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IMMUNIZATION WITH INACTIVE VIRUS OF INFLUENZA B: COMPARISON OF ANTIBODY RESPONSE WITH THAT PRODUCED BY INFECTION[1]

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Immunization of human beings with formalinized preparations of the virus of influenza A has been tried extensively. Earlier experiments were inconclusive or negative (*1–3*), but more recent studies (*4–6*) have indicated partial protection against infection amounting to a reduction of incidence by about one-half. The discovery of strains of virus (influenza B) not antigenically related to the type A virus (*9, 10*) made necessary the development of a vaccine against influenza B. Experiments on immunization with a formalinized allantoic fluid culture of this virus were therefore undertaken. The effectiveness of the vaccine cannot be adequately determined until an epidemic of influenza B occurs among the groups inoculated, but some indication of its antigenicity may be obtained from a comparison of the antibody response of vaccinated individuals with the antibody response resulting from infection of another group during an epidemic of influenza B.

MATERIALS AND METHODS

Preparation of vaccine.—Allantoic fluid passages done by the method of Nigg, Crowley, and Wilson (*7*) and amniotic fluid passages by the procedure of Burnet and Lush (8) were started from the

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eighty-fourth mouse-lung passage of the virus of influenza B, strain Lee. Most of the vaccine was made from the allantoic fluid and chorio-allantoic membranes of embryos inoculated into the allantoic sac with a 1:10 dilution of infected amniotic or allantoic fluid. A small lot of vaccine was also prepared from the amniotic fluid of embryos inoculated in the amnion; but there was no evidence that this was superior to the preparations from the allantoic fluid and membranes, and the yield was smaller. Embryos 9 to 11 days old were inoculated. After 48 to 72 hours' incubation the eggs were opened, the allantoic and amniotic fluids withdrawn, and the membranes and embryos separated. Pools of fluids, chorio-allantoic membranes, and embryos from 6 to 12 eggs were titrated separately by intranasal inoculation of mice. Fluids or 10 percent suspensions of membranes which killed half of the number of mice with typical lung lesions at a dilution of 1:1,000 to 1:10,000 were saved for vaccine. Lots with lower titers were discarded. In the minced embryos from which the heads and feet had been removed, the virus titered 1:100 or less. Consequently, the embryos were not used for the preparation of vaccine.

Each lot of vaccine was tested for bacterial contamination by the usual methods and for possible neurotropic viral contaminants by intracerebral inoculation of mice. A small proportion of the mice inoculated intracerebrally died after 6 to 7 days with symptoms suggesting encephalitis. The brains of these mice showed marked congestion. This might have been due either to a neurotropic property of the Lee strain itself or to some other virus introduced during the course of the intranasal mouse passages. The egg-adapted virus was specifically neutralized by sera from persons convalescent from influenza B. Preliminary experiments indicated that there was no specific neutralization of the agent which produced neurological signs in mice after intracerebral inoculation.

Because of the foregoing observations it was considered inadvisable to use the active influenza B virus for inoculation of human volunteers. The virus was inactivated by adding 0.14 to 0.20 percent of formaldehyde. All lots of vaccine were then stored in the liquid state at 4° C. for 10 to 20 days until a few minutes before use. Tests for viral activity were done by intranasal and intracerebral inoculation of mice. Mice inoculated intraperitoneally with 0.5 cc. of undiluted preparation and tested 2 weeks later by intranasal inoculation were protected against the production of lung lesions by 1,000 M.L.D. of the Lee strain.

Combined vaccination against influenza A and B.—Human volunteers mostly 20 to 30 years of age were inoculated subcutaneously into the left arm with 1 cc. of the influenza B vaccine. At the same time 1 cc.

of the complex influenza A-distemper vaccine[3] of Horsfall and Lennette *(11)* was inoculated into the right arm of each person. The circumstances under which this work was done made it necessary to use both vaccines at once. Blood specimens were collected from a representative group of those vaccinated before and 2 weeks after vaccination.

Neutralization tests.—Varying 4-fold dilutions of serum inactivated at 56° C. for 30 minutes were mixed with constant amounts of virus in mouse lung suspensions of the strain Lee. The dilution of mouse lung was 1 to 2 percent, representing about 10 to 20 M.L.D. The serum virus mixtures were incubated for 30 minutes at 37° C., and each dilution of serum plus virus was then inoculated intranasally into 3 Swiss mice. The lung lesions in mice dying and in those surviving for 10 days were recorded. The end point was taken as the highest even dilution of serum which protected mice against death and prevented the consolidation of more than 50 percent of the lung tissue *(12)*. Titers were stated in terms of the reciprocal of the original dilution of serum before the addition of an equal part of virus suspension.

NEUTRALIZING ANTIBODIES OF THE VACCINATED GROUP COMPARED WITH CASES OF INFLUENZA B

Degree of increase.—The neutralizing antibody titers of acute and convalescent serum specimens taken about 2 weeks apart from a group of 70 influenza patients who were studied during an epidemic of influenza B in the winter of 1940 *(13)* were compared with pre- and postvaccination serum specimens from 63 persons receiving the influenza B vaccine. The vaccinated and infected groups were comparable in age but could not in other respects be considered as strictly identical samples of the population.

From the results shown in table 1 it is evident that more of the influenza patients showed large increases in antibodies than did persons in the vaccinated group. Further analysis of the data indicates that this effect was related to the differences in initial antibody titers of the vaccinated and infected groups. Seventy-two percent of the influenza patients had antibody titers of 2 or less at the time of onset, while only 16 percent of the vaccinated group had comparably low titers before vaccination. In these groups with low initial titers, the mean increase resulting from infection was 17 times while that resulting from subcutaneous inoculation of formalinized virus was 22 times. In the smaller group of cases with initial titers of 4 to 8, the mean increase in antibodies was only 3.4 times while that of the comparable vaccinated group was 5.5 times. The least increase in

[3] This vaccine was supplied by the New York laboratories of the International Health Division of The Rockefeller Foundation.

antibodies occurred in the vaccinated group with initial titers of 16 or over which comprised 41 percent of the total.

TABLE 1.—*Increase in neutralizing antibodies following vaccination with inactive virus of influenza B compared with infection*

Group and number tested	Initial titers	Percent of total	Number showing increase after 14 to 28 days of—					Mean of antibody increase [1]
			0	Twice	4 to 8 times	16 to 32 times	Over 32 times	
Influenza cases (70)	0-2	72	5	3	14	19	10	17.0
	4-8	22	7	5	3	1	0	3.4
	16-32	6	2	1	0	0	0	----------
Vaccinated (63)	0-2	16	1	0	2	5	2	22.0
	4-8	43	3	7	15	2	0	5.5
	16-32	41	10	8	8	0	0	----------

[1] Geometric mean of the ratios of prevaccination to postvaccination titers or preinfection to postinfection titers. Does not include those showing no increase in titer.

There is at present no evidence that infection with influenza virus fails to elicit an antibody response in some persons, but this possibility should be kept in mind, especially when cases with high initial antibody titers are considered. Because of this uncertainty, the data for sera showing no increase in antibodies in the infected and vaccinated groups alike were not included in the calculation of the mean increase in antibodies. Only 4 persons with initial titers between 0 and 8 failed to develop more antibodies after vaccination.

Antibody levels 2 weeks after infection or vaccination.—In figure 1 the distribution of antibody levels of 54 convalescent sera is compared with

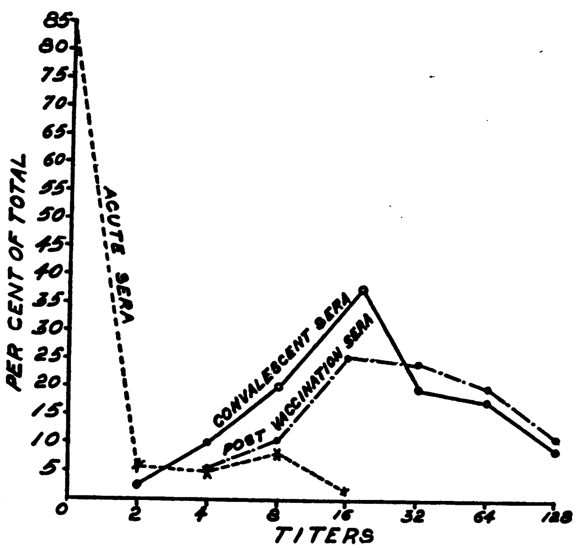

FIGURE 1.—Distribution curves for the neutralizing antibodies of acute and convalescent sera from influenza B patients and sera after vaccination with formalinized virus of influenza B.

postvaccination levels in 63 sera. It is apparent that the curve for the cases which showed an increase in antibodies is similar in location and form to the curve for the vaccinated group which includes individuals both with and without an increase in antibodies. The dotted line showing the titers in 54 acute-phase serum specimens is included for comparison. Roughly 90 percent of the sera from influenza convalescents and from vaccinated persons had a titer of 8 or above, while only 10 percent of the acute-phase sera showed this level of antibodies.

The results presented in table 1 and figure 1 indicate that, as far as circulating antibodies are concerned, the response resulting from vaccination with formalinized influenza B virus, prepared as described, is similar to that resulting from infection.

RESPONSE OF COMPLEMENT-FIXING ANTIBODIES

The results presented in table 2 indicate that the increase in complement-fixing antibodies after vaccination with the inactive influenza B virus was less definite than the response to infection. This is in contrast to the results with neutralization (compare table 1). In the infected group the mean increase in complement-fixing antibodies exceeded the mean increase in neutralizing antibodies. In the vaccinated group, on the other hand, the mean increase in complement-fixing antibodies was less than the mean increase in neutralizing antibodies. Discrepancies between complement fixation and neutralization tests are indicated by the footnotes to table 2. Failure to detect an increase in complement-fixing antibodies in pairs of sera showing an increase in neutralizing antibodies may have been due in part to the lack of a sufficiently sensitive type B antigen. In some of the vaccinated individuals the increase in complement fixation titers may have been exaggerated by a slightly increased reactivity of the post-vaccination specimens with normal mouse lung.

TABLE 2.—*Increase in complement-fixing antibodies following vaccination with inactive virus of influenza B compared with infection*

Group and number tested	Initial titers	Percent of total	Number showing increase after 14 to 28 days of—					Mean of antibody increase
			0	Twice	4 to 8 times	16 to 32 times	Over 32 times	
Influenza cases (45)	0–2	71	[1]6	1	1	16	8	31.0
	4–8	27	2	1	7	2	0	6.7
	16–32	2	0	1	0	0	0	----------
Vaccinated (43)	0–2	14	0	0	4	2	0	10.0
	4–8	56	1	[3]13	8	2	0	2.8
	16–32	30	[2]6	[3]7	0	0	0	----------

[1] 4 of these cases showed an increase in neutralizing antibodies.
[2] 4 out of 6 persons in this group showed an increase in neutralizing antibodies.
[3] 2 persons in these groups showed no detectable increase in neutralizing antibodies.

COMPARISON OF NEUTRALIZING ANTIBODY RESPONSE TO INFLUENZA A AND B FOLLOWING COMBINED VACCINATION

In the course of these studies the question arose as to whether or not human beings receiving influenza A and B viruses in two separate inactive formalinized preparations responded with the production of antibodies in equal degree to both. Many of the sera studied had high initial neutralizing antibody titers either to the type A or to the type B influenza virus. Consequently the increases in these cases were not comparable because of the difference in initial levels.

The pre- and postvaccination antibody titers against influenza A and B in a group having similar titers to both viruses before vaccination are summarized in table 3. It is obvious that some individuals showed a marked increase to influenza A, but little or none to influenza B, while the reverse was true in other cases. Less than half of the group showed any indication of equivalent response to both antigens.

TABLE 3.—*Comparison of neutralizing antibody responses to influenza A and B after combined vaccination of individuals having similar initial antibody titers for both viruses*

Initials	Titer influenza A		Titer influenza B	
	Prevaccination	Postvaccination	Prevaccination	Postvaccination
N. B.	4	4	4	32
V. L. S.	4	96	0	0
R. T.	4	96	8	8
B. C. G.	8	16	8	64
V. C. D.	8	32	8	32
H. R. L.	8	96	8	16
H. P.	8	16	8	16
J. L. D.	16	64	8	32
F. R. F.	16	64	16	64
M. E. N.	32	128	16	16
J. C. D.	32	96	32	32
J. D. G.	64	128	16	32

SUMMARY AND CONCLUSIONS

When the degree of antibody increase following vaccination and infection with the virus of influenza B is considered, the two groups, infected and vaccinated, are not strictly comparable because the initial antibody titers tend to be higher in the vaccinated group. However, it appears that the subcutaneous injection of inactive virus raises the titers of neutralizing antibodies to a level similar to that following infection. The less definite response of complement-fixing antibodies in the vaccinated group indicates that the antigenic stimulus produced by the inactive virus was not identical with that of infection.

Because of the present uncertainty as to the role of circulating antibodies in immunity to viruses, claims for effectiveness of any vaccine should not be based on considerations of antibody response. The results just reported indicate that formalinized allantoic fluid preparations of the virus of influenza B have a relatively high antigenicity as judged by the production of neutralizing antibodies.

