PUBLIC HEALTH REPORTS

VOL. 51

FEBRUARY 28, 1936

No. 9

PREVENTION OF EXPERIMENTAL INTRANASAL INFECTION WITH CERTAIN NEUROTROPIC VIRUSES BY MEANS OF CHEMICALS INSTILLED INTO THE NOSTRILS ¹

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Various experimental procedures have been found to influence the local susceptibility of the skin of animals to certain virus infections. Ledingham (1), for instance, showed that the introduction of india ink into the skin rendered the area relatively resistant to infection with Le Fevre (2), Rivers, Stevens, and Gates (3), and vaccine virus. others, found that various types of irradiation likewise tended to render the skin more resistant to this virus. Armstrong (4) demonstrated that diphtheria toxin produced a similar effect in rabbits and showed that the effect was the result of the tissue response rather than of any direct influence of the toxin on the virus. The same worker (5), moreover, showed that the mucous membranes of the eyes of rabbits behaved as did the skin in this regard, a result which led to an inquiry to determine whether the membranes of the nose, a natural route of infection, could be smilarly experimentally influenced.

Many chemicals have been recommended for introduction into the nostrils of man as a treatment for abnormal conditions with a view to producing an anodyne, protective, astringent, antiseptic, absorbent, or solvent action.

Flexner and Amoss (1920) (6) attempted to sterilize the poliomyelitis-inoculated nasal membranes of monkeys by means of chloramin-T and dichloramin-T, but concluded that antiseptic chemicals are of doubtful value and may even be objectionable.

Poulton (1932) (7) advocated an oily preparation, Glegg's mixture, which he had employed as early as 1921 for both treatment and prevention of common colds. He attributed its influence to the oily coating rendering the mucous membranes a less favorable environment for infecting organisms and advised a controlled field test of its prophylactic value. Olitsky and Cox (1934) (8) reported that three doses of tannic acid (0.5 to 1.0 percent) daily for 3 days exerted a temporary protective action in mice, but not in guinea pigs, against the

¹ From the National Institute of Health, Washington, D. C. Submitted for publication January 8, 1936.

virus of equine encephalomyelitis. Armstrong (1935) (5) found that sodium aluminum sulphate (2 to 4 percent) instilled into the nostrils tended to protect mice against the virus of encephalitis (St. Louis type), and Armstrong and Harrison (1935) (9) demonstrated that, with 3 to 12 preliminary instillations of 4 percent sodium aluminum sulphate into the nostrils of 23 monkeys, 17 survived the intranasal instillation of poliomyelitis virus, while of 19 nonprepared controls identically inoculated but 3 survived.

These results, together with the fact that encephalitis and poliomyelitis are strikingly similar as to epidemiology, pathology, and probable route of infection, led us to feel that agents which tend to prevent intranasal infection with one of these neurotropic viruses might also be effective against the other.

Encephalitis in white mice has therefore been utilized by Armstrong as a relatively convenient and inexpensive indicator by which various agents have been compared as to their relative efficiency in preventing intranasal infection. Those solutions found most effective in mice have then been utilized by the authors in an attempt to prevent intranasally-inoculated poliomyelitis of monkeys.

EXPERIMENTAL METHOD (ENCEPHALITIS IN MICE)

Strength of solutions.—It was found necessary to make a preliminary titration of each chemical for its irritative properties, and to select a concentration which was relatively noninjurious when introduced into the nostrils of mice. When a concentration too irritating was employed, variable numbers of mice promptly developed difficulty in breathing, which often resulted in death. This result was thought to be due to a swelling of the membranes blocking the nares to the passage of air. This fact and, in certain instances, the relative insolubility of the chemicals in water, rendered it impracticable to employ a uniform concentration of the various agents tested.

Handling of mice.—Three to six chemicals were usually compared in one test, each solution being applied to from 25 to 40 mice. The mice for each experiment were selected at random from the same shipments, equal numbers being placed in similar cages and identically fed and cared for throughout the trial.

The mice of each cage received from three to seven intranasal instillations of the selected chemical, in the predetermined concentration, at intervals of 2 to 7 days. The mice were lightly etherized and 0.04 cc of the solution was dropped into the nostrils from a 22-gage needle attached to a 0.25-cc syringe, the mouse being held ventral side upward, with the head slightly lower than the body. The virus inoculations were made in the same manner. Virus for making the infective inoculations was prepared by grinding three glycerinated brains taken from mice near death from encephalitis and diluting with saline to a 1:450 suspension. Then 0.03 of a cubic centimeter of this freshly prepared suspension was administered into the nostrils of each mouse from 3 to 5 days following the last chemical instillation.

In order to compensate for the possible loss in potency of the virus during administration, mice were taken one from each cage, in rotation, until all were inoculated, the same syringe being employed for all. Mice were observed for 15 days thereafter and deaths recorded.

CHEMICALS TESTED ON MICE

The following agents have been compared by this procedure: Cobra venom, sodium chloride, distilled water, alum, formalin, glucose, ferric chloride, aluminum sulphate, manganese chloride, zinc chloride, aluminum chloride, picric acid, tannic acid, lead acetate, sea water, thymol, tribrom-phenol, picramic acid, dinitrocresol, dinitrophenol, and quinine hydrochloride, in one or more concentrations and either alone or combined in certain instances (table 1).

		Num	Num-	Nur	nber of a	mice g	Per-	Aver- age	Protec- tion index=
Chemicals intranasally instilled	Con- centra- tion	ber of appli- cations	mice given treat- ment	To virus	4 days after virus	14 days after virus	cent- age sur- viving	tion life (up to 14 days)	average days life after virus÷ percent dying
June 12, 1934									
Cobra venom	1:5800	3	30	22	22	2	9.1	8.1	0. 089
Sodium chloride Distilled water Controls	Percent 5 100	3 3	25 25 20	18 21 18	17 21 18	4 5 4	23. 5 23. 8 22. 2	9.4 7.9 9.3	. 123 . 103 . 119
July 18, 1934 Alum	4	} 7	30	19	19	15	79.0	10. 0	. 477
Sodium chloride	4 2	7	30	21	20	12	60.0	8.6	. 215
Alum Formalin plus killed virus	4	7	30	19	16	14	87.5	9.5	. 76
Sodium chloride	4	7	30	11	10	6	60. 0	9.5	. 236
Glucose	15	7	30 30	27 21	25 21	12 8	48.0 38.0	9.1 8.0	. 175 . 129
July 31, 1934 Alum Sodium chloride Glucose Controls	3 4 15	7777	45 45 45 45	38 33 27 42	35 31 25 42	29 20 12 16	83. 0 64. 0 48. 0 38. 0	10. 0 9. 1 9. 1 8. 0	. 589 . 252 . 175 . 129
Nov. 16, 1984 Alum Do Do	3 1.5 .75	333	30 30 30	29 29 29	29 29 29	21 17 13	72. 4 58. 6 44. 9	8.8 8.4 8.1	. 319 . 202 . 147
Glucose	7	} 3	30 30	24 28	24 28	12 18	50.0 64.3	8.2 8.7	. 164 . 244

 TABLE 1.—Effect of intranasal chemicals on intranasally inoculated encephalitis of mice

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TABLE 1.—Effect of intranasal chemicals on intranasally inoculated encephalitis of mice Continued

<u></u>		Num	Num-	Nu	mber of survivi	' mice ng	Per-	Aver-	Protec- tion index=
Chemicals intranasally instilled	Con- centra tion	ber of appli- cations	given treat- ment	To virus	4 days after virus	14 days after virus	cent- age sur- viving	dura- tion life (up to 14 days)	average days life after virus + percent dying
Apr. 24, 1935									
Alum plus NaOH to near precip-									
Alum, acidulated H ₂ SO ₄			25 25	17	15	52	33.3 15.4	7.7 9.2	.115
Alum plus NaOH plus 1/4 vol. adrenalin 1:1,000	4	4	25	8	3	0	0		0
Alum, acidulated H ₂ SO ₄ tlus ¼ vol. adrenalin 1 : 1,000 Controls	4	- 4	25 25	11 18	8 16	5 2	62.5 12.5	7.3 7.3	. 194 . 083
June 15, 1955									
Ferric chloride Aluminum sulphate Manganese chloride Zinc chloride Aluminum chloride ontrols	. 16 . 24 . 57 . 18 . 43	3 3 3 3 3 3 3 3	25 25 25 25 25 25 25	16 14 8 21 17 18	16 10 8 20 14 15	11 1 6 13 2 6	68.6 10.0 75.0 65.0 14.3 40.0	9.2 9.4 9.5 8.3 7.4 8.6	. 292 . 104 . 38 . 237 . 086 . 143
Jan. 18, 1935									
Tannic acid Alum Lead acetate Picric acid	1 3 1 .64	3 3 3 3	30 30 30 30	14 20 16 27	14 19 16 26	9 10 8 22	64. 2 52. 6 50. 0 84. 6	8.6 9.8 8.0 8.2	. 24 . 207 . 160 . 533
Feb. 20, 1935									
Alum Picric acid Tannic acid Controls	Sat. Sol.	3 3 3 3	30 30 30 30	23 28 14 26	22 28 13 25	18 25 6 13	81. 8 89. 3 46. 1 52. 0	7.2 7.6 8.0 8.3	.394 .709 .148 .173
Aug. 5, 1935									
Picric acid	.64	4	31	28	28	17	60.7	8.4	. 213
Alum Pierie acid	2	4	31	27	27	10	59.3	8.2	. 200
Zinc chloride	.09	4	31	28	28	14	50.0	8.6	. 172
Manganese chloride	. 16	} 4	31	30	30	15	50.0	7.7	. 154
Ferric acid	. 32	} 4	31	30 20	30 20	15	50. 0	7.7	. 154
Controis				- 30			33. 3		. 115
Sept. zu, 1950 Sea water	100	5	30	25	25	6	24.0	7.9	. 104
Picric acid	. 64	5	30	23	23	12	52.2	8.5	. 178
Tribromphenol	± 3	5	30	27	27	8	42.9 29.6	8.2	. 130
Picramic acid	.5	5	30 30	21 22	21 18	42	19.1 11.1	8.2 7.9	. 101
Nov. 6. 1935									
3-5 dinitro-o-cresol	.5	5	30	28	27	8	29.6	7.4	. 10g
2-4-6 tribromphenol	.5	5	30	28 27	27 25	11	40.7	7.7	. 129
Pieric acid Alum	.64 3	5 5	30 30 30	28 23 28	26 22 27	13 8 3	50.0 36.3 11.1	7.2 7.8 7.6	. 144 . 106 . 086
Nov. 21, 1935									
Picric acid in H ₂ O Picric acid in saline Controls	. 32 . 32	4	40 40 40	33 39 37	32 35 36	7 13 2	21. 9 37. 1 5. 5	7.8 7.6 6.5	. 099 . 121 . 069
Dec. 30, 1935			-			-			
Quinine hydrochloride Picric acid Controls	1.5 .32	5 5	40 40 40	31 32 37	28 30 35	6 9 5	21. 4 30. 0 14. 2	7.9 8.0 7.3	. 103 . 114 . 085

RESULTS IN MICE

The protective value of a chemical against experimental intranasal infections may be evidenced by delayed deaths as well as by the proportion of mice surviving. Consequently these factors have been combined to form a prophylactic index, arrived at by dividing the average length of life, up to 14 days, following the virus inoculation by the percentage of mice dying. Deaths occurring during the 4 days immediately following the virus application have been found not to be due to the virus inoculated, hence, are eliminated from the compilation. These early deaths, together with those dying prior to the virus application do, however, give an idea of the comparative toxic or irritative effect of the various chemicals and should be considered in determining the practicability of any experimental solution.

