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THE ACTION OF IRRADIATED ERGOSTEROL IN THE RABBIT

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In the course of an investigation now in progress on the calcification of the tubercle it became necessary to examine the action of irradiated ergosterol in the normal animal. The present report concerns itself with the results of such a study in the rabbit, the object of which was to ascertain the effects of toxic and physiologic doses, respectively, on the calcium and the inorganic phosphorus of the serum, and upon the calcium content of certain tissues and organs.

In 1922 E. V. McCollum and his associates (1) first demonstrated the existence of a fat-soluble vitamin concerned with calcium metabolism, apart from the antixerophthalmic and growth-promoting vitamin A, which they designated vitamin D. Later studies by Steenbock and Nelson (2), Hess (3, 4), and others on the activation of certain foods and vegetable oils by means of ultraviolet rays led to the assumption that ultraviolet irradiation conferred antirachitic properties upon certain animal and vegetable sterols. More recent work by Rosenheim and Webster (5) and Hess and Windaus (6) seems to have clearly demonstrated that ergosterol first isolated from ergot by Tanret (7) and since shown to be a sterol having three unsaturated carbon linkages (5), is the parent substance of vitamin D, and, though of itself physiologically inert, when exposed to ultraviolet rays acquires antirachitic properties of an enormous magnitude and becomes a factor of extraordinary potency in calcium metabolism. A considerable literature has now accumulated with reference to the extraordinary efficacy of irradiated ergosterol in the treatment of rickets, both experimental and clinical. Less is known about the behavior of this substance in the normal animal, though some recent papers by Pfanstiehl (8), Kreitmair and Moll (9), Harris and Moore (10), and Klein (11), which, for the most part, have appeared while this work was in progress, indicate that massive doses of this substance may result in considerable impairment of

nutrition, loss of weight, pronounced hypercalcemia, and abnormal calcium deposits in certain tissues and organs. Dixon and Hoyle (12), however, state that they were unable to observe any pathologic effects upon the administration of ergosterol.

Experimental

Rabbits were used in this work exclusively. Full-grown animals kept on the usual laboratory diet of oats and cabbage were given orally or intramuscularly, three to four times a week, graded doses of irradiated ergosterol dissolved in almond oil.[1] Serum calcium and inorganic phosphate were estimated, by the methods of Clark and Collip (13) and Benedict and Theis (14), respectively, before the ergosterol treatment was instituted and again at intervals of 10 treatments, this being continued as long as the animals survived or until some 30 treatments in all had been given. In several of the survivors the serum calcium and inorganic phosphate were again estimated at from 6 to 10 days after treatment had been discontinued in order to ascertain the duration of the effects produced by the administration of irradiated ergosterol.

Careful autopsies were performed upon all the animals of the series, including those surviving the observation period, at which time they were sacrificed. Sections of aorta, lung, kidney, liver, spleen, and heart were fixed in a 10 per cent solution of formaldehyde in 95 per cent alcohol and stained by Von Kossa's silver nitrate stain for histologic examination.

For the chemical determination of calcium, various tissues, including the lungs, kidney, liver, spleen, and gluteal muscle, were freed of excess of blood in so far as possible, and were divided into small fragments and placed in 95 per cent alcohol for several days. The dehydrated tissues, exclusive of the alcohol, were then dried to constant weight for 48 to 72 hours at 105°–110° C. The dried material of known weight was then transferred to platinum dishes and ashed in an electric muffle furnace at about 700° C., one to two hours being required to complete the process. The ash was treated with 5 c. c. 5N HCl and evaporated to dryness. This treatment with hydrochloric acid and evaporation to dryness was repeated. The residue was finally taken up with 3 c. c. 5N HCl, diluted with about 10 c. c. hot water, and filtered.[2] The filtrate and washings

[1] The irradiated ergosterol was kindly supplied by the Winthrop Chemical Co. The preparation was tested by Dr. C. W. Hooper for its antirachitic potency on rats kept on the rachitogenic diet of Steenbock and Black, and its activity compared with that of a good grade of cod liver oil. The tests as reported by Doctor Hooper showed that the minimal curative dose of this preparation was 1/20000 mg., as compared with a minimal curative dose of 8 mg. for the cod liver oil, the preparation thus being more than one hundred and sixty thousand times as potent, weight for weight, as cod liver oil.

[2] Since it was our intention to utilize also this procedure for the determination of the phosphorus in these solutions by Briggs's method and since it has been pointed out by Fiske and Subbarow (J. Biol. Chem. (1925), 66, p. 378), that silica interferes, it was thought desirable to adopt a procedure which will remove the silica in case any considerable quantity were present.

measured about 35 c. c. A drop of methyl red indicator (0.04 per cent aqueous solution) was added and then dilute (1:1) ammonia until the solution became slightly alkaline. Five normal HCl was then added carefully until the solution became just distinctly acid to the methyl red indicator. Approximately 2N sodium acetate was then added, drop by drop, until the color of the indicator, on comparison with standard buffer solutions, indicated a pH of about 5.0.[3] In case the solution was not perfectly clear[4] at this point, it was filtered.[5] The solution or the filtrate and washings were made up to 50 c. c. The calcium was then determined as oxalate, by treating an aliquot of this solution with half its volume of approximately 3 per cent ammonium oxalate the pH of which had previously been adjusted to about 5.0 by means of N acetic acid. The procedure used in the completion of the calcium determinations in these cases was practically the same as that employed in the case of the serum, the method of Clark and Collip (13) being followed. The accuracy of the results was checked by carrying out a number of parallel gravimetric[6] determinations.

In considering the results of these experiments, we shall first refer to the toxicity of the substance under examination; secondly, to its effect upon the calcium and the inorganic phosphorus of the serum; and, thirdly, to its influence upon the tissue calcium.

1. THE TOXICITY OF IRRADIATED ERGOSTEROL

The toxicity of irradiated ergosterol was studied in a series of 27 rabbits weighing from 2.2 to 2.6 kg. The irradiated ergosterol was administered either orally or intramuscularly three to four times a week in doses ranging from 0.5 to 10 mg. The results of this study together with the post mortem findings of the animals that died during the treatment, as well as of the survivors most of which were sacrificed at the end of the treatment, are summarized in Table 1. Examination of the data given in this table shows that doses of irra-

[3] According to Shohl and Pedley (J. Biol. Chem. (1922), **50**, p. 539), for determining calcium as oxalate in the presence of phosphate, the optimum pH is between 4.8 and 5.2.

[4] If a considerable insoluble residue remains after the solution has been adjusted to a pH of about 5.0, the filtered residue should be redissolved in dilute hydrochloric acid, the solution diluted with water to about 35 c. c., the pH adjusted to about 5.0 as before, and the solution filtered. The two filtrates may be combined or each made up to 50 c. c. and aliquots used. If the amount of calcium in the first solution is comparatively very large, it may be necessary to repeat this treatment. It is better, however, to take a proportionately smaller sample in the first place.

[5] According to Patten and Winter (J. Assoc. Official Agr. Chem. (1928), **11**, p. 204), ferric phosphate is precipitated quantitatively and may be separated from calcium phosphate at a pH of 5.0 to 5.4. The procedure used should, therefore, enable one also to determine the iron colorimetrically by applying the thiocyanate reaction. Since the calcium phosphate remains in the filtrate and is separated from the iron, the objectionable presence of phosphate is thus avoided and the preliminary phosphomolybdate separation of Elvehjem and Hart (J. Biol. Chem. (1926), **67**, p. 48), becomes unnecessary. The small amount of phosphate which remains with the iron would probably not make it impossible to apply the colorimetric method when using the Walker Modification (Analyst (1925), **50**, 279).

[6] We are indebted to Mr. C. G. Remsburg for carrying out part of this analytical work.

diated ergosterol greater than 1.0 mg. are decidedly toxic in the rabbit, that the result is practically the same whether the drug is given orally or intramuscularly, and that the toxicity of this substance appears to be related to the size of the individual dose rather than to the total dose administered over a certain period of time, which suggests that the substance is disposed of at a fairly rapid pace.

TABLE 1.—*Toxicity of irradiated ergosterol in the rabbit on prolonged administration*

No.	Initial weight	Individual dose	Route	Total dose	Final weight	Died or survived	Histologic findings
	Grams	*Mg.*		*Mg.*	*Grams*		
F1	2,680	10	os	90	2,640	D	Calcification of aorta, bronchial cartilage, and interalveolar septa.
F2	2,450	10	os	310	2,350	S	Calcification of aorta, bronchial cartilage, and kidney.
F17	2,200	10	i.m.	220	1,800	D	Aorta calcified. Interstitial and glomerular nephritis.
F18	2,290	10	i.m.	230	1,920	D	Calcium deposits in aorta and kidney. Interstitial nephritis.
F3	2,340	5	os	80	2,040	D	Calcification of aorta, bronchial cartilage, and kidney cortex.
F4	2,400	5	os	115	2,130	S	Calcium deposits in aorta, bronchial cartilage, and kidneys.
F9	2,160	5	os	115	2,000	D	Do.
F10	2,460	5	os	50	2,530	D	Calcification of aorta and bronchial cartilage.
F11	2,220	5	i.m.	165	2,000	S	Calcium deposits in aorta, kidneys, bronchial cartilage, and interalveolar septa.
F12	2,200	5	i.m.	100	2,270	D	Calcification of aorta, kidney cortex, and bronchial cartilage.
F13	2,400	5	i.m.	125	2,500	D	Calcium deposits in aorta.
F14	2,080	2	i.m.	62	2,320	S	Insterstitial nephritis. No calcification.
F15	2,200	2	i.m.	62	2,260	S	Slight calcium deposits in kidney and interstitial nephritis.
F16	2,200	2	i.m.	40	1,880	D	Calcium deposits in aorta, kidneys, bronchial cartilage, and interalveolar septa.
F5	2,200	1	os	31	2,240	S	Kidney, liver, lung, and aorta normal.
F6	2,450	1	os	31	2,380	S	No calcification. Interstitial nephritis.
F19	2,320	1	i.m.	29	2,400	S	No calcification. Moderate interstitial nephritis.
F20	2,300	1	i.m.	29	2,400	S	Normal.
F21	2,320	1	i.m.	29	2,400	S	Do.
F25	2,600	1	i.m.	40	2,870	S	
F26	2,200	1	i.m.	40	1,980	S	
F27	2,500	1	i.m.	40	3,000	S	
F28	2,400	1	i.m.	37	2,380	S	
F29	2,160	1	i.m.	40	2,800	S	
F30	2,350	1	i.m.	40	3,020	S	
F7	2,280	.5	os	15	2,530	S	Do.
F8	2,280	.5	os	15	2,520	S	Do.

A consideration of the post-mortem findings in relation to dosage and to toxicity appears to indicate that the latter is a function of the tissue changes brought about by this substance especially with reference to calcium deposition. The tissues of the animals receiving in excess of 2.0 mg. of irradiated ergosterol, doses resulting in a considerable percentage of mortality, showed on microscopic examination much calcium deposition, while those receiving 1 mg. or less showed no evidence of calcium deposition. The calcium deposits in the tissues of the animals receiving the larger doses of irradiated ergosterol were especially pronounced in the thoracic aorta, the kidneys, and the lungs. In the latter the most frequent site for calcium deposition was the bronchial cartilage and the less frequent the interalveolar septa. No calcium deposits were seen in the pulmonary

or kidney vessels. In the kidney the calcium deposits were usually seen in the convoluted tubules of the cortex and as calcium casts in the straight uriniferous tubules. Deposition of calcium in the muscular coat of the aorta was noted with greatest frequency, and was usually more pronounced than in the other situations enumerated. There was no microscopic evidence of calcium deposits in the heart, liver, or spleen. It should be further noted that kidney damage in the nature of an acute or chronic diffuse nephritis usually accompanied the calcification on the larger doses of irradiated ergosterol, and in a few instances similar kidney injury was noted on the small dose of 1.0 mg., despite the complete absence of demonstrable calcific deposits.

2. THE INFLUENCE OF IRRADIATED ERGOSTEROL ON THE CALCIUM AND THE INORGANIC PHOSPHORUS ON THE SERUM

Table 2 shows the effect of continued administration of small and large doses of irradiated ergosterol on the serum calcium and the inorganic phosphate. The results may be summed up by saying that the serum calcium showed a tendency to progressive increase, in some cases the increase being very pronounced, especially on the larger doses. With the smaller doses the course was more variable and the effect less pronounced. The one notable exception, experiment F16, in which the calcium took a pronounced drop in the course of treatment with a moderately large dose, is probably accounted for by the fact that the animal in this instance was in a moribund state at the time the blood was taken; it died the following day. This probably accounts also for the unusually high serum phosphate. In general, the hypercalcemia bears some relation to size of dose, though by no means uniformly. However, viewing the degree of hypercalcemia with reference to dosage as shown in Table 2, in relation to survival and maintenance of body weight as indicated in Table 1, it appears that an increase of serum calcium of from 38 to 49 per cent above the normal was produced by doses of 2 to 10 mg. in the animals, failing to show the ill effects from the treatment.

The effects produced by the smaller doses are less pronounced, though in the main the tendency has been to some increase. Experiments F19, F20, and F21 are exceptions. As a possible explanation for the downward course of the serum calcuim in these experiments may be offered the suggestion that this might represent a seasonal variation. The last-named three experiments, together with F11 and F15, were carried into the latter part of December, while all the others recorded in the table were completed by the middle of November or earlier. Harnes (15), studying the level of serum calcium in rabbits over many months, states that there is usually little variation, but that there may be a slight drop during the months of December

and January. It is noteworthy that the serum calcium of the normal controls kept at the same time as the five foregoing experiments showed likewise a gradual drop of from 3 to 13 per cent of the normal.

TABLE 2.—*Influence of irradiated ergosterol on serum calcium and inorganic phosphorus*

No.	Individual dose	Route	Serum calcium milligram, per cent					Inorganic phosphorus milligram, per cent				
			Normal	10 doses	20 doses	30 doses	Maximum change from normal	Normal	10 doses	20 doses	30 doses	Maximum variations from normal
	Mg.											
F2	10	os	14.5	15.4	18.4	20.3	+40	6.6	12.1	9.1	7.9	+20- +83
F17	10	i.m.	15.2	14.8	17.3	-------	+14	6.9	6.3	13.1	-------	−9- +90
F18	10	i.m.	14.4	15.3	17.4	-------	+21	4.2	6.2	10.7	-------	+155
F3	5	os	13.2	14.3	-------	-------	+8	9.1	11.0	-------	-------	+21
F4	5	os	13.0	16.5	13.4	19.4	+49	6.6	11.9	7.0	7.1	+6- +80
F9	5	os	15.1	14.3	17.3	-------	+14	5.2	9.1	9.5	-------	+83
F10	5	os	14.5	16.7	-------	-------	+15	7.0	14.7	-------	-------	+110
F11	5	i.m.	13.2	14.2	16.1	14.8	+12-+22	4.7	5.8	6.8	7.2	+53
F12	5	i.m.	13.7	15.5	-------	-------	+13	5.9	7.1	-------	-------	+20
F13	5	i.m.	13.7	15.2	15.7	-------	+15	6.4	6.4	8.3	-------	+30
F14	2	i.m.	11.5	17.3	16.9	17.0	+48	5.9	7.5	6.1	4.9	+27- −17
F15	2	i.m.	12.6	14.6	17.4	16.5	+38	6.0	7.9	6.9	4.0	+31- −33
F16	2	i.m.	14.7	15.8	[1] 11.8	-------	+7-−20	4.7	6.9	[1] 23.7	-------	[1] +47-+404
F5	1	os	14.3	15.8	15.3	15.8	+10	5.6	7.1	7.0	4.5	+26- −20
F6	1	os	14.5	13.9	15.1	16.9	+17	7.2	8.2	5.6	5.7	+14- −22
F19	1	i.m.	14.2	14.9	14.5	13.8	+5- −3	5.7	5.7	3.9	7.4	−32- +30
F20	1	i.m.	16.4	16.0	15.5	14.1	−14	6.0	7.4	3.9	5.8	−35- +23
F21	1	i.m.	15.4	14.8	14.9	13.0	−16	6.3	6.7	4.1	4.5	+6- −35
F7	.5	os	14.0	14.4	15.3	17.5	+25	7.1	7.5	5.2	3.9	+5- −45
F8	.5	os	14.0	13.3	14.6	16.8	+20	7.1	7.9	6.3	4.0	+11- −44

[1] Animal was moribund and near death.