REFERENCES

(*1*) Smith, W., Andrewes, C. H., and Stuart-Harris, C. H.: Med. Res. Council, Special Report No. 228, p. 141 (1938).
(*2*) Stuart-Harris, C. H., Smith, W., and Andrewes, C. H.: The influenza epidemic of January–March, 1939. Lancet, **1**: 205–211 (1940).
(*3*) Taylor, R. M., and Dreguss, M.: An experiment in immunization against influenza with a formaldehyde-inactivated virus. Am. J. Hyg. **31**: Sec. B, 31–35 (1940).
(*4*) Martin, W. P., and Eaton, M. D.: Experiments on the immunization of human beings against influenza A. Proc. Soc. Exp. Biol. and Med., **47**: 405–409 (1941).
(*5*) Horsfall, F. L., Jr., Lennette, E. H., Rickard, E. R., and Hirst, G. K.: Studies on the efficacy of a complex vaccine against influenza A. Pub. Health Rep., **56**: 1863–1875 (1941).
(*6*) Brown, J. W., Eaton, M. D., Meiklejohn, G., Lagen, S. B., and Kerr, W. J.: An epidemic of influenza: Results of prophylactic inoculation of a complex influenza A-distemper vaccine. J. Clin. Invest., **20**: 663–669 (1941).
(*7*) Nigg, C., Crowley, J. H., and Wilson, D. E.: On the use of chick embryo cultures of influenza virus in complement fixation tests. Science, **92**: 603–604 (1940).
(*8*) Burnet, F. M.: Influenza virus infections of the chick embryo lung. Brit. J. Exp. Path., **21**: 147–153 (1940).
(*9*) Francis, T., Jr.: A new type of virus from epidemic influenza. Science, **92**: 405–408 (1940).
(*10*) Magill, T. P.: A virus from cases of influenza-like upper respiratory infection. Proc. Soc. Exp. Biol. and Med., **45**: 162–164 (1940).
(*11*) Horsfall, F. L., Jr., Lennette, E. H., and Rickard, E. R.: A complex vaccine against influenza A virus. J. Exp. Med., **73**: 335–355 (1941).
(*12*) Eaton, M. D.: Experimental immunization of mice with the virus of epidemic influenza. J. Immunol., **39**: 43–55 (1940).
(*13*) Eaton, M. D., and Beck, M. D.: A new strain of virus of influenza B isolated during an epidemic in California. Proc. Soc. Exp. Biol. and Med., **48**: 177–180 (1941.)

OBSERVATIONS ON EXPERIMENTAL MALARIA CONTROL DRAINAGE DITCH LININGS [1]

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INTRODUCTION

"Building malaria out" is a term in common usage among malaria control workers. The term may be defined as precluding the creation of anopheline (malaria-transmitting) mosquito breeding places by the inclusion of antimosquito breeding provisions in the design, construction, and maintenance of engineering works which involve both natural

[1] From the Division of Infectious Diseases, National Institute of Health.

and artificial bodies of water. This principle frequently is applied in the case of water impoundages, highways, railroads, flood control works, and other projects wherein "man-made" mosquito-breeding places could result. The practice is followed when the inverts of drainage ditches are lined with impervious materials and otherwise stabilized to promote durability. The stabilization of such ditches is a more permanent, a more positive, and generally a less expensive method of mosquito control than recurrent cleaning, grading, and larvicidal operations.

Lined ditches are not advocated to the exclusion of all other types of drainage. In many instances open earth ditches are entirely adequate and frequently only funds for their cheaper initial construction can be provided. On the basis of their long life, efficiency, and their generally lower total cost, i. e., construction and maintenance, lined ditches should be the choice where the finances of the community will allow (fig. 1).

Ditch lining is important in the field of malaria control as is evidenced by the extent of its use. (See fig. 2.)

The Public Health Service, through the Office of Malaria Investigations, has conducted studies of concrete and brick ditch linings. These studies were initiated on a small scale, during the latter part of 1930, in the city of Memphis and in Shelby County, Tennessee. They were intensified from 1936 through 1938. These studies have served as an important impetus to the practice of ditch stabilization by malaria control engineers in the United States.

The chief purpose of the investigations was to develop ditch linings which could be constructed at minimum cost, without sacrifice of durability. Leanest concrete mixes and thinnest slab sections permissible as well as simplicity in construction methods were among the principal objectives of the studies.

The removal of residual water within the time limit of the incubation period of mosquitoes is of extreme importance in the control of mosquito production. From this standpoint, the lined ditches have functioned satisfactorily with a negligible requirement of repair. Repair purposely has been withheld in order that the ditches might be subjected to conditions equivalent to those most demanding in the field. The experimentally lined ditches have been in service for periods varying from 2 to 10 years, and their durability appears to be that expected from concrete and brick materials. Their general condition to date leaves little to be desired from the standpoints of stability, durability, and residual water removing efficiency.

Monolithic concrete linings, linings of brick, and of precast concrete slabs were considered in the studies. Observations on these experimental projects are presented.

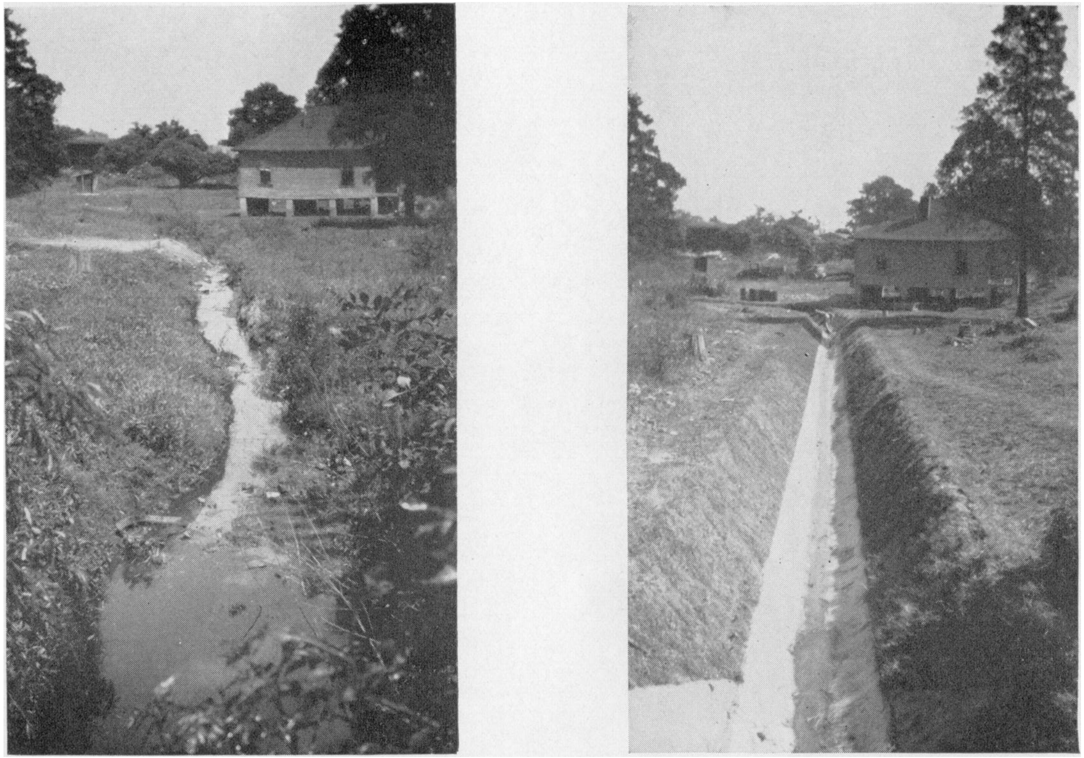

FIGURE 1.—Before and after installation of durable malaria control drainage. (Photographs by courtesy of Nelson H. Rector, Mississippi State Board of Health.)

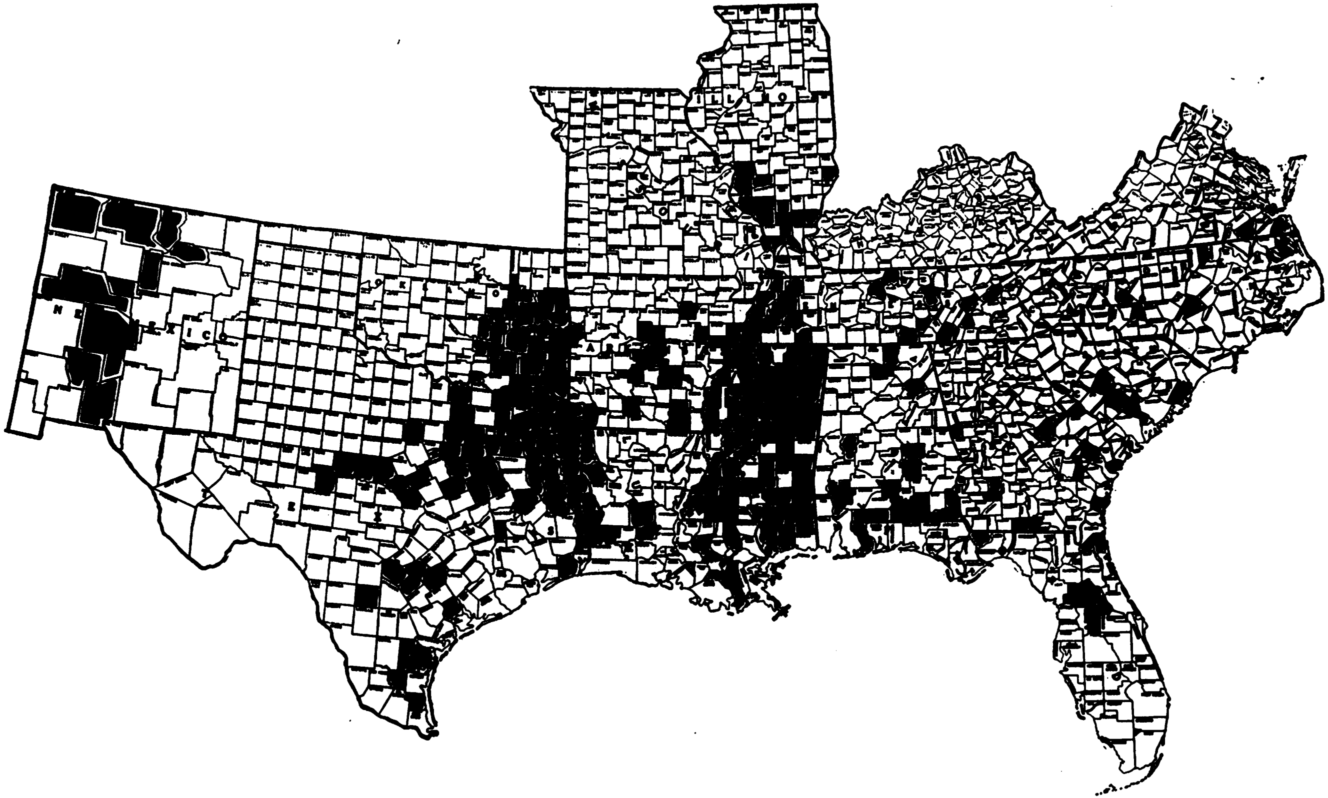

FIGURE 2.—Counties in which durable malaria control drainage projects were being carried on as of December 31, 1940.

PRELIMINARY CONSIDERATION

For the most part, the ditches selected for study were typical "field ditches" 3 to 4 feet deep. Effort was concentrated on search for linings suitable for small ditches as encountered in suburban, small town, village, and heavily populated rural situations, since here lies the greatest present need for an inexpensive, easily constructed ditch lining.

The experimental linings constructed in the inverts of the ditches vary from 24 to 90 inches in width and average about 30 inches. In most cases ditch banks were sloped 1½ to 1. Grades generally are under 1 percent. Topography of the area is gently sloping. For the period of record, temperature and precipitation reported for the area (*1*) was as follows:

Temperature = average 61.9° F.
absolute lowest −9° F.
absolute highest 106° F.
Precipitation = average for year 48.15 in.
greatest in 24 hrs. 10.48 in.
Freezes and thaws over past 4 years [2] = 146

Soil in the area is classified as Memphis silt loam (*2*). Vegetation cover, for the most part, consists of cultivated fields and pasture lands with an occasional small growth of hard woods.

The linings were designed to cover the ditch bottoms and extend up the banks a few inches above the observed erosion line. These factors were determined by inspection in the field. Following installation of the linings the ditch banks were "blanket sodded" with Bermuda grass sod, in most instances.

Cross section of a typical lining installation in a ditch three feet deep, with banks sloping 1½ to 1, is shaped like the arc of a circle, having a radius of 1.25 feet; the chord measures 2 feet, the arc 2.5 feet, and the depth or rise of chord 6 inches.

Inspections of the lined ditches have been made at periods following decided seasonal changes, most often during the spring and fall, and also following times of heavy rainfall.

PLAIN MONOLITHIC CONCRETE LININGS

After rough excavation, grade stakes were set above the established grade line a distance corresponding to the thickness of the lining, and final or finish grading was then done. These stakes were set at 5- or 10-foot intervals on the center line of the ditch. A nail was set in each stake to guide the measurements in locating the edges of the lining. Wooden forms were then set in place. (See fig. 3.) The

[2] Period during which majority of linings were in place.

type of form chosen depended on the thickness of the lining to be placed. If a 2-inch slab was to be cast, S4S two by fours 12 feet long were used; these sizes varied with the thickness of the proposed lining. Three-quarter inch holes were bored on the center line of the forms, 6 inches from each end and in the middle of each form. Tapered pins of either wrought iron or wood, about 6 inches long, were driven through the holes into the earth to secure the forms in place. No nails were used in placing the forms. Forms for 100 feet of lining were set at one operation. A cross-section form for a 1-inch expansion joint was set at each end of the 100-foot sections. One-half the chord of the arc of the cross section of the lining was established. This figure was used in locating the position of the forms, by hand rule, with relation to the nails in the center-line grade stakes. With all material at hand, 16 minutes was the average time required for two men to set forms for 100 linear feet of ditch lining. Before the concrete was placed the ground was "wetted down" by sprinkling to prevent the absorption of water from the freshly cast concrete slab.

A 3½ cubic foot batch concrete mixer was used on all projects. Mixer runs were timed 1 full minute or more. All materials necessary for 200 linear feet of lining were placed at 200-foot intervals along the ditch bank. The mixer was located on the bank, with room enough between the mixer and the ditch for man and wheelbarrow to pass. For the most economical operation, it was found that three men were sufficient. One man measured and fed the material into the mixer. This man also operated the mixer. A second man wheeled the concrete from the mixer to location. A third man used shovel, float, straight edge, and template to place the concrete in the form.

A straight edge reaching from grade stake to grade stake was used in finishing to assure a uniform flow line. A cross-section template was used to obtain uniformity in cross section.

In most instances header walls (key or curtain walls) 2 inches thick and 12 inches deep were constructed at the upstream ends of slabs. Arrangements for this wall were completed before any concrete was poured. Weep holes 1 inch in diameter were placed in the bottom of the invert lining at 10-foot intervals by means of plugs set through the fresh concrete.

Forms were removed immediately following pouring and shaping. The concrete was cured by covering with 2 inches of wet earth and allowing the earth to remain for 10 days except in cases where curing intentionally was omitted for study purposes.

