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BENIGN LYMPHOCYTIC CHORIOMENINGITIS (ACUTE ASEPTIC MENINGITIS)

A New Disease Entity

By CHARLES ARMSTRONG, *Surgeon, United States Public Health Service,* and PAUL F. DICKENS, *Lieutenant Commander, Medical Corps, United States Navy*

It has often proved difficult to establish an etiologic diagnosis in the case of patients showing signs and symptoms of cerebrospinal involvement, especially when the cellular response in the cerebrospinal fluid is predominantly lymphocytic in character; and occasionally cases are met in which heretofore it has not been possible to detect any living etiologic agent. For that reason, the term "acute aseptic meningitis" has been proposed as most nearly descriptive. The purpose of this paper is to show that some, if not all, of such cases represent a disease entity due to a filterable virus (Armstrong).

Viets and Watts (*1*, *7*) report 14 cases of meningitis characterized by an acute onset, headache, vomiting, and moderate fever. There was some degree of blurring of the optic disk in all cases. The cerebrospinal fluid showed a marked lymphatic pleocytosis with but few polymorphonuclear cells. Slight protein increase was noted; but the sugar and chloride content were within the normal range. No organism could be obtained. The spinal fluid pressure was higher than normal. The disease reported was self-limited, lasting from 3 to 6 weeks, and recovery took place without residual paralysis.

In 1932 Dickens (*2*) reported two cases of acute aseptic meningitis under the title of "acute aseptic (lymphocytic) meningitis", and asked the question: "Is this a new disease entity due to a filterable or nonfilterable virus?" In this article it is our intention to answer this question and (*a*) to present the clinical picture of acute aseptic meningitis in the human and the monkey; (*b*) give the laboratory findings common to this condition; (*c*) present immunological evidence that the etiology is a specific virus first described by Armstrong and Lillie of the National Institute of Health (1934); (*d*) report additional cases; and (*e*) demonstrate that human blood serum from patients recovered from the disease protects animals from the specific virus.

The clinical picture of the disease is that of an infection of the upper respiratory tract, followed by meningeal symptoms which are ushered in by sudden onset with headache, nausea or vomiting, rise in tem-

perature to 100°–103° F., stiff neck, and usually a positive Kernig's sign. There is no evidence of nerve involvement, and other than noted above the neurological examination is negative. The disease runs a benign course for about 10 days to 2 weeks. The temperature declines by lysis, and recovery is complete without residual of any kind. Four patients who have been "followed up" for more than 3 years remain entirely well.

The cerebrospinal fluid is under slight increase in pressure and is clear or at the most slightly hazy. The cellular response is almost entirely lymphocytic—rarely do we find as many as 10 percent polymorphonuclear leucocytes in the fluid. The number of cells may range anywhere from 50 to 2,000, according to the severity of the attack. The chemistry of the cerebrospinal fluid is important in that the sugar, chlorides, and urea content will be found within normal range. The Kahn or Wassermann is negative, and the colloidal gold curve is in the meningitic zone and of low color change. No organism or clot can be demonstrated. Drainage of a few cubic centimeters of cerebrospinal fluid will usually relieve the headache and nausea and quiet the patient. The white blood cell count may show a slight increase, up to 9,000 or 11,000, with a fairly normal differential percentage. That the cerebrospinal fluid shows no tendency to clot and that the sugar and especially the chlorides remain within normal limits are most important diagnostic points definitely against tuberculous meningitis, with which the disease is at first often confused. The fact that no muscle weakness or definite neurological signs are found helps to rule out encephalitis (all types) and acute anterior poliomyelitis.

The etiology is in all probability a filterable virus recovered by Armstrong and Lillie and reported in 1934 and 1935 (*3*, *4*). In August 1934 Armstrong called attention to a virus which he had recovered and which differed from any with which he was then familiar. It was encountered in the course of virus transmission work on monkeys, and it is uncertain whether the infection originated independently in the animals used or was inoculated with material from a human source. Monkeys seem to be usually susceptible, as are mice and guinea pigs, the infection producing in monkeys, as in man, a uniform symptom complex. On the fourth to the eighth day after inoculation with the virus the temperature rises to 104°–105° F., continuing at this elevation for 3 to 10 days. Defervescence is by lysis. The blood leucocyte count ranges from 10,000 to 19,000 per mm^3. The cerebrospinal fluid is clear, or at most slightly hazy, is under slight increase in pressure, and contains from 150 to 3,000 cells per mm^3, these being almost entirely lymphocytes. (The average normal cerebrospinal fluid cell count in a series of control monkeys was 19 lymphocytes.) The chemistry of the cerebrospinal fluid does not deviate from normal range.

In the series of sick monkeys the sugar averaged 61, sodium chloride 891, and the urea nitrogen 17.6 mg per 100 cc. (In the series of 10 control monkeys the average content per 100 cc of cerebrospinal fluid was sugar 56, sodium chloride 812, and urea nitrogen 16.8 mg.) The sick animal characteristically sits quietly with head drooping and eyes closed, but is easily aroused; and if disturbed sufficiently to make it move, the motions are slow and hesitating, as if the muscles were stiff. Armstrong (*3*) stated that the human disease most nearly resembling this disease in monkeys is, perhaps, the so-called "lymphocytic or aseptic meningitis" described by Wallgren, Viets, and Watts, Dickens, Bloedorn, and others, and demonstrated protective antibodies in the serum of a recovered case (*4*). Traub (*9*) recently recovered a virus from white mice which appeared to resemble closely the virus isolated by Armstrong. Soon thereafter (May 2, 1935), Rivers and Scott reported the isolation of a similar virus from 2 cases of meningitis, and stated that the serum from these cases protected animals from this virus. An exchange of protective sera was made with Traub in order that a serological comparison of the two viruses could be made. At the same time Traub tested two strains of his virus against the immune monkey serum of the National Institute of Health. The results of both tests are shown in tables 1 and 2.

TABLE 1.—*Armstrong's experiment using Traub's immune serum against the National Institute of Health virus (Armstrong)*

4 mice in each group inoculated intracerebrally with each virus-serum mixture

Armstrong virus suspension (dilution)	Traub G. P. immune serum (survived)	Monkey no. 883, immune serum (survived)	Control negative monkey serum (survived)	Control negative human serum (survived)
1:1,000	3	4	1	0
1:6,666	4	3	0	0
1:33,333	3	4	0	1

SECOND TEST

Armstrong virus suspension (dilution)	Traub G. P. immune serum (survived)	Monkey no. 311 (survived)	Control negative, monkey no. 67 (survived)	Control negative, monkey no. 584 (survived)
1:1,000	4	4	0	1
1:6,666	3	4	1	0
1:33,333	4	3	0	0

TABLE 2.—*Traub's experiment using National Institute of Health immune serum against his virus*

1 guinea pig inoculated with each dilution

Traub virus, strain	Dilution	Immune serum, Armstrong, (monkey)	Normal human serum (control)	Normal monkey serum (control)
A	1:100	Survived	Died	Died.
	1:1,000	do	do	Do.
	1:10,000	do	Survived	Survived.
B	Undiluted	do	Not used	Died.
	1:10	do	do	Do.
	1:100	do	do	Do.
	1:1,000	do	do	Do.