In order to ascertain whether the hypercalcemia produced by irradiated ergosterol is transient or of some duration, the serum calcium was determined in several of the animals with pronounced hypercalcemia at from 6 to 10 days after treatment was discontinued. The results showed that on the sixth day after treatment was discontinued the serum calcium was still well above normal while by the tenth day it had returned to a nearly normal level. As an illustration of this, experiments F14 and F15 may be cited, which, while at the height of treatment showed a hypercalcemia of 48 and 38 per cent, above normal respectively, still showed on the sixth day after the last injection a blood calcium of 33 and 29 per cent above the normal. Experiments F2, F4, and F7 having attained a hypercalcemia of 40, 49, and 25 per cent above the normal level showed normal or nearly normal serum calcium on the tenth day of the last injection of irradiated ergosterol, the serum calcium then being 2, 9, and 10 per cent, respectively, above normal.

The effect of irradiated ergosterol on the inorganic phosphorus of the serum is less subject to detailed analysis because of greater normal variations. Furthermore, serum phosphate in the rabbit at least seems to be subject to great variations from causes not clearly known

and, therefore, uncontrollable. That temporary inanition may lead to increased serum phosphate is, of course, well known. Examination of the normal inorganic phosphorus of the serum in the series of 20 rabbits given in Table 2 shows that the normal variation is from 4.2 to 9.1 mg. per cent, which agrees well with the figures given by Harnes (15). Despite the normal variations which make interpretation of the figures given in Table 2 rather difficult, it nevertheless appears that the administration of irradiated ergosterol in sufficiently large doses tends to develop a high inorganic phosphorus level. The unusually high serum phosphate in experiment F16, corresponding to the abnormally low serum calcium, is probably due to prolonged inanition and a high degree of acidosis, the animal being at the time of bleeding in a moribund state.

An attempt to correlate the inorganic phosphorus level of the serum with the hypercalcemia indicates that there is no necessary relationship. It should be noted, however, that on the larger doses of irradiated ergosterol which produced more or less marked increase in serum calcium and resulted in considerable deposition of calcium in the tissues, as will be shown in the following section, the inorganic phosphorus of the serum was generally high. On the smaller doses of irradiated ergosterol with no abnormal calcium deposition in the tissues the serum phosphate failed to show a noteworthy increase, and in many instances actually showed a decline irrespective of the condition of the serum calcium. We have no direct evidence as to the chemical nature of the calcium deposits in the soft tissues, but since the above relationship would seem to indicate that an excess of serum phosphate is essential for the calcific deposits under the influence of irradiated ergosterol, it is more than likely that the tissue calcium is deposited under these conditions as the insoluble phosphate, and the process is probably not essentially different from that of normal ossification.

3. THE EFFECT OF IRRADIATED ERGOSTEROL ON TISSUE CALCIUM

The results of this study are summarized in Table 3, in which the calcium is given in milligrams per 100 gm. of tissue that had been dried to constant weight. The tissues in which the calcium was estimated include the lungs, kidneys, liver, gluteal muscle, and spleen. In the case of the last-named tissue it was not feasible to estimate the calcium of individual spleens. The spleens of the groups of animals receiving equivalent doses of irradiated ergosterol were therefore pooled and the figures in the table represent the average calcium content for 100 gm. of dry spleen for the particular group.

TABLE 3.—*Effect of irradiated ergosterol on tissue calcium*

No.	Dose	Route	Number of injections	Total dose	Died or survived	Tissue calcium (milligrams per 100 grams dry tissue)				
						Lung	Kidney	Liver	Muscle	Spleen
	Mg.			*Mg.*						
F2	10	os	31	310	S	115	2,180	23	----	----
F17	10	i. m.	22	210	D	910	7,616	36	----	----
F18	10	i. m.	23	230	D	372	4,377	38	27	93
F3	5	os	16	80	D	566	----	----	----	----
F4	5	os	31	115	S	569	1,310	26	----	----
F9	5	os	23	115	D	373	2,932	42	----	----
F10	5	os	10	50	D	415	1,687	28	----	----
F11	5	i. m.	33	165	S	1,504	551	30	27	----
F12	5	i. m.	20	100	D	2,006	9,058	37	----	----
F13	5	i. m.	25	125	D	373	7,415	50	----	126
F14	2	i. m.	31	62	S	68	105	22	25	----
F15	2	i. m.	31	62	S	72	228	56	24	----
F16	2	i. m.	20	40	D	3,586	3,406	29	----	58
F5	1	os	31	31	S	83	70	19	----	----
F6	1	os	31	31	S	67	88	25	----	----
F19	1	i. m.	30	30	S	66	400	24	23	----
F20	1	i. m.	30	30	S	72	58	20	38	----
F21	1	i. m.	30	30	S	73	67	24	19	----
F7	.5	os	30	15	S	79	53	46	----	----
F8	.5	os	30	15	S	72	57	24	----	39

As a basis of comparison, calcium determinations in similar tissues of a group of three normal rabbits were made, which gave the following results, the figures being likewise in milligrams of calcium per 100 gm. of dry substance:

Lung	64	73	66
Kidney	45	54	53
Liver	19	19	20
Gluteal muscle	27	20	22
Spleen (pooled)	42	--	--

With the figures just given for the calcium content of normal rabbits in mind, we may now turn to those given in Table 3. It will be seen that 2 mg. and upwards of irradiated ergosterol given three to four times a week resulted in an enormous increase of calcium in the kidneys and the lungs, but not in the liver or gluteal muscle. It appears, therefore, that irradiated ergosterol acts more or less selectively, affecting certain tissues but not others. Comparing the calcium of the kidneys and lungs it is seen that the former present a relatively greater abundance of calcium than the latter. The spleen appears also to store a small amount of calcium under the influence of irradiated ergosterol. Doses of 1.0 mg. or less, with one exception, failed to effect any noteworthy increase in tissue calcium. If it is recalled that the last-named dose represents the upper limit of tolerance in the rabbit, it becomes apparent that the toxicity of this substance bears a close relationship to its influence upon the deposition of calcium in the tissues.

Discussion

There are several questions arising in connection with this work which may now be considered. First, Is there any relation between the hypercalcemia produced by irradiated ergosterol and the tissue calcium, and if so, is the hypercalcemia sufficient to account for the calcific deposits in certain of the soft tissues? Comparison of Tables 2 and 3 will indeed show that usually wherever the serum calcium had been materially increased there was also calcium deposition in the tissues. The coincidence is not by any means uniform, however. In several of the experiments, such as F3, F9, F10, F12, F13, and F16, the serum calcium had been increased only to from 7 to 15 per cent above the normal level, a relatively small increase, with, however, enormous calcium deposits in the tissues. On the other hand, in experiments F6, F7, F8, F14, and F15 the serum calcium was raised from 17 all the way up to 48 per cent above the normal with no or only slight increase in kidney calcium and no perceptible increase of calcium in any of the other tissues examined. If we consider the serum phosphate values at the same time we find the following very striking relationship: A positive serum phosphate, together with a positive serum calcium, even though the absolute level of the latter is not so high, has generally resulted in much tissue calcification; while negative serum phosphate values, no matter how high the serum calcium values may have been, has not resulted in abnormal deposition of calcium in the tissues. For convenience these findings may be grouped together in the following table:

Number	Serum calcium values	Serum phosphate values	Tissue calcium (milligrams per 100 grams dry tissue)		
			Kidney	Lung	Aorta
F3	+8	+21	------	566	Calcified.
F9	+14	+83	2,932	373	Do.
F10	+15	+110	1,687	415	Do.
F12	+13	+20	9,058	2,006	Do.
F13	+15	+30	7,415	373	Do.
F16	+7	+47	3,406	3,586	Do.
F6	+17	−22	88	67	Normal.
F7	+25	−45	53	79	Do.
F8	+20	−44	57	72	Do.
F14	+48	−17	105	68	Do.
F15	+38	−33	228	72	Do.

It is clear, therefore, that the hypercalcemia per se is not sufficient to account for the abnormal deposits of calcium in the tissues, but that coincident high inorganic phosphate is essential. A seeming exception to this would appear at first sight in experiments F19 and F20. However, careful consideration will show that while the serum phosphate in experiment F19 had risen to 30 per cent above normal, the serum calcium had shown only a ±5 per cent variation from the

normal, and in experiment F20 in which the serum phosphate had gone up to 23 per cent above normal the serum calcium had actually declined to 14 per cent below normal. Furthermore, the calcium in the kidneys of experiment F19 was 400 mg. per 100 gm. of dry substance—a figure well above the normal limits. That hypercalcemia as such will not bring about marked abnormal deposition of calcium salts in the tissues is attested by the fact that intravenous injections of soluble calcium salts, though it may bring about very pronounced hypercalcemia of some duration (16), has not been shown to increase appreciably the calcium of the tissues.

The question as to whether the change effected by irradiated ergosterol in the serum calcium and inorganic phosphate is the sole factor concerned with tissue calcium deposition is an open one; for it still remains to be explained why calcium deposition is brought about selectively in certain tissues and not in others. We may recall here what has been pointed out by Holt (17) in connection with the defective deposition of calcium in rachitic bone despite the excess of calcium and phosphate ions over the solubility product of tertiary calcium phosphate as calculated by him. Holt suggests that other factors may be concerned with calcification by assuming that certain substances may act as catalysts and increase the rate of calcium deposition. Furthermore, the possibility of calcium precipitation through lowered carbon dioxide tension known or likely to prevail in those tissues where calcium deposition has been observed to occur in greatest abundance, viz, the lungs, kidneys, and aorta, must not be overlooked. Wells (18) has indeed offered this as a possible mechanism for the metastatic calcification from various causes occurring in similar situations.

Another matter of some interest is the source of increased calcium in the blood under the influence of irradiated ergosterol. The first suggestion would seem to be more complete absorption of the food calcium from the intestinal tract. Such an explanation would appear probable on the basis of the experiments of Zucker and Matzner (19), indicating that cod liver oil brings about, in some manner, an increase in the hydrogen ion concentration of the intestinal contents, a change which, according to Irving and Ferguson (20), materially aids the absorption of calcium salts. That such an explanation will not suffice, however, appears from the recent experiments by Hess, Weinstock, and Rivkin (21) showing that irradiated ergosterol fed to rats on a calcium-free diet resulted in increased blood calcium. These investigators suggest that the calcium must be derived from the tissues, an explanation entirely untenable in the light of the present experiments. The other alternative, that of decreased elimination of calcium as a possible explanation of the hypercalcemia, has apparently not yet received adequate experimental consideration.

Apart from the various theoretical aspects as to the probable mode of action of irradiated ergosterol, we wish to emphasize the potential harm that might result from the careless clinical use of this substance. It is undoubtedly a useful drug and one endowed with great potency, but not without possible harm in the hands of the unsuspecting. This is probably also true of the haphazard consumption of foodstuffs that have been subjected to the action of ultra-violet rays. Indeed Reyher and Walkhoff (22) have recently reported pathologic changes in guinea pigs and mice, similar to those we have observed in rabbits, following the oral administration of irradiated cow's milk and irradiated egg yolk. Of course we would not be understood as deprecating the therapeutic use of irradiated ergosterol, but would rather call attention to the possible harm that might result from too large doses.

Summary and Conclusions

The action of irradiated ergosterol has been studied in the rabbit with especial reference to its toxicity, its influence upon serum calcium and inorganic phosphate, and its influence upon tissue calcium.

Repeated administration of 2 mg. and upwards of irradiated ergosterol given orally or intramuscularly to full-grown rabbits may prove fatal in a relatively short time.

Doses of 1.0 mg. or less given three to four times a week seem to be well tolerated.

Large doses of irradiated ergosterol produce a more or less marked hypercalcemia. Small doses produce variable results.

The inorganic phosphate of the serum, though subject to considerable normal fluctuations, also appears to be definitely increased under the influence of the larger doses of irradiated ergosterol.

Toxic doses of irradiated ergosterol produce great increases in the calcium of certain tissues. The calcifying action of irradiated ergosterol appears to be highly selective, involving certain tissues, e. g., the aorta, kidney, and lungs, but not others, e. g., liver or striated muscle.

The relation of the hypercalcemia under the influence of irradiated ergosterol to the tissue calcium is discussed.

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ACT ESTABLISHING NARCOTIC FARMS AND A NARCOTICS DIVISION IN THE PUBLIC HEALTH SERVICE

An act of the Seventieth Congress, approved January 19, 1929, authorizes the establishment of two institutions for the confinement and treatment of persons addicted to the use of habit-forming narcotic drugs who have committed offenses against the United States and of addicts who voluntarily submit themselves for treatment.

The act defines the term "habit-forming narcotic drug" or "narcotic" as meaning opium and coca leaves and their derivatives, and also "Indian hemp" and "peyote." This is the first time that these two substances have been included as narcotics in Federal laws dealing with the subject.

The Public Health Service was designated by Congress as the Federal agency to administer the narcotic farms, and the act creates, for this purpose, a new administrative division in the Office of the Surgeon General to be known as the Narcotics Division. The institutions will be designed to rehabilitate, restore to health, and, when necessary, train to be self-supporting and self-reliant, persons addicted to habit-forming drugs who are confined or admitted thereto.

Following is the text of the act:

[PUBLIC—No. 672—70TH CONGRESS]

[H. R. 13645]

An Act To establish two United States narcotic farms for the confinement and treatment of persons addicted to the use of habit-forming narcotic drugs who have been convicted of offenses against the United States, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That when used in this Act—

(a) The term "habit-forming narcotic drug" or "narcotic" means opium and coca leaves and the innumerable alkaloids derived therefrom, the best known of

these alkaloids being morphia, heroin, and codeine, obtained from opium, and cocaine derived from the coca plant; all compounds, salts, preparations, or other derivatives obtained either from the raw material or from the various alkaloids; Indian hemp and its various derivatives, compounds, and preparations, and peyote in its various forms.

(b) The term "addict" means any person who habitually uses any habit-forming narcotic drug as defined in this Act so as to endanger the public morals, health, safety, or welfare, or who is or has been so far addicted to the use of such habit-forming narcotic drugs as to have lost the power of self-control with reference to his addiction.

SEC. 2. That the Attorney General, the Secretary of the Treasury, and the Secretary of War be, and are hereby, authorized and directed to select sites for two institutions for the confinement and treatment of persons who have been or shall be convicted of offenses against the United States, including persons convicted by general courts-martial and consular courts, and who are addicted to the use of habit-forming narcotic drugs, and for the confinement and treatment of addicts who voluntarily submit themselves for treatment.

SEC. 3. That upon selection of appropriate sites the Secretary of the Treasury shall submit to Congress estimates of the cost of purchasing same, together with estimates of the expense necessary to construct the proper buildings thereon. The Secretary of the Treasury at the same time, and annually thereafter, shall submit estimates in detail for all expenses of maintaining the said United States narcotic farms, including salaries of all necessary officers and employees.

SEC. 4. That the Secretary of the Treasury is hereby authorized to cause the plans, drawings, designs, specifications, and estimates for the remodeling or construction of the necessary buildings to be prepared in the office of the Supervising Architect, Treasury Department, and the work of remodeling or constructing the said buildings to be supervised by the field force of said office: *Provided*, That the proper appropriations for the support and maintenance of the office of the Supervising Architect be reimbursed for the cost of preparing such plans, drawings, designs, specifications, and estimates for the aforesaid work and the supervision of the remodeling and construction of said buildings.

SEC. 5. That the control and management of the United States narcotic farms shall be vested in the Secretary of the Treasury, who shall have power to appoint competent superintendents, assistant superintendents, physicians, pharmacists, psychologists, nurses, and all other officers and employees necessary for the safekeeping, care, protection, treatment, and discipline of the inmates. There is hereby created in the office of the Surgeon General of the Bureau of the Public Health Service, in the Department of the Treasury, a division to be known as the Narcotics Division, which shall be in charge of a physician trained in the treatment and care of narcotic addicts, and which division shall have charge of the management, discipline, and methods of treatment of said United States narcotic farms under the rules and regulations promulgated by the Secretary of the Treasury.

SEC. 6. That the care, discipline, and treatment of the persons admitted to or confined in a United States narcotic farm shall be designed to rehabilitate them, restore them to health, and where necessary train them to be self-supporting and self-reliant. For this purpose the Secretary of the Treasury shall have authority to promulgate all necessary rules and regulations for the government of the officers and inmates of said United States narcotic farms. The Surgeon General of the Bureau of the Public Health Service shall also give the authorized representatives of each State the benefit of his experience in the administration of said United States narcotic farms and the treatment of persons confined therein

through the publication and dissemination of information on methods of treatment and research in this field, together with individual and group case histories, to the end that each State may be encouraged to provide similar facilities for the care and treatment of narcotic addicts within their own jurisdiction.