By the above methods it is possible to select the relatively most harmless and effective chemical from each test and to select solutions to be compared in further tests as desired. By reference to table 1 it may be seen that picric acid stands out as one of the least irritating or least toxic agents as well as the most effective experimental prophylactic agent tried, being superior in both these regards to sodium aluminum sulphate. It was therefore utilized in an attempt to prevent intranasally inoculated poliomyelitis of monkeys.

EXPERIMENTAL METHOD (POLIOMYELITIS OF MONKEYS)

Fresh monkeys were given identical care and treatment except that the test animals received three to six instillations of varying concentrations of picric acid, alone or combined with alum, into the nostrils, prior to the virus inoculations, by means of a tuberculin syringe from which the needle had been removed. The controls received no treatment whatever, as it had been determined in a previous test that saline instillations exerted no effect. Picric acid and alum in the same solution were employed in some instances because it was deemed possible that these agents might produce their protective effect in different ways, and thus supplement each other in their effects.

Virus for each test was prepared by grinding portions of cords from several monkeys recently dead of poliomyelitis and diluting to 4 percent suspension with 0.85 percent saline. Centrifugation was carried out at slow speed to remove gross particles and the supernatant fluid used for intranasal inoculation. Three inoculations of 1 cc were administered into each nostril at intervals of 24 hours. Temperatures were taken daily. Animals which developed poliomyelitis were allowed to go until complete paralysis developed, when they were etherized, autopsy was performed, and the tissues were submitted for pathological confirmation as to the cause of death.

RESULTS IN MONKEYS (POLIOMYELITIS VIRUS)

In order to determine whether picric acid would protect monkeys against intranasally inoculated poliomyelitis virus, as it did mice against encephalitis virus, a rapid test was carried out (table 2, experiment 1). Four monkeys were given 1.5 cc of 0.64 percent picric acid in water up each nostril on July 6, 8, and 9 (1935); on July 11, 12, and 13 these monkeys and four controls each received intranasally 1 cc of the supernatant fluid from a centrifuged 4 percent suspension of mixed poliomyelitis virus. Three of the four prepared animals survived while all four controls died of poliomyelitis.

In view of these encouraging results a comparative test of the efficacy of picric acid, picric acid plus alum, and our most effective previous agent, alum, was undertaken (table 2, experiment 2). Groups of 4 monkeys were intranasally inoculated (both nostrils) with 1.5 cc of 0.64 percent picric acid, a solution of 2 percent alum in 0.32 percent picric acid, and 4 percent alum, respectively, on August 28, August 30, September 6, 10, 12, and 14 (1935). On September 18, 19, and 20 each group of monkeys, together with the nonprepared controls, were given 1 cc of supernatant fluid from a centrifuged 4 percent suspension of mixed poliomyelitis virus into each nostril. The four picric acid and the four picric acid-alum prepared animals survived, while two of the alum prepared animals and the four controls died of poliomyelitis.

These results indicate that, in the concentrations employed, picric acid either alone or in combination with alum is superior to alum alone. Furthermore, it appears that the protective effect is cumulative, since three instillations of picric acid (table 2, experiment 1) protected but three or four animals while six instillations (table 2, experiment 2) protected all of four monkeys.

The number of monkeys is small; however, the results are strictly in accord with findings in the mouse-encephalitis studies and they tend to increase confidence in the latter as a cheap and convenient indicator in the selection of chemicals for trial in the monkey-poliomyelitis tests.

In order to determine whether weaker solutions would prove effective, groups of four monkeys each were given intranasal instillations, respectively, of 1.5 cc of 0.32 percent picric acid, 0.16 percent picric acid, and solutions containing 0.16 percent picric acid with 0.5 percent alum and 0.08 percent picric acid with 0.25 percent alum, on October 29, 31, and November 2, 4, 6, and 8 (1935), (table 2, experiment 3). On November 12, 13, and 14 these animals and 4 controls were each given 1 cc of 4 percent poliomyelitis virus prepared as in experiments 2 and 3.

Two animals died of colitis prior to receiving the virus, but the condition was not related to the nasal instillations, as several unused

Clinical and patho- logical diagnosis		Pollomyalitis. Do. Do. Do.		66 6666 66666
fever by following rus inoc-	Controls	[− 00 4 ¹ 10		
Onset of days first vi ulation	Prepared	9		
complete is follow- st intra- virus in- on	Controls	8 15 15		\$\$\$\$\$\$
Day of paralys ing fir nasal oculatio	Prepared	ටිගගග		<u>መመመመመመመው</u> ው ወ
	7-13-35	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	9-20 35	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
	7-12-35	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	9-19-35	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
по	7-11-35	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	9-18-35	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
id inoculat	7-9-35	0.64 P 0.64 P 0.64 P 0.64 P 1	9-14-35	0000000044444 2222244444 0000
paration ar	7-8-35	0.64 P 0.64 P 0.64 P 0.64 P 1	9- 12-35	000000004444 222244444 0000
anasal prej	7-6-35	0.64 P 64 P 0.64 P 0.64 P 1	9-10-35	000000004444 222244444 0000
Intr		1111111	9-6-35	000000004444 22222444444 UVVV
		1111111	8-30-35	000000004444 22222444444 7777
		1111111	8-28-35	000000004444 2222240044444 0000
Monkey no.		Experiment 1: 965 967 963 968 969 970		Experiment 2: 1009

TABLE 2.—Preventive effect of chemicals in monkeys

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	Clinical and patho- logical diagnosis		Poliomyelitts. Acute colitis. Do. Poliomyelitts. Poliomyelitts. Poliomyelitts. No symptoms. Poliomyelitts. No symptoms. Poliomyelitts. Poliomyelitts.
	fever by following rus inoc-	Controls	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	Onset of days first vii ulation	Prepared	80 () () () () () () () () () () () () ()
	complete is follow- st intra- virus in-	Controls	₩
	Day of paralys ing fir nasal oculatic	Preparad	ໝ 🛛 ໝ ໝ ໝ ໝ ໝ ໝ ໝ ຫຼື 🤅 👘 👘 👘
		11-14-35	>> > >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
		11-13-35	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
	lon	11-12-35	Died. V V V V V V V V V V V V V V V V V V V
	d inoculati	11-8-35	90000000000000000000000000000000000000
	paration an	11-6-35	90000000000000000000000000000000000000
-	anasal prej	11-4-35	00 232 25 25 25 25 25 25 25 25 25 25 25 25 25
	Intr	11-2-35	Ч
		10-31-35	Ц 1 1 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5
		10-29-35	00.327 00.3277 00.00.32777 00.00.227777 00.00.227777 00.00.227777 00.00.227777 00.00.227777 00.00.227777 00.00.227777 00.00.227777 00.00.227777 00.00.2277777 00.00.207777777777
	Мопкеу по.		Experiment 3: 723

0. 64 P=0.64 percent picric acid in distilled water, 1.5 cc each nostril. P A=Mixture of 2 percent sodium aluminum sulphate in 0.32 percent picric acid, 1.5 cc each nostril.
2.4.5.4 percent sodium aluminum sulphate, 1.5 cc each nostril.
0.32 P=0.32 percent picric acid.
0.32 P=0.45 percent picric acid.
P A = Mixture of 0.35 percent sodium aluminum sulphate in 0.16 percent picric acid, 1.5 cc each nostril.
P A = Mixture of 0.35 percent sodium aluminum sulphate in 0.06 percent picric acid, 1.5 cc each nostril.
P A = Mixture of 0.35 percent sodium aluminum sulphate in 0.06 percent picric acid, 1.5 cc each nostril.
P A = Mixture of 0.35 percent sodium aluminum sulphate in 0.07 percent picric acid, 1.5 cc each nostril.
P A = Mixture of 0.35 percent sodium aluminum sulphate in 0.08 percent picric acid, 1.5 cc each nostril.
P A = Mixture of 0.35 percent sodium aluminum sulphate in 0.08 percent picric acid, 1.5 cc each nostril.
P A = Mixture of 0.35 percent sodium aluminum sulphate in 0.08 percent picric acid, 1.5 cc each nostril.
P A = Mixture of 0.35 percent sodium aluminum sulphate in 0.08 percent picric acid, 1.5 cc each nostril.
P A = Mixture of 0.35 percent sodium aluminum sulphate in 0.08 percent picric acid, 1.5 cc each nostril.
P A = Mixture of 0.35 percent sodium aluminum sulphate in 0.08 percent picric acid, 1.5 cc each nostril.
P A = Mixture of 0.35 percent sodium aluminum sulphate in 0.08 percent picric acid, 1.5 cc each nostril.

TABLE 2.—Preventive effect of chemicals in monkeys—Continued

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monkeys from this shipment died of the ailment. Three animals received 0.32 percent picric acid, of which two survived the virus instillations and one died of poliomyelitis; three received 0.16 percent picric acid and all survived; four received 0.16 percent picric acid in 0.5 percent alum solution, and all survived; while of four monkeys getting 0.08 percent picric acid in 0.25 percent alum, three died of poliomyelitis and one recovered, following symptoms, with paralysis of the right front leg. Four nonprepared controls were similarly inoculated with virus, of which three died and one survived without symptoms.