Summarizing the results of these tests it is seen that serum from guinea pigs rendered immune to Traub's virus protected animals inoculated with Armstrong's virus, and that serum from monkeys rendered immune to Armstrong's virus protected animals inoculated with Traub's virus. The results of these two independent tests indicate that the Armstrong and Traub viruses are identical (serologically).

Rivers and Scott (*10*) have also isolated a virus from two human cases of meningitis which appears to be immunologically identical with the Armstrong virus. From Rivers, mice were obtained, which had been rendered immune to his virus, together with mice from the same stock for normal controls, and Armstrong conducted tests in which these mice were inoculated with his virus. The results, which are shown in table 3 indicate the serological identity of the viruses.

TABLE 3.—*Armstrong's experiment using Rivers' immune and normal mice inoculated with the National Institute of Health virus*

12 mice in each group inoculated with 1:500 suspension of Armstrong virus

	Rivers' mice		National Institute of Health normal mice
	Immune	Normal	
FIRST TEST			
1	Survived	Died	Died.
2	do	do	Do.
3	do	do	Do.
4	do	do	Do.
5	do	do	Do.
6	do	do	Survived.
SECOND TEST			
1	Survived	Died.	
2	do	do	
3	do	do	
4	do	do	
5	do	do	
6	do	do	

Further confirmatory work was done by Rivers, using his virus against Armstrong's immune serum, Traub's immune serum, and Rivers' serum in tests on guinea pigs, inoculating the serum-virus mixtures subcutaneously. The results are shown in tabular form and indicate the immunological identity of the Armstrong virus, the Traub virus, and the Rivers' virus (tables 3 and 4).

TABLE 4.—*Rivers' experiment using his virus against immune sera of Armstrong, Traub, and Rivers*

Guinea pigs inoculated subcutaneously with serum-virus mixtures. Time of death averaged 10-14 days. Animals observed 3 weeks

	Virus dilution	Normal human serum	Armstrong immune serum	Rivers immune serum	Traub immune serum
1	1:10	Died	Survived	Survived	Survived.
2	1:100	do	do	do	Do.
3	1:1,000	do	do	do	Do.

NOTE.—Data on experiments of Traub and Rivers taken from personal communication to Armstrong and inserted here in order to give proper credit to these workers.

CASE REPORTS

CASE 1

White female, aged 19, unmarried. First seen May 13, 1931, complaining of severe headache, more marked over the frontal region, nausea, vomiting, and pain in the epigastrium. Patient stated that for several days previous to the onset of the acute symptoms she had had a cold, and that she had not felt well for about 2 weeks.

Physical examination.—Temperature 100° F., pulse 92, and respiration 20. There was some slight tenderness over the frontal sinuses, which, however, transilluminated equally and well. The chest was clear to auscultation and percussion. The heart showed an occasional extrasystole. The abdomen was negative except for slight tenderness over the epigastric region.

Laboratory examination.—Urine showed a slight trace of albumin; white blood count 6,000; differential—polymorphonuclear leucocytes 58 percent with 5 percent band forms, lymphocytes 36 percent, and monocytes 1 percent. A provisional diagnosis of influenza was made.

Course.—The following day the temperature rose to 102°. She complained of severe headache. Examination revealed a well-marked rigidity of the neck, and a suggestive Kernig's sign. A spinal puncture was done, with relief of the headache; 15 cc of clear fluid was obtained under no apparent increase in pressure. The cell count was 590, with 80 percent lymphocytes, and 20 percent polymorphonuclear leucocytes. Smears were negative for organisms. The Wassermann and colloidal gold tests on the spinal fluid were negative. Urea N 10, sugar 60, and chlorides 712 mg per 100 cc of spinal fluid. On the

third day the temperature was 99.4°, but the rigidity of the neck was decidedly more marked and there was retraction of the head. Nausea and vomiting continued. A second spinal tap was done and 30 cc of fluid were obtained. The pressure was 18 mm Hg; cell count 3,200, with 96 percent lymphocytes and 4 percent polymorphonuclear leucocytes. Smears and cultures were negative for organisms. Sugar 60 mg, urea N 12, chlorides 712 mg per 100 cc of spinal fluid. The impression at this time was "tuberculous meningitis." On the fourth day the headache decreased in severity; there was no vomiting and little nausea. The rigidity of the neck, and retraction of the head continued, and Kernig's sign was positive. Spinal puncture was repeated; 4 cc of fluid under 4 mm Hg pressure were removed. Cell count 2,900, with 86 percent lymphocytes, and 14 percent polymorphonuclear leucocytes. On the sixth day the temperature remained normal and the patient showed improvement. From this time on there was steady improvement. The white cell count of the blood during the illness varied from 6,600 to 8,700; the differential count showing an average of 61 percent polymorphonuclear leucocytes, and 32 percent lymphocytes. On the thirteenth day of the illness the spinal fluid showed 38 cells, of which 93 percent were lymphocytes, and 7 percent polymorphonuclear leucocytes. Sugar 75 mg, Urea N 15, and chlorides 730 mg per 100 cc of spinal fluid.

The patient made an uneventful recovery and in 6 weeks was apparently well. At no time was there any evidence of cranial nerve involvement or any other significant localizing neurological findings. She has been under observation since then and has been free from symptoms.

On April 25, 1935, or 3 years and 11 months after the illness, blood serum was obtained from this patient and her serum protected mice against the virus of Armstrong (table 5).

TABLE 5.—*Virus-serum protection test on case 1*

4 mice inoculated with each virus dilution in each group (Armstrong, Apr. 25, 1935)

Serum	Virus dilution	Mouse deaths by days after inoculation											Survived
		1	2	3	4	5	6	7	8	9	10	11	
Case 1 (Dickens)	1:500				1								3
	1:3,333								1				3
	1:16,666												4
Positive control case MT [1]	1:500												4
	1:3,333												4
	1:16,666	1											3
Negative control, case RT	1:500							2	2				0
	1:3,333								3		1		0
	1:16,666									3		1	0
Normal monkey	1:500								3		1		0
	1:3,333									3	1		0
	1:16,666									1		1	2

[1] Report of case published in PUBLIC HEALTH REPORTS for Apr. 19, 1935.

CASE 2

(Reported by courtesy of Dr. Walter A. Bloedorn)

White male, aged 28. The patient was first seen on April 2, 1934, at which time he complained of headache, nausea, and vomiting, stiff muscles, and fever. He stated that 3 days previously he was suddenly taken ill with severe headache, coryza, and fever.