Forms were kept well covered with a coat of heavy oil.

Data on materials used and other pertinent information are as follows:

Cement.—Standard grade Portland cement (made in U. S. A.).

Water.—Memphis city water.

Water-cement ratio.—6 to 7 gallons of water per sack of cement.
Character of concrete.—"Moist, stiff and workable".
Cement and aggregate mixes.—1:2:4 to 1:3:6 and 1:4:5.
Range of ratio of fine aggregate to coarse aggregate:
Using ⅜ in. coarse aggregate—0.33 to 0.44.
Using ¾ in. coarse aggregate—0.33 to 0.44.

Graduation of aggregates:	Percent
Sand, passing ⅜-inch sieve	100.0
Sand, passing No. 4 sieve	100.0
Sand, passing No. 16 sieve	82.8
Sand, passing No. 50 sieve	5.4
Sand, passing No. 100 sieve	.7
¾ inch coarse, passing 1-inch sieve	100.0
¾ inch coarse, passing ¾-inch sieve	100.0
¾ inch coarse, passing ½-inch sieve	90.6
¾ inch coarse, passing ¼-inch sieve	39.0
¾ inch coarse, passing No. 4 sieve	15.6
⅜ inch coarse, passing ⅜-inch sieve	100.0
⅜ inch coarse, passing ¼-inch sieve	75.0
⅜ inch coarse, passing No. 4 sieve	40.6
⅜ inch coarse, passing No. 8 sieve	33.6

Organic impurities in aggregate = light straw color in sodium hydroxide test.
Fine material in aggregate = 7/32-inch deposit of silt in jar test.

The cost of plain monolithic concrete lining as shown in table 1 is based on the following unit costs (these unit costs also apply to all other linings described herein):

Item:	Unit cost[3]
Unskilled labor	30¢ per hour.
Cement	75¢ per sack.
Sand	$1.40 per cubic yard.
Gravel	$1.40 per cubic yard.
Water	Free.
Sod	Free.
Forms (material and labor) negligible.	

Labor charges for form assembly, and for concrete mixing, pouring, floating, finishing, and curing, all are included under "labor." Charges for engineering services, supervision, and labor for rough excavation and finish grading are not included.

One case of failure due to compression has been observed in the plain monolithic concrete linings. In this instance a transverse crack had occurred at the end of a section where no provision had been made for an expansion joint between the two sections (fig. 4), indicating that ample provision for expansion joints should be made between individual sections. Small amounts of vegetation have been observed growing in weep holes and uncaulked expansion joints. However, only in rare instances was this sufficient to cause any appreciable retardation of flow and deposition of silt. Objectionable

[3] These prices f. o. b. job.

vegetation growth possibly might be eliminated by caulking the joints or by overlapping the slab ends as is discussed under "precast slabs." Transverse cracks, longitudinal cracks, and holes in concrete have been noted in thin monolithic slabs (fig. 5).

TABLE 1.—*Cost of plain monolithic concrete ditch lining* [1]

Size of gravel, inches	Thickness, inches	Mix	Cost per square foot		
			Labor	Material	Total
⅜	½	1:3:6	$0.0065	$0.0078	$0.0143
⅜	¾	1:2:4	.0063	.0160	.0223
⅜	1	1:2:4	.0094	.0244	.0338
⅜	1	1:2.5:4	.0061	.0188	.0249
⅜	1	1:4:5	.0078	.0187	.0265
⅜	1¼	1:2.5:4	.0064	.0218	.0282
⅜	1¼	1:3:6	.0097	.0207	.0304
⅜	1¼	1:4:5	.0084	.0214	.0298
⅜	1½	1:2.5:5	.0084	.0286	.0370
⅜	1½	1:3:5	.0061	.0282	.0343
⅜	1½	1:3.5:5	.0077	.0269	.0346
⅜	1½	1:3:6	.0078	.0279	.0357
⅜	2	1:1.5:3	.0228	.0481	.0709
⅜	2	1:2:4	.0160	.0375	.0535
⅜	2	1:2.5:5	.0166	.0331	.0497
⅜	2	1:3:5	.0032	.0276	.0308
⅜	2	1:3:6	.0138	.0338	.0476
⅝	1½	1:3:5	.0092	.0220	.0312
⅝	1½	1:3:6	.0112	.0245	.0357
⅝	2	1:2:4	.0111	.0327	.0438
⅝	2	1:2.5:5	.0110	.0254	.0364
⅝	2	1:3:6	.0091	.0302	.0393
⅝	2½	1:3:5	.0091	.0425	.0516
⅝	2½	1:3.5:5	.0046	.0369	.0415
⅝	2½	1:4:5	.0058	.0364	.0422
Graded	1½	1:3:5	.0071	.0236	.0307
Do	1½	1:3:6	.0060	.0213	.0273
Do	2	1:3:4	.0070	.0334	.0404
Do	2	1:3:4.5	.0070	.0320	.0390
Do	2	1:3:5	.0070	.0311	.0381
Do	2	1:3:5.5	.0067	.0322	.0389
Do	2	1:3.5:5	.0073	.0316	.0389
Do	2	1:3:6	.0070	.0293	.0363
Do	2	1:3¼:6	.0074	.0316	.0390
Do	2	1:4:5	.0077	.0300	.0377
None	½	1:4½	.0054	.0088	.0142

[1] Average of linings installed under conditions listed.

An analysis of the data available shows a correlation between the slab thickness and the frequency of occurrence of these defects. It may be noted in table 2 that the frequency of each of these phenomena increases with decreasing thicknesses of slab cross section. For practical purposes it appears that a slab thickness of 2 to 2½ inches is the minimum which should be employed.

TABLE 2.—*Frequency of transverse and longitudinal cracking and disintegration in monolithic slabs*

Thickness, inches	Months of service	Transverse cracks per 100 linear feet			Percent of lining with longitudinal cracks	Percent of sections with holes
		Average	Range	Median		
1	39–45	13.5	10–17		75.0	100
1	40–45	7.3	2–13		9.0	9
1½	34–42	6.5	0–16	7	1.9	4
2	22–45	5.5	1–9	6	1.9	4
2½	36–40	2.1	0–4	2	0.0	0

FIGURE 3.—Ditch prepared for lining. Note forms and center-line stakes in place.

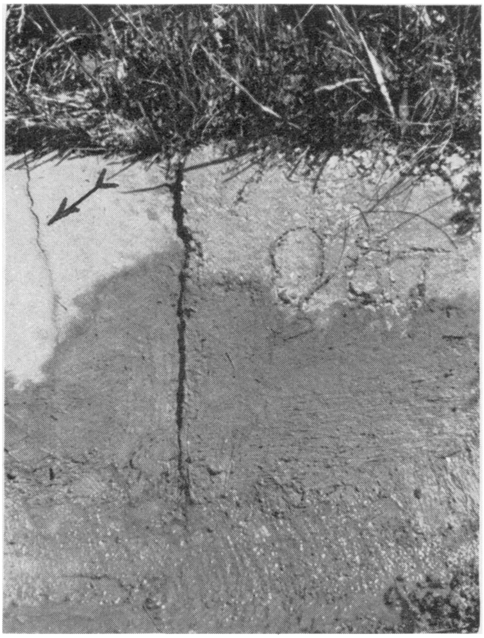

FIGURE 4.—Crack at extreme left (arrow) caused by compression resulting from lack of expansion joint between the two sections. Dark line along ends of slabs (center) is not an opening but a shadow cast by slab on right which has "overlapped" slab on left.

FIGURE 5.—Transverse and longitudinal cracking and holes in monolithic concrete slabs.

It should be stated that none of these defects have exhibited any harmful effect upon the residual water-carrying function of the linings. However, longitudinal cracks and holes, if left unrepaired, might exert a harmful effect on the linings themselves by rendering them vulnerable to undermining.

There are indications that transverse cracking may increase with increasing age of the concrete, perhaps at a decreasing rate, as the lining is subjected to more wetting, drying, freezing, and thawing (as has been the experience with concrete highways) (*3*). For example, there was a noticeable increase in the number of transverse cracks during the winter of 1939–40, a winter which was extremely severe in the Memphis area. In some instances there is evidence of flaking or chipping at the transverse cracks (see fig. 6).

It was considered desirable to control the position and direction of transverse cracking as these cracks, when formed at an angle, later developed into a Y or "crow foot" (the small piece of slab between the forks of the Y may become dislodged and lead to undermining of the lining (fig. 7)). Control of cracking was attempted by constructing dummy or false transverse joints by means of an edging tool, at right angles to the line of flow. The depth of these false joints was half the thickness of the lining. Observations to date indicate that control of cracking can be accomplished by this means (fig. 8). It may be seen in table 3 that dummy joints 3 feet apart prevent cracking. While no dummy joints have been installed at distances of 5 or 7.5 feet apart, some such greater distance might suffice.

TABLE 3.—*Cracks in plain monolithic concrete linings (2 inches thick) provided with dummy transverse joints (controlled cracks at dummy joints not included)*

Distance between joints (feet)	Months service	Transverse cracks per 100 linear feet
33	46	[1] 4
10 to 18	45	[1] 1
10	45	[1] 2
3	43	0

[1] Present in fall of 1939; no additional cracks during severe winter of 1939–40.

As stated before, determination of leanest concrete mixes permissible was one of the objectives of the studies. Mixes from 1:2:4 up to 1:3:6 and 1:4:5 with water ratios from 6 to 7 gallons of water per sack of cement were used. In an attempt to evaluate the effect of these factors on the durability of concrete linings it has been considered desirable to include a consideration of some other factors, viz, proportioning of aggregates, plasticity, and curing. All these factors are interrelated and exert an influence on the durability of concrete separately and in combination. Attempt has been made to determine whether there is any significance in conditions of abrasion, cracking, absorption, and strength of the concrete in the various projects.

A visual inspection reveals no evidence of detrimental wear from abrasion in any of the linings. In this connection it should be stated that there is remarkably little abrasive material carried by the ditches comprising these studies. This is especially true when provisions have been made for the introduction of surface water, along the course of the ditches, over grass-sodded aprons or concrete aprons to prevent bank scouring.

There was but a slight significant difference in transverse cracking when considered by varying mixes and by curing or absence of curing. It was noted that slightly fewer transverse cracks occurred in the "richer" concrete mixes and, as pointed out previously, fewer transverse cracks occurred in the thicker slabs.

Through the cooperation of the Portland Cement Association tests on absorption and compressive strength were conducted on a limited number of samples. All samples submitted for test were 2 inches thick and had been cured by covering with 2 inches of wet earth for 10 days. The absorption tests on samples taken from linings in service 38 to 49 months were uniformly low, ranging from 3.6 to 5.1 percent absorption by weight after 24 hours in water. These figures are well within those set for good concrete.

Samples submitted for test for compressive strength consisted of right-angle parallelopipeds, approximately 6 by 6 inches by lining thickness, broken from the linings. Except from the 1:2:4 mix sample, 2-inch test cubes could not be cut from the samples by sawing with the equipment available. The samples were described as "very open popcorn-like composition." It was reported that "the test specimens would shatter on sawing and when the saw would strike the coarse pebbles in the mixture, they would fly out, causing the concrete to break up." The cube from the one sample tested gave a compressive strength of 5,510 pounds per square inch compression, which when converted to 6- by 12-inch cylinder would equal 4,794 pounds per square inch. (Mix=1:2:4; water-cement ratio=7 gallons; cured 2 inches wet earth, 10 days; ⅝-inch gravel; in service 51 months.) With reference to the quality of the test specimens it was suggested that there may have been (*a*) insufficient compaction, (*b*) too low a sand-gravel ratio, (*c*) a need for proportioning and grading of the fine and coarse aggregates so as to secure a more dense, homogeneous mass, or (*d*) a harsh working concrete. In this connection the method of curing also should be examined.

These possibilities may be explained by the following considerations: (*a*) Lack of compaction may have occurred, as suggested by the description of the fresh concrete as being "moist-stiff-workable." While such concrete may have been workable, its consistency, "moist," and plasticity, "stiff," may still have left something to be desired. (*b*) The sand-gravel ratio was somewhat below that generally recommended, viz, 0.33 to 0.44 vs. 0.55 to 0.77 for ⅜-inch coarse aggregate and 0.33 to 0.44 vs. 0.40 to 0.60 for ¾-inch coarse aggregate. (*c*) Lack of homogeneity may have occurred, as an examination of the sieve tests on the aggregates (previously given) showed, at best, a questionable graduation. (*d*) Harshness of mix may have resulted from the use of the high-aggregate mixes. (*e*) It is suggested that curing concrete with wet earth is at best a questionable practice; unless water is readily available in the field the degree of wetness of the earth is debatable. These factors, in combination with the possible use of sun-dried aggregates, present a hazard to the water content of freshly cast concrete. Incidentally, in well-cured concrete there is less volume change and consequently less early shrinkage with resultant cracking. Water tightness and wear resistance are likewise enhanced.

It should be noted that these linings have been in service from a minimum of 38 months to a maximum of 51 months during which time they have been subjected to severe weather conditions. Up to the present time no unusual failures have occurred; the effects of future frost action remains to be seen. Header (key or curtain) walls were placed in some instances. As has been stated, grades encountered are under 1 percent and it is possible that this may account for the fact that no failures were observed which could be assigned to a difference in construction, i. e., with or without header walls.

Weep holes at 10-foot intervals were employed to relieve hydrostatic pressure. In some instances grade stakes were left in place flush with the slab surface. This was done to determine whether it might be possible to use these openings in lieu of weep holes. It has been observed in some instances that hydrostatic pressure, ground movement of plastic soil, or freezing and thawing action have forced these stakes upward several inches (fig. 9). This suggests that a more desirable practice would be to provide weep holes at the time of construction or that the grade stakes should be driven through for some distance following setting of the concrete.

Flash run-off following heavy rains on some occasions subjected newly installed monolithic linings and freshly blanket-sodded banks to intense scouring action. Even under these destructive conditions the linings remained intact and in place, as may be seen in figure 10. Only repair to the freshly sodded banks was necessary.

REINFORCED MONOLITHIC CONCRETE

Effort was made to determine any significant differences between the durability of plain and lightly reinforced concrete linings. Linings were installed reinforced with No. 19 wire poultry netting, 2-inch mesh, and 12½-gauge 4-point barb wire.