It is thus apparent that picric acid in dilutions as low as 0.16 percent exerted a definite protective effect, while 0.08 percent in 0.25 percent alum solution afforded no protection. Excluding this latter group as inadequately prepared, it is found that the survivals among the variously prepared groups were as follows:

	Мо	onkeys trea	ited	Controls			
Preparation	Total number of monkeys	Monkeys ing pol inocula	s surviv- iomyelitis tions	Number inocu-	Monkeys poliom oculatio	surviving yelitis in- ons	
	inocu- lated	Number	Percent	lated	Number	Percent	
Picric acid Picric acid plus alum Alum Alum (previously reported(9))	14 8 4 23	12 8 2 17	86 100}91 50 74}70	$ \begin{cases} 12 \\ 8 \\ 4 \\ 19 \end{cases} $	1 1 0 3	$ \begin{array}{c} 8.3\\12.5\\0\\15.8\end{array} $	

TABLE 3.—Summar	y of	results	(monkeys and	poliomyelitis)
				F	

As here employed it thus appears that picric acid alone or combined with alum is superior to alum alone in preventing intranasally inoculated poliomyelitis of monkeys and encephalitis of mice (tables 1, 2, 3). The solutions utilized in these tests were made with distilled water, but subsequent tests (table 1) indicate that solutions made with 85 percent saline are possibly more effective as well as being probably less irritating, and will therefore be used in future trials.

EFFECT OF PICRIC ACID ON THE MUCOUS MEMBRANES

The nasal membranes from 3 monkeys treated with 5 to 6 instillations of 0.64 percent picric acid and from 1 treated with 5 instillations of 0.32 percent picric acid in distilled water have been studied microscopically by Surg. R. D. Lillie, along with the membranes from 10 nontreated animals. It was not possible to distinguish the membranes from the two groups. In order that more visible membranes might be studied, 0.64 percent picric acid was repeatedly instilled into the left eye of 4 monkeys on alternate days for 4 to 12 doses, but no apparent evidence of irritation was observed and 2 of the treated eyes were examined histopathologically and found normal.

The left eyes of two additional monkeys were instilled with 0.64 percent picric acid in saline every other day for a month without evidence of inflammation.

The authors have taken 16 instillations of 0.32 percent picric acid in 0.85 percent saline, sprayed from an atomizer, into their own nostrils at intervals of 1 to 6 days. The treatments were largely devoid of temporary tingling, stinging, and increased secretions occasioned by 1 percent alum solution (9). In fact the picric solution occasioned but slightly more local discomfort than did 0.85 percent saline alone; neither was any cumulative influence noted. There was, however, a bitter taste apparent from the pharynx which lasted for some minutes following the nasal spray, but was not especially disagreeable. No impairment of smell was noted. The yellowish color of the solution left no skin stain provided it was wiped away before drying occurred.

IMMUNITY

Mice which survive the intranasal instillation of encephalitis virus either with or without preliminary intranasal preparation, are, after' a lapse of from 2 to 3 weeks, found to be from 30 to 80 percent immune to death following an intracerebral inoculation which is fatal to 100 percent of control mice, while a partial immunity, evidenced by delayed symptoms and death, is present in many of the prepared mice which die. Surviving monkeys have not been tested by reinoculation.

ACTION OF PICRIC ACID

Picric acid, as here employed, apparently produced no general ill effects in mice or monkeys; neither did it produce changes detectable by ordinary pathological methods in the nasal mucous membranes of the latter. That it exerts its protection through a local action is, however, indicated by the fact that picric acid intranasally administered to mice apparently affords no protection against intracerebrally inoculated virus. This local action may consist in some alteration in the nasal membranes which render them less permeable to the virus, although it is conceivable that the drug, either free or united with the cells of these structures, may exert a direct effect upon the virus itself.

INFLUENCE OF TIME OF TREATMENT IN RELATION TO VIRUS ADMINISTRATION (MICE)

It is conceivable that certain time relationships might occur which would tend to render the portal of entry for the virus increasingly, rather than less permeable to infection. In order to test this possi-

bility, five groups of mice were given, respectively, one intranasal instillation of 0.32 percent picric acid on the day of exposure to the virus, 1 and 2 days before, and 1 and 2 days after exposure. One control group received no picric acid. The results shown in table 4 indicate that the picric-acid treatment tended, under conditions of the experiment, always to reduce susceptibility of the mice groups. The protection afforded was greatest, however, when the chemical was administered prior to the virus instillations. Alum was found to act similarly (9).

TABLE 4.—Effect of intranasal administration of 0.32 percent picric acid before, after, and on the same day as the virus administration (encephalitis)

Number of mice receiv- ing virus	Int (day	ranas	sal tr Imini	eatm	ent tion)	Deaths by dates						als	tt sur- 7als						
ing virus inoculations	12-17	12-18	12-19	12-20	12-21	12-22	12-23	13-24	12-25	12-26	12-27	12-28	12-29	12-30	12-31	1-1	1-2	Surviv	Percen viv
33 32 33	P 	- P -	V V {V P	111	-	1				1 2	4 2 4	3 1 3	1 1 3		1 	1 1 		21 26 21	64 81 64
33 33 33	1	=	v v v	P 	- P 		 1 1			3 2 9	6 3 3	8 4 5	2 1 1	2 1		 	1 	18 20 13	55 61 39

P=0.32 percent picric acid solution (in saline). V=Encephalitis virus (0.03 cc 1:430 suspension).

-= No treatment.

Influence of variation in frequency of application and of concentration of picric acid on the prevention of poliomyelitis in monkeys.-In order to determine the influence which the frequency of application of a given concentration of picric acid has upon the prevention of poliomyelitis in animals, a group of four monkeys was given four intranasal instillations of 0.32 percent solution of picric acid in saline, The animals then received three intranasal at intervals of 7 days. inoculations of poliomyelitis virus on the sixth, seventh, and eighth days following the last picric-acid application. One monkey of this group died of poliomyelitis and three survived without symptoms (table 5).

Mon-	Dec.	Date	of pict of solu	ric acid ition ir	instill parts	ations per 10	and str) (1936)	ength	Data ist vir	e of ad tration rus (19	lmin- 1 of 936)	Days first	Days first dose virus	
key no.	30, 1935	1-6	1-11	1–13	1–15	1-19	1-20	1-23	1–26	1-27	1–28	to fever	to com- plete par- alysis	Diagnosis
104 105	0. 32 P . 32 P	0. 32 P . 32 P		0. 32 P . 32 P			0. 32 P . 32 P		v v	v v	v v	4	8 10	Poliomyeli-
106 107 108	. 32 P . 32 P . 16 P	. 32 P . 32 P . 16 P		. 32 P . 32 P . 16 P			. 32 P . 32 P . 16 P		v v v	V V V	v v v	5	8 8 10	Do.
109 110 111	. 16 P . 16 P . 16 P	. 16 P . 16 P . 16 P		. 16 P . 16 P . 16 P			. 16 P . 16 P . 16 P		V V V	V V V	V V V	4	8 8 11	Do.
112 113 114			0. 32 P . 32 P . 32 P		0. 32 P . 32 P . 32 P	0. 32 P . 32 P . 32 P		0. 32 P . 32 P . 32 P	v v v	v v v	v v v		888	
115 116 117			.32 P .16 P .16 P		. 32 P . 16 P . 16 P	. 32 P . 16 P . 16 P		. 32 P . 16 P . 16 P	v v v	v v v	v v v	5	8 8 11	Do.
118 119 120			. 16 P . 16 P		. 16 P . 16 P	. 16 P . 16 P		. 16 P . 16 P	V V V	V V V	v v v	4	9 8 8	Do.
121 122									v v	v v	v v	4	8 9	Symptoms. Poliomyeli- tis.
123									v	v	v	4	10	Do.

TABLE 5.—Picric acid, 0.16 and 0.32 percent at 7- and 4-day intervals

P=Picric acid. S=Survived.

A second group of four monkeys was similarly handled, except that the picric acid was administered at intervals of 4 days, the last application being followed on the third, fourth, and fifth days by an intranasal instillation of virus. All survived without symptoms.

A third and fourth group were respectively identically handled as were groups 1 and 2, except that the concentration of picric acid was 0.16 rather than 0.32 percent. Two monkeys from each group died of poliomyelitis and the others survived without symptoms.

From the fifth group of four nonprepared control monkeys there were two deaths of poliomyelitis, while a third developed high fever and tremors but recovered, and one survived without symptoms.

All groups of the series were inoculated on the same day and with virus from the same 4 percent centrifuged suspension of several cords, the dose being 1 cc into each nostril repeated on 3 successive days.

It thus appears (table 5) that 0.16 percent picric acid was not sufficiently concentrated to be effective at 4- and 7-day intervals, while 0.32 percent was effective at 4-day intervals, but failed in one monkey treated at 7-day intervals. In this connection, it is to be remembered that no picric acid was administered subsequent to the virus applications. Such a continuation of the chemical applications, at the selected intervals, following the virus exposures would better have simulated any application of the method to the prevention of natural infection through the periodic instillation of picric acid during a seasonal outbreak, and would possibly, judging from table 4, have improved the results.

SUMMARY

1. The instillation of various chemicals into the nostrils tends to prevent internasal infection of mice with encephalitis virus (St. Louis type) and of monkeys with poliomyelitis virus.

2. Picric acid, 0.32 to 0.64 percent either alone or combined with alum, was found to be superior to 4 percent alum and to be the most satisfactory and efficient experimental agent so far tried by the writers.

3. Picric acid in the concentration and amounts employed was devoid of detectable general or local injurious effects on animals. Sixteen applications sprayed by means of an atomizer into the nostrils of the authors produced no detectable injurious effects.

4. It is believed that picric acid exerts its protective effects locally, either by rendering the mucous membranes less permeable to infection or possibly by a direct action on the virus itself, or both.

5. The use of picric acid does not prevent the development of specific immunity in mice following a subsequent intranasal instillation of encephalitis virus.

6. Picric acid given to mice 1 and 2 days before, 1 and 2 days after, or on the same day as the virus instillation, led to a decreased susceptibility to the virus in all instances, as compared with nonprepared controls.

7. The protective effect of 0.32 percent picric acid is apparent against intranasally inoculated poliomyelitis for at least 4 to 7 days following its last administration.

8. Intranasally instilled chemicals effective in preventing encephalitis in mice have been found effective against poliomyelitis in monkeys, suggesting that the former may be utilized as an indicator in a further search for more effective prophylactic agents in the latter ailment.