Physical examination.—The patient was a well-developed, somewhat obese male; he did not look toxic, or gravely ill. The only significant findings were stiffness of the neck, a positive Kernig's sign, and a temperature of 101° F.

Laboratory examination.—Red blood cells 4,800,000; white blood cells 10,200; differential—polymorphonuclear leucocytes 66 percent (segmented 50 percent, bands 16 percent), lymphocytes 30 percent, monocytes 4 percent. Spinal fluid—cell count 1,260, almost exclusively lymphocytes (8 red blood cells, and 2 polymorphonuclear leucocytes were seen); globulin positive; chlorides, estimated as sodium chloride, 690 mg per 100 cc; sugar 60 mg per 100 cc. Kahn and Wassermann were negative; colloidal gold curve 0011221100. Culture negative after 48 and 72 hours and on the seventh day. Animal inoculation was negative for tuberculosis. Due to the sudden onset, absence of tuberculosis elsewhere in the body, and absence of paralysis and muscle weakness, together with the relief of the main symptoms and lowering of the body temperature by spinal puncture, Bloedorn made a tentative diagnosis of aseptic meningitis, which was confirmed by the laboratory findings. The illness lasted one week, was of a mild nature, and recovery was complete without residual manifestations. On April 8, 1935, 1 year after the illness, blood serum was obtained from this patient, and his serum protected mice and monkeys from the virus of Armstrong (table 6).

TABLE 6.—*Virus-serum protection test on case 2*

Virus of experimental choriomeningitis 1 part (various dilutions) plus 2 parts serum, mixed and incubated for 4 hours at 37.5° C. and then inoculated intracerebrally into white mice (0.03 cc virus-serum mixture given to each of 4 mice (Armstrong, Apr. 8, 1935.)

Serum	Virus dilution	Mouse deaths by days following inoculation												Survived
		1	2	3	4	5	6	7	8	9	10	11	12	
Case 2 (Bloedorn)	1:500	----	----	----	----	----	----	----	----	----	1	----	----	3
	1:3,333	----	----	----	----	----	----	----	----	----	----	----	----	4
	1:16,666	----	----	----	1	----	----	----	----	----	----	----	----	3
Immune monkey (positive control).	1:500	----	----	----	----	----	----	----	----	----	----	1	----	3
	1:3,333	----	----	----	----	----	----	----	----	----	----	----	----	4
	1:16,666	----	----	----	----	----	----	----	----	----	----	----	----	4
Garner (negative control)	1:500	----	----	----	----	1	----	1	2	----	----	----	----	0
	1:3,333	----	----	----	----	----	----	----	----	3	----	----	----	[1]1
	1:16,666	----	----	----	----	----	----	----	1	1	----	1	----	[1]1

[1] These 2 mice were discharged through error on the eleventh day.

CASE 8

White male, aged 33. First seen October 28, 1931, complaining of a severe headache, more marked at the occiput, nausea, and general soreness of the muscles. Patient stated that 2 weeks previously he had had a severe cold which had cleared within a week, but which was followed by herpes labialis.

Physical examination.—Temperature 102°, pulse 88, respiration 20. Residuals of herpes noted about nose and lips. There was no rash or erythema. The throat was moderately inflamed; tonsils had been removed. There was some stiffness and tenderness of the neck. The posterior cervical lymph glands and inguinal glands were palpable. Lungs, heart, and abdomen normal; blood pressure 130/80.

Neurological examination.—Bilateral Kernig and hyperactive knee-kicks; ophthalmoscopic examination showed some blurring of the disk margins.

Laboratory examination.—Urine negative; red blood count, 4,850,000; hemoglobin 85 percent, white blood cell count 8,000; differential—polymorphonuclear leucocytes 60 percent, lymphocytes 35 percent, monocytes 5 percent. Blood Kahn negative.

Spinal fluid

Day	Date	Cells [1]	Pressure mm of Hg	Protein	Sugar	Chlorides
1	Oct. 28	1,255	20	60	70	700
2	Oct. 29	1,520	15	60	65	650
5	Nov. 1	950	10	------	50	700
9	Nov. 5	722	7	30	60	675
14	Nov. 10	120	7	20	55	720
20	Nov. 16	18	10	22	64	680

[1] The cells of the spinal fluid were exclusively lymphocytes.

Smears and cultures from the fluid were negative for organisms. Animals inoculated and killed 5 weeks later showed no evidence of tuberculosis. There was no pellicle formation. Colloidal gold curve, 0011211000. X-ray of the head and chest negative for tumor, abscess, or tuberculosis.

Course.—The spinal taps relieved the headaches, and upon two occasions the patient asked for the spinal tap to ease the pain. The treatment was essentially symptomatic and nursing. The temperature the first 8 days ranged from 99.5° F. in the morning to 102° F. in the afternoon. On the eleventh day of the illness the temperature fell to normal and remained there. Recovery was without incident, and 6 weeks later the patient was apparently well. A check-up 2 months later showed the patient to be in good health. On April 20, 1935, 3½ years after the illness, blood serum obtained from this patient protected mice from the National Institute of Health strain of virus.

TABLE 7.—*Virus-serum protection test*

Four mice inoculated with virus dilution in each group (Armstrong)

Serum	Virus dilution	Mouse deaths by days following inoculation											Survived
		1	2	3	4	5	6	7	8	9	10	11	
Case 3 (Dickens)	1:500						1						3
	1:3,333							1					3
	1:16,666												4
Positive control (human serum)	1:500												4
	1:3,333												4
	1:16,666												4
Negative control (human serum)	1:500							3	1				0
	1:3,333								2	1	1		0
	1:16,666									1		3	0
Negative control (monkey serum)	1:500						1	1	2				0
	1:3,333							1	3				0
	1:16,666									1	2		1

CASE 4

White female, nurse, age 20. First seen March 15, 1935, at which time patient complained of a cold, severe headache, nausea, and vomiting, disturbances in vision, and pain in the sinuses. She stated that she had an acute attack of sinusitis in January 1935.

Physical examination.—Temperature 100.8° F., pulse 90, respiration 20. There was some blurring of the optic disks, and there was a positive Brudzinski sign together with a positive Kernig sign, otherwise the examination was essentially negative.

Laboratory examination.—Urine negative; red blood count 4,500,000, hemoglobin 85 percent, white blood cell count 8,000, differential—polymorphonuclear leucocytes 69 percent, lymphocytes 21 percent, monocytes 10 percent. Blood Kahn negative. Spinal fluid—cell count 209, exclusively lymphocytes; no organisms noted in the smear; the pressure showed no significant increase; and the fluid was practically clear.