SEC. 7. That the authority vested with the power to designate the place of confinement of a prisoner is hereby authorized and directed to transfer to the United States narcotic farms, as accommodations become available, all addicts, as herein defined, who are now or shall hereafter be sentenced to confinement in or be confined in any penal, correctional, disciplinary, or reformatory institution of the United States, including those addicts convicted of offenses against the United States who are confined in State and Territorial prisons, penitentiaries, and reformatories: *Provided*, That no addict shall be transferred to a United States narcotic farm who, in the opinion of the officer authorized to direct the transfer, is not a proper subject for confinement in such an institution either because of the nature of the crime he has committed, or his apparent incorrigibility. The authority vested with the power to designate the place of confinement of a prisoner is authorized to transfer from a United States narcotic farm to the institution from which he was received, or to such other institution as may be designated by the proper authority, any addict whose presence at a United States narcotic farm is detrimental to the well-being of the institution, or who does not continue to be a narcotic addict under the terms of this act. All transfers to or from a narcotic farm shall be made by the officer in charge of such farm, and the actual and necessary expenses incident to such transfers shall be paid from the appropriation for the maintenance of such farm.

SEC. 8. That it shall be the duty of each prosecuting officer, when sentence is pronounced, to report to the authority vested with the power to designate the place of confinement the name of each convicted person believed by him to be an addict, as herein defined, his reasons for such belief, and all pertinent facts bearing on such addiction, together with the nature of the offense.

SEC. 9. That the inmates of said narcotic farms shall be employed in such manner and under such conditions as the Secretary of the Treasury may direct. The Secretary of the Treasury may, in his discretion, establish industries, plants, factories, or shops for the manufacture of articles, commodities, and supplies for the United States Government; require any Government department or establishment or other institution appropriated for directly or indirectly by the Congress of the United States to purchase at current market prices as determined by the Secretary of the Treasury, or his authorized representative, such articles, commodities, or supplies as meet their specifications; and the Secretary of the Treasury shall provide for the payment to the inmates or their dependents such pecuniary earnings as he may deem proper, and establish a working-capital fund for said industries out of any funds appropriated for said narcotic farms; and said working-capital fund shall be available for the purchase, repair, or replacement of machinery or equipment, for the purchase of raw materials and supplies, and for the employment of necessary civilian officers and employees: *Provided*, That at the opening of each regular session of Congress the Secretary of the Treasury shall make a detailed report to Congress of the receipts and expenditures made from said working-capital fund.

SEC. 10. That any inmate of said narcotic farms or any narcotic addict confined in any institution convicted of an offense against the United States shall not be eligible for parole under sections 1, 2, 3, 4, 5, 6, 7, and 8 of the Act of Congress approved June 25, 1910, being an Act to provide for the parole of United States prisoners, and for other purposes, or under the provisions of any Act or regulation relating to parole, or receive any commutation allowance for good conduct in accordance with the provisions of the Act of Congress approved June 21, 1902,

and entitled "An Act to regulate commutation for good conduct for United States prisoners," and the Acts amendatory thereof and supplemental thereto, unless and until the Surgeon General of the Bureau of the Public Health Service shall have certified that said inmate is no longer a narcotic addict as defined by this Act. When such certificate shall have been made, the board of parole of the penal, correctional, disciplinary, or reformatory institution from which such former addict was transferred may authorize his release on parole without transfer back to such institution.

SEC. 11. That not later than one month prior to the expiration of the sentence of any addict confined in a United States narcotic farm, he shall be examined by the Surgeon General of the Bureau of the Public Health Service, or his authorized representative. If he believes the person to be discharged is still an addict within the meaning of this act and that he may by further treatment in a United States narcotic farm be cured of his addiction, the addict shall be informed, under such rules and regulations as the Secretary of the Treasury may promulgate, of the advisability of his submitting himself to further treatment. The addict may then apply in writing to the Secretary of the Treasury for further treatment in a United States narcotic farm for a period not exceeding the maximum length of time considered necessary by the Surgeon General of the Bureau of the Public Health Service. Upon approval of the application by the Secretary of the Treasury or his authorized agent, the addict may be given such further treatment as is necessary to cure him of his addiction: *Provided*, That if any addict voluntarily submits himself to treatment he may be confined in a United States narcotic farm for a period not exceeding the maximum amount of time estimated by the Surgeon General of the Bureau of the Public Health Service as necessary to effect a cure or until he ceases to be an addict within the meaning of this act.

SEC. 12. That any person, except an unconvicted alien, addicted to the use of habit-forming narcotic drugs, whether or not he shall have been convicted of an offense against the United States, may apply to the Secretary of the Treasury, or his authorized representative, for admission to a United States narcotic farm.

Any such addict shall be examined by the Surgeon General of the Bureau of the Public Health Service or his authorized agent, who shall report to the Secretary of the Treasury whether the applicant is an addict within the meaning of this act; whether he believes he may by treatment in a United States narcotic farm be cured of his addiction and the estimated length of time necessary to effect a cure, and any further pertinent information bearing on the addiction, habits, or character of the applicant. The Secretary of the Treasury may, in his discretion, admit the applicant to a United States narcotic farm. No such addict shall be admitted unless he voluntarily submits to treatment for the maximum amount of time estimated by the Surgeon General of the Bureau of the Public Health Service as necessary to effect a cure, and unless suitable accommodations are available after all eligible addicts convicted of offenses against the United States have been admitted. The Secretary of the Treasury may require any such addict voluntarily applying to pay the cost of his subsistence, care, and treatment. All such money shall be covered into the Treasury of the United States to the credit of the appropriation from which the expenditure was made: *Provided*, That if any addict voluntarily submits himself to treatment he may be confined in a United States narcotic farm for a period not exceeding the maximum amount of time estimated by the Surgeon General of the Bureau of the Public Health Service as necessary to effect a cure of the addiction or until he ceases to be an addict within the meaning of this act: *And provided further*, That any person who voluntarily submits himself for treatment at a United States narcotic farm shall not forfeit or abridge thereby any of his rights as a

citizen of the United States; nor shall such submission be used against him in any proceeding in any court, and that the record of his voluntary commitment shall be confidential and not divulged.

SEC. 13. Every person convicted of an offense against the United States shall upon discharge, or upon his release on parole, from a United States narcotic farm be furnished with the gratuities and transportation authorized by law to be furnished had his discharge or release been from the penal, correctional, disciplinary, or reformatory institution to which he was sentenced or from which he was transferred.

Any court of the United States having the power to suspend the imposition or execution of sentence, and place defendants on probation under any of the existing laws, may impose as one of the conditions of such probation that the defendant, if an addict, as herein defined, shall be admitted and submit himself for treatment at a United States narcotic farm until discharged therefrom as cured. Upon the discharge of any such probationer from a United States narcotic farm, he shall be furnished with the gratuities and transportation authorized to be furnished by the act of July 3, 1926, entitled "An act to increase the clothing and cash gratuities furnished to persons discharged from prisons." The actual and necessary expense incident to transporting such probationer to such farm and to furnishing such transportation and gratuities shall be paid from the appropriation for the maintenance of such farm: *Provided*, That where existing law vests a discretion in any officer as to the place to which transportation shall be furnished or as to the amount of clothing and gratuities to be furnished, such discretion shall be exercised by the Secretary of the Treasury with respect to addicts discharged from United States narcotic farms.

SEC. 14. Any person not authorized by law or by the Secretary of the Treasury who introduces or attempts to introduce into a United States narcotic farm or within the grounds adjoining or adjacent thereto any habit-forming narcotic drugs as defined in this act is guilty of a felony, and is punishable by confinement in the penitentiary for a period of not more than ten years.

SEC. 15. It shall be unlawful for any person properly committed thereto to escape or attempt to escape from a narcotic farm, and any such person upon apprehension and conviction in a United States court shall be punished by imprisonment for not more than five years, such sentence to begin upon the expiration of the sentence for which said person was originally confined.

SEC. 16. It shall be unlawful for any person to procure the escape of any inmate properly committed to a narcotic farm or to advise, connive at, aid, or assist in such escape, or conceal any such inmate after such escape, and upon conviction in a United States court shall be punished by imprisonment in the penitentiary for not more than three years.

SEC. 17. Wherever an alien addict has been transferred to either of the United States narcotic farms provided for in this act who is entitled to his discharge but is subject to deportation in lieu of being returned to the penal institution from which he came, he shall be deported by the authority vested by law with power over deportation.

Approved, January 19, 1929.

EFFECT OF REPEATED DAILY EXPOSURE OF SEVERAL HOURS TO SMALL AMOUNTS OF AUTOMOBILE EXHAUST GAS

The determination of the effect of repeated daily exposure of several hours to small amounts of automobile exhaust gas has recently been undertaken as a part of the study made by the Bureau of Mines in

cooperation with the New York State Bridge and Tunnel Commission and the New Jersey Interstate Bridge and Tunnel Commission, and the results are presented in PUBLIC HEALTH BULLETIN No. 186, recently issued by the Public Health Service. Earlier studies had been made to obtain data to serve as a basis for the design of a ventilating system for the Holland Vehicular Tunnel.

The study reported in PUBLIC HEALTH BULLETIN No. 186 was carried out to secure information as to the possible effect of repeated daily exposure for various periods on traffic officers and maintenance men. Six men were exposed from four to seven hours daily over a period of 68 days to gasoline engine exhaust gas-air mixtures containing 2, 3, and 4 parts of carbon monoxide per 10,000 parts of air, with the following results:

With the subjects at rest or exercising mildly:

1. Exposure to 2 parts of CO in 10,000 caused—
   - (*a*) In 2 hours, slight but not discomforting symptoms in some subjects.
   - (*b*) In 3½ to 4 hours, distinct frontal headaches of a discomforting nature in some subjects.
   - (*c*) In 6½ hours no occipital headaches occurred in any subjects and no symptoms of any kind were experienced in 50 per cent of the exposures.
   - (*d*) In 3½ to 4½ hours a blood saturation of 20 per cent.
   - (*e*) In 5 to 6 hours a blood saturation of 25 per cent. Saturation above 25 per cent was attained very slowly.
2. Exposure to 3 parts of CO in 10,000 caused—
   - (*a*) In less than 2 hours slight symptoms in some subjects.
   - (*b*) In 2½ to 3 hours distinct frontal headaches in some subjects.
   - (*c*) After 3 hours a few occipital headaches and cases of vertigo.
   - (*d*) In 5 hours distinct discomforting symptoms in more than 65 per cent of the subjects.
   - (*e*) In 2½ to 3½ hours a blood saturation of 20 per cent.
   - (*f*) In 3 to 4 hours a blood saturation of 25 per cent.
   - (*g*) In 4 to 4¾ hours a blood saturation of 30 per cent.
3. Exposure to 4 parts of CO in 10,000 caused—
   - (*a*) In 1½ to 2 hours frontal headaches, in some subjects.
   - (*b*) In 2½ to 3½ hours a few occipital headaches.
   - (*c*) In 3½ to 4 hours more than 90 per cent had distinct frontal headaches.
   - (*d*) In 1½ to 2½ hours a blood saturation of 20 per cent.
   - (*e*) In 2½ to 3½ hours a blood saturation of 25 per cent.
   - (*f*) In 3 to 4 hours a blood saturation of 30 per cent.

4. The results of the control tests showed that a few cases of headache occurred, but the number was probably no greater than might be expected in any group of normal men. There was no distinct difference in the character and number of symptoms when exhaust gas was entirely absent from the air as compared with experiments when the air contained exhaust in which the CO was reduced to an insignificant amount by carburetor adjustment.

Although there was a tendency for headaches to appear with a lower amount of CO hemoglobin when the latter was attained by exposure to the lower concentrations of carbon monoxide, in general frontal headaches began in some subjects only when the saturation reached 18 to 20 per cent. A few occipital headaches accompanied by vertigo distinctly occurred at 23 to 28 per cent.

With exercise.—Even though of a mild form, exercise distinctly augmented the absorption of CO and caused symptoms to appear after shorter exposure. Exercise immediately after exposure markedly increased the speed of elimination, but this procedure is not recommended or advised as a treatment for poisoning by CO.

Until the supply is exhausted, single copies of this bulletin may be had free upon application to the Surgeon General, United States Public Health Service, Washington, D. C. Additional copies may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 15 cents per copy.

COURT DECISION RELATING TO PUBLIC HEALTH

Certain provisions in barber act held invalid.—(United States District Court, W. D. Washington, N. D.; Marx *v.* Maybury, State Director of Licenses of Washington, et al., 30 F. (2d) 839; decided February 11, 1929.) A suit to restrain the enforcement of certain provisions of the Washington statute relating to the practice of barbering was brought by the plaintiff, a barber having in the city of Seattle a barber college and barber shops separate from the barber school. One of the statutory provisions objected to was "that not more than one student or apprentice shall be employed in any one barber shop." Another provision was that "no barber school or college shall be issued a permit by the director of licenses unless such school or college requires * * * as a prerequisite to graduation a course of instruction of not less than 1,000 hours to be completed within six months of not more than eight hours in any working day, such course of instruction to include the following subjects: Scientific fundamentals for barbering, hygiene, bacteriology, histology of the hair, skin, nails, muscles and nerve structure of the head, face,

and neck, elementary chemistry relating to sterilization and antiseptics, diseases of the skin, hair, glands, and nails, massaging and manipulating the muscles of the upper body, hair cutting, shaving and arranging, dressing, coloring, bleaching, and tinting the hair."

On consideration of these parts of the act the court held them to be unreasonable and void, and in so holding stated in part as follows:

The provisions in question can only find support in that they are an exercise of the police power of the State in the interest of the public health. * * *

If the limiting of the number of apprentices to one to each barber shop, whether the number of barbers in a particular shop be one, or a dozen, or more, has even a remote bearing upon public health, it is so remote we are unable to see it. We think it an unreasonable and arbitrary interference with the liberty of the citizen. That the practice of barbering by apprentices does not necessarily imperil the public health or safety the Washington Legislature recognizes, for by the act under consideration such practice is expressly authorized. That being true, the only conditions that may lawfully be imposed upon the practice are such as fall within the principles we have stated. If, as contended, apprentices may reasonably be required to work under the supervision of an experienced barber, no one has suggested why, if two such barbers operating separate shops can efficiently supervise two apprentices, they can not as well exercise the same supervision when all four are working in the same shop.

Section 14 sets forth an imposing array of subjects to be covered by a course of instruction in barber schools and colleges. * * *

While section 14 on its face appears to make elaborate provision to guard the health of patrons of barber shops, it is difficult to avoid the impression that its practical effect is to limit the number of barber schools or colleges, and the number of students, graduates, or apprentices. What, if any, reason could exist why the course is "to be completed in six months," is not apparent. Nor is it apparent how the public health is to be protected by the age restrictions. The entire section, we think, has no real or substantial relation to the public health, is unreasonable and unnecessary, and an invasion of rights secured by the Constitution.

The court decided that the plaintiff was "entitled to an injunction restraining defendants from interfering with the number of student apprentices which he may employ in any one barber shop, and from enforcing against him the provisions of section 14 of the act in question."

DEATHS DURING WEEK ENDED MAY 11, 1929

Summary of information received by telegraph from industrial insurance companies for the week ended May 11, 1929, and corresponding week of 1928. (From the Weekly Health Index, May 15, 1929, issued by the Bureau of the Census, Department of Commerce)

	Week ended May 11, 1929	Corresponding week, 1928
Policies in force	74, 121, 111	71, 171, 763
Number of death claims	14, 325	15, 891
Death claims per 1,000 policies in force, annual rate	10. 1	11. 7

Deaths from all causes in certain large cities of the United States during the week ended May 11, 1929, infant mortality, annual death rate, and comparison with corresponding week of 1928. (From the Weekly Health Index, May 15, 1929, issued by the Bureau of the Census, Department of Commerce)

City	Week ended May 11, 1929		Annual death rate per 1,000, corresponding week, 1928	Deaths under 1 year		Infant mortality rate, week ended May 11, 1929 [2]
	Total deaths	Death rate [1]		Week ended May 11, 1929	Corresponding week, 1928	
Total (65 cities)	7,343	12.9	15.2	695	892	[3] 59
Akron	48			7	6	72
Albany [4]	31	13.5	19.5	3	7	59
Atlanta	79	16.2	13.9	6	7	62
White	35			3	3	
Colored	44	(5)	(5)	3	4	
Baltimore [4]	203	12.8	15.0	19	20	61
White	154			14	13	56
Colored	49	(5)	(5)	5	7	79
Birmingham	56	13.2	21.2	6	7	54
White	33			4	3	60
Colored	23	(5)	(5)	2	4	46
Boston	209	13.7	17.5	22	31	61
Bridgeport	31			2	4	35
Buffalo	139	13.1	14.8	19	12	82
Cambridge	25	10.4	17.5	2	6	36
Camden	34	13.1	9.3	5	5	86
Canton	26	11.6	13.0	5	4	119
Chicago [4]	717	11.9	15.3	75	115	67
Cincinnati	136			7	14	41
Cleveland	197	10.2	13.5	16	35	47
Columbus	89	15.6	14.5	9	8	84
Dallas	42	10.1	9.1	2	8	
White	35			2	7	
Colored	7	(5)	(5)	0	1	
Denver	86	15.3	15.1	4	9	39
Des Moines	34	11.7	11.0	4	3	72
Detroit	352	13.3	14.9	42	52	67
Duluth	21	9.4	15.2	1	1	24
El Paso	39	17.3	13.3	8	11	
Erie	26			3	3	61
Fall River [4]	37	14.4	12.1	4	3	75
Flint	53	18.6	10.2	7	7	85
Fort Worth	46	14.1	13.5	3	3	
White	36			3	3	
Colored	10	(5)	(5)	0	0	
Grand Rapids	39	12.4	13.1	8	5	121
Houston	58			2	8	
White	35			1	6	
Colored	23	(5)	(5)	1	2	
Indianapolis	99	13.5	14.5	9	7	72
White	85			7	6	65
Colored	14	(5)	(5)	2	1	119
Jersey City	61	9.8	15.3	5	6	39
Kansas City, Kans	27	11.9	15.0	4	1	88
White	20			4	1	101
Colored	7	(5)	(5)	0	0	0
Kansas City, Mo	86	11.5	13.1	4	13	34
Knoxville	30	14.9	18.4	3	4	66
White	25			3	2	73
Colored	5	(5)	(5)	0	2	0
Los Angeles	282			20	30	59
Louisville	87	13.8	10.6	8	3	65
White	70			4	2	37
Colored	17	(5)	(5)	4	1	252
Lowell	23			2	3	45
Lynn	24	11.9	12.9	1	2	27
Memphis	76	20.9	17.9	6	5	71
White	35			3	1	57
Colored	41	(5)	(5)	3	4	94
Milwaukee	110	10.6	13.6	13	22	57
Minneapolis	87	10.0	12.6	8	6	49
Nashville	45	16.9	17.6	4	6	65
White	25			2	4	43
Colored	20	(5)	(5)	2	2	126
New Bedford	24			5	3	107
New Haven	49	13.6	22.3	1	4	15

Footnotes at end of table.