Operations were essentially the same as those described under the method of construction of plain monolithic linings. Light reinforcement appears to offer but slight advantage over plain monolithic construction. The same types of failures have been observed; however, with reference to transverse cracking there appears to be slight advantage in favor of the reinforced concrete. That this advantage is sufficient to warrant the additional cost for material and labor is open to question.

TABLE 4.—*Comparison between transverse cracking of plain and reinforced monolithic concrete ditch lining*

Thickness, inches	Months of service		Transverse cracks per 100 linear feet	
	Plain	Reinforced	Plain	Reinforced
1	39–45	42	13.5	7
1	40–45	40	7.3	4
1½	34–42	42–45	6.5	7
2	22–45	45	5.5	3.2

TABLE 5.—*Cost of reinforced monolithic concrete ditch lining* [1]

Type of reinforcing	Size of gravel, inches	Thickness, inches	Mix	Cost per square foot		
				Labor	Material	Total
Poultry wire	⅜	¾	1:3:6	$0.0073	$0.0193	$0.0266
Do	⅜	1	1:2:3.5	.0067	.0187	.0254
Do	⅜	2	1:1.5:3	.0238	0484	.0722
Do	⅜	2	1:2.5:4	.0186	.0433	.0619
Do	⅜	2	1:2.5:5	.0163	.0396	.0559
Do	None	½	1:6	.0063	.0160	.0223
Barb wire	⅜	1½	1:2:4	.0116	.0277	.0393
Do	⅜	1½	1:3:6	.0079	.0271	.0350
Do	⅜	2	1:1.5:3	.0207	.0486	.0693
Do	⅜	2	1:2:4	.0112	.0395	.0507
Do	⅜	2	1:3:6	.0153	.0365	.0518
Barb wire and poultry wire	⅜	2	1:2:4	.0209	.0423	.0632

[1] Average of linings installed under conditions listed.

PRECAST CONCRETE SLAB LININGS

Several types of precast concrete slab ditch linings were cast and installed. These sections, for the most part, were cast in small units for one-man handling. They varied in shape and method of tying-in or together. Some [4] were fastened by wires threaded transversely through the sections (*4*); others depended upon locking arrangements and weight for stability. The various types included slabs with butt joints, interlocking joints, tongue and groove joints, and overlapping joints (*5*).

[4] The Shelby County, Tennessee, Health Department cooperated in this work.

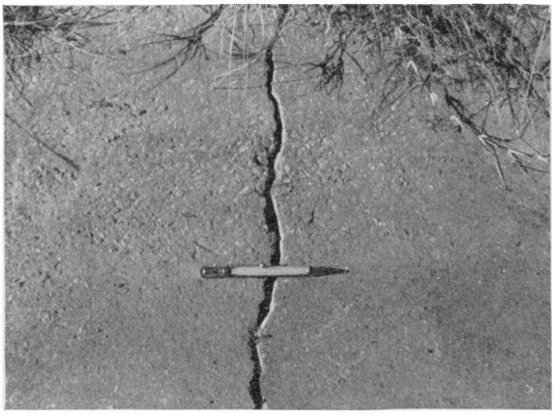

FIGURE 6.—Flaking of concrete at transverse crack.

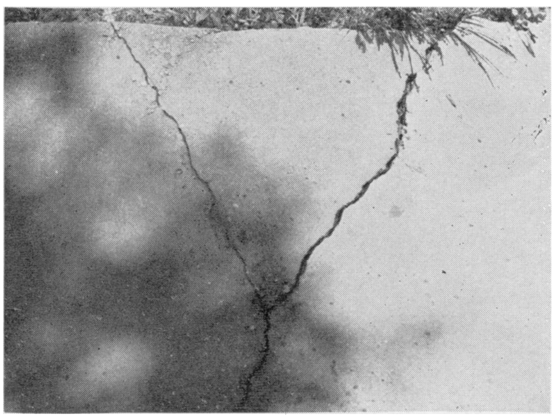

FIGURE 7.—Y or crowfoot crack.

FIGURE 8.—Dummy or false transverse joint.

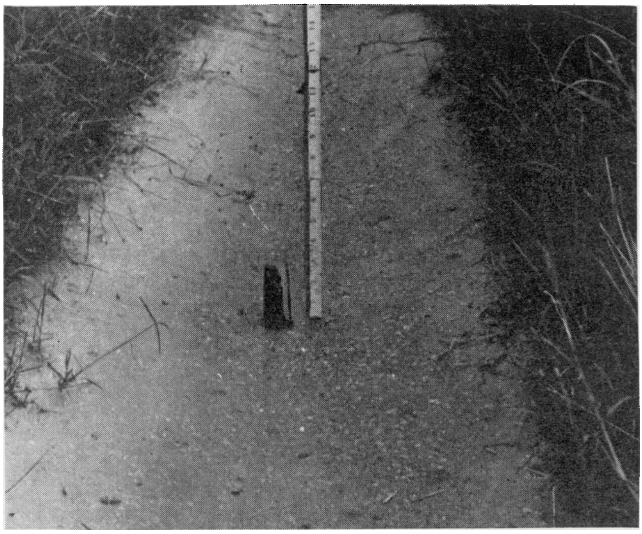

FIGURE 9.—Grade stake pushed above lining by frost action, a distance of 3 inches

FIGURE 10.—Newly installed monolithic lining intact after being subjected to intense scouring run-off. Note destruction of freshly sodded ditchbanks.

Methods of manufacture of all these slabs were practically the same. Sets of homemade wooden forms and a hand-mixed stiff dry-mix concrete were used. A crew of two men was employed. One man measured the ingredients and mixed the concrete; the other assembled and tamped concrete in the forms. A wetter mix was used for the flat side-slabs than for the curved invert-pieces. The latter were cast in "bottom-side-up" or convex position. Following tamping, the side form-pieces were carefully removed and the section allowed to remain on the supporting form. When casting overlapping joint third round sections, the above procedures were modified in an attempt to lower costs by reducing labor required for tamping. In this case forms were constructed to cast these sections in "right-side-up" or concave position; at the same time wetness of the mix was increased. However, no great reduction in costs resulted as the labor required to place a wet mix in position or tamp a dry one by these methods was almost the same.

All slabs were cured by covering with wet bagging and kept damp by hand sprinkling for a period of 7 days. Costs of these sections are shown in table 6.

TABLE 6.—*Cost of precast slab concrete ditch lining* [1]

Type	Thickness, inches	Mix	Casting per square foot		Placing per square foot, labor [2]	Total cost per square foot
			Labor	Material		
T. & G. Interlocking	2	1:3:1	$0.0207	$0.0332	$0.0017	$0.0557
T. & G. Interlocking	2	1:4:2	.0239	.0274	.0027	.0540
Third round	2	1:4:4	.0384	.0408	(3)	[4] .0792
Interlocking	2	1:3:2	.0435	.0374	(3)	[4] .0809
Interlocking	2	1:4:4	.0480	.0363	(3)	[4] .0843
Interlocking	2	1:3:2	.0413	.0387	(3)	[4] .0800

[1] Average of linings installed under conditions listed in headings.
[2] Haulage, a factor variable with distance, not included in placing charge.
[3] Not yet placed.
[4] Not placed.

Precast slab concrete linings installed have functioned with a minimum of failures. Some breakage of slabs was experienced during handling attendant to installation; however, these sections were installed and grouted in place. One disadvantage is that vegetation grows between the joints of butt joint slabs (figs. 11 and 12).

Comparable growths have not been observed in the joints of precast slabs held together by tongue and groove, interlocking, or overlapping joints. While it is true that the experimental linings of these latter types are installed in situations generally less favorable to vegetation growth, indications are that objectionable growth would not have occurred to any great extent.

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BRICK

The method employed for the installation of brick and brickbat linings consisted in stretching a cord along the ditch center line from grade stake to grade stake, set at 5-, 10-, or 25-foot centers. Bricks were laid parallel to the center line and spaced about ⅜-inch apart. A well-mixed dry mortar, 1:3 to 1:4, was broomed into the space between the bricks. Water was then applied with a hand sprinkler until brick and mortar were water-satisfied. The cost of brick lining is given in table 7.

TABLE 7.—*Cost brick ditch lining* [1]

Mortar mix	Method placing	Cost per square foot		
		Material [2]	Labor	Total
1 : 3	Dry	$0.0079	$0.0097	$0.0176
1 : 3.25	do	.0039	.0056	.0095
1 : 3.5	do	.0088	.0115	.0203
1 : 4	do	.0074	.0089	.0163
1 : 4.5	do	.0133	.0083	.0216
1 : 3	Wet	.0391	.0079	.0470
1 : 4	do	.0034	.0117	.0201
1 : 4.5	do	.0140	.0081	.0221
1 : 6	do	.0122	.0073	.0195

[1] Average of linings installed under conditions listed.
[2] Material, cement and sand. Brick obtained without cost.

One of the most important failures observed in the construction of brick linings is failure to secure initial bond. This can be caused by insufficient spacing between the brick and consequently a lack of mortar to furnish bonding. This failure can be prevented if good workmanship is observed. The face of the bricks themselves may be dirty or covered with small vegetable growths which prevent the mortar from adhering and bonding to the brick surface. This failure can be overcome by assuring that the surfaces of the bricks are clean. Lack of initial bond leads to later loosening of brick and to possible washouts of the lining.

In some instances, growth of vegetation through a mortar of 1:4 has occurred in sufficient amount to retard flow and permit silting. Vegetation growth has not been observed through mortar mixes of 1:3.

That only hard durable brick should be used is demonstrated by the disintegration of soft or "salmon" brick, with subsequent formation of holes in the lining. Soft brick should not be incorporated in the lining (fig. 13).

Brick linings are vulnerable to hydrostatic pressure unless sufficient weep holes are provided. This is demonstrated by one instance of almost complete failure of an entire brick lining subjected to hydrostatic pressure which was not adequately provided with weep holes.

Care should be exercised to obtain firm compaction of back-filling when brick linings are to be installed. Subsequent settling of the

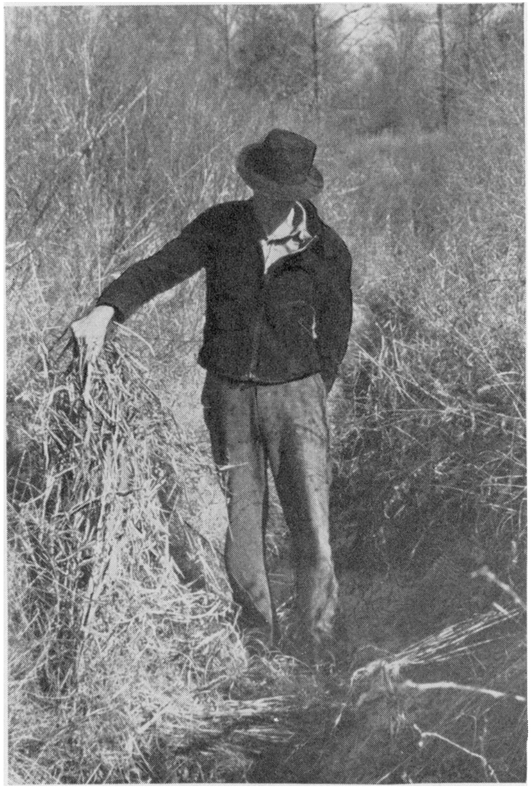

FIGURE 11.—Heavy vegetation growth between the joints of butt-joint precast slabs.

FIGURE 12.—Young willow growing between the joints of butt-joint precast slabs.

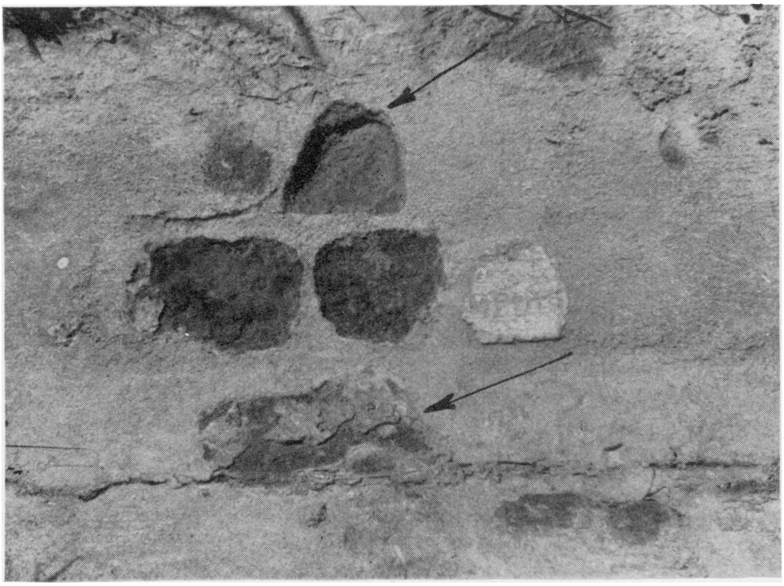

FIGURE 13.—Disintegration of soft or "salmon" brick.

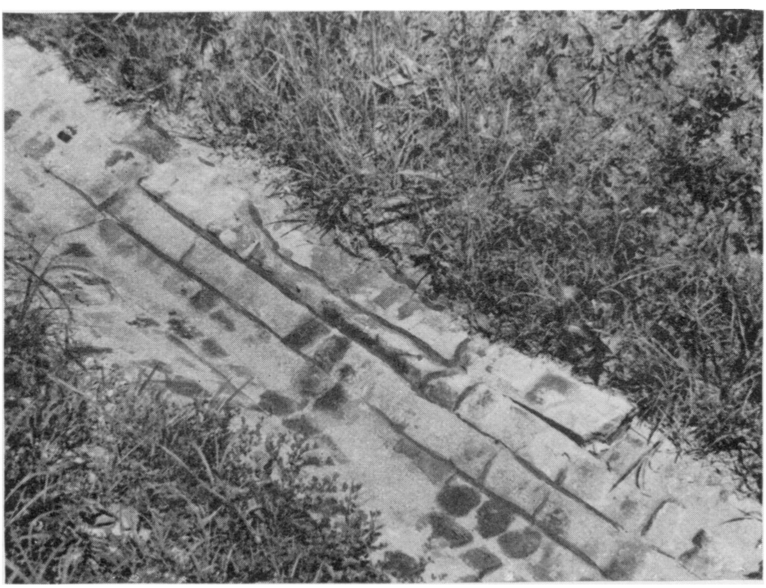

FIGURE 14.—Well-bonded brick broken away from the mother lining. Break was due to settling of backfill

back-fills has caused sections of well-bonded brick to break away and become separated from the mother lining. This has occurred mainly along the edges of the lining (fig. 14).