Course.—Throughout the illness the main symptoms were headache, nausea, and vomiting. The temperature maintained a level of 100.8° F. for 3 days, dropped to normal for 1 day, and fluctuated between 99° and 100° F. for 3 more days before dropping to normal and remaining there. Spinal taps gave the patient relief early in the illness, but caused some reaction in the form of headache later on in the course of the disease. On the fifth day the blood examination was as follows: Red blood cell count 4,500,000, hemoglobin 85 percent, white blood cell count 9,500, differential—polymorphonuclear leucocytes 44 percent, band forms 5 percent, eosinophiles 3 percent, lymphocytes 41 percent, monocytes 7 percent. Blood chemistry: Urea 12, sugar 91, and chlorides 675 mg per 100 cc. Spinal fluid on the third day of the illness: Cell count 409, exclusively lymphocytes, sugar 60, and chlorides 775 mg per 100 cc; no organisms could be found by smear, and cultures of the fluid were negative. Kahn and Wassermann negative

and the colloidal gold curve was 000322221. On the tenth day of the illness the spinal fluid cell count was 22, all lymphocytes; there was no pellicle or clot formation in the fluid. On the twenty-first day the chloride content of the spinal fluid was 775 mg per 100 cc, and the colloidal gold curve was 0000000000. The blood counts were essentially normal. The treatment other than the spinal taps was essentially symptomatic and nursing. The patient made a gradual and uneventful recovery, and 1 month later was feeling well.

On March 24, 1935, or on the tenth day of illness, blood serum obtained from this patient did not protect animals inoculated with the virus of Armstrong; however, on May 15, 1935, 2 months after the onset of the illness, her blood serum did protect the animals inoculated with the virus of Armstrong (table 8).

It will be noted that, in human beings, as in the experimental animals, the blood serum does not have protective power in preventing the disease until after the second week of the illness. This case is important in that the serum was not protective early in the disease, but became definitely protective after the illness, probably indicating definite immunity.

TABLE 8.—*Virus-serum protection test*

4 mice inoculated with virus dilution in each group

Serum	Virus dilution	Mouse deaths by days following inoculation												Survived
		1	2	3	4	5	6	7	8	9	10	11	12	
Case 4 (Dickens)	1:500													4
	1:3,333													4
	1:16,666													4
Negative control (Ill. serum no. 149).	1:500							2	1	1				0
	1:3,333							2	1			1		0
	1:16,666										2			2

It is believed that these are important observations in that they seem to prove that we are dealing with a new disease entity caused by a virus that was independently isolated by Armstrong and Lillie (3), Traub (9), and Rivers and Scott (10), and that the serum of patients recovered from this disease protects animals against this virus.

SUMMARY

(1) A symptom complex of headache, fever, meningeal irritation, cerebrospinal fluid under increased pressure, with an increase in cells (with a lymphocytic response dominant) above 50, coupled with a normal chloride, sugar, and urea content in the cerebrospinal fluid and a negative spinal fluid Wassermann, is a clinical entity which has previously been designated in man as *acute aseptic meningitis*.[1]

[1] Since the ailment here considered is caused by a virus, "aseptic" is a misnomer, and consequently we prefer to denote the condition by the term (*3, 4*) "acute lymphocytic choriomeningitis."

(2) The virus of Armstrong produces a symptom complex in monkeys similar to the above.

(3) The blood serum of patients recovered from the disease protects animals from the virus of Armstrong (National Institute of Health strain).

(4) This disease occurs sporadically in man and has been transferred experimentally to animals.

(5) Traub has isolated a virus from white mice and Rivers and Scott have isolated a virus from human patients which are serologically identical with the National Institute of Health strains of the Armstrong virus.

(6) Cases reported in this paper and by Dickens (*2*) and Armstrong (*3*) cover scattered geographical areas, having their origin in California, Maryland, District of Columbia, Illinois, Ohio, and Virginia.

CONCLUSIONS

(1) The symptom complex is a disease entity.

(2) This condition by priority should be designated "acute aseptic meningitis" (*7, 8*), but in view of the recent advance in the knowledge of its etiology, this designation is a misnomer, and we suggest the designation "acute lymphocytic choriomeningitis" as a more accurate designation (*3, 4*).

(3) The etiological agent is a filterable virus first described by Armstrong and Lillie (*3*).

(4) The blood serum of patients recovered from "acute aseptic meningitis" protects animals from the virus. This may be used to confirm the diagnosis.

(5) Monkeys, mice, and guinea pigs are susceptible to the virus, and it is conceivable that a reservoir of the disease may exist in animals.

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THE DETERMINATION AND CONTROL OF INDUSTRIAL DUST

A treatise on the engineering methods employed in studying the industrial dust problem has just been issued by the Public Health Service.[1] When one realizes that the workmen employed in the dusty trades comprise the largost group exposed to any one industrial hazard, it is quite apparent that this problem is one of major importance to the industrial hygienist. Furthermore, it is now well established that exposure to certain kinds of dusts, such as those containing considerable amounts of quartz, has increased the morbidity and mortality rate from respiratory diseases; while metallic dusts, such as lead and its compounds, have been associated with general systemic poisoning of workers.

In view of the fact that certain kinds of dusts have been known to produce definite damage to the workers exposed to them it is obvious that a knowledge of the properties of a given dust, which determines its capacity to produce injurious effects, is essential. Experience has shown that these properties are the composition of the dust, the quantity suspended in the industrial atmospheres, and its particle size.

In order to study all these factors involved in the industrial dust problem, it is necessary to conduct careful investigations. Such studies in industry serve a threefold purpose. First, they enable one to evaluate the extent of the hazard; this is accomplished by obtaining occupational dust exposures, which disclose the dust-creating tasks. Second, if clinical studies are also made, dust counts may indicate the permissible amount of dust which may be breathed with impunity. Third, dust determinations are used in an attempt to control the hazard; this is effected by testing the efficiency of such devices which have been developed for this purpose.

The recent bulletin describes the methods and instruments used in conducting dust studies in industry and discusses the manner of interpreting the results of such studies and their practical application to industrial problems, especially those phases dealing with the control of the dust hazard. The material in this bulletin is based largely on the practical experience gained by the authors in engineering studies of the dust problem in numerous industries in the United States. The first five chapters of the bulletin deal with various dust-

[1] The determination and control of industrial dust. By J. J. Bloomfield and J. M. DallaValle. Public Health Bulletin No. 217. Government Printing Office, Washington, 1935.

sampling instruments, the methods employed in studying the character, composition, and concentration of dusts, and the application of dust determinations to practical problems. The remaining seven chapters deal with general dust-control methods, the design of local exhaust systems, and the means used in collecting and disposing of the dust removed from the workrooms. In addition, a discussion is presented on the instruments employed in measuring air flow and the problem of personal respiratory protection. The bulletin contains 39 tables, 77 figures, and an extensive bibliography covering some 73 sources of reference. It is hoped that this volume will meet the needs of engineers, chemists, industrial managers, and others interested in the control of the industrial dust problem.