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DEATHS DURING WEEK ENDED FEB. 8, 1936

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

	Week ended Feb. 8, 1936	Correspond- ing week, 1935
Data from 86 large cities of the United States: Total deaths. Deaths per 1,000 population, annual basis. Deaths under 1 year of age. Deaths under 1 year of age per 1,000 estimated live births. Deaths under 1 year of age per 1,000 estimated live births. Deaths per 1,000 population, annual basis, first 6 weeks of year. Deaths per 1,000 population, annual basis, first 6 weeks of year. Deaths for industrial insurance companies: Policies in force. Number of death claims. Death claims per 1,000 policies in force, annual rate. Death claims per 1,000 policies, first 6 weeks of year, annual rate.	9, 589 13. 4 564 51 13. 4 67, 857, 697 14, 405 11. 1 10. 6	9, 424 13. 1 647 59 13. 1 67, 235, 778 13, 845 10, 7 11, 0

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 Feb. 15, 1936, and Feb. 16, 1935

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Feb. 15, 1936, and Fcb. 16, 1935

	Diph	theria	Influenza Measles			Mening meni	Meningococcus meningitis	
Division and State	Week ended Feb. 15, 1936	Week ended Feb. 16, 1935						
New England States: Maine New Hampshire Vermont	1	1	5 15	9	324 30 271	349 16 3	0	0
Massachusetts	9	11			706	549	6	Ŏ
Rhode Island	i	1		2	58	17	Ó	İÖ
Connecticut		1	12	21	122	620	Ó	0
Middle Atlantic States:								
New York	37	42	1 69	1 24	1,807	1, 391	20	3
New Jersey	10	11	17	17	70	407	5	3
Pennsylvania	48	52			640	3,004	9	4
East North Central States:								
Ohio	53	95	95	255	216	912	11	13
Indiana	36	35	45	113	9	562	3	5
Illinois	51	60	39	67	19	2,509	9	9
Michigan	4	9	8	31	27	895	1	4
Wisconsin	ī	3	44	120	43	1.458	1	3
West North Central States:	-	-				-,	_	-
Minnesota	2	2	1	45	195	1.884	8	1
Iowa	7	10	4	87	14	1.462	12	3
Missouri	31	43	308	703	16	745	10	12
North Dekote	1	3	2	23	-4	133	Õ	Õ
South Dakota	î	•	-	~	3	41	i	ŏ
Nebreska	5	11			6	301	5	5
Kaneag	15		47	40	15	1.300	ŏ	Ă
South Atlantia States:	10				10	1,000	-	•
Dolomoro		1		1	71	1	0	0
Morriand ?		ŝ	21	113	214	54	ž	2
District of Columbia	10	ő	21	110	21	7	i	3
Viscinio	17	ากั	Ű	-	05	013	15	5
West Virginia	14	20		401	90 9	437	2	3
West Virginia	1/	44 92	224	210	22	653	2	2
North Carolina	14	43	1 529	210	13	54	10	ñ
	11	10	1,000	101	19	~	- 20	Ň
Georgia .		10	10	101			ŝ	Ň
F 10F108	4 (20	19 1	82	0		01	U

See footnotes at end of table.

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Cases of certain communicable diseases reported by telegraph by State Sealth officers for weeks ended Feb. 15, 1936, and Feb. 16, 1935—Continued

	Diph	theria	Infl	uenza	Me	asles	Menin men	gococcus ngitis
Division and State	Week ended Feb. 15, 1936	Week ended Feb. 16, 1935	Week ended Feb. 15, 1936	Week ended Feb. 16, 1935	Week ended Feb. 15, 1936	Week ended Feb. 16, 1935	Week .anded Feb. 15, 1936	Week ended Feb 16, 1935
East South Central States: Kentucky Tennessee Alabama Mississipp1 ** Weet South Central States:	15 9 15 3	14 16 16 8	62 245 686	99 515 1,862	68 15 30	679 67 766	13 16 3 2	2 14 2 3
Arkansas. Louisiana. Oklahoma 4. Texas 3	9 25 8 69	3 41 13 41	57 48 207 370	80 24 437 981	2 40 3 93	22 94 84 202	2 3 17 8	2 0 5 6
Mountain States: Montana. Idabo Wyoming Colorado. New Mexico. Arizona.	2 4 6	2 10 7	18 6 8 151	311 3 25 81	56 14 3 8 1 22	135 68 16 600 14 17	0 1 2 6 0 3	3 0 0 0 0
Utah ² Pacific States: Washington Oregon Cabifornia	1	2 56	67 3 890	41 173 306	4 174 767 1 529	- 7 - 349 - 102 - 530	1 1 2 10	0 3 0 8
Total First 7 weeks of year	596 4,864	739	9,077	8, 591 62, 783	7,872	24, 477 119, 483	234	134 673
Division and State	Polion Week ended Feb. 15, 1936	Week ended Feb. 16, 1935	Scarle Week ended Feb. 15, 1936	t føver Week ended Feb. 16, 1935	Smal Week ended Feb. 15, 1936	Week ended Feb. 16, 1935	Typhoi Week ended Feb. 15, 1936	d fever Week ended Feb. 16, 1935
New England States: Maine. New Hampshire		0 0 0 0 0 0 0	14 8 31 290 19 67 905	29 8 11 172 15 65 717	0 0 0 0 0 0	0 0 0 0 0 0	0 0 5 0 0 4	0 0 0 0 0 0 0 7
New Jelsey. Pennsylvania. East North Central States: Ohio Indiana Illinois. Michigan. Wisconsin Wast North Central States:	0 1 0 1 1 0	1 3 0 2 0 1	525 473 438 668 315 454	666 1, 225 254 948 379 627	0 1 0 14 3 25	0 1 3 1 1 18	11 2 2 3 1 1	12 5 3 11 2 2
Minesota Iowa Missouri Missouri North Dakota South Dakota Nebraska Kansas	0 0 1 0 0 0 1	1 1 0 0 0 0 0	361 131 186 74 54 184 255	97 97 155 68 9 41 110	4 8 4 1 12 20 22	0 4 2 0 3 78 9	1 12 0 0 1 1	0 1 2 1 1 0 0
Bouth Atlanuc States: Delaware	0 0 0 0 0 0 0 0 0	0 0 3 0 0 0 0 0 1	6 90 21 43 35 30 4 25 6	14 85 36 74 155 42 3 19 13	0 0 0 1 0 0 0	0 0 0 0 0 0 0 0 0	1 1 6 2 7 0 0 0	0 1 13 5 1 0 3 1

See footnotes at end of table.

Ceses

7 136 47

	Polion	yelitis	Scarle	t fever	Sma	llpox	Typho	id fever
Division and State	Week ended Feb. 15, 1936	Week ended Feb. 16, 1935	Week ended Feb. 15, 1936	Week ended Feb. 16, 1935	Week ended Feb. 15, 1936	Week ended Feb. 16, 1935	Week ended Feb. 15, 1936	Week ended Feb. 16, 1935
East South Central States:	·							
Kentucky	4	0	54	36	0	0	3	12
Tennessee	0	1	43	57	0	0	0	0
Alabama	1	1	19	14	0	0	1	4
Mississippi ³	0	0	13	9	0	1	2	5
West South Central States:								
Arkansas	0	0	14	15	0	1	1	2
Louisiana	2	Ō	25	26	Ō	Ō	ĩ	16
Oklahoma (ō	ŏ	35	23	ĭ	, š	3	4
Taxes 1	ň	ň	105	74	ī	111	5	29
Mountain States	v	v	100	••	•		Ŭ	
Montene	0	0	84	9	8	1	0	0
Ideho	ĭ	ň	50	1 7	10	Ô	ĭ	ī
Wyoming	i i	ň	119	3	4	3 a	ĥ l	ī
Colorado	ň	ž	143	230	20	Š	ň	l õ
Nor Maria	Ň	៍	01	10		2	3	3
Arizona	i i	Ň	24	20	ŏ	ő	l ő	ň
Litch 1	.	ň	85	82	ŏ	Ň	ň	ŏ
Decide States	v	v	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	02	v	U U		v
Facilic States:		1	<u>en</u>	59	17	27		
wasnington	1		49	57	11	31	1	
Oregon.		10	40	07	, v		1	
California	8	13	395	204	1	8	3	
Total	25	32	7, 444	7, 293	177	299	88	157
First 7 weeks of year	162	198	50, 141	45, 206	1, 599	1, 492	806	1, 037

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Feb. 15, 1936, and Feb. 16, 1935—Continued

New York City only.
 Week ended earlier than Saturday.
 Typhus fever, week ended Feb. 15, 1936, 9 cases, as follows: Georgia, 2; Mississippi, 1; Texas, 6.
 Exclusive of Oklahoma City and Tulsa.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following 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	Menin- gococ- cus menin- gitis	Diph- theria	Influ- enza	Mala- ria	Mea- sles	Pel- lagra	Polio- mye- litis	Scarlet fever	Small- pox	Ty- phoid fever
January 1938 District of Colum- bia Florida Maine Michigan Nebraska New Jersey Ohio Oregon South Carolina West Virginia	19 6 1 13 2 17 42 4 4 23	154 46 6 46 31 51 152 18 122 91	14 21 50 13 2 54 232 93 1,509 726	48 	24 6 921 220 205 182 543 2,099 16 26	1 1 1 23	0 0 5 0 0 3 2 1 1 	96 58 75 1, 314 678 920 1, 641 265 33 221	0 0 1 151 0 10 8 1 2	12 5 1 11 11 7 8 3 3 3 10

Chicken pox: District of Columbia Florida Maine Michigan Nebraska New Jersey Ohio Oregon South Carolina West Virginia	Cases 75 91 368 2, 507 199 1, 773 2, 306 242 72 350	Dengue: Florida South Carolina Diarthea: South Carolina Ohio (under 2 years, enteritis included) Dysentery: Florida (bacillary) Michigan (amoebic) New Jersey (amoebic)	Cases 1 2 199 13 1 1 1 1	Epidemic encephalitis: District of Columbia New Jersey German measles: Maine Michigan New Jersey Ohio South Carolina West Virginia

