do	90	13	
Portugal:				
Lisbon	May 15–June 18		32	
Oporto	June 19–25	1		
Portuguese East Africa:				
Lourenco Marques	May 8–28	8		
Rumania:				
District—				
Hotin	Apr. 1–30	40	9	
Orhei	Mar. 1–31	2		
Russia:				
Province—				
Esthonia	Apr. 1–30	6		
Latvia—				
Riga	do	26		
Senegal:				
Dakar	May 1–31	1	1	
Spain:				
Barcelona	May 12–June 22		13	
Malaga	May 1–31		34	
Tarragona	May 9–15		1	
Valencia	May 22–28	1		
Do	July 2–9	5		

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

Reports Received from July 2 to Aug. 12, 1921—Continued.

SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Switzerland:				
Zurich	May 28–June 11	10		
Syria:				
Aleppo	Apr. 9–16			Present.
Beirut	May 10–30	1	1	
Tunis:				
Tunis	May 30–June 17	2	3	
Do	July 2–8	1	2	
Turkey:				
Constantinople	June 12–25	5		
Do	June 26–July 2	6		
Union of South Africa:				
Cape Province	Apr. 24–May 7			Outbreaks.
Natal	do			Do.
Orange Free State	do			Do.
Transvaal	May 22–28			Do.

TYPHUS FEVER.

Algeria:				
Algiers	May 1–June 30	109	25	
Oran	May 22–June 30	41	30	
Asia Minor:				
Smyrna	June 12–18	1		In district.
Bolivia:				
La Paz	Apr. 1–30	32	39	
Brazil:				
Porto Alegre	June 19–25		3	
Chile:				
Concepcion	Apr. 12–June 20		8	
Valparaiso	Mar. 27–May 28		4	
China:				
Antung	May 30–June 5	1		
Hankow	May 22–June 11	3		
Manchuria—				
Harbin	May 23–29	1		
Chosen (Korea):				
Fusan	May 1–31	1		
Gensan	do	2		
Seoul	do	1		
Czechoslovakia:				
Prague	June 5–26	5	2	
Egypt:				
Alexandria	May 21–June 23	21	8	
Do	June 24–July 1	8	3	
Cairo	Mar. 19–May 6	94	39	
Port Said	Apr. 2–May 13	8	2	
Finland	May 1–15	5		
Germany				Apr. 24–June 4, 1921: Cases, 7.
Hamburg	May 27–June 4	1		
Great Britain:				
Dublin	May 29–June 4	1		
Greece:				
Saloniki	May 23–June 26	21	6	
Do	June 27–July 3	1		
Japan:				
Nagasaki	May 23–June 5	7	2	
Jugoslavia				Jan. 30–Mar. 13, 1921: Cases, 109; deaths, 15.
Belgrade	May 1–14	6		
Zagreb	June 19–25	3		
Mexico:				
Mexico City	May 15–June 25	102		Including municipalities in Federal district.
Do	June 26–July 2	29		
Poland				Mar. 1–Apr. 30, 1921: Cases, 11,489; deaths, 1,131.
District—				
Bialystok	Mar. 1–Apr. 30	853	45	
Cracovia	do	603	90	
Kielce	do	848	62	
Leopol	do	2,508	277	
Lodz	do	521	53	
Lublin	do	1,446	83	
Posen	do	77	5	
Silesia	do	26		In Teschen.
Stanislawow	do	1,557	232	
Tarnopol	do	1,855	194	
Warsaw	do	972	61	
Warsaw city	do	223	29	

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

Reports Received from July 2 to Aug. 12, 1921—Continued.

TYPHUS FEVER—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Rumania:				
District—				
Hotin	Apr. 1-30	107	10	
Orhei	Mar. 1-31	80	.....	
Russia:				
Province—				
Esthonia	Apr. 1-May 31	98	.....	
Latvia	Apr. 1-30	209	.....	
Siberia—				
Vladivostok	Mar. 1-May 31	5	2	
Spain:				
Madrid	May 1-31	.....	1	
Syria:				
Beirut	May 20-June 10	1	1	
Tunis:				
Tunis	June 11-17	.....	3	
Turkey:				
Constantinople	May 22-June 18	11	.....	
Do	June 26-July 9	7	.....	
Union of South Africa:				
Cape Province	.....	.....	.....	Apr. 24-May 28, 1921: Outbreaks.
Capetown	May 13-19	10	3	At native cantonment in vicinity.
East London	May 22-28	.....	1	
Orange Free State	.....	.....	.....	Apr. 24-May 28, 1921: Outbreaks.

YELLOW FEVER.

Mexico:				
Alamo	June 1-30	10	.....	State of Vera Cruz.
Vera Cruz	June 13-27	7	.....	
Peru	.....	.....	.....	Mar. 1-31, 1921: Cases, 66; deaths, 25. Apr. 1-30, 1921: Cases, 106; deaths, 32. In 13 localities.
Department—				
Lambayeque—				
Chiclayo	Mar. 1-31	20	10	
Chongollape	do	2	2	
Ferrenafe	do	.....	1	
Lambayeque	do	15	5	
Monsefu	do	18	4	
Motupe	do	1	1	
Pomalca	do	5	1	
Villa Eten	do	5	1	
Callao—				
Callao	Apr. 1-30	1	.....	At quarantine station. From Chiclayo.
Lambayeque—				
Chiclayo	do	23	5	
Chongollape	do	10	1	
Jayanca	do	5	2	
Lambayeque	do	5	2	
Monsefu	do	8	5	
Motupe	do	45	11	
Olmos	do	2	4	
Villa Eten	do	2	.....	
Zana	do	1	.....	
Libertad—				
Guadalupe	do	2	.....	
Pueblo Nuevo	do	1	1	
Trujillo	do	1	1	Country.
Lambayeque—				
Chiclayo	June 1-15	4	3	
Monsefu	do	3	.....	
Pacora	do	1	.....	
Libertad—				
Casa Grande	do	1	.....	Farm.
Pacanga	do	1	1	
Paijan	do	3	4	
Trujillo	do	1	1	