COURT DECISION ON PUBLIC HEALTH

Employment of county nurse.—(Georgia Supreme Court; *Williams et al.* v. *Board of Education of Gwinnett County et al.*, 178 S. E. 148; decided Jan. 16, 1935.) The statutes of Georgia relating to county boards of health provided that such boards should have full power to adopt regulations deemed necessary and proper for protecting the health of their respective counties and for preventing the introduction, generation, and spread of communicable diseases therein. It was also provided that, before such regulations as might be established should have the force of law, they should have the written approval of not less than three reputable physicians of the county, should be posted at the county courthouse door, and should be published at least once in the newspaper of the county in which the sheriff's notices were advertised. In an injunction suit brought against a county board of education and others, the supreme court, in a syllabus opinion, stated in part as follows:

1. An examination of the entire statute creating the "county boards of health" and specifying their powers and authority now contained in the code of 1933, chapter 88, discloses that such board has no power to employ a county nurse. Under the facts of this case the board did not employ a county nurse. The nurse was employed by the county board of commissioners of roads and revenues. It is admitted that there was no compliance with the requirement of the statute as to making and publishing rules and regulations. It is insisted by the defendants that compliance therewith is discretionary. The contrary construction seems to be demanded by the words of the statute, that compliance is necessary "before the same shall have the force of law." Inasmuch as this involves the expenditure of public funds which must be raised by taxation, the loose construction for which the defendants contend is not authorized. The accepted and safer construction of such statutes is to require full compliance with their express provisions. For that reason the county board of health was not authorized and empowered to negotiate with the county board of commissioners of roads and revenues, as was done in this case, for the employment of a county nurse.

* * * * * * *

3. The county board of commissioners of roads and revenues is not authorized to pay from the county treasury the salary of a county nurse, based upon the recommendation of the county board of health, until the county board of health has fully complied with the requirements of the statute authorizing them to act; * * *

DEATHS DURING WEEK ENDED JUNE 1, 1935

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

	Week ended June 1, 1935	Corresponding week, 1934
Data from 86 large cities of the United States:		
Total deaths	8,245	8,005
Deaths per 1,000 population, annual basis	11.5	11.2
Deaths under 1 year of age	586	596
Deaths under 1 year of age per 1,000 estimated live births	54	54
Deaths per 1,000 population, annual basis, first 22 weeks of year	12.4	12.3
Data from industrial insurance companies:		
Policies in force	67,801,363	67,823,174
Number of death claims	10,469	11,196
Death claims per 1,000 policies in force, annual rate	8.1	8.6
Death claims per 1,000 policies, first 22 weeks of year, annual rate	10.5	10.8

PREVALENCE OF DISEASE

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

UNITED STATES

CURRENT WEEKLY STATE REPORTS

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

Reports for weeks ended June 8, 1935, and June 9, 1934

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 8, 1935, and June 9, 1934

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended June 8, 1935	Week ended June 9, 1934	Week ended June 8, 1935	Week ended June 9, 1934	Week ended June 8, 1935	Week ended June 9, 1934	Week ended June 8, 1935	Week ended June 9, 1934
New England States:								
Maine	1				157	28	0	0
New Hampshire						100	1	0
Vermont		1			25	65	0	0
Massachusetts	5	9			451	980	0	0
Rhode Island	1				601	32	2	0
Connecticut	5	4	3	1	761	260	1	2
Middle Atlantic States:								
New York	35	55	[1] 6	[1] 4	3,478	1,387	29	5
New Jersey	14	17	8	11	2,454	746	4	2
Pennsylvania	43	54			2,481	2,637	2	0
East North Central States:								
Ohio	18	19	7	4	1,414	925	7	1
Indiana	11	17	6		155	626	8	0
Illinois	46	39	20	8	1,412	2,414	19	4
Michigan	8	6	1	3	2,888	356	0	2
Wisconsin	1	1	22	23	1,953	2,095	1	2
West North Central States:								
Minnesota	4	3		3	351	167	1	0
Iowa	4	7	2		220	263	2	0
Missouri	26	35	10	12	167	117	10	2
North Dakota	1	5	1		11	45	0	0
South Dakota [2]	2	2	1		31	131	0	0
Nebraska	4	9			183	119	1	0
Kansas	4	9	1	1	380	454	1	0
South Atlantic States:								
Delaware	2	2			26	56	0	0
Maryland [2] [3]	6	8	4	3	96	866	10	0
District of Columbia	7	6		2	34	21	10	1
Virginia [2]	6	9			357	955	18	0
West Virginia	11	11	23	15	186	143	1	1
North Carolina [2]	9	13	1	14	50	969	1	2
South Carolina [4]	10	3	67	100	18	119	0	0
Georgia [4]	8	1				121	0	0
Florida [4]	3	9		1	19	155	2	0
East South Central States:								
Kentucky	3	11	2	5	147	293	1	0
Tennessee	7	6	46	11	27	250	8	3
Alabama [4]	5	8	15	7	80	238	4	1
Mississippi [2]	9	3					0	1

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 8, 1935, and June 9, 1934—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended June 8, 1935	Week ended June 9, 1934	Week ended June 8, 1935	Week ended June 9, 1934	Week ended June 8, 1935	Week ended June 9, 1934	Week ended June 8, 1935	Week ended June 9, 1934
West South Central States:								
Arkansas	6	6	21	17	36	27	0	1
Louisiana	9	11	2	7	36	175	1	1
Oklahoma [3]	11	5	51	21	63	71	6	0
Texas [4]	28	46	98	142	85	875	1	0
Mountain States:								
Montana [2]	2	1	15	2	324	48	1	0
Idaho [2]			1		3	10	0	0
Wyoming [2]					18	111	0	0
Colorado	3	14			330	544	0	0
New Mexico	5	1	2		8	49	0	1
Arizona	6	2	6		18	7	0	0
Utah [2]	1	3			3	27	0	0
Pacific States:								
Washington				1	347	283	0	0
Oregon [2]	1	1	19	21	114	34	4	0
California [2]	23	16	31	26	1,451	879	4	1
Total	414	488	492	465	23,449	21,273	161	33
First 23 weeks of year	14,324	16,513	101,131	45,703	621,885	604,158	3,303	1,260