January 1936

42216°-36-2

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January 1936-Continued

C	8885		Cases	1	Cases
Hookworm disease: South		Puerperal septicemia: Ohio.	. 5	Typhus fever:	
Carolina	23	Rabies in animals:		Florida	. 2
Impetigo contegiose: Ore-		New Jersey	16	South Carolina	1
Impenso concessiosa. Ore-	47	Oregon	15	Undulant fever:	• -
gou	- 11	South Caroline	20	Maine	1
Lead poisoning:		Sophies Oregon	42	Michigan	· 1
Michigan	4	Boables. Oregon	- 10	New Jarcov	Ā
Ohio	9	Septic sore throat:		Obio	
Mumps:		Maine	4		· · ·
Florida	76	Michigan	39		
Maine 1	405	Ohio	122	South Carolina	. 2
Michigan	804	Oregon	18	Vincent's infection:	
Nabracha	76	Tetanus.		Maine	- 4
Now Incor	~~~ I	Michigan	1	Michigan	21
Obio 1	117	Ohio	î	Oregon	10
	,	m	•	Whooping cough:	
Oregon	139	Trachoma:		District of Columbia	16
South Carolina	86	New Jersey	1	Florida	23
West Virginia	239	Ohio	6	Maine	119
Ophthalmia neonatorum:	- 1	Trichinosis		Michigan	1.406
New Jersey	1	A fichinosis.		Nebreske	34
Ohio.	77	Michigan	1	Now Japony	490
South Carolina	7	New Jersey	3	Obio	740
West Virginia	- i l	Tularaemia:		0moren	90
Denotembaid former Michi	- 1	Ohio	10	Cregou.	30
raratypholo lever: Michi-	. 1		10	South Carolina	70
gan	- 1	South Carolina	11	west virginia	52

CASES OF VENEREAL DISEASES REPORTED FOR DECEMBER 1935

These reports are published monthly for the information of health officers in order to furnish current data as to the prevalence of the venereal diseases. The figures are taken from reports received from State and city health officers. They are preliminary and are therefore subject to correction. It is hoped that the publication of these reports will stimulate more complete reporting of these diseases.

Reports from States

	8yı	ohilis	Gone	orrhea
	Cases reported during month	Monthly case rates per 10,000 population	Cases reported during month	Monthly case rates per 10,000 population
Alabama 1				
Arizona 1				
Arkansas	145	0.77	117	0.62
California	1,406	2.28	1, 270	2.06
Delewara	189	1.14	105	.63
District of Columbia	127	1.20	100	1.24
Florida	279	1.07	75	
Georgia	692	2.38	224	. 10
Idaho	ō	ō	ō	0
Illinois	1, 376	1.75	1,076	1.37
Indiana	128	. 39	61	. 18
Iowa ²	-90	. 36	138	. 56
Kansas	60	. 31	40	. 21
Kentucky	225	.85	229	. 86
Louisiana *	307	1.42		. 30
Maryland	840	. 40 5 09	210	1.04
Marsachusetts	437	1 01	530	1.20
Michigan	494	.97	558	1.10
Minnesota	351	1.35	337	1.30
Mississippi	1,097	5. 33	1, 616	7.86
Missouri 1				
Montana 2	23	. 43	37	. 69
Nebraska	25	. 18	48	. 34
Nevada *	;;-			
New Hampsmre	490	1 12	3	.00
New Maxim 2	46	1.13	22	.00
New York 1	10	1.00	~	. 00
North Carolina	1. 121	3.40	447	1.35
North Dakota	13	. 19	49	.71
Ohio	458	. 67	234	. 34
Oklahoma ²	127	. 51	113	. 46
Oregon	64	. 65	120	1, 21
Pennsylvania	239	. 24	180 (. 18

See footnotes at end of table.

Reports from States-Continued

	Syp	hilis	Gond	orrhea
	Cases	Monthly	Cases	Monthly
	reported	case rates	reported	case rates
	during	per 10,000	during	per 10,000
	month	population	month	population
Rhode Island	126	1. 79	38	. 54
	144	. 82	193	1. 10
	13	. 18	40	. 57
	866	3. 24	355	1. 23
	89	. 15	88	. 14
Utah ¹	16	. 44	27	. 75
	202	. 83	154	. 63
	169	1. 05	194	1. 21
	144	. 81	108	. 60
	27	. 09	91	. 30
Total	12, 785	1. 22	9, 629	0. 92

Reports from cities of 200,000 population or over

Almon Obio	92	0.81		0.26
Atlanta Go	122	4 46	71	9 47
Deltimore Md	591	7.04	1 10	1 22
Disminshom Ala I		1.04	110	1.00
Birmingnam, Ala.	140	2 02	902	
DOSLOII, MIRSS	100	2.02	200	1.00
Bullalo, N. Y	1//	2.99	717	1.00
Unicago, III	006	2.20	11/	2.01
Cincinnati, Onio	3/	. /9	39	.84
Cleveland, Ohio	182	1.90	73	.78
Columbus, Ohio	48	1.57	26	.85
Dallas, Tex. ¹				
Dayton, Ohio	13	. 62	0	0
Denver, Colo	12	.40	3	. 10
Detroit, Mich	179	1.03	215	1.24
Houston, Tex. ³	126	3.76	33	.£9
Indianapolis, Ind	18	.48	41	1.09
Jersev Čitv. N. J	1	. 03	1 1	.C3
Kansas City Mo	73	1.73	6	.14
Los Angeles, Calif	384	2.68	295	2.06
Louisville Ky	284	8.77	162	5.00
Memphie Tenn	194	7.27	56	2.10
Milwonboo Wie	3	.05	17	.28
Minneepolie Minn	87	1 79	90	1 85
Namork N I	144	3 11	95	2 05
Now Orleans I a l	111			
New Vriealis, La.				
New IOFK, N. I.	17	56	24	1 19
	11			1.14
Umana, Neor	145	.30	52	. 41
rniladelphia, Pa	140	. /3	00	. 41
Pittsburgh, Pa	50	.82	40	. 38
Portland, Oreg	42	1.34	10	2.42
Providence, R. I.	56	2.16	23	. 89
Rochester, N. Y.	49	1.45	62	1.84
St. Louis, Mo	429	5.13	406	4,80
St. Paul, Minn	42	1.49	51	1.81
San Antonio, Tex. ³				
San Francisco, Calif	215	3. 21	122	1.82
Seattle, Wash	119	3. 13	116	3.06
Syracuse, N. Y.	15	. 69	30	1.38
Toledo, Óhio	38	1.25	21	. 69
Washington, D. C. ⁷	93	1.87	109	2.19
······································				

¹ No report for current month.
² Incomplete.
³ Not reporting.
⁴ Only cases of syphilis in the infectious stage are reported.
⁴ Reported by the Jefferson Davis Hospital; physicians are not compelled to report venereal diseases.
⁶ Reported by the Syracuse Free Dispensary.
⁷ Reported by Social Hygiene Clinic.

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WEEKLY REPORTS FROM CITIES

City reports for week ended Feb. 8, 1936

This table summarizes the reports received weekly from a selected list of 140 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 cit.es, from which the data are tabulated and filed for reference.

State and city	Diph- theria cases	Infl Cases	uenza Deaths	Mea- sles cases	Pneu- monia deaths	Scar- let- fever cases	Small- pox cases	Tuber- culosis deaths	Ty- phoid- fever cases	Whoop- ing- cough cases	Deaths, all causes
Maine: Portland	0		0	0	4	1	0	0	0	. 5	19
New Hampshire:				•	1	0			0		14
Manchester	ŏ		ŏ	ŏ	2	1	ŏ	ŏ	ŏ	ŏ	14
Nashua	0			0	1	1	0		0	0	
Vermont: Barre	0		0	0	0	0	0	2	0	0	5
Burlington	Ŏ		Ŏ	Ŏ	Ŏ	i	Ŏ	Ō	Ŏ	Ō	7
Rutland	0		1	9	0	8	0	0	U	U	10
Boston	2		1	129	35	71	0	12	Q	16	
Fall River	1		1	0	5	7	0	2	8	2 12	40
Worcester	ŏ		ŏ	Ô	7	21	ŏ	î	ŏ	ĩ	51
Rhode Island:											
Providence	1		1	12	6	9	ŏ	2	ŏ	3	75
Connecticut:						10					41
Bridgeport	0		1	1	8	12	ŏ	4	ŏ	3 5	49
New Haven	ŏ	1	ī	ō	9	ĩ	Ŏ	ī	Ō	16	39
New York:										• 1	
Buffalo	0		1	25	17	56	0	8	0	9	145
New York	39	60	6	603	203	408	Ň	97	3	- 59 1	1, 094
Syracuse	ŏ		ĭ	59	6	10	ŏ	ĭ	ŏ	12	42
New Jersey:				,	.						90
Newark	Ó	5	ĭ	1	13	85	ŏ	5	ŏ	12	111
Trenton	Ŏ		ō	Ō	1	7	Ŏ	i	Ŏ	1	26
Pennsylvania:	7	5		237		89	0	26	- 1	52	539
Pittsburgh	8	5	3	22	37	59	ŏ	7	ō	21	208
Reading	0		0	1	1	27	0	1	<u> 0</u>	0	. 27
Beranton	v			3		'	, v		۳I	° I	
Ohio:					10	19		-			164
Cleveland	8	49	3	45	12	26	ŏ	13	ŏl	76	220
Columbus	Ő	4	4	1	9	19	0	2	0	1	112
Toledo	2	1	1	34	6		•	0	•	8	90
Anderson	6		0	2	1	1	0	0	0	9	12
Fort Wayne	1		2	0	6	4	0	9	8	0	33
Muncie	2		6	1	5	3	ŏ	il	ŏ	0	17
South Bend	ō		Ŏ	i	4	1	Ó	Ō	Ő	1	23
Terre Haute	1		0	0	0	2	0	0	•	0	23
Alton	1		0	0	0	0	0	0	0	0	10
Chicago	5	12	6	6	51	245	1	32	1	189	764
Moline	- X		8 I	öl	2	12	öl	ŏ	ŏ	ŏ	9
Springfield	ŏ		ŏ	ŏ	5	13	Ő	i	Ó	Ó	28
Michigan:				15	21	101	,	17		155	262
Flint.	i		ō	ŏ	8	6	ô	"i	ŏ	3	26
Grand Rapids.	0		0	1	4	8	0	0	0	4	50
wisconsin: Kenosha	0			0	0	6	0	• 0	0	3	8
Milwaukee	ĭ	2	ž	Ă I	Ğ	75	ŏ	2	i	68	108
Racine	0		<u> </u>	1	0	17	<u> </u>	1	8	2	14
superior	° I		۰	۲	۳I	°	۳	۳I	۳I	۲ľ	•
Minnesota:			.	,						,	92
Minneapolis	ĭ		ől	57	12	99	ŏl	2	ŏ	12	129
St. Paul	ō	2	2	25	5	42	Ó	2	0	1	65

See footnotes at end of table.