Deaths from all causes in certain large cities of the United States during the week ended May 11, 1929, infant mortality, annual death rate. and comparison with corresponding week of 1928—Continued

City	Week ended May 11, 1929		Annual death rate per 1,000, corresponding week, 1928	Deaths under 1 year		Infant mortality rate, week ended May 11, 1929
	Total deaths	Death rate		Week ended May 11, 1929	Corresponding week, 1928	
New Orleans	155	18.9	18.5	15	14	74
White	85			6	6	42
Colored	70	(5)	(5)	9	8	151
New York	1,514	13.2	16.7	147	188	60
Bronx Borough	205	11.3	13.7	24	26	41
Brooklyn Borough	515	11.7	15.1	61	71	62
Manhattan Borough	594	17.7	23.4	57	78	70
Queens Borough	158	9.7	10.8	15	13	61
Richmond Borough	42	14.6	16.0	0	0	0
Newark, N. J	99	10.9	13.1	10	10	53
Oakland	58	11.1	9.9	1	1	11
Omaha	59	13.8	10.3	8	5	94
Paterson	32	11.5	14.8	8	4	141
Philadelphia	490	12.4	14.5	36	55	51
Pittsburgh	179	13.9	16.6	19	32	65
Portland, Oreg	56			4	3	46
Providence	73	13.3	11.7	6	6	53
Richmond	67	18.0	15.1	2	4	28
White	37			0	1	0
Colored	30	(5)	(5)	2	3	82
Rochester	87	13.9	14.8	9	12	76
St. Louis	197	12.1	18.6	7	18	24
St. Paul	53			3	6	31
Salt Lake City [4]	25	9.5	13.3	2	4	31
San Antonio	96	23.0	18.7	25	23	
San Diego	43	18.8	18.3	3	2	57
San Francisco	141	12.6	15.0	11	6	70
Schenectady	26	14.6	14.0	3	3	96
Seattle	95	13.0	9.6	2	2	21
Somerville	17	8.7	12.2	1	4	36
Spokane	29	13.9	10.1	2	1	52
Springfield, Mass	41	14.3	16.4	7	6	116
Syracuse	54	14.2	19.7	6	9	72
Tacoma	21	9.9	9.9	2	1	51
Toledo	71	11.9	15.2	3	6	28
Trenton	31	11.7	16.6	0	3	0
Utica	30	15.1	14.6	0	3	0
Washington, D. C	119	11.3	16.3	8	12	47
White	70			5	6	42
Colored	49	(5)	(5)	3	6	57
Waterbury	18			2	6	51
Wilmington, Del	32	13.0	13.4	3	3	78
Worcester	58	15.3	15.1	7	8	88
Yonkers	29	12.5	12.5	1	4	23
Youngstown	40	12.0	11.4	5	5	72

[1] Annual rate per 1,000 population.
[2] Deaths under 1 year per 1,000 births. Cities left blank are not in the registration area for births.
[3] Data for 71 cities.
[4] Deaths for week ended Friday.
[5] In the cities for which deaths are shown by color, the colored population in 1920 constituted the following percentages of the total population: Atlanta, 31; Baltimore, 15; Birmingham, 39; Dallas, 15; Fort Worth, 14; Houston, 25; Indianapolis, 11; Kansas City, Kans., 14; Knoxville, 15; Louisville, 17; Memphis, 38; Nashville, 30; New Orleans, 26; Richmond, 32; and Washington, D. C., 25.

PREVALENCE OF DISEASE

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

UNITED STATES

CURRENT WEEKLY STATE REPORTS

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

Reports for Weeks Ended May 11, 1929, and May 12, 1928

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended May 11, 1929, and May 12, 1928

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended May 11, 1929	Week ended May 12, 1928	Week ended May 11, 1929	Week ended May 12, 1928	Week ended May 11, 1929	Week ended May 12, 1928	Week ended May 11, 1929	Week ended May 12, 1928
New England States:								
Maine		4	7	38	83	32	0	0
New Hampshire	1	1			61	5	1	0
Vermont					9	73	0	0
Massachusetts	78	98	8	66	744	1,002	3	1
Rhode Island	6	4		2	93	221	1	0
Connecticut	14	24	7	71	400	381	2	1
Middle Atlantic States:								
New York	356	324	[1] 18	[1] 194	1,324	4,021	24	30
New Jersey	136	97	5	40	288	2,114	6	10
Pennsylvania	146	120			1,799	2,527	8	10
East North Central States:								
Ohio	53	124	36	229	2,211	1,073	22	14
Indiana	16	16	9	56	563	470	0	0
Illinois	196	95	94	95	1,965	275	28	9
Michigan	80	67	4	12	1,045	1,170	85	4
Wisconsin	11	18	33	838	1,491	71	10	12
West North Central States:								
Minnesota	20	13	2	22	620	116	2	2
Iowa	10	4			85	18	1	1
Missouri	37	23	3	65	185	519	16	17
North Dakota	10	3		55	45	11	1	0
South Dakota	3	2		5	55	29	1	0
Nebraska	13	2		3	182	131	3	0
Kansas	8	7	1	11	566	202	3	2
South Atlantic States:								
Delaware	2				26	43	0	0
Maryland [2]	20	30	13	16	58	817	1	0
District of Columbia	5	14	1	4	31	181	1	0
West Virginia	6	9	1	190	358	120	0	3
North Carolina	12	19			23	1,114	4	1
South Carolina	11	18	235	419	13	264	0	0
Georgia	10	8	18	86	27	160	5	0
Florida	7	8	4	4	68	101	0	0

[1] New York City only.
[2] Week ended Friday.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended May 11, 1929, and May 12, 1928—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended May 11, 1929	Week ended May 12, 1928	Week ended May 11, 1929	Week ended May 12, 1928	Week ended May 11, 1929	Week ended May 12, 1928	Week ended May 11, 1929	Week ended May 12, 1928
East South Central States:								
Kentucky	-------	4	-------	50	20	222	1	0
Tennessee	3	6	30	115	124	170	0	1
Alabama	5	13	23	405	89	366	0	0
Mississippi	2	9	-------	-------	-------	-------	-------	-------
West South Central States:								
Arkansas	4	6	22	348	10	351	3	0
Louisiana	17	22	30	59	51	237	4	2
Oklahoma [2]	4	20	11	293	39	438	2	1
Texas	32	14	49	53	246	194	1	1
Mountain States:								
Montana	3	1	1	-------	192	11	7	1
Idaho	2	1	-------	-------	11	1	5	0
Wyoming	3	1	-------	-------	56	16	2	1
Colorado	-------	7	-------	-------	-------	20	-------	4
New Mexico	9	1	-------	-------	43	184	5	0
Arizona	4	17	-------	9	55	119	2	1
Utah [2]	2	2	6	3	9	-------	4	2
Pacific States:								
Washington	7	10	3	-------	191	130	9	1
Oregon	6	3	-------	22	263	40	0	0
California	43	83	30	36	121	109	22	3

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended May 11, 1929	Week ended May 12, 1928	Week ended May 11, 1929	Week ended May 12, 1928	Week ended May 11, 1929	Week ended May 12, 1928	Week ended May 11, 1929	Week ended May 12, 1928
New England States:								
Maine	0	1	36	20	0	0	3	3
New Hampshire	0	0	7	12	1	0	1	0
Vermont	0	1	10	1	2	0	0	0
Massachusetts	1	1	198	242	13	0	9	5
Rhode Island	0	0	15	27	0	0	1	1
Connecticut	0	0	59	98	10	0	0	2
Middle Atlantic States:								
New York	3	4	499	618	2	5	12	10
New Jersey	1	0	139	229	0	2	2	5
Pennsylvania	2	3	390	412	0	0	17	16
East North Central States:								
Ohio	1	1	226	247	45	41	7	9
Indiana	0	0	181	99	81	109	5	2
Illinois	1	0	429	239	91	76	6	9
Michigan	0	1	409	318	44	18	7	4
Wisconsin	1	3	129	272	1	5	2	13
West North Central States:								
Minnesota	0	2	80	116	3	0	2	1
Iowa	0	0	115	50	37	54	3	1
Missouri	0	0	63	82	29	62	64	8
North Dakota	1	0	21	19	6	0	2	1
South Dakota	0	0	7	33	34	4	1	0
Nebraska	0	0	159	84	41	34	1	1
Kansas	0	0	102	165	70	97	0	6
South Atlantic States:								
Delaware	0	0	4	1	0	0	1	0
Maryland [3]	0	1	122	73	0	0	4	7
District of Columbia	0	2	19	47	0	0	0	1
West Virginia	0	0	23	34	6	35	9	7
North Carolina	0	1	34	17	10	46	7	7
South Carolina	0	1	9	8	2	7	17	7
Georgia	0	0	9	22	0	0	9	11
Florida	1	0	5	5	2	8	3	7

[2] Week ended Friday.
[3] Figures for 1929 are exclusive of Oklahoma City and Tulsa.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended May 11, 1929, and May 12, 1928—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended May 11, 1929	Week ended May 12, 1928	Week ended May 11, 1929	Week ended May 12, 1928	Week ended May 11, 1929	Week ended May 12, 1928	Week ended May 11, 1929	Week ended May 12, 1928
East South Central States:								
Kentucky	0	0	25	64	21	38	6	7
Tennessee	0	0	31	14	58	23	7	8
Alabama	0	3	13	3	2	5	10	6
Mississippi	0	0	15	5	1	2	16	5
West South Central States:								
Arkansas	1	0	8	14	1	4	6	4
Louisiana	0	0	67	12	37	16	20	15
Oklahoma [3]	0	0	27	71	50	129	8	7
Texas	2	0	80	66	112	94	9	3
Mountain States:								
Montana	0	0	9	13	12	19	1	3
Idaho	0	0	10	4	5	6	0	0
Wyoming	1	0	2	31	28	1	1	0
Colorado	----	0	----	66	----	6	----	1
New Mexico	0	0	7	16	3	9	1	1
Arizona	0	0	13	4	7	16	8	0
Utah [2]	0	0	10	3	6	12	0	1
Pacific States:								
Washington	0	0	23	44	39	39	4	1
Oregon	0	1	23	22	39	52	1	3
California	2	7	414	161	69	13	13	18

[2] Week ended Friday.
[3] Figures for 1929 are exclusive of Oklahoma City and Tulsa.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of monthly State reports is published weekly and covers only those States from which reports are received during the current week:

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
March, 1929										
Florida	1	34	32	74	183	4	3	39	0	19
April, 1929										
Arizona	31	13	29	----	10	----	0	37	53	2
Arkansas	35	13	76	237	256	58	----	43	17	27
Dist. of Columbia	2	36	4	----	84	2	0	65	0	3
Florida	1	40	9	15	241	6	13	17	6	23
Georgia	----	26	127	171	98	64	0	53	20	32
New Hampshire	----	12	15	----	----	----	2	46	----	0
New Jersey	31	478	34	----	1,389	----	1	755	0	4
Tennessee	13	26	215	132	173	30	0	161	25	30
Vermont	----	9	----	----	54	----	0	56	31	0
Wyoming	8	5	9	----	114	----	1	67	44	1

March, 1929

Florida:	Cases
Chicken pox	100
Dengue	1
Dysentery	3
Lethargic encephalitis	1
Mumps	33
Paratyphoid fever	1
Typhus fever	1
Whooping cough	253

April, 1929

Anthrax:	Cases
New Jersey	1
Chicken pox:	
Arizona	39
Arkansas	104
District of Columbia	132
Florida	72
Georgia	100
New Jersey	1,065

Chicken pox—Continued.	Cases
Tennessee	120
Vermont	37
Wyoming	56
Conjunctivitis:	
Georgia	2
Dengue:	
Georgia	28
Dysentery:	
Georgia	35
Tennessee	1
German measles:	
New Jersey	83
Hookworm disease:	
Arkansas	1
Georgia	5
Lead poisoning:	
New Jersey	4
Leprosy:	
Florida	1
Lethargic encephalitis:	
District of Columbia	1
Georgia	1
Tennessee	1
Mumps:	
Arizona	4
Arkansas	167
Florida	18
Georgia	93
Tennessee	120
Vermont	152
Wyoming	116
Ophthalmia neonatorum:	
New Jersey	3
Paratyphoid fever:	
Arkansas	1
Georgia	1
Tennessee	1

Rabies in man:	Cases
Tennessee	3
Rocky Mountain spotted or tick fever:	
Wyoming	3
Septic sore throat:	
Georgia	29
Tennessee	7
Wyoming	1
Tetanus:	
Georgia	1
Trachoma:	
Arizona	7
Arkansas	2
New Jersey	1
Tennessee	7
Trichinosis:	
New Jersey	3
Tularæmia:	
Georgia	4
Typhus fever:	
Florida	1
Georgia	1
Undulant fever:	
Arizona	1
Georgia	1
Whooping cough:	
Arizona	11
Arkansas	54
District of Columbia	129
Florida	235
Georgia	147
New Jersey	913
Tennessee	112
Vermont	143
Wyoming	9

GENERAL CURRENT SUMMARY AND WEEKLY REPORTS FROM CITIES

The 96 cities reporting cases used in the following table are situated in all parts of the country and have an estimated aggregate population of more than 31,530,000. The estimated population of the 89 cities reporting deaths is nearly 29,960,000. The estimated expectancy is based on the experience of the last nine years, excluding epidemics.

Weeks ended May 4, 1929, and May 5, 1928

	1929	1928	Estimated expectancy
Cases reported			
Diphtheria:			
46 States	1,476	1,395	----------
96 cities	823	743	830
Measles:			
45 States	16,037	20,534	----------
96 cities	5,637	8,439	----------
Meningococcus meningitis:			
45 States	279	186	----------
96 cities	131	89	----------
Poliomyelitis:			
46 States	21	23	----------

Weeks ended May 4, 1929, and May 5, 1928—Continued

	1929	1928	Estimated expectancy
Cases reported—Continued			
Scarlet fever:			
46 States	5,007	4,428	
96 cities	1,818	1,513	1,297
Smallpox:			
46 States	967	1,038	
96 cities	73	81	89
Typhoid fever:			
46 States	214	175	
96 cities	47	36	36
Deaths reported			
Influenza and pneumonia:			
89 cities	758	1,387	
Smallpox:			
89 cities	0	1	
Terre Haute, Ind	0	1	

City reports for week ended May 4, 1929

The "estimated expectancy" given for diphtheria, poliomyelitis, scarlet fever, smallpox, and typhoid fever is the result of an attempt to ascertain from previous occurrence the number of cases of the disease under consideration that may be expected to occur during a certain week in the absence of epidemics. It is based on reports to the Public Health Service during the past nine years. It is in most instances the median number of cases reported in the corresponding weeks of the preceding years. When the reports include several epidemics, or when for other reasons the median is unsatisfactory, the epidemic periods are excluded and the estimated expectancy is the mean number of cases reported for the week during non-epidemic years.