SODDING

In most cases the ditch banks above the linings were blanket-sodded with Bermuda grass sod. Sod squares 12 x 12 inches were secured to the ditch banks by means of wooden pegs to prevent their washing away by scouring action of water from rains occurring before the sod had time to take root and establish itself. Sod squares of this size can be easily handled. Cost of sodding is shown in table 8.

TABLE 8.—*Cost sodding ditch banks* [1]

Type	Cutting per square foot	Placing per square foot	Total per square foot
Strip	$0.0039	$0.0025	$0.0054
Blanket	.0024	.0022	.0046

[1] Average of all sod installed on projects. Haulage, a factor variable with distance, not included.

The value of the stabilization of ditch banks cannot be overemphasized. It is considered that a large part of the efficiency of the experimentally lined ditches can be assigned to the stabilization of the banks by means of vegetation. This subject is of such importance that it warrants exhaustive investigation.

Naturally a study such as has been described emphasizes imperfections; however, it should be pointed out that the poorest of the ditch linings are rendering acceptable service and apparently will continue to do so for a considerable period of time.

Some small amount of experimental work was done with bituminous materials, but no satisfactory method was worked out. Additional research is needed in this direction.

REFERENCES

(*1*) Brist: Annual Meteorological Summary, 1939, Memphis, Tennessee. Weather Bureau, U. S. Department of Agriculture.

(*2*) Bennett, Allen, Davis, and Watkins: Soil Survey of Shelby County, Tennessee (1916). Bureau of Soils, U. S. Department of Agriculture.

(*3*) What old concrete roads tell us; Highway planning and design series, No. 4, Portland Cement Association.

(*4*) Precast concrete units for ditch linings; No. C P 40, Concrete Information, Portland Cement Association.

(*5*) Elmendorf and Lee: Concrete invert and tile manufacture by the Malaria Division of the Escambia County Health Department, Pensacola, Florida. Supplement to the Symposium on Malaria appearing in the July and August, 1939, issues of the Southern Medical Journal.

DEATHS DURING WEEK ENDED MARCH 14, 1942

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

	Week ended Mar. 14, 1942	Corresponding week, 1941
Data from 86 large cities of the United States:		
Total deaths	9,361	8,988
Average for 3 prior years	9,093	
Total deaths, first 10 weeks of year	91,852	95,433
Deaths per 1,000 population, first 10 weeks of year, annual rate	13.0	13.5
Deaths under 1 year of age	544	513
Average for 3 prior years	496	
Deaths under 1 year of age, first 10 weeks of year	5,625	5,369
Data from industrial insurance companies:		
Policies in force	64,963,934	64,649,882
Number of death claims	13,506	12,836
Death claims per 1,000 policies in force, annual rate	10.8	10.4
Death claims per 1,000 policies, first 10 weeks of year, annual rate	10.2	11.1

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 21, 1942

Summary

Meningococcus meningitis is the only one of the important communicable diseases for which the current incidence is above that for the corresponding week of each year since 1937. A total of 91 cases was reported, as compared with 88 last week and a 5-year (1937–41) median of 54 cases. For the corresponding week in 1937, however, a total of 215 cases was reported. During the current week, New York reported 22 cases, Texas 10, Maryland 9, and Connecticut, New Jersey, Illinois, and Virginia 5 each. A total of 752 cases has been reported to date this year, as compared with 537 last year and a 5-year cumulative median of 587.

The number of cases of poliomyelitis dropped from 18 to 16. The 5-year median for the week is 22. Influenza declined (4,508 cases as compared with 5,101 last week and 5-year median of 7,037), while measles increased slightly. The current and cumulative figures to date for measles are both above the 5-year median. The current incidence, however, is only about 50 percent of that for the corresponding week last year.

The incidence of smallpox increased from 16 to 40 cases (14 in Texas, 10 in Missouri), slightly above last year's record low for the the week (36 cases).

Other reports for the week include 2 cases of anthrax in Pennsylvania, 11 cases of amebic dysentery (5 in Texas), 70 cases of bacillary dysentery (42 in Texas, 11 in Georgia), 34 cases of unspecified dysentery (19 in Arizona, 14 in Virginia), 63 cases of typhoid fever (below the incidence for the corresponding week in any prior year), 13 cases of tularemia, and 35 cases of endemic typhus fever.

The crude death rate for the current week for 88 large cities in the United States is 12.4 per 1,000 population, as compared with 13.2 for the preceding week and 12.7 for the 3-year (1939–41) average.

Telegraphic morbidity reports from State health officers for the week ended March 21, 1942, and comparison with corresponding week of 1941 and 5-year median

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

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1937–41	Week ended		Median 1937–41	Week ended		Median 1937–41	Week ended		Median 1937–41
	Mar. 21, 1942	Mar. 22, 1941		Mar. 21, 1942	Mar. 22, 1941		Mar. 21, 1942	Mar. 22, 1941		Mar. 21, 1942	Mar. 22, 1941	
NEW ENG.												
Maine	1	0	0	3	------	4	173	118	118	4	0	0
New Hampshire	0	0	0	------	3	------	10	89	50	0	0	0
Vermont	0	0	0	------	------	------	15	13	13	0	0	0
Massachusetts	1	1	3	------	------	------	830	700	700	3	4	2
Rhode Island	1	0	0	1	------	------	171	2	9	0	0	0
Connecticut	0	0	4	2	6	7	413	94	94	5	0	0
MID. ATL.												
New York	26	19	28	[1] 11	[1] 32	[1] 32	683	7,892	1,408	22	3	3
New Jersey	4	10	10	16	29	19	443	2,772	1,401	5	2	1
Pennsylvania	18	21	34	------	------	------	1,087	5,149	322	2	4	5
E. NO. CEN.												
Ohio	7	6	20	22	68	14	196	7,691	252	1	1	1
Indiana	7	26	12	57	38	57	125	1,156	60	0	5	3
Illinois	20	17	23	41	53	53	645	4,159	104	5	1	2
Michigan [2]	7	1	8	4	19	3	246	3,275	289	1	0	0
Wisconsin	2	0	1	38	184	184	871	1,058	1,058	0	0	1
W. NO. CEN.												
Minnesota	3	0	2	5	3	2	947	12	62	1	0	0
Iowa	1	3	3	4	161	9	402	198	147	0	0	0
Missouri	2	9	9	1	201	201	325	384	22	0	3	1
North Dakota	1	0	2	------	8	62	64	27	27	0	0	0
South Dakota	3	0	0	------	1	2	4	3	2	0	0	0
Nebraska	4	2	2	11	11	4	304	9	15	0	0	0
Kansas	3	8	3	9	5	22	415	1,012	537	1	1	0
SO. ATL.												
Delaware	1	0	0	------	------	------	8	392	32	0	0	0
Maryland [2]	10	8	8	5	32	32	890	196	196	9	1	1
Dist. of Col.	0	2	7	5	2	2	83	287	39	1	1	1
Virginia	10	2	20	382	583	501	290	1,896	376	5	0	2
West Virginia	2	8	8	257	49	218	148	552	20	0	1	2
North Carolina	10	15	13	28	73	73	1,362	1,065	1,085	2	1	1
South Carolina	1	1	5	505	666	666	257	293	41	0	0	0
Georgia	4	8	8	119	226	226	450	396	205	0	2	2
Florida	3	5	8	20	149	10	185	1,066	178	2	1	1
E. SO. CEN.												
Kentucky	5	3	7	6	90	90	91	1,111	137	2	3	5
Tennessee	6	2	8	71	267	267	140	337	165	2	3	5
Alabama	7	6	6	440	551	551	349	731	190	0	1	7
Mississippi [2]	12	3	4	------	------	------	------	------	------	1	1	1
W. SO. CEN.												
Arkansas	5	6	6	226	247	211	235	240	39	0	0	0
Louisiana	7	3	12	3	7	14	188	120	21	1	3	2
Oklahoma	11	5	6	213	250	250	376	55	55	0	1	1
Texas	50	40	35	1,228	2,598	1,677	2,363	1,250	476	10	1	1
MOUNTAIN												
Montana	3	2	2	33	2	4	[3] 87	9	18	0	0	0
Idaho	2	0	0	------	------	2	81	18	18	0	0	0
Wyoming	0	1	1	192	3	------	95	61	61	0	0	0
Colorado	8	5	9	74	18	18	247	266	253	0	0	0
New Mexico	2	1	1	5	15	15	66	143	70	0	1	1
Arizona	0	2	2	209	173	173	365	0	26	1	0	0
Utah [2]	0	1	1	5	22	15	155	13	105	0	1	0
Nevada	0	0	------	3	6	------	4	10	------	0	0	------
PACIFIC												
Washington	2	5	2	9	8	------	322	89	89	1	1	1
Oregon	4	3	3	28	26	51	167	545	45	2	0	0
California	17	16	25	217	152	181	5,148	473	473	2	5	3
Total	293	271	450	4,508	7,037	7,037	22,521	47,447	9,246	91	52	54
11 weeks	3,542	3,308	5,828	54,130	453,935	144,942	[3] 158,613	263,427	136,721	752	557	587

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 21, 1942, and comparison with corresponding week of 1941 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median 1937–41	Week ended		Median 1937–41	Week ended		Median 1937–41	Week ended		Median 1937–41
	Mar. 21, 1942	Mar. 22, 1941		Mar. 21, 1942	Mar. 22, 1941		Mar. 21, 1942	Mar. 22, 1941		Mar. 21, 1942	Mar. 22, 1941	
NEW ENG.												
Maine	0	0	0	11	11	17	0	0	0	0	0	0
New Hampshire	0	0	0	12	2	2	0	0	0	0	1	0
Vermont	0	0	0	11	7	7	0	0	0	0	1	0
Massachusetts	1	1	0	330	153	169	0	0	0	1	0	0
Rhode Island	0	0	0	8	9	11	0	0	0	0	1	0
Connecticut	1	0	0	44	81	91	0	0	0	0	0	0
MID. ATL.												
New York	0	0	0	548	553	1,017	0	0	0	3	1	3
New Jersey	0	0	0	197	381	239	0	0	0	0	0	1
Pennsylvania	0	0	0	572	371	436	0	0	0	8	5	5
E. NO. CEN.												
Ohio	0	0	1	374	319	317	0	1	5	2	3	3
Indiana	2	0	1	153	186	196	0	0	6	0	3	1
Illinois	1	0	0	269	520	601	2	7	10	1	1	4
Michigan [2]	0	0	0	259	155	442	2	2	2	1	2	4
Wisconsin	1	0	0	191	144	172	0	1	4	0	0	1
W. NO. CEN.												
Minnesota	0	1	0	113	47	105	2	3	9	0	0	0
Iowa	0	0	0	47	69	157	0	4	23	1	1	1
Missouri	1	0	0	76	228	228	10	6	8	1	2	2
North Dakota	1	3	0	32	3	28	0	2	3	0	0	0
South Dakota	0	1	0	39	24	18	0	0	4	0	0	0
Nebraska	1	0	0	50	27	27	1	0	8	0	0	0
Kansas	0	0	0	125	55	130	1	0	5	0	1	1
SO. ATL.												
Delaware	0	0	0	51	14	14	0	0	0	0	0	0
Maryland [2]	0	0	0	85	55	47	0	0	0	1	0	1
Dist. of Col	0	0	0	16	23	20	0	0	0	0	1	7
Virginia	0	0	1	28	43	40	0	0	0	2	3	3
West Virginia	1	0	0	41	42	46	0	0	0	2	3	3
North Carolina	0	0	0	45	25	40	0	0	1	1	0	1
South Carolina	0	0	0	5	8	4	0	1	0	0	3	1
Georgia	0	0	0	20	15	15	0	0	0	4	3	3
Florida	0	6	0	4	8	10	0	0	0	3	6	3
E. SO. CEN.												
Kentucky	0	2	0	135	133	100	0	0	0	5	1	4
Tennessee	0	0	0	75	105	59	2	1	0	2	1	2
Alabama	1	1	0	29	16	14	2	1	0	1	2	2
Mississippi [2]	0	0	0	29	2	3	0	0	0	1	2	2
W. SO. CEN.												
Arkansas	0	0	0	6	6	10	4	0	2	2	3	3
Louisiana	2	0	0	4	8	11	0	0	2	3	0	4
Oklahoma	0	2	1	21	30	27	0	0	14	1	5	1
Texas	0	1	1	50	59	71	14	0	6	4	8	14
MOUNTAIN												
Montana	0	3	0	23	22	22	0	0	2	0	0	0
Idaho	1	0	0	6	5	21	0	1	2	0	0	0
Wyoming	0	0	0	27	9	9	0	1	0	0	1	0
Colorado	0	0	0	42	46	51	0	0	4	0	6	1
New Mexico	0	0	0	2	6	22	0	0	0	0	4	2
Arizona	0	0	0	6	5	7	0	0	0	1	1	1
Utah [2]	0	0	0	32	22	29	0	0	0	0	0	0
Nevada	0	0	------	0	0	------	0	0	------	0	0	-----
PACIFIC												
Washington	0	0	0	37	34	46	0	5	6	2	3	2
Oregon	0	1	1	10	6	39	0	0	18	3	1	1
California	2	2	2	136	177	236	0	0	18	7	3	3
Total	16	24	22	4,426	4,269	5,029	40	36	327	63	82	101
11 weeks	266	274	238	44,084	40,114	58,995	271	880	3,297	842	827	1,213

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 21, 1942, and comparison with corresponding week of 1941 and 5-year median—Con.