City reports for week ended Feb. 8, 1936-Continued

State and city	Diph- theria cases	Infl Cases	uenza Deaths	Mea- sles cases	Pneu- monia deaths	Scar- let- fever cases	Small- pox cases	Tuber- culosis deaths	Ty- phoid- lever cases	Whoop- ing- cough cases	Deaths, all causes
Tows:		1									
Cedar Rapids	0			0		1	0		0	2	
Davenport	Ő			0		14	0		Ó	Ō	
Des Moines	2			0		6	0		0	1	31
Sioux City	0			1		6	5		0	0	
Waterloo	1			1		0	0		0	0	
Missouri:						~					1
St Looph			3		30	21	Ň		Ň		130
St. Joseph	11			1	3		Ň		Ň	l i	21
North Dakota			· ·	•	~		v		v	•	2 01
Fargo.	0		0	0	0	10	0	0	0	8	6
Grand Forks	Ŏ			Õ		Ō	Ó		Ó	Õ	
Minot	Ó		0	0	0	18	0	0	0	0	13
South Dakota:											
Aberdeen	0			0		0	0		0	0	
Sioux Falls	0			Ģ	0	18	1	0	0	0	9
Nebraska: Omana	U		0	1	5	81	4	0	U	U	55
Aansas:	•			1			0	•	0	0	15
Topeka	Ň		2	0	5	ŏ	ŏ	ň	ň	ň	13
Wichita	ň	3	2	ŏ	8	18	ŏ	ŏ	ŏ	2	36
	v	Ů	-	, v	Ŭ	-0	·	Ů	ů	-	
Delaware: Wilming-											
ton	0		0	1	3	0	0	1	0	7	34
Maryland:	-					~				~	071
Baltimore	3	4	3	14	37	32	U	11	1	20	251
Cumperiand	v v	1		N N			0	8	Ň	0	
District of Colum	U		ا ۲	v			v		v	v	
bia. Washington	12	2	6	7	30	30	0	15	0	5	219
Virginia:		-	l V	•			•				
Lynchburg	0		0	2	5	2	0	0	0	3	20
Norfolk	Ó	2	Ő	Ö	3	4	0	1	0	0	27
Richmond	1		2	0	12	6	0	3	0	0	78
Roanoke	0		0	1	3	0	0	0	0	0	22
West Virginia:							•				00
Charleston	1		0	0	6	Z	N N	1		N N	20
Huntington	0			N N		2					10
North Carolina	T			v	•	•	v I	v I	•	v I	10
Gastonia	0	3	ا م	0	1	0	0	1	0	0	13
Raleigh	ŏ	Ů	ŏ	ŏ	- 4	ŏ	ŏ	ō	ŏ	ŏ	16
Wilmington	ŏ	4	ŏ	ŏ	ō	Ō	Ó	Ŏ	Ó	Ó	8
Winston-Salem_	Ō		Ó	22	2	2	0	3	0	0	16
South Carolina:											
Charleston	0	395	1	0	12	0	0	3	0	1	32
Columbia	0		0	0	8	0	v l	0	N N	N N	19
Florence	0		N N			N N	N N			× N	13
Greenvine	U		۷I	20	- 1		۳	- 1	۳I		10
Atlente	1	76	5	0	8	8	0	7	0	0	105
Brunswick	4		ŏl	ŏl	ŏ	ĭ	ŏl	i l	ŏl	ŏ	4
Savannah	ō	67	Å I	ŏl	3	ī	ŏ	il	Ó	2	30
Florida:		•	-	-	-						
Miami	0		0	0	4	1	0	5	1	3	45
Tampa	1	1	1	0	9	2	0	1	0	0	26
Kantuchu											
Achland					- 1	<u>م</u>	•	1	أم	0	2
Covington	1			Ň	5	¥ I	ň	il	ŏ	ňl	25
Lexington	2		ŏ	ŏl	š l	ō	ŏ	2	ŏ	ŏ	26
Louisville	2	12	ĭ	ĭ	10	3	ŏ	3	ŏ	10	63
Tennessee:	-		-	-		- 1	- 1	-			
Knoxville	1		4	11	5	1	0	2	0	0	33
Memphis	1		3	2	10	5	0	5	0	10	93
Nashville	0		5	0	13	3	0	2	0	0	63
Alabama:					10						75
Mabile		30	1	× I	10	2	N I	8		Ň	32
Montgomery	i l	a l	- 1	N N	-	6	Ň	•	Ň I	Ň I	04
monteomer à	-	-		v l		۳I	, v		۳I	۳ľ	
Arkansas:						1					
Fort Smith	1	I		0		0	0		0	0	·
Little Rock	5		1	0	3	5	0	1	0	0	· · · · · · · •
Louisiana:											-
Lake Charles	0	;-	0 I	,0	2	10	Ň	U I	Ň	U	15R
Shreveport	10	- 1	0	14	19	10	N I	il	Ň I	ŏ	47
Differebore			~ 1	41 1	01	• 1	• 1	- 1	~ 1	• 1	

See footnotes at end of table.

the second se											
	Diph-	Inf	luenza	Mea-	Pneu-	Scar-	Small-	Tuber-	Ty-	Whoop-	Deaths,
State and city	cases	Cases	Deaths	sies Cases	monia deaths	fever cases	pox cases	deaths	fever cases	cough cases	all causes
Texas: Dallas Fort Worth Galveston Houston San Antonio	3 2 4 11 1	4	4 1 1 1 3	13 0 0 13 1	13 6 2 16 14	7 5 8 5 8	0 0 0 0	5 3 2 3 8	0 0 0 2 1	1 0 0 1 0	78 51 19 88 72
Montana: Billings Great Falls Helene	0 0		0	0	1 1	14 15	0	0	2 0	1 2	6 7
Missoula Idaho: Boise Colorado:	0 0		0	0 1	0 1	2 9	0	0	0 0	0	3 6
Denver Pueblo	0 2 0		0 1 1	3 6 0	3 12 2	9 21 20	1 0 0	1 6 0	0 0 0	1 7 0	15 90 13
buquerque Utah: Salt Lake City Nevada: Reno	0	1	0	0 2	3 1	12 84	0 0	2 0	0	9 10	18 25
Washington: Seattle Spokane Tacoma Oregon:	0 0 0		0 0 0	24 4 4	3 1 6	24 7 5	0 0 0	4 1 0	2 0 0	0 4 0	113 29 40
Portland Salem California: Los Angeles Sacramento	1 0 7 4	2 49 7	1 2 2	279 5 206 12	6 25 3	13 0 90 13	00	2 20 2	0 0 1 0	5 9 27 12	90 857 29
San Francisco	1 M	(eninge menin	7 periodicial periodicial peri	Polio- mye- litis	22	85 State	and city	7	0 Mening menin	9 ococcus ngitis	Polio- mye- litis
	C	ases	Deaths	CB.SES	-				Cases	Deaths	C8.865
Massachusetts: Boston Worcester	 br	1	1	0	Dela Mar Dist	ware: yland: rict of	Wilming Baltim Colu	nbia:	0 10	1 1 2	00
New Jorsey: Newark Pennsylvania: Pit burgh Ohio:	tts-	1 0	0 1	Ö	Geo	th Caro Charles Greenv rgia: At	lina: ton ille tlanta		1 0 1	1 1 0	1 0 0
Columbus Toledo Indiana: Indianapolis Illinois: Chicago	 	1 2 0 0 8	1 0 1 1	000000000000000000000000000000000000000	Arka	nessee: Knorvi Memph ansas: 1 isiana: 1	lle nis Little R Shrevep	ock	1 4 1 1	0 2 0 2	0 0 0
Minnesota: Minneap Iowa: Des Moines Missouri: Kansas City	011S	1 1 3	0 0 0	0 0 0	Colo	as: Housto: San An orado:	n tonio Color	ado	3 1	0 1	0 0
St. Joseph St. Louis Nebraska: Omaha Kansas: Wichita		2 3 1 0	0 2 0 0	0 2 0 1	Sp Was Oreg Cali	hingtor on: Po fornia:	n: Seatt rtland Los Ang	le geles	0 1 1 1	0 1 0 1	1 0 0 2

City reports for week ended Feb. 8, 1936-Continued

Epidemic encephalitis.—Cases: Columbus, 1; Chicago, 1; Kansas City, Mo., 1. Pelagira.—Cases: Charleston, S. C., 1; Tampa, 1; New Orleans, 1; Dallas, 1; Los Angeles, 1; San Fran-cisco, 3. Rabies in man.—Deaths: Greenville, S. C., 1. Typhus fever.—Cases: Boston, 1; Worcester, 1; Flint, 1.

FOREIGN AND INSULAR

CEYLON

Mortality.—From November 1934 to October 1935 more than 100,000 deaths from malaria and allied causes occurred in Ceylon. During the same period a total of 214,224 deaths from all causes were reported, as compared with 113,640 deaths for the previous 12 months.

The following table shows the mortality figures by months since the malaria epidemic began in November 1934, as compared with the previous 12 months.