If the reports have not been received for the full nine years, data are used for as many years as possible, but no year earlier than 1920 is included. In obtaining the estimated expectancy the figures are smoothed when necessary to avoid abrupt deviation from the usual trend. For some of the diseases given in the table the available data were not sufficient to make it practicable to compute the estimated expectancy.

Division, State, and city	Population, July 1, 1928, estimated	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
			Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
NEW ENGLAND									
Maine:									
Portland	78,600	6	1	0		0	16	0	2
New Hampshire:									
Concord	(1)	0	0	0		0	26	0	2
Manchester	85,700	0	2	0		0	2	0	0
Nashua	(1)	0	0	0		0	0	0	0
Vermont:									
Barre	(1)	0	0	0		0	0	2	0
Burlington	(1)	1	0	0		0	0	3	0
Massachusetts:									
Boston	799,200	65	35	15	5	1	15	23	20
Fall River	134,300	1	3	6		0	8	6	0
Springfield	149,800	3	2	0		0	3	0	1
Worcester	197,600	7	4	0		0	16	0	1
Rhode Island:									
Pawtucket	73,100	4	1	3		0	11	0	0
Providence	286,300	0	8	6		0	88	0	8
Connecticut:									
Bridgeport	(1)	1	4	1		0	10	0	2
Hartford	172,300	6	5	3	2	0	25	3	3
New Haven	187,900	16	2	2		0	3	0	8

[1] No estimate of population made.

City reports for week ended May 4, 1929—Continued

Division, State, and city	Population, July 1, 1928, estimated	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
			Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
MIDDLE ATLANTIC									
New York:									
Buffalo	555,800	17	10	9	1	1	74	4	25
New York	6,017,500	374	254	295	22	6	79	249	168
Rochester	328,200	10	9	1	1	0	32	14	3
Syracuse	199,300	26	6	1	----	0	2	15	5
New Jersey:									
Camden	135,400	1	7	18	1	1	6	1	1
Newark	473,600	68	14	34	6	0	8	71	17
Trenton	139,000	1	3	0	----	1	12	0	1
Pennsylvania:									
Philadelphia	2,064,200	104	64	23	2	0	56	23	39
Pittsburgh	673,800	32	17	13	2	4	67	7	20
Reading	115,400	2	2	0	----	0	7	0	2
EAST NORTH CENTRAL									
Ohio:									
Cincinnati	413,700	12	7	5	----	2	2	0	11
Cleveland	1,010,300	67	24	16	8	0	644	17	16
Columbus	299,000	15	3	1	2	1	20	0	2
Toledo	313,200	5	4	2	2	2	28	17	6
Indiana:									
Fort Wayne	105,300	3	3	2	----	0	53	0	2
Indianapolis	382,100	55	3	2	----	0	207	0	8
South Bend	86,100	3	1	0	----	0	16	0	1
Terre Haute	73,500	1	0	2	----	0	12	4	3
Illinois:									
Chicago	3,157,400	84	65	157	13	1	1,329	15	76
Springfield	67,200	1	0	0	----	1	6	0	1
Michigan:									
Detroit	1,378,900	92	45	60	4	1	136	54	54
Flint	148,800	23	4	0	----	1	9	0	8
Grand Rapids	164,200	6	2	0	----	1	87	0	0
Wisconsin:									
Kenosha	56,500	10	0	0	----	0	46	0	1
Milwaukee	544,200	63	12	4	1	0	1,034	29	11
Racine	74,400	17	2	1	----	0	35	0	0
Superior	(1)	3	0	0	----	0	3	3	2
WEST NORTH CENTRAL									
Minnesota:									
Duluth	116,800	2	0	0	----	0	1	60	3
Minneapolis	455,900	58	14	2	----	2	236	62	7
St. Paul	(1)	5	11	1	----	1	365	51	9
Iowa:									
Davenport	(1)	1	0	0	----	----	0	0	----
Des Moines	151,900	0	1	0	----	----	2	0	----
Sioux City	80,000	15	0	0	----	----	6	1	----
Waterloo	37,100	5	0	0	----	----	3	46	----
Missouri:									
Kansas City	391,000	26	5	2	----	2	91	2	9
St. Joseph	78,500	0	1	1	----	0	20	0	0
St. Louis	848,100	18	40	26	----	1	39	5	----
North Dakota:									
Fargo	(1)	0	1	0	----	0	24	0	0
Grand Forks	(1)	0	0	0	----	----	0	0	----
South Dakota:									
Aberdeen	(1)	0	0	1	----	----	0	13	----
Sioux Falls	(1)	0	0	0	----	----	1	0	----
Nebraska:									
Omaha	222,800	3	2	6	----	0	49	0	8
Kansas:									
Topeka	62,800	5	0	1	2	0	----	0	3
Wichita	99,300	15	0	1	----	0	89	14	3

[1] No estimate of population made.

City reports for week ended May 4, 1929—Continued

Division, State, and city	Population, July 1, 1928, estimated	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
			Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
SOUTH ATLANTIC									
Delaware:									
Wilmington	128,500	1	2	2		0	10	0	2
Maryland:									
Baltimore	830,400	37	23	13	8	0	2	183	15
Cumberland	(1)	0	0	1		0	0	0	0
Frederick	(1)	0	0	0		0	0	0	0
District of Columbia:									
Washington	552,000	29	11	10	2	1	20	0	11
Virginia:									
Lynchburg	38,600	10	0	0		0	6	79	1
Norfolk	184,200	28	0	0		0	3	59	6
Richmond	194,400	4	1	6		1	5	4	5
Roanoke	64,600	2	0	0		0	0	1	2
West Virginia:									
Charleston	55,200	4	0	0	1	1	86	0	1
Wheeling	(1)	1	1	0		1	87	0	2
North Carolina:									
Raleigh	(1)	4	0	0		0	0	0	1
Wilmington	39,100	27	0	0		0	0	0	1
Winston-Salem	80,000	2	0	0		0	2	1	0
South Carolina:									
Charleston	75,900	2	0	0	12	0	0	0	3
Columbia	50,600	3	0	2		1	4	4	2
Georgia:									
Atlanta	255,100	7	1	3	6	1	8	0	8
Brunswick	(1)	0	0	0		0	0	0	1
Savannah	99,900	0	1	0	3	0	0	0	2
Florida:									
Miami	156,700	1	2	1		0	18	0	1
St. Petersburg	53,300		0			0			0
Tampa	113,400	3	0	0		0	2	1	1
EAST SOUTH CENTRAL									
Kentucky:									
Covington	59,000	0	1	1		0	1	0	5
Tennessee:									
Memphis	190,200	13	2	0		0	1	0	7
Nashville	139,600	0	1	1		1	1	0	1
Alabama:									
Birmingham	222,400	3	2	1	7	2	2	3	9
Mobile	69,600	0	0	0		1	6	0	1
Montgomery	63,100	7	0	0		0	8	0	0
WEST SOUTH CENTRAL									
Arkansas:									
Fort Smith	(1)	3	0	0			0	0	
Little Rock	79,200	1	0	0		0	0	0	1
Louisiana:									
New Orleans	429,400	0	6	11		0	10	0	6
Shreveport	81,300	5	1	0		0	5	0	2
Oklahoma:									
Oklahoma City	(1)	0	0	2		0	0	0	0
Tulsa	170,500	25	1	0			11	4	
Texas:									
Dallas	217,800	3	3	4		0	68	0	4
Fort Worth	170,600	1	1	1		0	6	1	6
Galveston	50,600	0	0	0		0	0	0	1
Houston	(1)	1	3	7		0	7	0	4
San Antonio	218,100	1	1	4		2	0	0	5
MOUNTAIN									
Montana:									
Billings	(1)	3	1	0		0	0	1	1
Great Falls	(1)	2	0	0		0	41	1	1
Helena	(1)		0						
Missoula	(1)	0	0	0		0	0	0	2
Idaho:									
Boise	(1)		0						

[1] No estimate of population made.

City reports for week ended May 4, 1929—Continued

Division, State, and city	Population, July 1, 1928, estimated	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
			Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
MOUNTAIN—continued									
Colorado:									
Denver	294,200	46	11	6		1	3	46	9
Pueblo	44,200	18	1	0		0	0	2	1
New Mexico:									
Albuquerque	(1)	4	0	1		0	0	0	0
Utah:									
Salt Lake City	138,000	10	3	1		0	7	175	3
Nevada:									
Reno	(1)	0	0	0		1	0	0	1
PACIFIC									
Washington:									
Seattle	383,200	39	4	0			4	29	
Spokane	109,100	14	2	6			89	0	
Tacoma	110,500	17	1	1		2	1	2	1
Oregon:									
Portland	(1)	5	6	2		0	89	6	4
Salem	(1)	1	0	1		1	2	0	0
California:									
Los Angeles	(1)	109	40	6	15	1	18	28	16
Sacramento	75,700	10	2	7	1	1	5	7	2
San Francisco	585,300	20	9	10	1	1	2	25	4

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
NEW ENGLAND											
Maine:											
Portland	2	3	0	0	0	1	0	1	0	4	25
New Hampshire:											
Concord	0	0	0	0	0	0	0	0	0	0	5
Manchester	3	0	0	0	0	0	0	0	0	0	3
Nashua	0	0	0	0	0	1	0	0	0	0	13
Vermont:											
Barre	0	0	0	0	0	0	0	0	0	6	2
Burlington	0	1	0	2	0	0	0	0	0	1	
Massachusetts:											
Boston	68	70	0	0	0	14	1	1	0	50	219
Fall River	5	6	0	0	0	6	0	0	0	18	34
Springfield	7	14	0	0	0	2	0	0	0	3	32
Worcester	10	4	0	0	0	4	0	0	0	10	39
Rhode Island:											
Pawtucket	1	0	0	0	0	2	0	0	0	0	15
Providence	10	15	0	0	0	3	0	0	0	4	60
Connecticut:											
Bridgeport	11	7	0	0	0	1	0	0	0	0	29
Hartford	6	5	0	0	0	4	0	0	0	1	46
New Haven	8	0	0	0	0	0	0	1	0	2	43
MIDDLE ATLANTIC											
New York:											
Buffalo	22	48	0	0	0	13	0	0	0	23	140
New York	293	286	0	0	0	91	9	8	1	102	1,493
Rochester	14	7	0	0	0	1	0	0	0	16	66
Syracuse	10	4	0	0	0	3	1	0	0	19	47
New Jersey:											
Camden	6	5	0	0	0	0	0	0	0	10	31
Newark	30	26	0	0	0	8	0	0	0	32	124
Trenton	3	1	0	0	0	3	0	0	0	0	32

[1] No estimate of population made.

City reports for week ended May 4, 1929—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
MIDDLE ATLANTIC—continued											
Pennsylvania:											
Philadelphia	92	90	0	0	0	34	3	3	0	81	454
Pittsburgh	29	30	0	0	0	12	0	0	0	41	164
Reading	3	11	0	0	0	0	0	0	0	3	22
EAST NORTH CENTRAL											
Ohio:											
Cincinnati	20	63	2	10	0	12	1	0	0	28	133
Cleveland	39	27	0	0	0	12	1	1	0	55	207
Columbus	9	5	2	4	0	2	0	0	0	12	82
Toledo	13	16	1	0	0	5	0	0	0	76	78
Indiana:											
Fort Wayne	6	0	2	0	0	0	1	2	1	1	25
Indianapolis	12	107	12	0	0	8	0	0	0	40	108
South Bend	4	4	1	1	0	0	0	0	0	0	10
Terre Haute	3	3	1	0	0	2	0	0	0	0	32
Illinois:											
Chicago	117	192	2	0	0	57	2	1	0	43	736
Springfield	4	5	0	0	0	0	0	1	0	1	20
Michigan:											
Detroit	96	230	1	2	0	31	2	0	0	116	353
Flint	7	57	2	4	0	2	0	0	0	4	41
Grand Rapids	6	9	1	2	0	1	0	0	0	44	31
Wisconsin:											
Kenosha	2	3	0	0	0	0	0	0	0	11	5
Milwaukee	27	27	1	0	0	3	1	0	0	85	112
Racine	5	0	0	0	0	2	0	0	0	3	13
Superior	2	0	0	0	0	1	0	0	0	5	8
WEST NORTH CENTRAL											
Minnesota:											
Duluth	8	6	0	0	0	1	0	0	0	4	24
Minneapolis	43	22	2	0	0	8	0	0	0	77	117
St. Paul	24	23	0	0	0	6	0	0	0	48	54
Iowa:											
Davenport	2	2	2	9	-------	-------	0	0	-------	0	-------
Des Moines	5	31	2	0	-------	-------	0	0	-------	0	27
Sioux City	2	0	1	0	-------	-------	0	0	-------	4	-------
Waterloo	1	24	0	0	-------	-------	0	3	-------	13	-------
Missouri:											
Kansas City	13	2	1	0	0	7	0	0	0	10	102
St. Joseph	3	1	1	1	0	0	0	0	0	0	16
St. Louis	34	19	3	2	0	19	1	1	1	55	211
North Dakota:											
Fargo	2	0	0	0	0	0	0	1	0	0	5
Grand Forks	2	0	0	2	-------	-------	0	0	-------	0	-------
South Dakota:											
Aberdeen	1	1	0	0	-------	-------	0	0	-------	1	-------
Sioux Falls	2	2	0	1	-------	-------	0	0	-------	0	6
Nebraska:											
Omaha	3	7	4	3	0	5	0	0	0	3	60
Kansas:											
Topeka	3	4	0	0	0	1	0	0	0	14	27
Wichita	3	28	1	1	0	3	0	0	0	11	36
SOUTH ATLANTIC											
Delaware:											
Wilmington	5	0	0	0	0	1	0	0	0	3	29
Maryland:											
Baltimore	30	27	0	0	0	21	2	0	0	130	186
Cumberland	0	1	0	0	0	0	0	0	0	0	9
Frederick	2	1	0	0	0	0	0	0	0	0	3
District of Columbia:											
Washington	24	15	1	0	0	20	1	2	0	23	139

City reports for week ended May 4, 1929—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
SOUTH ATLANTIC—continued											
Virginia:											
Lynchburg	0	1	0	0	0	0	0	0	0	2	11
Norfolk	2	0	0	0	0	3	0	0	0	18	-------
Richmond	3	4	0	0	0	4	0	1	0	1	59
Roanoke	0	0	1	0	0	0	0	0	0	0	11
West Virginia:											
Charleston	1	1	0	0	0	1	0	0	0	2	14
Wheeling	2	0	0	0	0	1	1	0	0	4	14
North Carolina:											
Raleigh	0	0	0	0	0	1	0	0	0	8	10
Wilmington	0	0	0	0	0	0	0	0	0	0	11
Winston-Salem	1	1	2	0	0	0	0	1	0	24	26
South Carolina:											
Charleston	0	0	1	0	0	2	0	0	0	3	28
Columbia	0	2	0	0	0	1	0	0	0	0	22
Georgia:											
Atlanta	4	8	4	0	0	4	0	0	0	27	86
Brunswick	0	0	0	0	0	0	0	0	0	0	4
Savannah	0	0	1	0	0	1	1	2	2	2	46
Florida:											
Miami	0	0	1	0	0	1	1	0	0	13	15
St. Petersburg	0	-------	0	-------	0	0	0	-------	0	-------	9
Tampa	1	0	0	0	0	1	1	0	0	5	21
EAST SOUTH CENTRAL											
Kentucky:											
Covington	2	3	0	3	0	1	0	0	0	0	27
Tennessee:											
Memphis	4	11	3	0	0	4	1	1	0	11	64
Nashville	1	19	1	0	0	1	0	1	0	0	40
Alabama:											
Birmingham	2	0	6	0	0	2	1	2	0	6	59
Mobile	0	0	0	0	0	3	0	0	0	0	24
Montgomery	0	0	0	0	-------	-------	0	0	-------	0	-------
WEST SOUTH CENTRAL											
Arkansas:											
Fort Smith	0	0	0	0	-------	-------	0	0	-------	0	-------
Little Rock	0	0	0	0	0	0	0	0	0	4	-------
Louisiana:											
New Orleans	5	51	0	0	0	17	2	4	2	3	154
Shreveport	0	0	1	1	0	0	0	0	0	1	24
Oklahoma:											
Oklahoma City	1	4	2	2	0	1	0	0	1	3	27
Tulsa	1	2	2	2	-------	-------	0	0	-------	5	-------
Texas:											
Dallas	3	11	2	8	0	7	0	0	0	10	59
Fort Worth	1	2	6	2	0	3	0	0	0	0	29
Galveston	0	2	0	0	0	0	1	0	0	0	11
Houston	1	3	1	1	0	6	0	3	0	1	75
San Antonio	1	5	0	1	0	10	0	1	0	0	77
MOUNTAIN											
Montana:											
Billings	1	0	0	0	0	0	0	0	0	0	6
Great Falls	1	1	2	0	0	1	0	0	0	7	8
Helena	2	-------	0	-------	-------	-------	0	-------	-------	-------	-------
Missoula	1	0	0	5	0	0	0	0	0	0	7
Idaho:											
Boise	1	-------	0	-------	-------	-------	0	-------	-------	-------	-------
Colorado:											
Denver	12	3	1	0	0	13	0	0	0	6	78
Pueblo	1	0	0	0	0	0	0	1	0	0	2
New Mexico:											
Albuquerque	0	0	0	0	0	6	0	0	0	0	14
Utah:											
Salt Lake City	2	4	2	8	0	1	0	0	0	8	34
Nevada:											
Reno	0	1	0	0	0	0	0	0	0	0	5