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended June 8, 1935	Week ended June 9, 1934	Week ended June 8, 1935	Week ended June 9, 1934	Week ended June 8, 1935	Week ended June 9, 1934	Week ended June 8, 1935	Week ended June 9, 1934
New England States:								
Maine	0	0	16	16	0	0	2	8
New Hampshire	3	0	9	2	0	0	0	1
Vermont	0	0	1	16	0	0	0	0
Massachusetts	0	1	197	179	0	0	2	2
Rhode Island	0	0	8	8	0	0	1	1
Connecticut	0	0	64	31	0	0	2	0
Middle Atlantic States:								
New York	3	3	903	616	0	0	11	10
New Jersey	2	0	165	146	0	0	5	10
Pennsylvania	2	0	573	496	0	0	11	11
East North Central States:								
Ohio	1	0	406	416	0	1	8	7
Indiana	1	0	55	71	1	2	3	9
Illinois	1	2	994	415	5	0	9	8
Michigan	0	2	212	438	0	2	7	10
Wisconsin	0	0	435	217	14	15	3	3
West North Central States:								
Minnesota	1	0	214	66	8	4	8	0
Iowa	0	0	86	39	2	1	0	0
Missouri	1	0	45	40	1	0	7	17
North Dakota	0	0	48	14	0	1	0	0
South Dakota [2]	0	0	12	2	3	0	0	0
Nebraska	0	0	44	21	42	1	3	1
Kansas	1	0	45	20	31	1	2	7
South Atlantic States:								
Delaware	0	0	7	2	0	0	1	1
Maryland [2 3]	1	0	66	31	0	0	1	3
District of Columbia	0	0	23	7	0	0	0	0
Virginia [2]	1	0	28	14	0	1	12	8
West Virginia	1	0	36	64	0	0	9	10
North Carolina [2]	17	0	9	11	2	0	11	1
South Carolina [4]	0	0		2	0	0	24	9
Georgia [4]	0	4	5	1	0	1	23	24
Florida [4]	1	0	5	1	0	0	3	1
East South Central States:								
Kentucky	0	2	24	37	0	1	10	14
Tennessee	0	0	18	8	0	0	14	4
Alabama [4]	1	0	5	4	1	1	16	8
Mississippi [3]	0	2	6	5	1	0	8	6

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 8, 1935, and June 9, 1934—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended June 8, 1935	Week ended June 9, 1934	Week ended June 8, 1935	Week ended June 9, 1934	Week ended June 8, 1935	Week ended June 9, 1934	Week ended June 8, 1935	Week ended June 9, 1934
West South Central States:								
Arkansas	1	0	----	2	0	0	3	3
Louisiana	2	0	4	8	0	0	12	11
Oklahoma [5]	0	0	7	6	2	1	3	4
Texas [4]	3	1	50	33	11	28	34	31
Mountain States:								
Montana [3]	0	0	11	6	1	0	0	1
Idaho [3]	0	0	2	6	1	0	0	0
Wyoming [3]	0	0	24	1	16	8	0	0
Colorado	0	2	134	10	4	5	1	2
New Mexico	0	0	15	4	0	0	4	3
Arizona	0	1	18	7	0	0	2	5
Utah [3]	0	0	126	4	0	0	0	0
Pacific States:								
Washington	0	0	44	50	38	4	1	3
Oregon [3]	0	1	22	22	3	0	1	0
California [3]	9	273	164	181	28	7	7	15
Total	53	294	5,385	3,796	215	85	284	272
First 23 weeks of year	618	1,065	160,582	132,546	4,383	3,308	3,392	3,968

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended June 8, 1935, 30 cases, as follows: South Dakota, 1; Maryland, 2; Virginia, 1; North Carolina, 2; Montana, 4; Idaho, 2; Wyoming, 9; Oregon, 8; California, 1.
[3] Week ended earlier than Saturday.
[4] Typhus fever, week ended June 8, 1935, 21 cases, as follows: South Carolina, 1; Georgia, 12; Florida, 1; Alabama, 6; Texas, 1:
[5] Exclusive of Oklahoma City and Tulsa.

SUMMARY OF MONTHLY REPORTS FROM STATES

The fo lowing summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
April 1935										
Mississippi	1	27	3,585	3,924	641	328	----	21	1	11
May 1935										
Arkansas	2	13	76	233	278	38	4	11	11	12
Connecticut	2	11	7	1	5,380	----	1	470	0	5
Delaware	----	6	2	----	51	----	0	36	0	1
District of Columbia	39	62	1	----	250	1	0	216	0	1
Indiana	13	66	47	----	1,089	----	0	451	3	14
Missouri	49	116	227	26	2,125	2	1	241	15	18
Nebraska	8	17	13	----	1,093	----	1	247	119	1
New Mexico	4	17	26	2	126	6	0	41	7	13
Vermont	----	1	----	----	358	----	1	36	0	3

April 1935

	Cases
Mississippi:	
Chicken pox	596
Dysentery (amoebic)	39
Hookworm disease	279
Mumps	950
Puerperal septicemia	28
Rabies in animals	7
Trachoma	1
Tularaemia	1
Undulant fever	3
Whooping cough	844

May 1935

	Cases
Actinomycosis:	
Connecticut	1
Anthrax:	
Delaware	2
Chicken pox:	
Arkansas	37
Connecticut	590
Delaware	37
District of Columbia	139
Indiana	375
Missouri	359
Nebraska	112
New Mexico	88
Vermont	195
Conjunctivitis:	
Connecticut	45
New Mexico	1
Dysentery:	
Connecticut (bacillary)	4
Missouri	11
New Mexico	3

May 1935—Contd.

	Cases
Epidemic encephalitis:	
Arkansas	1
Connecticut	3
District of Columbia	3
Missouri	2
Food poisoning:	
New Mexico	5
German measles:	
Connecticut	1,205
Delaware	24
New Mexico	71
Vermont	1,650
Mumps:	
Arkansas	65
Connecticut	270
Delaware	93
Indiana	162
Missouri	464
Nebraska	218
New Mexico	146
Vermont	14
Ophthalmia neonatorum:	
Missouri	1
New Mexico	4
Paratyphoid fever:	
Connecticut	3
Puerperal septicemia:	
New Mexico	4
Rabies in animals:	
Connecticut	3
Indiana	92
Missouri	14
New Mexico	2

May 1935—Contd.

	Cases
Rocky Mountain spotted fever:	
District of Columbia	1
Septic sore throat:	
Connecticut	26
Missouri	78
Nebraska	1
New Mexico	6
Trachoma:	
Arkansas	3
Missouri	96
Undulant fever:	
Arkansas	3
Connecticut	2
Delaware	1
District of Columbia	1
Indiana	5
Missouri	16
Vermont	3
Whoopin · cough:	
Arkansas	262
Connecticut	265
Delaware	7
District of Columbia	13
Indiana	245
Missouri	189
Nebraska	16
New Mexico	110
Vermont	108

PLAGUE-INFECTED RODENTS IN MODOC AND SAN LUIS OBISPO COUNTIES, CALIF.

The Director of Public Health of California has reported positive findings for plague in 28 ground squirrels and 1 field mouse found in Modoc County, Calif., and received at the laboratory on May 11, 24, 29, and 31, and June 3, and in 1 wood rat received at the laboratory on May 24 from a ranch 5 miles north of San Luis Obispo, San Luis Obispo County. Three of the rodents found in Modoc County were from ranches 11 to 12 miles west and 4 miles south of Alturas, and the others were found 1 to 2 miles west and northwest of Alturas.

WEEKLY REPORTS FROM CITIES

City reports for week ended June 1, 1935

This table summarizes the reports received regularly from a selected list of 121 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table. Weekly reports are received from about 700 cities, from which the data are tabulated and filed for reference.