	1934	1933		1934	1933
November	12, 198	9, 447	December	19, 728	9, 049
	1935	1934		1935	1934
January February March April May	36, 252 26, 552 19, 065 15, 931 16, 693	11, 541 9, 964 9, 105 8, 786 9, 116 8, 720	July August September October	16, 236 14, 309 10, 895 10, 913	9, 476 9, 967 8, 540 9, 910

Deaths reported from all causes

ITALY

Communicable diseases—4 weeks ended December 8, 1935.—During the 4 weeks ended December 8, 1935, cases of certain communicable diseases were reported in Italy as follows:

	Nov. 11-17 No		Nov.	18-24	Nov. 25-Dec. 1		Dec. 2-8	
Disease	Cases	Com- muni- ties af- fected	Cases	Com- muni- ties af- fected	Cases	Com- muni- ties af- fected	Cases	Com- muni- ties af- fected
Anthrax. Cerebrospinal meningitis. Diphtheria and croup. Dysentery. Hookworm disease. Lethargic encephalitis. Measles. Paratyphoid fever. Poliomyleitis. Puerperal fever. Rabies. Scarlet fever. Typhoid fever. Undulant fever.	30 7 2222 717 11 9 120 20 48 1 1 685 688 21 193	28 7 7 343 107 343 10 8 	24 6 245 5 796 12 5 1 1, 317 78 25 41 649 552 23 3 243	22 6 122 379 11 4 1 207 53 20 36 252 301 17 7 89	17 9 288 730 7 9 1 1,210 91 22 47 590 531 14 330	17 8 107 370 7 1 209 68 19 47 233 301 14 4 76	17 5 304 766 16 10 1 1, 139 73 19 32 514 444 21 261	17 5 118 368 12 6 1 1 220 58 14 32 208 2251 19 81

226

LATVIA

Notifiable diseases—October-December 1935.—During the months of October, November, and December, 1935, cases of certain notifiable diseases were reported in Latvia as follows:

Disease	Octo- ber	Novem- ber	Decem- ber	Disease	Octo- ber	Novem- ber	Decem- ber
Anthrax Cerebrospinal meningi- tis. Diphtheria. Erysipelas. Influenza Leprosy. Measles. Mumps.	1 70 23 65 2 8 8 8	7 80 22 53 1 69 4	5 87 35 75 1 74 15	Paratyphoid fever Poliomyelitis Puerperal septicemia Scarlet fever Tetanus Trachoma Tuberculosis Typhoid fever Whooping cough	25 8 176 1 26 808 64 9	87 8 260 1 42 333 48 30	11 8 2 241 72 294 33 22

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 table 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

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oton oncer. D	BLES CASES, L,
C	Calles Cases, L,
inter action D	ICBUES CERES, T,
Renter ander D	LICENCES CERSES, L,
director cores. D	ULCBLCS CB363, L,
adiantan anaan D	uulcales cases, L,
Indiantan anana D	ILLULTENES CASES, L,
Indiantan anasa. D	ILLUICALES CASES, L,
l'indiantan annan D	VILLUICALES CASES, L,
C indicator concer D	O IMULCIANCE CARGO, D,

	•									Week (pepu						
Place	June 30- July 27, 1935	July 28- Aug. 31, 1035	Sept. 1-28, 1935	Sept. 29- Oct. 36 1035		Nov	ember 1	935		н	ecembe	r 1935		Ja	nuary	1936	
		0001 110		0001 (01	3	6	16	ន	30	7	14	21	8	4	Π	18	32
China: Amoy India. Amoy Assam	255,494 13,2586 13,2586 1,3288 1,3288 3,732 2,972 1,2972 1,2972 2,232 2,232 2,232 2,232 2,232 2,232 2,232 2,232 2,232 2,232 2,232 2,232 2,232 2,236 2,237 2,236 2,237 2,236 2,236 2,236 2,237 2,236 2,237 2,236 2,237 2,236 2,237 2,	25, 713 57, 713 946 1, 7045 1, 7045 1, 7045 2, 6827 2, 6827 2, 6827 2, 6827 2, 6827 3, 2467 3, 247 3, 24	24, 707 24, 5805 7, 7586 3, 3286 3, 3386 3, 33866 3, 33866 3, 33866 3, 33866 3, 33866 3, 33866 3, 33866 3, 338666 3, 3386666666666666666666666666666666666	28, 882 15, 882 3, 768 3, 775 5, 775 1148 1148 12 1148 1148 1148 1148 1148 1	6, 397 5, 54 5, 54 5, 56 5, 56 2, 53 5, 58 5, 58	2, 246 2, 746 775 196 487 196 487 1963 487 1963 487 11	2, 9, 553 1280 1280 4084 196 196 196 196 196 196 196 196 196 196	2, 2, 288 2, 288 1238 1238 1238 2460 2460 2460 1 1 1 1 1 1	2,6,890 1122 1122 1122 1122 1122 1122 1122 1223 30 30 44 4 4 4 4 4 4	1, 2006 2006 1003 1003 1003 1003 1003 1003 1003 1	2 4 4 0 154 154 165 2 5 5 5 2 5 5	1,019 1,019 1,019 1,004 1,100 67 1,100 67 1,100 67 1,100 67 1,100 67	828 828 828 828 828 828 828 828 828 828	222 132 47 47 47 47 47 47 47 47 47 47 47 47 47	94 94 94 94	22 0 23 0 23 0 23 0 23 0 23 0 23 0 23 0	₩ ₩ ₩
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CHOLERA-Continued

[C indicates cases; D, deaths; P, present]

Place Philippine Islands:	June 30- July 27, 1935	July 28- 28- 31, 1935	Sept. 1-28, 1935	Sept. 29- Oct. 26, 1935	~	MON 6	16 16	88	8	Week o	erembe	r 1935 21	8	n	11 11 11 11 11 11 11 11	88 89	8
Göcidentai Negros Province	ω		346 346 144 144 107	0.8 ⁰ 8 ¹	330-1 Q	00 - m	∞.4∞ ∞.01−−		0 1 1 1 1	<u>6</u> 173	<u>ا</u> ن مو ا	25 14 16 16	24 I 1 3 3 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	₿ 0 ¹ 0 0 0 0 1 1 1 1 1	8814 1 180²00	0 12 m 22 8 8 2 2 8	80.4840 400
Singhapuri Province		51 51		3.95	¹⁰		40-11	3.4	-400	8 9 9	41-	12-28	1382.2	10 00 00 10 00 00	82	ထင္က	80 g

¹ During the period Apr. 20 to July 9, 1835, 98 cases of cholera with 95 deaths were reported in Kanchanapuri Province, Siam.

Terr	•	ugust 193	10	Sept	tember 1	335	ŏ	ctober 19	88	Nov	ember 19	385	Đ	ember 19	8
0001	1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20	21-31
Indochina (French) (see also table above): Cambodia ³ O								-				-			
D Cochin-China ¹ D D			19 co								11	1		20	
8 Reports incomplete.															

PLAGUE 1

[C indicates cases; D, deaths; P, present]

										Week	ended-						1
Place	June 30- July 27, 1935	July 28- Aug. 31, 1935	Sept. 1-28, 1935	Sept. 29-Oct. 26, 1935		Not	ember	935			Decemb	er 1935		5	anuary	1936	
					5	6	16	ន	30	7	14	21	8	4	п	18	ส
Algeria: Philipperille Argentina (see also table below): Pamna Tarritorr-1 aventina 1				ø													
San Luis. Azores. (See table below.) Bagian Congo	8	ы	8														
Bollyla. (See table below.) Brazil 4 Brtish Bast Africa: Kenya	5	8	8	9 9	5	6	-	1	-	60	61	1	8		-		
Tanganyika	240 215	នីនី	188	28 88 88	3 8	89	38	88	219	ສສ	21 19		15	6	6 7	01 21	-
¹ Including plague in the United States and its	s possessio	DS.	1 5														

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

PLAGUE-Continued

[C indicates cases; D, deaths; P, present]

										Week e	nded						1
Place	June 30- July 27, 1935	July 28- Aug. 31, 1935	Sept. 1-28, 1935	Sept. 29-Oct. 26, 1935		Nov	ember 1	935			ecembe	1935		, n	anuary	1936	
					5	a	16	ន	ສ	~	14	21	8	4	=	18	ส
Ceylon: Balapitiya. Colombo	2	1		9	Í		3		6	8	•		6			1	
Plague-infected rats Ratnapura	60 C		80		9	17	1	70	60	5	4	ся ю	61	8	101	8	~
Tellijiawilla																	
Manchurla. Dutch East Indies: West Java C D	591 588	670 668	888 898	692 168	215 214			•									
Ecuador: Duran		3	00 0	35 1	2	66	50	17	101	13	5				~~~	**	1-0
Plague-infected rats. Lola Province-Celica.	-			200		101		9 -4 4		•		14		-		•	•
Egypt: Alexandria-Plague-infected rats. Asynt Province.	₽,∾	<u></u> Рч ¬	д	P4		ĥ	1	A		Α,	-	6	<u>е</u> ,	-	£,∾	101-	1
Great Britain-England-Liverpool-Plague- infortion are				1						c						•	
Hawaii Territory: Plague-infected rats: Hawaii Island-Hamakua district									-	•						<u> </u>	
Kalopa Kukalau Doorhalau	~	-			5				•	1			•				
Paaulio. Pohakea Sector ?				•									T,	•			
(9-10 miles from)		۳ 									_						

663 649 723 481 514 419 201 204 249 196 249 106 249 106 249 106 249 214 106 249 106 249 214 106 249 10 214 106 249	323 386 382 206 273 119 117 56 137 323 386 382 206 273 119 117 56 137 14 22 15 218 30 30 3				
635 451 655 1 181 184 1 181 184 1 33 71 333 33 44	1221 1231 1231 1331 1331 1331 1331 1331		8	•	11.2
83 1,43 13 13 1,5 1,5 1,5 1,5 1,5 1,5 1,5 1,5 1,5 1,5	555 555 449 111 6 6 1 1 1 1 1 1		2 0 0 0		
2000 34 11 2000 34 110	, cool 000	64 18		1 1	9
India	Bombay Bombay Central Provinces and Berar Madras Presidency Punjab Punjab Bancon Bancon Data Status Detected rats Data Status Data	Phom-Penh. Baigon-Cholon Iraq: Baghdad. Libys: Province of Tripoll-Tagura. Madagaseart. (See table below.) Morocco: Draa boundaries-Tighmert	Peru. (See table below.) Benegal. (See table below.) Bouth-Weet Africa. (See table below.) Tuthar Tunia	Union of South Africa	Oregon – Plague-infected ground guirrels: Grant County Wallows County Da vessel: S. S. Ipanema at MarseilleO

For 2 weeks.
 Includes 1 suspected plague-infected squirrel.
 In One of these cases was a member of the other was a stevedore believed to have worked on the vessel. Several plague-infected rats were reported found on board the vessel.

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

PLAGUE—Continued

[C indicates cases; D, deaths; P, present]

Place	July 1935	Au- gust 1935	Sep- tember 1935	Octo- ber 1935	No- vember 1935	De- cember 1935	Place	July 1935	Au- gust 1935	Sep- tember 1935	Octo- her 1935	No- vember 1935	De- cember 1935
Argentina (see also table above): Cordoba Province	112 102 4	100 123388 T #F 33	2232 1 4 4 1 3 3 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5	2 283 282 1	38451 38451 134 134 134	16 16 16	Peru-Continued. Lilberad Department. Callao	1 1222 1222 1222 1222 1222 1222 1222 12	°°∞0000 601488	11 00 07 17	-	1 P07	

14 From the beginning of 1335 up to Sept. 30, 185 cases of plague were reported in Ovamboland, South-West Africa. 14 For 2 months. 18 Incomplete reports. 11 Suspected.