City reports for week ended May 4, 1929—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
PACIFIC											
Washington:											
Seattle	8	11	3	6	----	----	0	2	----	80	----
Spokane	4	3	7	1	----	----	0	1	----	6	----
Tacoma	2	3	3	5	0	1	0	0	0	6	28
Oregon:											
Portland	5	7	8	14	0	4	1	0	0	0	76
Salem	----	0	----	1	0	0	----	0	0	0	----
California:											
Los Angeles	25	44	6	2	0	20	1	0	0	38	190
Sacramento	1	12	1	2	0	0	0	0	1	13	32
San Francisco	17	70	1	0	0	16	1	1	1	19	171

Division, State, and city	Meningococcus meningitis		Lethargic encephalitis		Pellagra		Poliomyelitis (infantile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, estimated expectancy	Cases	Deaths
NEW ENGLAND									
New Hampshire:									
Nashua	0	0	0	0	0	0	0	0	1
Massachusetts:									
Worcester	1	0	0	0	0	0	0	0	0
MIDDLE ATLANTIC									
New York:									
New York	23	6	6	2	0	0	1	1	0
Rochester	0	0	0	0	0	1	0	0	0
Syracuse	1	1	0	0	0	0	0	0	0
New Jersey:									
Newark	1	1	0	0	0	0	0	0	0
Pennsylvania:									
Philadelphia	3	1	1	0	0	0	0	0	0
Pittsburgh	0	1	0	1	0	0	0	0	0
EAST NORTH CENTRAL									
Ohio:									
Cincinnati	0	0	0	1	0	0	0	0	0
Cleveland	12	4	1	0	0	0	0	1	0
Toledo	2	0	0	0	0	0	0	0	0
Indiana:									
Indianapolis	0	1	0	0	0	0	0	0	0
Illinois:									
Chicago	12	8	0	2	0	0	0	0	0
Michigan:									
Detroit [1]	35	14	1	0	0	1	0	1	1
Flint	3	2	0	0	0	0	0	0	0
Wisconsin:									
Milwaukee	1	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL									
Minnesota:									
Minnneapolis	1	0	0	0	0	0	1	0	0
Missouri:									
Kansas City	10	6	0	0	0	0	0	0	0
St. Louis	5	3	0	0	0	0	0	0	0
North Dakota:									
Fargo	0	0	2	1	0	0	0	0	0
Kansas:									
Topeka	0	0	1	1	0	0	0	0	0
Wichita	1	0	0	0	0	0	0	0	0

[1] Rabies (human): 1 death at Detroit, Mich.

City reports for week ended May 4, 1929—Continued

Division, State, and city	Meningococcus meningitis		Lethargic encephalitis		Pellagra		Poliomyelitis (infantile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, estimated expectancy	Cases	Deaths
SOUTH ATLANTIC									
Virginia:									
Lynchburg	0	0	0	0	0	2	0	0	0
Richmond	1	0	0	0	0	0	0	0	0
North Carolina:									
Wilmington	0	0	0	0	0	1	0	0	0
South Carolina:									
Charleston	0	0	0	0	1	1	0	0	0
Columbia	0	0	0	0	0	4	0	0	0
Georgia:									
Atlanta	1	1	0	0	0	0	0	0	0
Savannah [2]	0	0	0	0	1	1	0	0	0
EAST SOUTH CENTRAL									
Tennessee:									
Memphis	1	1	0	0	0	0	0	0	0
Nashville	0	0	0	0	0	1	0	0	0
Alabama:									
Montgomery	0	----	0	----	1	----	0	0	----
WEST SOUTH CENTRAL									
Arkansas:									
Little Rock	[3] 1	0	0	0	0	0	0	0	0
Louisiana:									
New Orleans	1	0	1	1	4	2	0	0	0
Oklahoma:									
Oklahoma City	0	1	0	0	0	0	0	0	0
Texas:									
Houston	0	0	0	0	0	1	0	0	0
MOUNTAIN									
Montana:									
Missoula	1	0	0	0	0	0	0	0	0
Colorado:									
Denver	1	0	0	0	0	0	0	0	0
Utah:									
Salt Lake City	3	2	0	0	0	0	0	0	0
PACIFIC									
Washington:									
Seattle	4	----	0	----	0	----	0	0	----
Oregon:									
Portland	1	0	0	0	0	0	0	0	0
California:									
Los Angeles	3	2	0	0	0	0	0	0	0
Sacramento	3	2	0	0	0	0	0	0	0
San Francisco	2	2	0	0	0	0	1	0	0

[2] Typhus fever; 2 cases at Savannah, Ga.

[3] Nonresident.

The table following gives the rates per 100,000 population for 98 cities for the 5-week period ended May 4, 1929, compared with those for a like period ended May 5, 1928. The population figures used in computing the rates are approximate estimates, authoritative figures for many of the cities not being available The 98 cities reporting cases have an estimated aggregate population of more than 31,000,000. The 91 cities reporting deaths have nearly 30,000,000 estimated population. The number of cities included in each group and the estimated aggregate populations are shown in a separate table.

Summary of weekly reports from cities, March 31 to May 4, 1929—Annual rates per 100,000 population, compared with rates for the corresponding period of 1928 [1]

DIPHTHERIA CASE RATES

	Week ended—									
	Apr. 6, 1929	Apr. 7, 1928	Apr. 13, 1929	Apr. 14, 1928	Apr. 20, 1929	Apr. 21, 1928	Apr. 27, 1929	Apr. 28, 1928	May 4, 1929	May 5, 1928
98 cities	131	135	124	146	135	139	136	130	[2] 136	125
New England	136	126	118	168	143	131	111	133	81	133
Middle Atlantic	190	189	166	210	198	204	194	172	190	171
East North Central	125	121	126	116	122	116	143	131	159	107
West North Central	75	102	83	102	112	80	85	84	77	78
South Atlantic	82	96	71	90	66	88	58	94	69	96
East South Central	27	35	75	42	7	42	54	56	20	35
West South Central	119	134	126	162	103	126	130	101	103	81
Mountain	44	44	61	133	70	80	78	133	[2] 65	80
Pacific	60	77	67	74	60	102	60	56	75	125

MEASLES CASE RATES

98 cities	842	1,275	827	1,336	900	1,361	842	1,284	[2] 922	1,421
New England	525	1,874	642	1,727	502	1,743	566	1,593	509	1,322
Middle Atlantic	174	1,508	160	1,744	146	1,829	153	1,868	165	2,273
East North Central	1,884	1,033	1,943	997	2,025	816	1,962	727	2,319	793
West North Central	1,961	765	1,655	864	2,123	990	1,711	1,021	1,775	892
South Atlantic	650	2,386	465	2,173	761	2,455	536	1,810	435	2,235
East South Central	88	596	129	814	54	1,480	20	1,297	129	610
West South Central	257	442	241	434	182	385	289	401	356	397
Mountain	618	709	192	744	269	762	366	842	[2] 472	753
Pacific	282	448	329	525	389	394	389	386	297	266

SCARLET FEVER CASE RATES

98 cities	291	276	271	223	269	252	296	267	[2] 301	255
New England	344	331	319	301	244	264	294	329	280	345
Middle Atlantic	244	367	224	274	224	288	246	313	245	303
East North Central	426	252	372	193	417	271	451	281	467	254
West North Central	275	264	242	278	215	289	281	276	261	219
South Atlantic	94	186	122	161	90	168	97	222	114	186
East South Central	210	91	183	42	143	112	109	161	224	147
West South Central	281	150	237	130	233	166	225	169	285	150
Mountain	104	239	165	239	70	213	122	204	[2] 83	275
Pacific	324	133	387	123	384	151	407	119	357	154

SMALLPOX CASE RATES

98 cities	11	18	12	20	9	22	13	25	[2] 12	14
New England	2	0	2	0	0	0	0	0	0	0
Middle Atlantic	0	0	0	0	0	0	0	0	0	0
East North Central	15	24	20	24	11	31	17	28	15	15
West North Central	17	84	8	49	10	61	13	68	13	31
South Atlantic	4	15	4	11	2	11	2	33	0	15
East South Central	7	14	7	28	0	21	0	98	20	14
West South Central	79	4	79	16	12	8	24	28	43	36
Mountain	26	166	78	151	44	168	26	151	[2] 129	106
Pacific	17	18	10	74	62	59	82	43	40	31

TYPHOID FEVER CASE RATES

98 cities	5	5	12	5	10	6	8	4	[2] 8	6
New England	5	2	9	9	7	7	5	5	7	2
Middle Atlantic	2	1	7	5	8	6	4	3	5	4
East North Central	7	3	11	1	4	3	4	2	3	3
West North Central	4	6	25	8	10	6	12	6	10	2
South Atlantic	4	13	13	4	24	10	17	6	11	15
East South Central	7	21	20	21	7	21	20	7	27	0
West South Central	8	16	43	20	42	20	26	24	33	28
Mountain	0	0	0	0	0	0	0	0	[2] 9	0
Pacific	7	8	7	3	10	3	7	0	10	15

[1] The figures given in this table are rates per 100,000 population, annual basis, and not the number of cases reported. Populations used are estimated as of July 1, 1929 and 1928, respectively.

[2] Helena, Mont., and Boise, Idaho, not included.

Summary of weekly reports from cities, March 31 to May 4, 1929—Annual rates per 100,000 population, compared with rates for the corresponding period of 1928—Continued

INFLUENZA DEATH RATES

	Week ended—									
	Apr. 6, 1929	Apr. 7, 1928	Apr. 13, 1929	Apr. 14, 1928	Apr. 20, 1929	Apr. 21, 1928	Apr. 27, 1929	Apr. 28, 1928	May 4, 1929	May 5, 1928
91 cities	20	35	15	31	15	29	13	33	[1] 8	33
New England	11	16	7	9	9	7	7	14	2	21
Middle Atlantic	16	31	14	27	11	26	12	34	6	28
East North Central	18	40	15	27	14	28	6	35	5	36
West North Central	27	24	6	37	18	61	12	46	18	80
South Atlantic	17	21	17	33	21	17	13	33	11	23
East South Central	74	92	30	123	15	92	30	54	30	115
West South Central	49	108	32	92	53	46	45	37	8	25
Mountain	44	80	17	53	9	53	52	44	[1] 19	35
Pacific	20	7	23	13	13	13	13	17	16	7

PNEUMONIA DEATH RATES

91 cities	102	218	139	213	127	204	118	204	[1] 124	213
New England	102	179	127	177	115	166	145	138	106	189
Middle Atlantic	178	244	161	243	134	243	130	246	136	265
East North Central	134	240	126	199	119	191	99	214	125	211
West North Central	147	184	114	263	108	233	111	135	126	193
South Atlantic	144	187	165	212	146	187	127	178	109	189
East South Central	141	283	163	176	155	238	96	222	170	230
West South Central	142	187	93	241	81	200	93	191	93	92
Mountain	122	97	113	186	122	106	87	106	[1] 167	159
Pacific	131	104	96	88	157	81	125	125	75	74

[1] Helena, Mont., and Boise, Idaho, not included.

Number of cities included in summary of weekly reports, and aggregate population of cities of each group, approximated as of July 1, 1929 and 1928, respectively

Group of cities	Number of cities reporting cases	Number of cities reporting deaths	Aggregate population of cities reporting cases		Aggregate population of cities reporting deaths	
			1929	1928	1929	1928
Total	98	91	31,568,400	31,052,700	29,995,100	29,498,600
New England	12	12	2,305,100	2,273,900	2,305,100	2,273,900
Middle Atlantic	10	10	10,809,700	10,702,200	10,809,700	10,702,200
East North Central	16	16	8,181,900	8,001,300	8,181,900	8,001,300
West North Central	12	9	2,712,100	2,673,300	1,736,900	1,708,100
South Atlantic	19	19	2,783,200	2,732,900	2,783,200	2,732,900
East South Central	6	5	767,900	745,500	704,200	682,400
West South Central	8	7	1,319,100	1,289,900	1,285,000	1,256,400
Mountain	9	9	598,800	590,200	598,800	590,200
Pacific	6	4	2,090,600	2,043,500	1,590,300	1,551,200

FOREIGN AND INSULAR

ANGOLA

Communicable diseases—January, 1929.—During the month of January, 1929, cases of communicable diseases were reported in Angola, as follows:

Disease	Cases	Disease	Cases
Ancylostomiasis	53	Pneumonia and broncho-pneumonia	82
Bilharzia	62	Puerperal fever	5
Chicken pox	59	Relapsing fever	7
Diphtheria	1	Scabies	177
Dysentery	111	Smallpox	1
Erysipelas	1	Syphilis	138
Gonorrhea	112	Tetanus	1
Influenza	432	Trypanosomiasis	280
Leprosy	2	Tuberculosis	47
Malaria	1,301	Venereal disease	192
Malarial hemoglobinuria	18	Whooping cough	63
Measles	81	Yaws	522
Mumps	1		

Communicable diseases—Year, 1928.—During the year 1928, communicable diseases were reported in Angola as follows:

Disease	Cases	Disease	Cases
Ancylostomiasis	533	Mumps	153
Beriberi	110	Pneumonia and broncho-pneumonia	950
Bilharzia	635	Puerperal fever	24
Cerebrospinal meningitis	33	Relapsing fever	86
Chicken pox	376	Scabies	901
Diphtheria	14	Smallpox	67
Dysentery	800	Tetanus	345
Erysipelas	4	Trypanosomiasis	5,147
Influenza	4,801	Tuberculosis	435
Leprosy	90	Typhoid fever	35
Malaria	11,352	Venereal disease	4,278
Malarial hemoglobinuria	264	Whooping cough	370
Measles	1,014	Yaws	4,026

CANADA

Vital statistics—1926 and 1927.—The following table gives the vital statistics for Canada, exclusive of Yukon and North West Territories, for the years 1926 and 1927, as compiled by the Dominion Bureau of Statistics:

	1926	1927
Estimated population	9,378,000	9,507,000
Marriages	66,658	69,515
Marriage rate per 1,000 population	7.1	7.3
Births (exclusive of stillbirths)	232,750	234,188
Birth rate per 1,000 population	24.8	24.6
Illegitimate births	6,121	6,715
Per cent of total births	2.63	2.87

Provinces—Communicable diseases—Week ended April 27, 1929.—The Department of Pensions and National Health reports cases of certain communicable diseases from eight Provinces of Canada for the week ended April 27, 1929, as follows:

Disease	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal fever				7			6	2	15
Influenza			5	9					14
Smallpox			11	21	1	3		8	44
Typhoid fever		1	20	12	16		3	4	56

Quebec Province—Communicable diseases—Week ended May 4, 1929.—The Bureau of Health of the Province of Quebec reports cases of certain communicable diseases for the week ended May 4, 1929, as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	3	Mumps	69
Chicken pox	40	Scarlet fever	120
Diphtheria	59	Smallpox	4
German measles	11	Tuberculosis	41
Influenza	3	Typhoid fever	8
Measles	123	Whooping cough	31

Quebec Province—Vital statistics—Comparative—January, 1929.—Births, deaths, and marriages for the month of January, 1929, with comparisons for the same month of the years 1926, 1927, and 1928 are given in the following table:

	January, 1926		January, 1927		January, 1928		January, 1929	
	Number	Per 1,000 population	Number	Per 1,000 population	Number	Per 1,000 population	Number	Per 1,000 population
Births	6,893	31.6	6,249	28.3	6,825	30.5	6,317	27.6
Marriages	1,145	5.2	1,193	5.4	1,283	5.6	1,045	4.6
Deaths	3,052	14.0	3,199	14.5	3,028	13.5	4,614	20.2
Deaths under 1 year	909		968		794		1,092	
Estimated population	2,561,800		2,604,000		2,647,000		2,691,000	

The deaths of infants under 1 year per 1,000 live births were: 1929, 172.9; 1928, 116.3; 1927, 154.9; 1926, 131.9.