Division and State	Whooping cough		Week ended Mar. 21, 1942								
	Week ended			Dysentery							
	Mar. 21, 1942	Mar. 22, 1941	Anthrax	Amebic	Bacillary	Unspecified	Encephalitis	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENG.											
Maine	16	36	0	0	0	0	0	0	0	0	0
New Hampshire	6	3	----	----	----	----	----	----	----	----	----
Vermont	43	5	0	0	0	0	2	0	0	0	0
Massachusetts	269	189	0	0	0	0	0	0	0	0	0
Rhode Island	38	14	0	0	0	0	0	0	0	0	0
Connecticut	86	59	0	0	1	0	0	0	0	0	0
MID. ATL.											
New York	527	294	0	2	9	0	0	0	0	0	0
New Jersey	268	93	0	1	0	0	0	0	0	0	0
Pennsylvania	220	373	2	0	0	0	0	0	0	2	0
E. NO. CEN.											
Ohio	116	307	0	0	0	0	0	0	0	0	0
Indiana	45	37	0	0	0	0	0	0	0	0	0
Illinois	124	86	0	1	0	0	0	0	0	1	0
Michigan [2]	147	199	0	0	1	0	0	0	0	0	0
Wisconsin	182	101	0	0	0	0	0	0	0	0	0
W. NO. CEN.											
Minnesota	25	74	0	----	----	----	----	----	----	----	0
Iowa	15	64	0	----	----	----	----	----	----	----	0
Missouri	9	90	0	----	----	----	----	----	----	----	0
North Dakota	1	17	0	----	----	----	----	----	----	----	0
South Dakota	2	10	0	----	----	----	----	----	----	----	0
Nebraska	7	32	0	----	----	----	----	----	----	----	0
Kansas	42	136	0	----	----	----	----	----	----	----	0
SO. ATL.											
Delaware	0	6	0	----	----	----	----	----	----	----	0
Maryland [2]	35	94	0	0	0	0	0	0	0	1	0
Dist. of Col	15	7	0	----	----	----	----	----	----	----	0
Virginia	38	98	0	0	0	14	0	0	0	0	0
West Virginia	25	64	0	----	----	----	----	----	----	----	0
North Carolina	127	271	0	0	0	0	0	0	0	0	1
South Carolina	57	116	0	0	0	0	0	0	0	1	0
Georgia	32	18	0	1	11	0	0	0	0	4	8
Florida	37	15	0	0	0	0	0	0	0	0	5
E. SO. CEN.											
Kentucky	82	74	0	----	----	----	----	----	----	----	0
Tennessee	33	30	0	0	0	1	0	0	0	0	0
Alabama	23	37	0	----	----	----	----	----	0	1	3
Mississippi [2]	----	----	0	----	----	----	----	----	0	1	1
W. SO. CEN.											
Arkansas	10	20	0	0	0	0	0	0	0	0	0
Louisiana	19	13	0	1	0	0	1	1	0	1	3
Oklahoma	15	45	0	0	0	0	0	0	0	0	0
Texas	117	269	0	5	42	0	0	0	0	1	14
MOUNTAIN											
Montana	10	31	0	0	0	0	1	0	0	0	0
Idaho	2	9	0	0	0	0	0	0	0	0	0
Wyoming	10	0	0	0	0	0	0	0	0	0	0
Colorado	36	85	0	0	0	0	0	0	0	0	0
New Mexico	9	15	0	0	0	0	0	0	0	0	0
Arizona	81	42	0	0	0	19	0	0	0	0	0
Utah [3]	87	86	0	0	0	0	0	0	0	0	0
Nevada	3	0	0	0	0	0	0	0	0	0	0
PACIFIC											
Washington	115	93	0	0	0	0	0	0	0	0	0
Oregon	39	18	0	0	0	0	0	0	0	0	0
California	286	465	0	0	6	0	3	0	0	0	0
Total	3,531	4,240	2	11	70	34	7	1	0	13	35
11 weeks	43,609	47,732	----	----	----	----	----	----	----	----	----

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Correction, week ended Mar. 7, 1942: Montana, 90 cases.

CONSOLIDATED MONTHLY STATE MORBIDITY REPORTS FOR OCTOBER, NOVEMBER, AND DECEMBER, 1941

	Actino-mycosis	Chick-enpox	Diph-theria	Dysen-tery, amebic	Dysen-tery, bacil-lary	Dysen-tery, unde-fined	En-cepha-litis, infec-tious	Ger-man measles	Hook-worm disease	Influ-enza	Malaria	Measles	Menin-gitis, menin-gococ-cus	Mumps	Oph-thalmia neona-torum	Pellagra	Pneu-monia, all forms	Polio-myeli-tis
NEW ENG.																		
Maine		677	1				1	351		2	1	1,796	4	834	1		107	18
New Hampshire		109	4					1		3		77		92			4	16
Vermont		416	16					20				23		321			3	8
Massachusetts	3	3,345	44		105		6	162				1,508	36	2,487	82	5	[1] 593	62
Rhode Island		192	48		1			12		1	1	398		107			58	11
Connecticut	1	1,304	4	1	73		1	47		21	4	624	10	886			456	35
MID. ATL.																		
New York		4,910	144	22	406		22	329			23	2,287	45		26		4,880	435
New Jersey		3,402	66	6	6		5	191		123	3	359	13	861	19		875	109
Pennsylvania		6,274	157	6	19		12				2	5,041	47	3,367			1,159	198
E. NO. CEN.																		
Ohio		5,642	237	2	30		3	50		134	6	555	8	712	35		867	130
Indiana		675	195	1	1		1	7		331	11	165	8	62			181	27
Illinois	2	3,254	324	23	75		14	114		133	35	460	20	1,673	9	5	2,709	132
Michigan	2	5,583	108	13	119		4	645		14	8	722	14				858	85
Wisconsin		6,274	20	2			9			263		1,542	11	4,857			156	44
W. NO. CEN.																		
Minnesota	5	2,262	33	10	4		19		1	21		495	4				213	92
Iowa	1	782	46		1		13	8		24	2	459	4	609			353	13
Missouri		417	100			29				68	7	148	8	140		1	422	12
North Dakota	1	600	19				19	34		75		803	1	33			305	10
South Dakota		204	54				3			1		25	3	358			49	7
Nebraska		242	41				1	4		2		61		47			7	1
Kansas		2,325	55		3		13	23		140	7	831	8	972		1	412	16

[1] Lobar pneumonia only.

CONSOLIDATED MONTHLY STATE MORBIDITY REPORTS FOR OCTOBER, NOVEMBER, AND DECEMBER, 1941—Con.

	Actinomycosis	Chickenpox	Diphtheria	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria	Measles	Meningitis, meningococcus	Mumps	Ophthalmia neonatorum	Pellagra	Pneumonia, all forms	Poliomyelitis
SO. ATL.																		
Delaware		223	15	1						5		20		41		1	5	16
Maryland		551	159	6	62	33	2	85		61	14	892	23	263	3		605	48
District of Columbia		157	19	1	1					11		37	3	8		1	159	26
Virginia		547	443	1	1, 448					2, 188	26	979	11	92		9	596	70
West Virginia		345	120		31		1			157	2	1, 470	7	582			38	18
North Carolina		1, 084	978		1			33		67	27	2, 445	10			7	32	42
South Carolina		100	801	5			7	73	390	3, 491	2, 594	327	6	139	11	199	880	39
Georgia		156	382	8	32	8	9		1, 674	464	225	328	3	112		41	404	57
Florida		38	98	9	3			10	2, 230	148	37	110	7	96	3	3	225	30
E. SO. CEN.																		
Kentucky		789	152		44		2			41	3	486	18	177			186	46
Tennessee		371	247	8	70			19	13	318	117	443	14	89	2	22	536	209
Alabama		193	391	2			4	5		655	1, 634	325	8	137	3	55	455	140
Mississippi		903	207	383	1, 392				1, 456	13, 361	6, 824	1, 724	10	1, 484	25	704	3, 427	29
W. SO. CEN.																		
Arkansas		139	277	8	20			11	28	914	658	489	4	167	2	62	266	24
Louisiana		60	122	7	5		1		191	130	88	31	13	52	6	6	282	17
Oklahoma		166	203	5	54		3		6	1, 128	513	343	3	108		15	327	23
Texas		1, 194	897	64	594		19			12, 651	1, 759	1, 488	15	1, 413	19	321	1, 626	43
MOUNTAIN																		
Montana		894	30	1			2	25		67		342	3	302			32	11
Idaho		248	13					11		12		87		103			5	4
Wyoming		335	15				2	4		68		39	3	45			44	4
Colorado		453	159		4		4			412		1, 289	1	94			250	7
New Mexico		170	16	5	21		1	43		18	7	201	2	153		1	203	1
Arizona		295	36			306	6	145		1, 241	21	622		456	2	40	332	4
Utah		2, 327	2				1	132		90		287	2	971			97	14
Nevada		54	2									8		125			36	

PACIFIC																		
Washington	....	2,637	9	....	5	....	4	150	....	65	2	109	4	2,430	....	....	116	28
Oregon	....	673	42	3	....	....	1	....	....	182	6	462	1	660	....	1	228	32
California	1	7,294	247	38	100	....	28	1,218	....	1,015	29	5,469	16	10,071	7	....	[1] 794	65
Total	16	71,285	7,798	641	4,730	376	243	3,962	5,989	40,316	14,696	39,231	431	38,788	255	1,500	26,853	2,508
Fourth quarter 1940	13	78,491	5,601	603	2,598	388	141	1,958	6,105	178,440	13,638	48,035	347	23,923	141	1,706	31,301	3,219
Median, (4th qr.) 1936–40	....	67,016	11,000	....	....	....	222	....	7,515	31,594	17,580	38,721	494	21,855	494	1,699	28,100	1,833
Total 1941	50	299,985	17,939	3,175	24,281	1,461	3,045	160,362	26,093	685,226	67,225	891,051	1,984	198,264	810	7,725	142,293	8,947
Total 1940	37	279,159	16,252	2,991	19,152	1,484	911	9,682	35,536	423,072	77,553	286,791	1,631	117,693	1,038	8,688	141,939	9,781
Median, 1936–1940	....	272,472	28,551	....	....	....	911	....	30,940	277,826	82,123	297,378	2,638	145,620	2,142	9,301	127,933	7,281
Alaska	....	152	8	....	....	....	....	124	....	224	....	20	....	157	....	....	38	....
Hawaii Territory	....	56	29	6	13	....	2	11	4	46	1	287	1	25	....	....	[1] 46	27

[1] Lobar pneumonia only.

CONSOLIDATED MONTHLY STATE MORBIDITY REPORTS FOR OCTOBER, NOVEMBER, AND DECEMBER, 1941—Con.

	Puerperal septicemia	Rabies in animals	Rabies in man	Rocky Mountain spotted fever	Scarlet fever	Septic sore throat	Smallpox	Tetanus	Trachoma	Trichinosis	Tuberculosis, respiratory	Tuberculosis, all forms	Tularemia	Typhoid and paratyphoid fever	Typhus fever	Undulant fever	Vincent's infection	Whooping cough
NEW ENG.																		
Maine				0	169	1	0				85	97		12		5	13	297
New Hampshire				0	125	2	0					24		2		11		182
Vermont				0	54	1	0				14	35		1		11	7	226
Massachusetts		5		0	2, 373	35	0	6	5	16	793	882	1	36		14		2, 093
Rhode Island				0	115	11	0				84	503		4		2		592
Connecticut				0	262	25	0			2	338	352	2	9		29		695
MID. ATL.																		
New York		10		2	2, 066	223	0	19		39	3, 021	3, 266	1	112	12	60	199	6, 141
New Jersey		66		0	1, 062	15	0	3	1	12		727	1	28	1	16		2, 381
Pennsylvania	1			1	2, 226		0		3			529	21	125	3	9		2, 916
E. NO. CEN.																		
Ohio			1	1	2, 529	13	3	1	2	1	1, 116	1, 189	189	123		37		2, 607
Indiana				0	931		15		1		284	286	73	27		8	1	278
Illinois		97	1	4	2, 062	36	2	14	30	2	2, 164	2, 367	59	49		48	44	2, 799
Michigan		7		0	2, 003	421	13	8		3		1, 522	37	66	2	48	48	4, 283
Wisconsin				0	1, 510	19	5					255	19	16		37		3, 484
W. NO. CEN.																		
Minnesota				0	749	17	8	3	2			494	2	2		39		711
Iowa		11		0	577	70	11				173	173	9	21		132		253
Missouri				0	687	10	18	1	229			521	16	53		4		236
North Dakota				1	128		3				64	67	2	4		1	18	135
South Dakota				0	279	5	2		12			54		7		1		90
Nebraska				0	217	3	1				5	46		15		2		48
Kansas		7		0	871	5	6	3			116	138	9	12		15	39	721
SO. ATL.																		
Delaware			1	0	193		0				41	41		7				38
Maryland				1	584	59	0	4			681	703	9	81		14	56	455
District of Columbia				0	186		0				376	385		10		2		225
Virginia				2	699	460	0	1	7		708	708	16	162	9	7		655
West Virginia				0	744	18	0					410	13	57		4		358
North Carolina				2	1, 052	45	0				486	505	5	40	31	2	7	1, 440
South Carolina		34		1	161	18	1	1				112		41	41			513
Georgia	1			0	459	127	3	4		1		387	10	59	395	31		222
Florida				0	73	1	0	4				250		23	45	4	15	157

E. SO. CEN.																		
Kentucky				0	908	33	3				401	408	94	101		2		955
Tennessee	2			1	938	59	5	6	5	4		818	23	98	34	4	36	417
Alabama		43	1	0	552		1	9				578		33	115	19		186
Mississippi	75			0	288		5		11		208	303	3	20	25	2		1,711
W. SO. CEN.																		
Arkansas	4	72		2	116	143	8	2	122		216	231	19	82	3	3		183
Louisiana		4		0	96	7	2	8			275	275	7	90	87	23	1	41
Oklahoma				2	261	116	8	1	493			317	14	37		13	27	114
Texas		8		0	630		10		32			508	9	148	162	56		1,114
MOUNTAIN																		
Montana				1	318	21	1		6			54	1	7				324
Idaho				0	90		1				8	8		3		7	7	82
Wyoming				9	82	6	C		5			16	19	11		9		97
Colorado				0	274	7	2				253	253	3	32		6		595
New Mexico	3	26	1	0	95	6	1				223	228	1	27		1		235
Arizona				0	51	12	2		228			223		7		2		243
Utah				0	135	16	0				30	32	4	2		4		278
Nevada				0	15		0		1			17		2		1	1	100
PACIFIC																		
Washington		14		0	499	19	3		1		208	336	1	19		14	5	1,232
Oregon		4		0	99	8	3		6			163	1	10		5	36	351
California		143		0	1,553	17	3	21	49	20	2,267	2,379	3	74	13	96		2,583
Total	86	551	5	30	32,740	2,110	149	119	1,251	100	14,818	24,175	696	2,007	978	860	560	46,075
Fourth Quarter 1940	103	643	8	13	31,794	1,945	579	98	1,525	129	13,652	24,053	571	2,139	624	781	615	51,065
Median, (4th qr.) 1936–1940	103			14	42,187		1,369			66	12,891	24,053	571	3,184	603	781		38,398
Total 1941	315	2,494	25	505	128,518	10,345	1,368	426	5,426	404	63,664	106,372	1,482	8,485	2,780	3,408	1,939	221,590
Total 1940	427	2,761	31	417	155,707	10,198	2,764	412	4,489	521	57,245	103,348	1,641	9,658	1,879	3,358	2,167	183,273
Median 1936–1940	427			380	183,893		9,738			331	56,406	103,718	1,641	13,767	1,879	3,358		183,273
Alaska					4	11					116	126		2			2	46
Hawaii					4	1		5	1	2	198	212		33	31	5		134

Anthrax: Massachusetts, 3; New York, 5; New Jersey, 3; Pennsylvania, 15; North Carolina, 1; Florida, 1; Texas, 3; Oregon, 1.