State and city	Diphtheria, cases	Influenza		Measles, cases	Pneumonia, deaths	Scarlet fever, cases	Smallpox, cases	Tuberculosis, deaths	Typhoid fever, cases	Whooping cough, cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0	------	0	0	0	3	0	0	0	4	24
New Hampshire:											
Concord	0	------	0	0	0	1	0	0	0	0	11
Nashua	0	------	--------	0	-------	0	0	-------	0	0	--------
Vermont:											
Barre	-------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Burlington	0	------	0	2	0	1	0	0	0	0	20
Massachusetts:											
Boston	1	------	1	53	20	37	0	15	0	16	223
Fall River	0	------	0	2	0	12	0	1	0	2	19
Springfield	0	------	0	0	2	16	0	0	1	4	34
Worcester	0	------	0	6	4	0	0	2	1	3	48

City reports for week ended June 1, 1935—Continued

State and city	Diphtheria, cases	Influenza		Measles, cases	Pneumonia, deaths	Scarlet fever, cases	Smallpox, cases	Tuberculosis, deaths	Typhoid fever, cases	Whooping cough, cases	Deaths all causes
		Cases	Deaths								
Rhode Island:											--
Pawtucket	0	------	0	5	0	0	0	0	0	0	16
Providence	0	------	0	385	5	10	0	2	0	9	50
Connecticut:											
Bridgeport	0	1	1	22	2	9	0	2	0	2	25
Hartford	0	------	0	9	7	4	0	1	0	13	54
New Haven	0	------	0	104	4	1	0	1	0	4	40
New York:											
Buffalo	0	------	0	17	17	58	0	11	0	30	145
New York	23	4	3	1,322	154	537	0	92	4	159	1,612
Rochester	0	------	0	59	8	13	0	1	3	29	72
Syracuse	0	------	0	444	1	24	0	3	0	28	53
New Jersey:											
Camden	1	------	0	1	3	7	0	2	0	5	37
Newark	0	4	0	454	9	12	0	6	0	45	98
Trenton	0	------	0	3	2	8	0	2	0	0	34
Pennsylvania:											
Philadelphia	3	------	0	76	26	120	0	25	3	75	424
Pittsburgh	1	3	1	196	29	43	0	11	0	26	186
Reading	0	------	0	115	2	7	0	0	0	6	40
Scranton	0	------	-------	2	------	0	0	------	0	0	-------
Ohio:											
Cincinnati	1	------	0	10	11	16	0	6	2	2	123
Cleveland	1	22	2	318	12	39	0	8	0	25	193
Columbus	0	2	2	71	7	24	0	2	0	1	118
Toledo	0	2	1	89	5	18	0	3	0	10	75
Indiana:											
Fort Wayne	7	------	0	1	3	0	0	1	0	1	34
Indianapolis	0	------	0	73	13	12	0	9	0	8	112
South Bend	0	------	0	0	1	6	0	0	0	1	16
Terre Haute	0	------	0	2	0	0	0	0	0	0	35
Illinois:											
Chicago	23	2	2	679	48	577	0	38	4	72	729
Springfield	0	7	0	0	1	4	0	0	0	3	13
Michigan:											
Detroit	1	1	0	624	36	92	0	27	1	67	276
Flint	2	------	0	2	6	8	0	1	0	0	20
Grand Rapids	0	------	1	118	1	18	0	1	0	14	34
Wisconsin:											
Kenosha	0	------	0	3	2	13	0	0	0	2	14
Milwaukee	0	------	0	317	6	78	0	8	0	19	106
Racine	0	------	0	151	0	27	0	0	0	6	10
Superior	0	------	0	6	0	0	0	0	0	0	21
Minnesota:											
Duluth	0	------	0	12	1	0	0	0	0	0	17
Minneapolis	7	------	2	20	8	83	0	2	2	14	94
St. Paul	0	------	0	8	7	48	8	0	1	4	68
Iowa:											
Davenport	0	------	-------	0	------	1	0	------	0	0	-------
Des Moines	1	------	0	48	0	3	0	0	0	0	43
Sioux City	0	------	0	5	0	1	0	0	0	5	1
Waterloo	0	------	-------	1	------	4	0	------	0	3	-------
Missouri:											
Kansas City	1	------	1	18	7	14	0	4	0	3	82
St. Joseph	0	------	0	4	5	4	0	1	0	1	25
St. Louis	7	------	0	25	5	14	0	13	0	5	181
North Dakota:											
Fargo	0	------	0	1	1	18	0	0	0	0	8
Grand Forks	0	------	-------	1	------	0	0	------	0	1	-------
South Dakota:											
Aberdeen	0	------	-------	3	------	0	0	------	0	1	-------
Nebraska:											
Omaha	14	------	0	47	7	3	1	4	0	1	63
Kansas:											
Topeka	------	------	-------	------	------	------	------	------	------	------	-------
Wichita	0	------	0	26	1	1	0	0	0	0	20
Delaware:											
Wilmington	2	----	0	4	0	6	0	0	0	0	22
Maryland:											
Baltimore	1	1	1	23	18	39	0	9	0	21	211
Cumberland	0	------	-------	0	------	1	0	0	0	0	11
Frederick	0	------	0	9	0	0	0	0	0	0	5
District of Col.:											
Washington	13	1	1	28	16	31	0	17	0	2	181