The following table shows the number of deaths from certain causes in the Province of Quebec for the month of January, 1929:

	Deaths		Deaths
Cancer	173	Pneumonia	379
Cerebrospinal meningitis	7	Scarlet fever	19
Diabetes	28	Syphilis	2
Diarrhea	87	Tuberculosis (pulmonary)	222
Diphtheria	55	Tuberculosis (other forms)	46
Heart disease	379	Typhoid fever	22
Influenza	946	Violence	45
Measles	11	Whooping cough	13

CEYLON

Colombo—Cholera.—Cholera was reported at Colombo, Ceylon, May 4, 1929.

CHINA

Meningitis.—During the week ended May 4, 1929, 7 cases of meningitis, with 7 deaths, were reported at Canton, China. At Shanghai, during the week ended May 11, there were 41 admissions to the hospital and 32 deaths from meningitis.

CUBA

Habana—Communicable diseases— April, 1929.—During the month of April, 1929, communicable diseases were reported from Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chicken pox	18		Measles	227	17
Diphtheria	34	3	Scarlet fever	8	1
Leprosy	1		Typhoid fever [1]	29	5
Malaria [1]	19				

[1] Many of these cases are from the interior.

CZECHOSLOVAKIA

Communicable diseases—March, 1929.—During the month of March, 1929, communicable diseases were reported in the Republic of Czechoslovakia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	1		Puerperal fever	57	22
Cerebrospinal meningitis	28	17	Scarlet fever	1,170	38
Diphtheria	898	91	Trachoma	202	
Dysentery	8	2	Typhoid fever	220	27
Paratyphoid fever	3	1	Typhus fever	41	1

GREECE

Patras—Amebic dysentery.—Amebic dysentery was reported prevalent at Patras, Greece, May 15, 1929.

ITALY

Communicable diseases—Four weeks ended December 16, 1928.—During the four weeks ended December 16, 1928, communicable diseases were reported in the Kingdom of Italy as follows:

Disease	Nov. 19-25		Nov. 26-Dec. 2		Dec. 3-9		Dec. 10-16	
	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected
Anthrax	41	38	37	29	22	19	30	22
Cerebrospinal meningitis	4	4	8	7	2	2	4	4
Chicken pox	204	74	309	111	181	71	247	91
Diphtheria	554	281	577	312	485	258	469	248
Dysentery	14	10	2	2	8	5	5	3
Lethargic encephalitis	4	3	2	2	1	1	1	1
Measles	1,163	182	1,549	225	1,139	195	1,542	215
Poliomyelitis	17	13	14	12	6	5	11	10
Rabies	3	1			1	1		
Scarlet fever	401	147	412	183	345	140	445	154
Smallpox							2	2
Typhoid fever	842	362	827	357	826	284	525	268

JAMAICA

Communicable diseases—Four weeks ended April 27, 1929.—During the four weeks ended April 27, 1929, cases of certain communicable diseases were reported from Kingston, Jamaica, and from the island of Jamaica outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chicken pox	15	14	Puerperal fever		3
Dysentery	3	8	Smallpox		1
Erysipelas		1	Tuberculosis	14	52
Poliomyelitis		2	Typhoid fever	4	60

NORWAY

Anthrax.—According to information dispatched April 24, 1929, two cases of anthrax, one fatal, occurred at Evje, Norway. Both were evidently caused from contact with the same cow, the butcher and the owner having contracted the disease. Necessary precautions have been taken.

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

From medical officers of the Public Health Service, American consuls, 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

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

Place		Oct. 21–Nov. 17, 1928	Nov. 18–Dec. 15, 1928	Dec. 16, 1928–Jan. 12, 1929	Jan. 13–Feb. 9, 1929	Week ended— February, 1929		March, 1929					April, 1929				May 4, 1929
						16	23	2	9	16	23	30	6	13	20	27	
Ceylon	C			7				2	2								
	D			4				2	2								
Colombo	C			3	2												P
	D			1													
Ingiriya Province	C	1															
	D	1															
China: Canton	C	2		3						1	1	1		1			
	D			1										1			
India	C	20,937	23,528	17,038	12,566	2,193	1,881	1,766									
	D	12,490	14,950	10,507	7,912	1,280	1,092	1,007									
Bassein	C		1		6	2	1	1	2	1	3	12	29	26			
Bombay	C	1	4		1					1		4					
	D	1	4						1			1	1				
Calcutta	C	219	247	103	120	43	56	72	90	108	155						
	D	140	155	61	85	30	31	40	43	56	83	79	89	96			
Madras	C	203	102	16	4	2	3	1	3								
	D	115	42	17	5	1		3									
Madras Presidency	C		1														
	D		1														
Moulmein	C		1						1	4	1	1	1				
Negapatam	C		1	6	18	1	1	1									
	D		1														
Rangoon	C		5	6	15	1	4	5	3	3							
	D		3	5	9		1	4	1	2	6	28	1	4			
Tuticorin	C		2	115	85	5	1										
	D	1		61	52	2	2										
India (French):																	
Chandernagor	C	43	25	4						1	1	1		1			
	D	34	10	4						1	1	1		1			
Karikal	C	111	7	54	150	28	10	28	22	14	6			3			
	D	85	4	41	128	21	8	21	21	12	3			3			
Pondicherry Province	C	6	37	92	139	29	18	29	10	30	12	4					
	D	5	30	55	104	24	18	24	8	24	10	4					

Indo-China (see also table below):																	
Pnompenh	C	1	1	6	2	7	22	12	1		2	3	1	3	8		
	D	1	1	1	1	5	20	10	1		1	3	1	1	5		
Saigon	C	1		6	6					2	5	5		3	3		
	D			4	3						1		1	2	1		
Kwangchow-Wan (see table below).																	
Siam	C	47	104	224	195	39	43	41	42	50	74	117	156	175	85		
	D	27	68	150	138	26	32	22	37	33	59	73	104	119	61		
Anthoang	C			4	1	3											
	D			1	1	2											
Ayudhaya	C	15	2	16	4			4				1		2			
	D	12	2	14	4			4				1		2	1		
Bangkok	C	5	18	22	50	17	19	12	13	10	14	3	11	15	16		
	D	3	12	6	43	12	7	5	12	7	9	1	4	10	13		
Chaxoengsao	C				9		1										
	D				9		1										
Dhannapuri	C		6	16	3	1	1	1						2			
	D		5	10	2		1							1			
Lobpuri	C			74		2			1					1			
	D			61		1								1			
Nagara Pathom	C								2								
	D								2								
Nondpuri	C		1	4													
	D		1	2													
Pradhumdham	C				1												
	D				1												
Singhapuri	C			17	6	1											
	D			12	7	1											
Smud Prakar	C		37	30	10	1											
	D		28	10	8												
Smud Sagara	C	27	84														
	D	12	16														
On vessel:																	
S. S. Ekma at Penang from Singapore	C								P								
S. S. Tilawa at Penang from Singapore	C									P							
S. S. Elephanta at Penang from Calcutta	C										P						

Place		October, 1928	November, 1928	December, 1928	January, 1929			February, 1929			March, 1929			April, 1929	
					1-10	11-20	21-31	1-10	11-20	21-28	1-10	11-20	21-31	1-10	11-20
Indo-China (French) (see also table above):															
Annam	C	11	5									3	3		13
Cambodia	C	25	21	25	26	25	28	29	40			26	3		40
Cochin-China	C	52	156	607	232	202	226	107	115			13	170		51
Kwangchow-Wan	C		1												

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

PLAGUE

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

Place		Oct. 21–Nov. 17, 1928	Nov. 18–Dec. 15, 1928	Dec. 16, 1928–Jan. 12, 1929	Jan. 13–Feb. 9, 1929	Week ended— February, 1929		March, 1929					April, 1929				May, 1929	
						16	23	2	9	16	23	30	6	13	20	27	4	11
Algeria:																		
Algiers	C	2																
Oran	C	2																
Argentina:[1]																		
Buenos Aires [2]	C											1	1					
	D											1	1					
Catamarca Province—Recreo	C	P	9															
Cordoba Province—																		
Canada Honda	C	14																
Laborde	C			1														
Jujuy Province—Perico	C			1	3													
Rosario	C			2	1							[2] 20						
Santiago del Estero	C	7																
Tucuman Province—El Mollar	C		5															
Azores: St. Michaels Island	C	3		2	1						1							
	D	1																
Belgian Congo:																		
Djugu	C	2			1	3			1									
	D				1				1									
Lenza	C	1	1	1														
Brazil:																		
Para	C				1													
Santos	C		2															
British East Africa (see also table below):																		
Uganda	C	114	124	155	152	36	27	22	27	18	20							
	D	103	121	152	149	35	27	20	26	17	19							
Canary Islands: Teneriffe	C		1															
Laguna	C				1													
Ceylon:																		
Colombo	C	1	4	8	[3] 6	2			2		2	2		2	2			
	D	1	4	8	5	2			1				1	1	2			
Plague-infected rats			5		2	2				2				1				
Jaffna	C	1																

China:																		
Hainan	C				P		1	P										
Mongolia—Tungliao	C	19																
Suyuan Province	C				P		1	P										
Dutch East Indies:																		
Celebes—Makassar	D			1														
Plague-infected rats		2			1													
Java—																		
Batavia and West Java	C	23	43	54	74	16	16	24	14	21	17			1				
	D	22	42	53	73	16	16	23	14	21	16							
Plague-infected rats			1					2	2		2		3	5				
East Java and Madura	C									1	1							
	D									1	1							
Surabaya	C	2	1		6													
	D	2			6													
Kediri Residency	C				P													
Ecuador (see table below).																		
Egypt:																		
Alexandria	C				3													1
	D				1													
Assiout Province	D	3																
Beni-Suef	C		4	9	3				4	2				1	5		1	
	D		1	2	3				1	1	1				1		1	
Dierout	D	1																
Girga	C		1															
Kena Province	C		4															
Menoufieh Province	C	7																
Port Said	C															1	1	1
Suez	C							1			1	1					1	
Tanta	C	5																
Greece (see also table below):																		
Athens and Piraeus	C	5																
Corfu	C		1															
India	C	8,710	7,767	7,841	12,600	3,767	4,030	4,970										
	D	4,428	4,863	5,234	9,815	2,896	2,867	3,528										
Bassein	D	2		1	4	2	1			1	2	2	1		2			
Bombay	C	5	4		2		2	2		1	1	1						
	D	2	6		4	1	1	1	1	1	3		1	3	1			
Plague-infected rats		7	32	35	38		8	12	18	9	17	18	13	18	20			
Cochin	D			10														
Madras Presidency	C	539	686	800	434	103	90	87	53	50	43							
	D	235	307	231	235	49	58	52	30	32	27							
Rangoon	C	2	1	1	4	1	1	2			5	5						
	D	3	1	2	5	1	1	2			3	3	3	6	4			
Plague-infected rats		4			5	1	4	3	3	2	2	6	5	3	1			

[1] During the period from Nov. 10 to Dec. 11, 1928, 13 cases of plague were reported at El Mollar, Tucuman Province, Argentina. During the same period 1 case of plague was reported at Chipion and 1 at Ucacha, both in Cordoba Province, Argentina.

[2] 18 plague-infected rats were reported at Buenos Aires, Argentina, from July 1 to Dec. 31, 1928.

[3] Unofficial report.

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

PLAGUE—Continued

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

Place		Oct. 21–Nov. 17, 1928	Nov. 18–Dec. 15, 1928	Dec. 16, 1928–Jan. 12, 1929	Jan. 13–Feb. 9, 1929	Week ended— February, 1929		March, 1929					April, 1929				May, 1929	
						16	23	2	9	16	23	30	6	13	20	27	4	11
Indo-China (see also table below):																		
Pnompenh	C	1	4	8	10	2	-------	1	2	3	2	4	1	------	3	5	------	------
	D	1	4	6	9	1	-------	1	1	3	2	4	1	------	3	5	------	------
Saigon	C	1	------	------	------	------	1	------	------	------	------	------	------	------	------	------	------	------
Tourane	C	------	------	------	------	5	------	------	------	------	------	------	------	------	------	------	------	------
Iraq:																		
Baghdad	C	9	10	9	6	-------	1	6	3	4	5	2	------	1	1	2	4	5
	D	5	5	8	3	-------	-------	3	------	------	2	1	------	1	1	2	3	2
Plague-infected rats		------	------	------	6	6	6	5	5	3	2	2	7	2	------	------	------	------
Naudham	C	------	------	------	2	------	------	------	------	------	------	------	------	------	------	------	------	------
	D	------	------	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------
Plague-infected rats		------	------	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------
Madagascar (see also table below): Tamatave	C	7	------	2	1	------	------	------	------	------	------	------	------	------	------	------	------	------
	D	3	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Morocco	C	------	------	------	------	------	------	------	------	------	22	59	25	------	19	------	------	------
	D	------	------	------	------	------	------	------	------	------	14	43	16	------	12	------	------	------
Nigeria:																		
Lagos	C	83	43	12	14	2	4	5	------	1	1	1	------	------	1	------	------	------
	D	77	41	11	12	2	4	5	------	1	1	1	1	------	1	------	------	------
Plague-infected rats		145	30	28	48	10	16	15	9	13	------	3	------	------	------	------	------	------
Peru (see table below).																		
Senegal (see table below).																		
Siam	C	1	9	4	45	3	4	1	1	------	2	4	1	5	1	------	------	------
	D	1	8	3	17	2	5	1	1	------	2	4	------	3	------	------	------	------
Bangkok	C	1	------	4	1	------	1	------	------	------	------	------	------	------	------	------	------	------
	D	1	------	1	2	------	1	------	------	------	------	------	------	------	------	------	------	------
Nagara Pathom	C	------	------	------	------	------	2	1	------	------	------	4	------	1	------	------	------	------
	D	------	------	------	------	------	1	1	------	------	------	4	------	1	------	------	------	------
Panknampo	C	------	8	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Straits Settlements: Singapore	C	------	------	------	------	------	1	------	------	------	------	------	------	------	------	1	------	------
	D	------	------	------	------	------	1	------	------	------	------	------	------	------	------	1	------	------
Syria (see table below).																		
Turkey: Adalia	C	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

Union of Socialist Soviet Republics:																			
Kalmouks District	C	10																	
Kazaks	C	7																	
Ural Government	C	7																	
Union of South Africa:																			
Cape Province	C	2	1	4															
Orange Free State	C	P		1		6	1	1			P	1	1						
	D					1							2						
Transvaal	C			3								5	3						
	D											5	3						
Uruguay:																			
Montevideo	C												4						
Rivers	C			1															
On vessel:																			
S. S. Chenonceaux, at Singapore, from Colombo	C											1							
	D											1							
S. S. Halydan, at Bangkok, from Singapore	C			1															
S. S. Soudades, at Hamburg, from Rosario, Argentina—Plague-infected rats															2				
S. S. Sjomand, at Alexandria, from Batoum	C					1													

Place		November, 1928	December, 1928	January, 1929	February, 1929	March, 1929	April, 1929
British East Africa (see also table above):							
Kenya	C	16	15	7	4	10	
Uganda	C					121	
	D					113	
Ecuador: Guayaquil	C	21	20	25	54	26	
	D	8	7	12	22	4	
Plague-infected rats		29	75	29	27	14	
Greece (see also table above)	C	1	2	3			
	D	1	1	1			
Indo-China (see also table above)	C			11		3	2
Madagascar (see also table above)	C		282	233			
	D		263	224			
Ambositra Province	C	14	79	169			
	D	14	74	159			
Antisirabe Province	C	6	4	15			
	D	6	4	15			
Itasy Province	C	6	11	3			
	D	6	11	3			
Moramanga Province	C	32	28	22			
	D	32	27	21			
Tamatave	C	2	2	4			
	D	2	2	4			

Place		November, 1928	December, 1928	January, 1929	February, 1929	March, 1929	April, 1929
Madagascar—Continued.							
Tananarive Province	C	159	158	208			
	D	141	144	192			
Peru	C	18	26	37			
	D	6	6	9			
Senegal:							
Baol [1]	C	18	4			6	
	D	6	2			3	
Cayor [1]	C		14				
	D		10				
Dakar [1]	C						5
	D						4
Louga [1]	C	2					
	D	1					
Rufisque [1]	C	8					
	D	4					
Thies [1]	C	11			8	4	20
	D				7	3	20
Tivaouane [1]	C				12		
	D				2		
Syria: Beirut	C	3					

[1] Reports incomplete.