SMALLPOX

[C indicates cases; D, deaths; P, present]

	June	July		Sept.						Week	ended						
Place	Å je k	Aug.	Sept. 1-28, 1935	ૡૢઽૢૣૹૢ		Nov	ember 1	935		I	ecembe	ır 1935		Ä	anuary	1936	
	OPAT	OSAL		1830	5	6	16	ន	8	2	14	21	*		11	18	25
Algeria: Algiers Department	8 7	4	2 0														

British East Africa: Kanva		2							-				-			_	1
Tanganyika.	6	69	36	6	0		20		1							90	
British Gulana. British Somalland British Sonth A Hrea:	-	8	26	-41	1	-	-			61	-		4	61	-		1
Northern Rhodesia			1	1											$\frac{11}{11}$		11
Canada: Alberta		::	ľ						- 1:								ľ
	•		•						İİ		-		-			-	• • •
Quebec		3		13													
Canary Islands: Santa Uruz de Tenerife C Ohle: Chuquicamata					Ť			$\frac{1}{1}$									
		8 10															
Foothow		P 1	P P	A.	<u>н</u>		<u>е</u> , і		<u>e</u>				<u> </u> -				
Houg Kong Ranking Shanking		200	1	2	6-		-0-	10	00 64	19	10 01	22	<u>4</u> 0	<u> </u>		64	
Swatow Tientein			1		-		5						-				
Tsingtao Chosen. (See table below.) Colombia.		~ ~ ~	III			6 25			18		14	15	8		=		
Bogota		P 10	14	7		۶ ۱			2	~							
Asmara France. (See table below.) Greene: Salonika				4			6	6							6		
Guatemala. (See table below.) Honduras: Tela		10 676	, K20	147	1 907	1 227	1 721	020	9 207	9 036	046	925					
Assam	 	8 100 8 100	1, 256	^{3, 13} , 865 10	52 52 1	265	1, 191 346 2	418	108 208 7	4 42 43 43 43 45 43 45 43		37 77 77	52	88	81	ន	37
Bombay Presidency	10000 1044	73 1, 678 71 363 02 54	748 133 24	487 65 11	117 9 2	178	000	152 32 32	188 9 9 9 9	33	600	38 38 38 38 29 29 29 29 29 29 29 29 29 29 29 29 29	1033	279 67 13		<u>80</u> 0	181
	-	nn i A0	2	۳ 	-	-	4	-		•	a	-	-	- D	• • •	 5	3

A report dated Oct. 25, 1935, states that 19 cases of smallpox have been reported in Entre Rios Province, Argentina.
 A report dated July 6, 1935, states that 57 cases of smallpox with 1 death were reported in British Guiana.
 For 2 weeks.
 For 6 weeks.

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

SMALLPOX-Continued

[C indicates cases; D, deaths; P, present]

	June	July		Sept.						Week e	nded						
Place	Suly 1	28- 31,	Sept. 1-28, 1935	ß.cc.		Nove	mber 19	35		н	ecembe	r 1935		ſ	anuary	1936	
	1935	1935		1935	8	a	16	ន	30	7	14	21	*		п	18	S2
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<i>Imagrateria</i> at Krangoon from Gopalpore	Chitose Maru at Nagasaki from Dairen	casesJu	uly 2, 16	35	vi vi vi vi
	Englistan at Rangoon from Gopalpore	Dase Ju	7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	85 85 85	ສ່ສ່ອ ສີ່ສີ່ສີ່

For 2 weeks.
 Imported.
 A report dated June 11, 1935, stated that 10 deaths from smallpox had occurred in Mizuna Migifu Prefecture, Japan.
 For 3 weeks.

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

SMALLPOX-Continued [C indicates cases; D, deaths: P, present]

De- ber 1935	1
No- vem- ber 1935	
Octo- ber 1935	1215 124 154 154
Sep- tem- 1935	22 111 111 111 111 111 111
Au- gust 1935	8 51180 19995 19995
July 1935	44 33,28508,12 8,29508,12 8,29508,120000000000
Place	Mexico (see also table above)—Cont. Mexico, D. F. Oxaco Sitsate. Oracos Sitate. Puebla State. San Luis Potosi State. C San Luis Potosi. Vera Cruz State. Vera Cruz State. Moroco. Moroco. Morambique. Niger Territory. D' Portugal (see also table above) Portugal (see also table above) Sal vador
Decem- ber 1935	2 iii 20
No- vem- ber 1935	31 31 10 10
Octo- ber 1935	12 88 16 23 1 23 48 198 16
Sep- tem- ber 1935	57 57 16 103 103 108
Au- gust 1935	261 303 322 323 323 323 323 303 303 1338 1338 1338 1338 1338 1338
July 1935	197 47 203 31 203 31 203 31 203 203 102 47 102 102 102 102 102 102 102 102 102 102
Place	Belgian Congo

February 28, 1936

TYPHUS FEVER

[C indicates cases; D, deaths; P, present]

-	June	July			•					W	eek en	led							
Place	July 21, y	28- 31, 31,	Sept. 1-28, 1935		Octobei	r 1935			Novei	nber 19	35		Ă	cembe	ır 1935		Janua	ry 1934	
	1935	1935		ŝ	12	19	38	3	6	16	ន	8	7	14	21	*	4	Ħ	18
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Constantine Department	36	8	40		ŝ	1			-									100	
Constantine C	61		1		-												67	-	
Australia: QueenslandC	3 0	1																	Í
Sydney. Basutoland. Basutoland.	Ħ										-	-							
Bolivia. (See table below.) Bulgaria. C			1																
Chile. Concepcion. Santiago ³ .	282 111 111	307 52 245	285 32 32 32				1,233			460									
China: China: Caston Hanton	2	20	*	«	-	2 -	<u> </u>	ន	77			2	8	15	a	8	m	8	
Harbin.4 Hong Kong Nanking	-			۰	'			-											
Shanghai South Manchurla Railway Zone Tientain	5	-	6					•			4			-	1	1			
Tsingtao. Chosen. (See table below.) Czechoslovakia. (See table below.)	-	°	2												~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				
1 For 4 weeks																			

1 For 4 weeks. Tor 2 weeks. • A report dated Jan. 20, 1936, states that there were 305 cases of typhus fever with 58 deaths in Santlago Province, Chile, from Nov. 2–16, 1935, • A report dated June 25, 1935, states that about 400 cases of typus fever occurred at Harbin, Manchurla, China.

February 28, 1936

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

TYPHUS FEVER—Continued

[C indicates cases; D, deaths; P, present]

	December 1935 January 1936	7 14 21 28 4 11 18			· · · · · · · · · · · · · · · · · · ·				0					13 9 4 15 49 35			8		17				• •
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	Noven	8				-			1					-				N			$\frac{1}{1}$		
		2				+					-			-							<u> </u>		
		26		<u> </u>	-									3		4		-				<u>.</u>	
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	ctober	12			•			-						3		6		N		İ			
	0	5			-			+												İ	<u> </u>		
	Sept. 1-28, 1935				8	-	1.		- N	1		-		18				3			-		~
July	28- 31. 31.	1930			המ		•		g -	•		1	1	41		-		R -	•	-			8
June	July 27,	9281		- - -	a I	-0			80	8	61 0	N	4	88		1	8	87				1	12
	Place		Egypt: Alexandria	Asynt Province	Beni-Suef Province	Cairo Dakahiiya Province	Damietta	Falyum Province	Gires Province	Minufiya Province.	Minya Province	Core Developed	Sharkiya Province	Provinces	France. (See table below.) Greece: Salonika (see also table below) C	Guatemala. (See table below.) Hawaii Territory-Honolulu C	Hungary	Teheran	Iraq	BaghdadU	Irish Free State: Waterford County: You-	Japan: Tokyo	Latvia. (See table below.) Lathuania

60. 3 3 1 62. 3 3 62. 62. </th <th>Au- Nut Bep- Octo- Novem- Decem- tust tember ber ber ber 1935 1935 1935 1985</th> <th>200 200 200 200 200 200 200 200</th>	Au- Nut Bep- Octo- Novem- Decem- tust tember ber ber ber 1935 1935 1935 1985	200 200 200 200 200 200 200 200
	July 1935	20%20242242242242666
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11 30 3 30 <u>30</u>	Decem- ber 1935	
	Novem- ber 1935	284 30 284 30
	Octo- ber 1935	80 ¹ 2018
58 ¹ 12 58	Sep- tember 1935	140 17 44 48 48
94 00 10 10 10 10 888 888	Au- gust 1936	150 31 33 33 33 34 56 55 55 55 66
	July 1935	114 114 114 114 114 114 114 114 114 114
Merico (see also table below): Gradalahr Macico, D. F. Macio, D. F. Maro, D. F. Maro, D. F. Maro, D. F. Maro, D. F. Palestine: Bafa Paraguay: Asuncion Paraguay: Asuncion Peranguay: Asuncion Portugal. (See table below.) Bratisa: Fundia Fundia Portugal. (See table below.) Bratisa: Tunisa: Tunisa: Provinces Provinces Pruces Pruces Maron of South Arrica Statis below.) Bratisa: Tunisa: Provinces Maron of South Arrica Maron of South Arri	Place	Bolivia. Manchuria-Harbin

Includes imported cases.

² For 2 weeks.

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

YELLOW FEVER

[C indicates cases; D, deaths; P, present]

	Jan. 4,	1936	
		8	
	er 1935	21	
	Decemb	14	
		7	
		30	
papu	1935	33	
Week e	vember	16	
	No	6	
		8	
		26	
	er 1935	19	
	Octob	12	
		5	
	Sept. 1-28, 1935		
-	Aug.	31, 1930	0
	July 30-	21, 1930	00 1117
	Place		olivia: Santa Cruz Department–Chuchlo: 1 Irazii: 3 Bahla State State 1 Matto Grosso State 1 Para State Para State Para State 1 Diomores: State 1 Minas Gerees State 2 Para State Para State Para State Para State Para State 2 Para

¹ During the month of June 1935, 1 case of yellow fever was reported at Chuchlo, Bolivia. ¹ Yellow fever has also been reported in Brazil as follows: Matto Grosso State, week ended Jan. 18, 1936, 1 case, 1 death; Winas Geraes ² Yellow fever has also been reported in Brazil as follows: Matto Grosso State, week ended Jan. 18, 1936, 1 case, 1 death; Minas Geraes ³ Xelach, week ended Jan. 11, 1936, 1 case, 1 death; week ended Jan. 18, 1936, 1 case, 4 deaths; week ended Jan. 18, 1936, 3 cases, 3 deaths. ⁴ During the week ended Feb. 1, 1936, 1 case of yellow fever was reported at Kolda, Senegal.