Botulism: North Dakota, 3; New Mexico, 1; California, 11.

Dengue: South Carolina, 10; Alabama, 2; Louisiana, 1; Texas, 342; Arizona, 6.

Diarrhea: Ohio, 275 (under 2 years); Michigan, 3 (infant, diarrhea); Maryland, 123; South Carolina, 1655; New Mexico, 89; Nevada, 6 (infant, diarrhea); Washington, 22 (under 2 years, 20); California, 21 (infant, epidemic).

Food poisoning: Ohio, 13; Illinois, 14; Kansas, 1; Louisiana, 2; New Mexico, 8; California, 182.

Granuloma, coccidioidal: California, 8.

Leprosy: Florida, 2; Louisiana, 3; Texas, 6; California, 1; Hawaii Territory, 7.

Psittacosis: New York, 2; Pennsylvania, 1; California, 1.

Weil's disease: Michigan, 1; Washington, 14; Hawaii Territory, 4.

WEEKLY REPORTS FROM CITIES

City reports for week ended March. 7, 1942

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Atlanta, Ga	0	0	6	0	1	0	4	0	4	0	0	0
Baltimore, Md	1	0	12	4	317	2	28	0	20	0	1	29
Billings, Mont	0	0	------	0	2	0	0	0	1	0	0	0
Birmingham, Ala	0	0	17	0	8	0	6	0	3	0	1	2
Boise, Idaho	0	0	------	0	0	0	0	0	0	0	0	0
Boston, Mass	0	0	------	1	96	0	26	0	86	0	0	43
Bridgeport, Conn	0	0	------	0	8	0	2	0	7	0	0	0
Brunswick, Ga	0	0	------	0	9	0	0	0	0	0	0	0
Buffalo, N. Y	1	0	------	1	6	0	13	0	16	0	0	7
Camden, N. J	0	0	1	0	10	0	4	0	17	0	0	0
Charleston, S. C	0	0	97	1	0	2	3	0	1	0	0	0
Chicago, Ill	6	0	8	3	106	0	35	0	115	0	0	75
Cincinnati, Ohio	3	0	------	0	0	0	7	0	24	0	0	13
Cleveland, Ohio	1	0	11	0	11	2	6	0	76	0	1	17
Columbus, Ohio	1	0	1	1	11	0	5	0	1	0	0	12
Concord, N. H	0	0	------	0	0	0	0	0	2	0	0	0
Cumberland, Md	0	0	------	0	0	2	0	0	1	0	0	0
Dallas, Tex	3	0	1	1	210	0	9	0	1	0	1	3
Denver, Colo	5	0	15	0	94	0	3	0	9	0	0	31
Detroit, Mich	2	0	1	1	70	0	28	0	151	0	0	33
Duluth, Minn	0	0	------	0	0	0	1	0	13	0	0	1
Fall River, Mass	1	0	------	3	11	1	1	0	35	0	0	1
Fargo, N. Dak	0	0	------	0	1	0	1	0	0	0	0	7
Flint, Mich	0	0	------	0	1	0	4	0	4	0	0	3
Fort Wayne, Ind	0	0	------	0	1	0	4	0	2	0	1	0
Frederick, Md	0	0	------	0	12	0	0	0	0	0	0	0
Galveston, Tex	0	0	------	0	0	0	1	0	1	0	1	0
Grand Rapids, Mich	0	0	------	1	10	0	2	0	5	0	0	1
Great Falls, Mont	0	0	------	0	37	0	2	0	0	0	0	5
Hartford, Conn	0	0	------	0	16	1	5	0	3	0	0	2
Helena, Mont	0	0	------	0	3	0	1	0	0	0	0	0
Houston, Tex	1	0	------	0	52	0	17	0	4	0	1	0
Indianapolis, Ind	1	0	------	1	14	0	8	0	23	0	0	9
Kansas City, Mo	0	0	1	1	14	0	10	0	34	0	0	1
Kenosha, Wis	0	0	------	0	2	0	0	0	2	0	0	4
Little Rock, Ark	0	0	13	1	119	0	3	0	0	0	0	0
Los Angeles, Calif	8	0	24	0	422	0	13	1	38	0	1	23
Lynchburg, Va	0	0	------	0	0	0	0	0	1	0	0	6
Memphis, Tenn	0	0	7	5	2	0	4	0	4	1	2	4
Milwaukee, Wis	0	0	------	0	41	0	1	0	27	0	0	84
Minneapolis, Minn	2	0	------	0	93	0	5	0	28	0	0	9
Missoula, Mont	0	0	------	0	0	0	2	0	0	0	0	0
Mobile, Ala	1	0	2	0	0	0	1	0	1	0	0	0
Nashville, Tenn	0	0	------	2	1	0	5	0	7	0	0	6
Newark, N. J	0	0	3	0	37	2	5	0	34	0	0	46
New Haven, Conn	0	0	------	0	147	0	0	0	0	0	0	7
New Orleans, La	0	0	3	2	21	1	12	1	4	0	0	3
New York, N. Y	24	5	17	4	51	4	77	0	263	0	3	224
Omaha, Nebr	1	0	------	0	105	0	6	0	3	0	0	0
Philadelphia, Pa	1	0	1	5	43	1	30	0	225	0	1	67
Pittsburgh, Pa	1	1	4	5	27	2	10	0	19	0	0	9
Portland, Me	0	0	------	0	8	0	2	0	1	0	0	0
Providence, R. I	0	0	------	0	100	0	4	0	4	0	0	43
Pueblo, Colo	0	0	------	1	31	0	2	0	4	0	0	0
Racine, Wis	0	0	------	0	10	0	1	0	2	0	0	14
Reading, Pa	0	0	------	0	2	0	2	0	0	0	0	8
Richmond, Va	0	0	------	0	0	0	0	0	2	0	0	0

City reports for week ended March 7, 1942—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
Roanoke, Va	0	0	------	0	1	0	0	0	0	0	0	0
Rochester, N. Y	0	0	------	0	6	0	1	0	12	0	0	13
Sacramento, Calif	0	0	------	0	123	1	3	0	2	0	0	20
Saint Joseph, Mo	0	0	------	0	8	0	3	0	3	0	0	0
Saint Louis, Mo	0	0	1	2	172	0	14	0	16	0	0	5
Saint Paul, Minn	2	0	------	0	508	0	2	1	7	0	0	20
Salt Lake City, Utah	0	0	------	0	6	0	2	0	3	0	0	9
San Antonio, Tex	0	1	2	0	8	0	9	0	3	0	0	0
San Francisco, Calif	3	0	------	0	64	1	12	0	15	0	0	10
Savannah, Ga	0	0	43	2	56	1	1	0	1	0	0	0
Seattle, Wash	1	0	------	2	1	1	6	0	4	0	0	37
Shreveport, La	0	0	------	0	10	0	7	0	2	0	3	0
South Bend, Ind	1	0	------	0	3	0	5	0	22	0	0	2
Spokane, Wash	0	0	------	0	9	0	3	0	1	0	0	4
Springfield, Ill	0	0	------	0	93	1	1	0	5	0	0	2
Springfield, Mass	0	0	------	0	12	0	5	0	10	0	0	14
Superior, Wisc	0	0	------	0	0	0	0	0	0	0	0	2
Syracuse, N. Y	0	0	------	0	22	0	2	0	4	0	0	27
Tacoma, Wash	0	0	------	0	0	0	2	0	1	0	0	4
Tampa, Fla	0	0	------	0	10	0	2	0	0	0	0	0
Terre Haute, Ind	0	0	------	1	2	0	0	0	1	0	0	0
Topeka, Kans	0	0	------	0	2	0	6	0	2	0	0	7
Trenton, N. J	0	0	------	0	4	0	2	0	7	0	0	6
Washington, D. C	2	0	3	1	46	2	7	0	13	0	1	31
Wheeling, W. Va	0	0	------	0	0	0	2	0	0	0	0	0
Wichita, Kans	0	0	------	0	19	0	3	0	3	0	0	5
Wilmington, Del	0	0	------	0	0	0	5	0	11	0	0	0
Wilmington, N. C	0	0	------	0	192	0	1	0	0	0	0	0
Winston-Salem, N. C	0	0	------	0	127	0	1	0	0	0	0	0
Worcester, Mass	0	0	------	0	4	2	7	0	16	0	0	41

Dysentery, amebic.—Cases: Dallas, 1; New York, 4; St. Louis, 1; Worcester, 1.
Dysentery, bacillary.—Cases: Los Angeles, 1; New York, 1.
Leprosy.—Cases: New Orleans, 1.
Typhus fever.—Cases: Savannah, 1.

Rates (annual basis) per 100,000 population for the group of 87 cities in the preceding table (estimated population, 1942, 33,962,266)

Period	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Typhoid fever cases	Whooping cough cases
Week ended Mar. 7, 1942	11.21	45.14	7.98	598.93	82.14	229.07	0.15	2.30	170.57
Average for week, 1937-41	18.28	125.36	18.44	1,118.32	119.01	273.50	4.18	3.41	175.86

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended February 21, 1942.—During the week ended February 21, 1942, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		2	2	5	7		1		4	21
Chickenpox	1	17		190	427	63	37	20	150	905
Diphtheria	1	25		30	4	3	1		2	66
German measles	1	1		56	51	17	18	16	46	206
Influenza		9			20	5			20	54
Measles		5	1	555	117	166	47	6	38	935
Mumps	1	10		446	533	115	231	45	449	1,830
Pneumonia		8			4	1	2		9	24
Scarlet fever	3	19	7	93	311	49	32	62	38	614
Tuberculosis		4	13	64	47	46	4			178
Typhoid and paratyphoid fever				6						6
Undulant fever					1					1
Whooping cough		18	2	162	62	6	4	1	27	282
Other communicable diseases		1		7	214	34	7	1	4	268

CUBA

Habana—Communicable diseases—4 weeks ended March 7, 1942.—During the 4 weeks ended March 7, 1942, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	22	1	Scarlet fever	2	
Leprosy	1		Tuberculosis	13	3
Malaria	16		Typhoid fever	33	2
Measles	19				

Provinces—Notifiable diseases—4 weeks ended January 31, 1942.—During the 4 weeks ended January 31, 1942, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	1	2	1	8		15	27
Chickenpox		1		1		1	3
Diphtheria	2	26	1	3	1	8	41
Hookworm disease		21					21
Leprosy		1			1	2	4
Malaria	176	37	1	12	2	540	768
Measles		6	1	5			12
Poliomyelitis		1					1
Scarlet fever		2					2
Trachoma				16			16
Tuberculosis	29	19	19	52	15	29	163
Typhoid fever	12	49	7	23	7	22	125
Whooping cough				1			1
Yaws						1	1

[1] Includes the city of Habana.