City reports for week ended June 1, 1935—Continued

State and city	Diphtheria, cases	Influenza		Measles, cases	Pneumonia, deaths	Scarlet fever, cases	Smallpox, cases	Tuberculosis, deaths	Typhoid fever, cases	Whooping cough, cases	Deaths, all causes
		Cases	Deaths								
Virginia:											
Lynchburg	0		0	2	2	4	0	0	0	20	13
Norfolk	0		0	40	3	3	0	2	1	2	41
Richmond	0		0	20	3	1	0	7	1	0	59
Roanoke	1		0	7	1	1	0	0	0	0	14
West Virginia:											
Charleston	1		0	3	0	0	0	4	0	0	18
Huntington	0			5		2	0		0	0	
Wheeling	0		0	48	5	3	0	0	0	3	26
North Carolina:											
Raleigh	0		0	0	0	0	0	1	0	0	9
Wilmington	0		0	2	1	0	0	0	0	2	4
Winston-Salem	1		0	0	1	0	0	1	0	2	9
South Carolina:											
Charleston	0	5	0	0	0	0	0	1	0	0	18
Columbia											
Greenville	0		0	0	1	0	0	0	0	1	7
Georgia:											
Atlanta	0	3	0	1	3	2	0	5	0	12	71
Brunswick	0		0	0	0	0	0	0	0	0	4
Savannah	1		0	0	0	0	0	3	2	2	35
Florida:											
Miami	0		0	2	2	1	0	2	0	3	17
Tampa	1		0	9	2	1	0	1	0	1	19
Kentucky:											
Ashland											
Lexington	0		0	10	3	1	0	2	1	5	17
Louisville	0	2	0	51	3	14	0	1	0	14	56
Tennessee:											
Memphis	0		0	1	6	2	0	3	2	6	52
Nashville	0		0	1	3	7	0	4	1	2	44
Alabama:											
Birmingham	1	2	0	25	6	2	0	5	1	0	69
Mobile	0		2	2	0	0	0	1	0	0	23
Montgomery	1			0		0	0		2	0	
Arkansas:											
Fort Smith	0			0		0	0		0	1	
Little Rock	0		0	13	3	0	0	0	0	2	3
Louisiana:											
New Orleans	8	2	4	28	8	2	0	19	0	2	149
Shreveport	0		0	1	4	0	0	0	0	4	44
Oklahoma:											
Tulsa	0			0		1	0		0	1	
Texas:											
Dallas	2		0	0	5	7	1	3	0	4	55
Fort Worth	1		0	0	3	4	0	5	1	0	33
Galveston	0		0	0	0	1	0	0	0	0	10
Houston	3		0	5	7	2	0	9	0	0	55
San Antonio	1		0	0	1	2	0	7	0	0	68
Montana:											
Billings											
Great Falls	0		0	3	0	1	0	0	1	10	8
Helena	0		0	2	0	0	0	0	0	4	2
Missoula	0		0	0	3	0	0	0	0	0	10
Idaho:											
Boise	0		0	2	0	1	0	0	0	0	8
Colorado:											
Denver	2		0	176	3	48	0	3	0	0	64
Pueblo	0		0	24	3	3	0	0	0	0	14
Arizona:											
Utah:											
Salt Lake City	0		1	2	1	103	0	0	0	69	22
Nevada:											
Reno	0		0	1	0	0	0	0	0	0	1
Washington:											
Seattle	0			254		21	2		0	4	
Spokane	0		0	33	7	7	0	1	0	3	30
Tacoma	0		0	1	0	2	1	0	0	0	29
Oregon:											
Portland	0		0	76	2	7	0	1	0	0	59
Salem	0			1		3	0		0	0	
California:											
Los Angeles	12	16	0	79	9	65	1	25	0	8	266
Sacramento	0		0	173	2	11	1	2	0	1	32
San Francisco	0		3	68	7	26	0	10	0	41	163

City reports for week ended June 1, 1935—Continued

State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Boston	2	0	1
Springfield	1	1	0
Worcester	1	0	0
Rhode Island:			
Providence	2	0	0
New York:			
New York	21	14	1
New Jersey:			
Newark	3	1	0
Pennsylvania:			
Philadelphia	2	1	0
Pittsburgh	1	1	0
Ohio:			
Cincinnati	9	5	0
Illinois:			
Chicago	9	3	0
Springfield	3	0	0
Michigan:			
Detroit	1	1	0
Minnesota:			
Minneapolis	1	0	0
Iowa:			
Sioux City	1	1	0
Missouri:			
Kansas City	3	2	0
St. Louis	1	0	0
Nebraska:			
Omaha	0	1	0
Maryland:			
Baltimore	5	1	0
District of Columbia:			
Washington	6	4	0
Virginia:			
Norfolk	3	0	0
West Virginia:			
Wheeling	0	0	1
Kentucky:			
Louisville	3	0	0
Tennessee:			
Nashville	2	1	0
Louisiana:			
New Orleans	1	0	0
Oklahoma:			
Tulsa	1	0	0
Texas:			
Dallas	0	0	1
San Antonio	0	0	1
Nevada:			
Reno	1	0	0
Washington:			
Seattle	1	0	0
Oregon:			
Portland	3	1	0
California:			
Los Angeles	3	3	1
Sacramento	2	0	0

Dengue.—Miami, 1 case.
Epidemic encephalitis.—Cases: New York, 1; Trenton, 1; Atlanta, 1.
Pellagra.—Cases: Winston-Salem, 1; Charleston, S. C., 2; Miami, 1; Tampa, 1; New Orleans, 3; Dallas, 1.
Typhus fever.—Cases: Providence, 1; Tampa, 1.

FOREIGN AND INSULAR

CEYLON

Malaria.—According to a report dated April 29, 1935, there was a recrudescence of the malaria epidemic in many districts of Ceylon. The increase was said to be taking place on a much smaller scale than in November and December 1934, and the disease was of milder type. Mortality figures were given for the four quarters of 1934 and the first quarter of 1935, showing the great increase in the number of deaths (all causes), as follows:

1934	*Number of deaths*
First quarter	30,610
Second quarter	26,641
Third quarter	27,983
Fourth quarter	41,836
1935	
First quarter	81,873

LITHUANIA

Vital statistics—1933.—The following vital statistics for Lithuania for 1933 have been published by the Lithuanian Department of Public Health:

	Number	Rates per 10,000 inhabitants		Number	Rates per 10,000 inhabitants
Population	2,421,700		Deaths from—Continued.		
Marriages	19,511	[1] 8.1	Scarlet fever	16	.06
Births	62,145	[1] 25.7	Syphilis	2,195	9.06
Deaths	32,749	[1] 13.5	Tuberculosis (respiratory)	250	1.03
Deaths from—			Tuberculosis (other forms)	171	.70
Diphtheria	311	1.28	Typhoid fever	20	.08
Influenza	487	2.01	Typhus fever	239	.98
Measles	135	.55	Whooping cough		

[1] Per 1,000 inhabitants.

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

(NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for May 31, 1935, pp. 749–763. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued June 28, 1935, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

China—Swatow.—During the week ended May 18, 1935, 1 case of cholera was reported at Swatow, China.

Indo-China—Cochin-China—Bienhoa Province.—On June 2, 1935, 1 case of cholera was reported in Bienhoa Province, Cochin-China, Indo-China.

Plague

China—Amoy.—During the week ended May 11, 1935, 1 imported case of plague was reported at Amoy, China.

United States—California.—A report of plague-infected rodents in Modoc and San Luis Obispo Counties, Calif., appears on page 848 of this issue of PUBLIC HEALTH REPORTS.

Smallpox

Colombia.—During the week ended May 4, 1935, 1 case of smallpox was reported at Barranquilla, and 1 case of smallpox at Bogota, Colombia.

Japan—Mizuna Migifu Prefecture.—According to a report dated June 8, 1935, smallpox had broken out at Mizuna Migifu Prefecture, Japan. The number of cases and deaths is unobtainable. The port of Nagoya is unaffected.

Yellow Fever

Brazil.—During the week ended June 1, 1935, 4 cases of yellow fever were reported in Goyaz State, and 6 cases of the same disease in Minas Geraes State, Brazil.

Colombia—Intendencia of Meta—Restrepo.—During the week ended May 11, 1935, 1 case of yellow fever was reported at Restrepo, Intendencia of Meta, Colombia.

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