MALTA

Notifiable diseases—November 1941.—During the month of November 1941, certain notifiable diseases were reported in the Island of Malta, including the Island of Gozo as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cancer		11	Lethargic encephalitis		1
Cerebrospinal meningitis	2	1	Measles	1	
Chickenpox	4		Nephritis		21
Diabetes mellitus		18	Pneumonia	54	14
Diarrhea and enteritis (under 2 years of age)		84	Puerperal fever	3	
Diphtheria	21	4	Scarlet fever	3	
Erysipelas	10		Trachoma	8	
Gastroenteritis		94	Tuberculosis (respiratory system)	20	13
Influenza	4		Typhoid fever	30	4
Leprosy		3	Undulant fever	40	2
			Whooping cough	29	

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; P, present]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January-December 1941	January 1942	February 1942—week ended— 7	14	21	28
ASIA							
Afghanistan: Southern Province	C	P					
Ceylon	C	3					
China:							
Canton	C	464					
Hong Kong	C	1,667					
Macao	C	1,475					
Shanghai	C	834					
India	C	97,826					
Bombay	C	15					
Calcutta	C	2,160					
Rangoon	C	116					
India (French)	C	34					
Japan: Taiwan	C	2					

PLAGUE

[C indicates cases; P, present]

Place		January-December 1941	January 1942	February 1942—week ended—			
				7	14	21	28
AFRICA							
Belgian Congo	C	[1] 39	--	--	--	--	--
British East Africa:							
Kenya	C	768	--	--	--	--	--
Tanganyika Territory	C	2	--	--	--	--	--
Uganda	C	198	--	--	--	--	--
Egypt: **Port Said**	C	10	--	--	--	--	--
Madagascar	C	285	22	--	--	--	[2] 19
Morocco	C	2,210	21	1	4	6	6
Casablanca [3]	C	4	--	--	--	--	--
Tunisia: **Tunis**	C	2	--	--	--	--	--
Union of South Africa	C	[4] 74	2	--	--	--	--
ASIA							
China:							
Chekiang	C	[5] 125	--	--	--	--	--
Fukien Province: [6]							
Foochow	C	3	--	--	--	--	--
Hunan Province	C	[7] 7	--	--	--	--	--
Dutch East Indies:							
Java and Madura	C	[8] 494	--	--	--	--	--
West Java	C	[8] 378	--	--	--	--	--
India	C	4,144	--	--	--	--	--
Calcutta	C	3	--	--	--	--	--
Rangoon	C	9	--	--	--	--	--
Indochina (French)	C	26	--	--	--	--	--
Palestine: **Haifa**	C	10	2	--	1	--	--
Plague-infected rats		72	--	--	--	--	--
Thailand: Lampang Province	C	3	--	--	--	--	--
EUROPE							
Portugal: Azores Islands	C	3	--	--	--	--	--
NORTH AMERICA							
Canada—Alberta—Plague-infected ground squirrel		1	--	--	--	--	--
SOUTH AMERICA							
Argentina:							
Buenos Aires Province	C	3	--	--	--	--	--
Cordoba Province	C	[9] 50	--	--	--	--	--
Mendoza Province	C	3	--	--	--	--	--
Santa Fe Province—Plague-infected rats		67	--	--	--	--	--
Santiago del Estero Province	C	2	--	--	--	--	--
Brazil:							
Alagoas State	C	45	--	--	--	--	--
Bahia State	C	12	P	--	--	--	--
Pernambuco State	C	96	--	--	--	--	--
Rio de Janeiro State	C	2	--	--	--	--	--
Chile:							
Santiago	C	[10] 1	--	--	--	--	--
Valparaiso	C	2	--	1	--	--	--
Ecuador	C	[11] 33	--	--	--	--	--
Peru:							
Ancash Department	C	10	6	--	--	--	--
Lambayeque Department	C	3	--	--	--	--	--
Libertad Department	C	12	2	--	--	--	--
Salaverry—Plague-infected rats		--	P	--	--	--	--

[1] Includes 21 cases of pneumonic plague.
[2] For the month of February.
[3] A report dated June 23, 1941, stated that an outbreak of plague had occurred in Casablanca, Morocco, where several deaths had been reported.
[4] Final figures for the year indicate 74 cases were reported instead of 93 cases as previously published.
[5] October 2 to December 6, 1941.
[6] A report dated Nov. 22, 1941, stated that bubonic plague had appeared in epidemic form in Shaowu and Yangkow, Fukien Province, China.
[7] For November and December 1941.
[8] January to October 25, 1941.
[9] Includes 3 cases of pneumonic plague.
[10] Imported.
[11] January to April 1941, inclusive.

PLAGUE—Continued

[C indicates cases; P, present]

Place		January-December 1941	January 1942	February 1942—week ended—			
				7	14	21	28
SOUTH AMERICA—continued							
Peru—Continued.							
Lima Department	C	24	14				
Moquegua Department—Ilo	C	7					
Piura Department	C	11	3				
OCEANIA							
Hawaii Territory:[12] Plague-infected rats		75	8	1	1		
New Caledonia	C	11					

[12] During April and May 1941, 4 lots of plague-infected fleas were also reported in Hawaii Territory.

SMALLPOX

[C indicates cases]

AFRICA							
Algeria	C	935	150			23	
Angola	C	[1] 29					
Belgian Congo	C	682					
British East Africa	C	72					
Dahomey	C	467					
French Guinea	C	45					
French West Africa	C	3	41				[2] 133
Gold Coast	C	510					
Ivory Coast	C	40					
Morocco[3]	C	648	441	112		55	38
Nigeria	C	1,026					
Niger Territory	C	273					
Portuguese East Africa	C	9					
Portuguese Guinea	C	20					
Rhodesia: Southern	C	86					
Senegal	C	65					
Sierra Leone	C	15					
Sudan (Anglo-Egyptian)	C	7					
Sudan (French)	C	19					
Tunisia: Tunis	C	[4] 1					
Union of South Africa	C	758					
ASIA							
Ceylon	C	114					
China	C	259					
Chosen	C	696					
Dutch East Indies—Bali Island	C	3					
India	C	24,484					
India (French)	C	9					
India (Portuguese)	C	70					
Indochina (French)	C	1,298	137				[2] 313
Iran	C	8					
Iraq	C	1,593	9				
Japan	C	200					
Straits Settlements	C	1					
Syria	C	1					
Thailand	C	303					
EUROPE							
France:							
Seine Department	C						[2] 41
Unoccupied zone	C	1		[5] 6	7		
Portugal	C	53	8	2			
Spain	C	457	20				
Switzerland	C	1					

[1] For June.
[2] For February.
[3] A report dated Dec. 31, 1941, stated that an epidemic of smallpox had occurred near Casablanca, Morocco, where about 100 cases per week were reported.
[4] For December.
[5] Imported.

SMALLPOX—Continued

[C indicates cases]

Place		January-December 1941	January 1942	February 1942—week ended— 7	14	21	28
NORTH AMERICA							
Canada	C	25					
Dominican Republic	C	2					
Guatemala	C	6					
Mexico	C	321					
Panama Canal Zone (alastrim)	C	[6] 11					
SOUTH AMERICA							
Bolivia	C	18					
Brazil	C	[7] 1					
Colombia	C	935					
Paraguay	C	[8] 8					
Peru	C	1,841					
Uruguay	C	7					
Venezuela (alastrim)	C	254	36				

[6] October, November, and December.
[7] For August.
[8] January, February, and March.

TYPHUS FEVER

[C indicates cases]

AFRICA							
Algeria	C	12,827	3,362			1,988	
British East Africa: Kenya	C	12					
Egypt	C	9,324	1,189	515			
Morocco [1]	C	1,471	1,443	634	646	793	868
Sierra Leone	C	5					
Tunisia	C	7,078	1,819	416			
Union of South Africa	C	780					
ASIA							
China	C	245					
Chosen	C	425					
Dutch East Indies: Sumatra	C	136					
India	C	4	3				
Iran	C	115					
Iraq	C	53	3				
Japan	C	864					
Malaya: Unfederated States	C	1					
Palestine	C	232	4				
Straits Settlements	C	8					
Trans-Jordan	C	9					
EUROPE							
Bulgaria	C	284	27	3		22	42
Czechoslovakia	C	28					
France (unoccupied zone)	C	2		[2] 2			[2] 2
Germany	C	2,158					
Gibraltar	C	2					
Greece	C	7					
Hungary	C	652	122	19	13	32	42
Irish Free State	C	26					
Poland	C	3,786					
Portugal	C	50					
Rumania	C	1,827	688	199	152	237	106
Spain	C	9,560	975				
Switzerland	C	5					
Turkey	C	704		12	38	15	21
Union of Soviet Socialist Republics [3]	C		[4] 16				
Yugoslavia	C	86					

[1] Information dated Dec. 31, 1941, reports typhus fever present in epidemic form in Casablanca, Morocco.
[2] Imported.
[3] See also PUBLIC HEALTH REPORTS of Mar. 13, 1942, p. 407.
[4] For 1 week.

TYPHUS FEVER—Continued

[C indicates cases]

Place		January-December 1941	January 1942	February 1942—week ended—			
				7	14	21	28
NORTH AMERICA							
Guatemala	C	190	14				[5] 14
Jamaica	C		1	2	2		
Mexico	C	222					
Panama Canal Zone	C	5					
Puerto Rico	C	12	2		1		
SOUTH AMERICA							
Bolivia	C	[6] 75					
Brazil	C	1					
Chile	C	337					
Colombia	C	11					
Ecuador	C	127	7				
Peru	C	1,435					
Venezuela	C	59					
OCEANIA							
Australia	C	15	4				
Hawaii Territory	C	60	8	1	2	1	

[5] For February.
[6] For January, February, and March.

YELLOW FEVER

[C indicates cases; D, deaths]

Place		January-December 1941	January 1942	February 1942—week ended 7	14	21	28
AFRICA							
Belgian Congo:							
Aba	C	[1] 2					
Kimvulu	C	1					
Libenge	C	1					
Stanleyville	D	[1] 1					
British East Africa: Uganda	C	1					
Dahomey: Grand Popo	C	[1] 2					
French Equatorial Africa:							
Gabon	C	2					
Mayumba	C	4					
French Guinea	C	[2] 3					
French West Africa	C	5	1				
Gold Coast	C	[2] 3					
Accra	C	1					
Ivory Coast	C	[3] 8	1				
Nigeria	C	[1] 1					
Senegal.[4]							
Sierra Leone: Freetown	C		1				
Spanish Guinea	D	4					
Sudan (French)	C	[5] 11	[1] 1				
Togo: Hohoe	C		1				
SOUTH AMERICA [6]							
Brazil:							
Acre Territory	D	1					
Amazonas State	D	4					
Bahia State	D	3					
Para State	D	8					
Colombia:							
Antioquia Department	D	3					
Boyaca Department	D	8		2			
Intendencia of Meta	D	15	1				
Santander Department	D	20	1				
Tolima Department	D	1					
Peru: Junin Department	C	5					
Venezuela: Bolivar State	C	1					

[1] Suspected.
[2] Includes 1 suspected case.
[3] Includes 4 suspected cases.
[4] According to information dated Feb. 9, 1942, 15 deaths from yellow fever among Europeans have occurred in Senegal.
[5] Includes 5 suspected cases.
[6] All yellow fever in South America is of the jungle type unless otherwise specified.

COURT DECISION ON PUBLIC HEALTH

Sewage disposal—statute held valid—action of State board of health and State committee on water pollution held authorized.—(Wisconsin Supreme Court; *State ex rel. Martin, Attorney General,* v. *City of Juneau,* 300 N. W. 187; decided October 7, 1941.) The State Board of Health and the State Committee on Water Pollution of Wisconsin found that the discharge of inadequately treated sewage from the city of Juneau into a drainage ditch caused, among other things, a menace to public health and a nuisance. Based on these findings the board and committee ordered that the city take immediate steps to secure detailed plans and specifications for a complete sewage treatment system or plant adequate to meet local needs, which plans and specifications were to be submitted to the board for approval in accordance with statutory requirements. It was also ordered that the treatment system or plant be installed and placed in operation in a little less than a year and that it be so operated and maintained as to prevent objectionable pollution conditions in the ditch. The city failed to comply with the order and the State sought a mandatory injunction commanding the city to comply and asking that it be enjoined from discharging inadequately treated sewage into the drainage ditch after a reasonable time to be determined by the court. The city did not pursue the statutory remedies provided for the review of the order or the arbitration of the question, and the Supreme Court of Wisconsin said that, because of the city's failure to avail itself of the remedies provided, it was considered that in the instant action the city was foreclosed from raising any questions except (1) the validity of chapter 144 of the Wisconsin Statutes, and (2) whether the State board of health and the State committee on water pollution acted within the powers conferred upon them by statute. The city, upon appeal by it from the lower court's order, contended that chapter 144 was invalid and unconstitutional because (1) it was vague and indefinite and incapable of enforcement, (2) it unlawfully delegated both legislative and judicial power, and (3) it was unreasonable, arbitrary, and oppressive.

The purpose of the statute respecting the State committee on water pollution was to prevent pollution of the waters of the State and under it the committee had the duty and power to issue special orders directing particular owners to secure such operating results toward pollution control as the committee might prescribe. One objection of the city was that because the words "operating results" were not specifically defined the statute was invalid because indefinite. The supreme court said that it would seem to be reasonably plain that an operating result was one which prevented pollution and rejected this objection and stated that other specific objections of the same general character did not need to be separately considered. Relative to the question of delegation of legislative and judicial power, it was the view of the court that the limitations upon the power to delegate had not been exceeded by the provisions of chapter 144. The appellate court also pointed out that what the statute conferred upon the State board of health and the State committee on water pollution was authority to promote public health. "The discretion vested in" the board and committee "is not arbitrary, it is subject to court review and the rights of all parties are fully protected." Neither did the court find any basis for the city's contention that the board and committee had acted beyond and without the powers conferred upon them by chapter 144.

The statute being valid and the board and committee having acted within their statutory powers, the supreme court affirmed the lower court's order.

COURT DECISION ON PUBLIC HEALTH

Statutes regarding appointment of health officer for particular county alone held unconstitutional.—(North Carolina Supreme Court; *Board of Health of Nash County et al.* v. *Board of Commissioners of Nash County et al.*, 16 S.E.2d 677; decided October 8, 1941.) The general statutory law of North Carolina provided that a county board of health should elect either a county physician or a county health officer. In 1941 the State legislature enacted 2 statutes which by their terms applied only to Nash County, 1 out of the 100 counties of the State. These statutes, the later of which amended the prior one, provided substantially that the appointment of a health officer of Nash County should not become effective until approved by the board of county commissioners and that, if the health officer appointed by the board of health should be disapproved by the county commissioners, such appointee would be ineligible and the board of health should, within 30 days, appoint some other person. It was further provided that, if the county commissioners failed to approve the second appointee, the secretary of the State board of health should appoint, etc. The Nash County Board of Health appointed a certain person as health officer and the board of commissioners of the county disapproved such appointment. The board of health took no further action in the matter but in a proceeding contended that the two 1941 statutes referred to were unconstitutional and void because in violation of a State constitutional provision which read, in part, that the general assembly "shall not pass any local, private, or special act or resolution * * * relating to health, sanitation, and the abatement of nuisances."

The Supreme Court of North Carolina stated that there was no room to doubt that the said statutes were local and that the court was committed to the proposition that a law affecting the selection of officers to whom was given the duty of administering health laws was a law "relating to health." "We have become increasingly conscious," said the court, "of the fact that many of the problems which heretofore we have considered purely local are so related to the welfare of the whole State as to demand uniform and coordinated action under general laws." The constitutional provision in question was stated to mention especially general laws relating to health as being within its protective purview, "recognizing that the alleviation of suffering and disease, the eradication or reduction of communicable disease in its humanitarian, social, and economic aspect, is a State-wide problem which ought not to be interfered with by local dilatory laws which are so frequently the outcome of local indifferency, or factional and political disagreements." It was the court's view that the two 1941 statutes involved were unconstitutional and void and that the election of a county health officer by the board of health was valid and effective without reference to any act by the county commissioners.

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