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

SMALLPOX

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

Place		Oct. 21–Nov. 17, 1928	Nov. 18–Dec. 15, 1928	Dec. 16, 1928–Jan. 12, 1929	Jan. 13–Feb. 9, 1929	Week ended— February, 1929 16	February, 1929 23	March, 1929 2	March, 1929 9	March, 1929 16	March, 1929 23	March, 1929 30	April, 1929 6	April, 1929 13	April, 1929 20	April, 1929 27	May, 1929 4	May, 1929 11
Algeria:																		
Algiers	C	2	1										3					
Cherchell	C						4	11	6	11	19	12		1				
Oran	C		7					1			1			1				
Arabia: Aden	C	1	1	1	2					1	11	9	9	28	17	19		
Brazil (see table below).	D										1	4	3	6	4	6		
British East Africa (see also table below), Kenya—Mombasa	C			3														
British South Africa:																		
Northern Rhodesia	C	342	67	173														
	D	14	8	23														
Southern Rhodesia	C	1	5		1	1	16				68	1						
Tanganyika	C	1			13	1		1	1									
Canada:																		
Alberta	C	4	21	3	3		2	1	1			7		5				
Calgary	C								1								2	
Edmonton	C			14	2		2			2			10		4		1	
British Columbia—Vancouver	C	21	25	51	66	17	14	21	18	22	17	18		12	19	8		
Manitoba	C	14	29	23	21	2	5	3	5			3				1		
Winnipeg and vicinity	C		17	2														
New Brunswick	C											3		1				
Nova Scotia	C			5	2													
Ontario	C	12	15	36	83	38	23	15	7	12	21	14	10	15	37	21		
Kingston	C	1																
Niagara Falls	C										1					2	1	
North Bay	C		1			1	2		1									
Ottawa	C	6	2				1											
Sarnia	C	1																
Toronto	C				1						1		1	1				
Windsor	C															3		3
Prince Edward Island	C				2				2									
Quebec	C	118	125	37	24	6	14	3	5	4	3	2	5	11	8	11		
Montreal	C	10	3	8	10	3	10	2	1	3		1				3	1	
Quebec	C	12	6	4	8						1		2	1				
Riviere du Loup	C													1				

Saskatchewan	C	10	52	14	35	13	22	31	4		13				9	3			
Moose Jaw	C	2	1								1								
Regina	C		2	1	6														
Saskatoon	C				4						1								
China:																			
Amoy	C	P	2	5	P	1	1	1	2	1	1	1							
Canton	C		14	18	87	17	25	15	29	22	42	38	38	29	21	19			
	D			2	2	3	1	2	9	3	4	4	4	2	3	5			
Chefoo	C	P	P																
Foochow	C	P	P	P	P	P	P	P	P	P	P		P						
Hong Kong	C	66	202	319	307	47	54	51	37	26	31	22	13	21	16	11	5		
	D	21	78	152	286	61	59	34	42	51	47	29	10	39	36	15	7		
Manchuria—																			
Changshun	C				3		2							1					
Fushun	C	1			5														
Harbin	C	7	4	2	5														
Kwantung—Dairen	C	2	5		2	1	4	3	1				1	6	2	2			
	D				2	1		2						3		1			
Mukden	C			1	3								1						
	D				1														
Shanghai—																			
Foreigners only	C	9	6	23	28	3	4	1	3	1	1	1	1	1					
Including natives	D	20	32	64	60	9	9	10	12	3	8	5	9	7		5			
Swatow	C							5	4	12	7	6	8	22	32				
Tientsin	C	6	2	6	3		1		1	2		2	4	2					
Tsingtao	C					P	P	P		P		P	P	P					
Yunnanfu	C									P	P	P							
Colombia: Cartagena	D		7				7												
Dominican Republic	C				1														
Dutch East Indies:																			
Balikpapan	C						1			1	4								
Belawan Deli	C	5	6	7	26	4	3	1	1	2	2	2	1	1		3			
	D	2	2	3	6	3	2	1			1	1							
Borneo	C				30		13		13										
Pontianak	C	1																	
Samarinda	C	16	27	11	4		17	3	27	1			1		1				
	D	2	4	3			3	1			3								
Celebes—Makassar	C		1									4	2	6	9	10			
	D												2	5	4	7			
Java—																			
Batavia and West Java	C	2	1																
East Java and Madura	C	1																	
	D	1																	
Surabaya	C	1	2																
Palembang	C					1		8											
	D					1		1											
Sumatra—																			
Baros	C			96	106	3	19	13	1		9								
	D			30	26	1	3	1											
Medan	C	4	3	9	11	4	3	1	1	2	2	2	1						
	D	2	1	5	5	3	2	1		1	1	1							

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

SMALLPOX—Continued

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

Place		Oct. 21–Nov. 17, 1928	Nov. 18–Dec. 15, 1928	Dec. 16, 1928–Jan. 12, 1929	Jan. 13–Feb. 9, 1929	Week ended— February, 1929		March, 1929					April, 1929				May, 1929	
						16	23	2	9	16	23	30	6	13	20	27	4	11
Ecuador (see table below).																		
Egypt:																		
Gharbieh	C					1												
Port Said	C				1													
Suez	C		1												1	4		
France (see table below).																		
Great Britain:																		
England and Wales	C	581	719	733	890	231	275	288	289	272	288	323	273	339	374	354		
Bradford	C		1		1		1		1		3				1			
Bristol	C				1													
Cardiff	C		1		4													
Castleford	C	6	8	16	48	22	31	12	20	13	17	17	1	1				
Hull	C	3	1		2								9	5	14	5		
Leeds	C	1	2	1	3	1	1	3	1	1	3	3	1	1	1	1		
Liverpool	C				1								1					
London	C	21	14	36	40	9	17	10	18	11	13	19	15	29	49	56		
London and Great Towns	C				433	92	102	107	124	123	131	193	151	206	250	203		
	D			1						2			1	1	2	2		
Newcastle-on-Tyne	C	1	3		6	2		3	1	2			14	1				
Nottingham	C	1	3	3	1					2								
Plymouth	C	6																
Stoke-on-Trent	C	9	11	4	14	5	4	4	5	4	28	20	20	42	30	27		
Scotland—																		
Aberdeen	C																	
Dundee	C	2	1												1	1		
Glasgow	C																	
Greece (see table below).													1	12	6	1		
Hedjaz	C			48	153	29	42	37			24	30	30	23	124	13		
	D			15	56	13	15	12			10	21	21	16	22	10		
India	C	3,041	5,902	7,877	12,531	3,528	3,520	3,937										
	D	836	1,602	2,143	3,045	860	788	847										
Bombay	C	9	11	34	158	44	93	112	148	142	119	94	86	104	57	85		
	D	4	4	21	78	32	37	49	70	58	52	51	45	46	30	48		

Calcutta	C	2	13	10	32	13	9	11	71	35	32	22	28	34	24	25			
	D	2	7	6	16	6	7	7	9	24	21	13	19	26	16	16			
Karachi	C			6	5	28	24	49	46	43	57	58	48	29	57	33			
	D				223	7	4	11	22	14	13	20	33	8	22	17			
Madras	C	71	58	94	35	60	56	68	76	88	96	104	104	107	87	70			
	D	22	16	25	6	13	6	18	24	11	23	23	26	20	26	22			
Moulmein	C		5	3	2	4		5	5	5	3	5	5		1	3			
	D		1	1					4	2		1	1		1	3			
Negapatam	C	38	33	8	26	2	2		1	4	3		2	1		3			
	D	8	5		6	2	1		1				1						
Rangoon	C	1	1	1	8	4	6	2	5	3	2	4	3	2					
	D				1	1	1	2	2	1	2		1						
Tuticorin	C				2		1									1			
Vizagapatam	C			2	8	12	4	17	19	8	3	15		9	4	11			
	D					2		3	4	1	2	2		1	4				
India (French):																			
Chandernagor	C	3																	
	D	3																	
Pondicherry Province	C	84	48	75	59	18	26	16	19	6	21	23	20	21	2				
	D	67	46	62	51	14	22	12	13	6	17	18	19	19	2				
Indo-China (see also table below):																			
Pnompenh	C	30	44	38	77	19	15	18	10	13	19	27	9	9	19	9			
	D	5	20	21	42	10	8	11	7	5	10	14	4	5	13	4			
Saigon	C	2		12	5		1	1		1		1	1	1					
	D	2		6	1														
Iraq:																			
Baghdad	C	40	46	20	17	4	2	1		2	3		1	16	1	1	2		
	D	23	45	29	3	4	1				1								
Basra	C	35	35	11	18	4	2		1	2	1	1	5	2	1		2	2	
	D	33	26	7	10	3	1		1			1	1		1		2	1	
Hillah Liwa	C			54	20														
	D			14	9														
Kirkuk Liwa	C		173	86		9	9												
	D		38	17		2	2												
Mossoul	C	53	294	55	30	14	14												
	D	23	110	39	17	2	2												
Sinjar	C			53	61														
	D			5	15														
Italy:																			
Palermo	C	2	3	3															
Rome and vicinity	C			1	2														
Turin	C					1													
Ivory Coast (see table below).																			
Jamaica (outside Kingston) (alastrim)	C			1											1				
Kingston (alastrim)	C		1																
Japan:																			
Kobe	C							1											
Nagasaki	C				3														
	D				2														
Osaka	C							1											
Shimane Province	C																		
Macao	D			9	24	24	24	12	15	6	3	16 14	9	9	6	3			

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

SMALLPOX—Continued

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

Place		Oct. 21–Nov. 17, 1928	Nov. 18–Dec. 15, 1928	Dec. 16, 1928–Jan. 12, 1929	Jan. 13–Feb. 9, 1929	Week ended— February, 1929		March, 1929					April, 1929				May, 1929	
						16	23	2	9	16	23	30	6	13	20	27	4	11
Mexico:																		
Aguascalientes	D		2	1	3		3				2		5	1	6		2	
Chiapas Province	C											P						
Chihuahua	D				1													
Jalisco (State): Guadalajara	C		4	1	3	4	2	1	1		2	4	7	3	1			
Juarez	D			5	1			1		3								
Mexico City and surrounding territory	C	5		7	2		2			1					P			
Oaxaca-Zacatepec	C							1										
Palomas	C																	
Saltillo	C	1																
San Luis Potosi	C	1																
Tampico	C	1					1				2							
Vera Cruz	D										2			P				
Morocco (see table below).																		
Nicaragua: Managua	C																	
Nigeria:																		
Lagos	C	1																
Southern Provinces	C				162													
	D				31									2				
Norway: Stavanger	C																	
Panama Canal Zone	C											P		2				
Poland	C	1	3	1	41													
	D	1			3									2				
Portugal (see also table below).																		
Lisbon	C			2	4					3				2		2		
Oporto	C											1			1			
Senegal (see table below).																		
Siam	C	1	8	19	2		3	1										
	D			2														
Bangkok	C		1															
Spain: Valencia	C						1	1			4	1						
Straits Settlements: Singapore	C			1	5	3		1				1						
Sudan (Anglo-Egyptian)	C	79	220	491	265	49	71	13	55	30	22	37	156	127	138	12	100	162
	D	13	42	57	34	13	14	11	16	6	2	6	15	17	3	3	3	5

Sudan (French) (see table below).																			
Sweden: Stockholm	C		1																
Syria (see table below).																			
Tunisia: Tunis	C	1	2	14				3	2						2				
Union of South Africa:																			
Cape Province	C	P	P																
Natal	C			1															
Orange Free State	C	P																	
Transvaal	C	P																	
Upper Volta	C	5			3	2		2				3	1	7					
On vessel:																			
S. S. Ballarat, en route to Cape Town, South Africa	C	1																4	
S. S. Le Panto at Suez, Egypt	C													1					
S. S. Lopez-Lopez, at Suez	C														1				
S. S. Malwa, at Suez	C													1					
S. S. Mancar, at Suez, from Calcutta	C						3						P						
Tantalus (motorship), at Amsterdam	C																		
S. S. Tuscania, at Glasgow, from Bombay	C																		

Place		October, 1928	November, 1928	December, 1928	January, 1929			February, 1929			March, 1929			April, 1929	
					1-10	11-20	21-31	1-10	11-20	21-28	1-10	11-20	21-31	1-10	11-20
Indo-China (see also table above)	C	100	144	243	74	130	107	128	236			200	361	500	155
Ivory Coast	C	1											4		
Senegal	C	2						80			17	8	45	50	7
	D							8			1	3	7	15	
Sudan (French)	C	32		2								26		10	9
	D	2										3			
Syria: Beirut	C	1	2	1		1		21	24	3		10	2	2	

Place		November, 1928	December, 1928	January, 1929	February, 1929	March, 1929	April, 1929
Brazil: Porto Alegre	C	3					
British East Africa (see also table above):							
Kenya	C	37	31			23	1
Chosen: Chinampo	C				1		
Ecuador: Guayaquil	C	6	13	12	4	2	
	D	1	1	1	1		
France	C		18	9	3	5	

Place		November, 1928	December, 1928	January, 1929	February, 1929	March, 1929	April, 1929
Greece	C	6	6	8	5	2	
	D			1	1		
Morocco	C	2		7	11		
Persia	D		119	68	23	8	
Turkey	C			16	7		
	D			6			

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

TYPHUS FEVER

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

Place		Oct. 21–Nov. 17, 1928	Nov. 18–Dec. 15, 1928	Dec. 16, 1928–Jan. 12, 1929	Jan. 13–Feb. 9, 1929	Week ended— February, 1929		March, 1929					April, 1929			
						16	23	2	9	16	23	30	6	13	20	27
Algeria:																
Algiers	C	4								3	1		2	4	2	3
Constantine Department	C				2	2			11	P	2					
Oran	C	2			5				2						2	1
Bulgaria	C	4	9	5	7	3		19	17	7	18	10	5	5	16	
	D	1							2	1	3		1	1	1	
Sofia	C				1											
Chile: Valparaiso	C		1													
China:																
Canton	C				2											
	D				2											
Hong Kong	C				1											
Manchuria—																
Harbin	C		2													
Kwantung	C	1							1							
Chosen (see table below).																
Czechoslovakia (see table below).																
Egypt:																
Alexandria	C									1						1
Assouan Province	C					2										
	D					2										
Behera Province	C					6	7						67	50		
	D												9	9		
Daqahliya Province	C		15	11						34						
	D		1	2												
Gharbieh	C				1		2									
	D						1									
Menoufieh Province	C														35	
Port Said	C	1														
Greece (see table below).																
Ireland: Irish Free State—																
Clare County—Scariff	C	1														
Cork County	C							1								

Dublin	C				1												
	D				1												
Kerry County—																	
Dingle	C									2						1	
Killarney	C								1					2			
Lithuania (see table below).																	
Mexico (see also table below):																	
Aguascalientes	D		2							3		2					
Chihuahua	D			1													
Mexico City, including municipalities in Federal District	C	15	12	9	11	1	3	1	2	1	1	2		3			
	D	2	1	2	3	1			1					1			
San Luis Potosi	D			1													
Morocco	C	1	16	4	20	6	10	1		7		6	6		8	8	
Palestine	C	6	12	2	3		2					2		1			
Peru (see table below).																	
Poland	C	81	117	203	222	47	51	91	55	69	80	67					
	D	10	11	16	15	6	6	5	3	7	5	2					
Portugal: Oporto	C		1														
Rumania	C	17	42	167	173	42	32	70	67	62	79						
	D		1	11	23	3	7	8	10	7	3						
Tunisia	C	4	6		2	3				9		9	2	7	2		
Menzel	C	1															
Turkey (see table below).																	
Union of South Africa:																	
Cape Province	C	P	P	P	P	P	P	P	P	P	P						
Natal	C	P	P	2			2			P	P						
Orange Free State	C	P	P	P	P	P	P										
Transvaal	C			P	1												
Yugoslavia (see table below).																	

Place		November, 1928	December, 1928	January, 1929	February, 1929	March, 1929	April, 1929
Chosen:							
Chemulpo	C	1					
Seoul	C		3	4			
Czechoslovakia	C			6	7	41	
	D				1	1	
Greece: Athens	C	4	1	13			
	D			5			

Place		November, 1928	December, 1928	January, 1929	February, 1929	March, 1929	April, 1929
Lithuania	C	4	11	32	24	62	101
	D			3	3	1	7
Mexico: Sonora (see also table above)	D			1			
Peru	C	3					
Turkey	C		19	1	3	11	
	D				1		
Yugoslavia	C	17	7	15	13	7	
	D				2		

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

YELLOW FEVER

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

Place		Oct. 21–Nov. 17, 1928	Nov. 18–Dec. 15, 1928	Dec. 16, 1928–Jan. 12, 1929	Jan. 13–Feb. 9, 1929	Week ended— February, 1929 16	23	March, 1929 2	9	16	23	30	April, 1929 6	13	20	27	May 4, 1929
Belgian Congo: Tumba	C															1	
Brazil:																	
Bahia	C	1		2								1					
	D			1								1					
Guaratingueta	C							[3] 1									
	D							[3] 1									
Para	D			2	1								5				
Pernambuco	C												4				
Rio de Janeiro [1]	C	2	2	2	16	13	11	21	47		59	61	66	57	51	39	33
	D	1		2	17	9	6	18	27		30	38	32	34	23	20	17
Sao Paulo	C				1												
	D				1												
Dahomey: Ouidah Military Camp	C	1	1														
	D	1															
Gambia: Bathurst	C	4	3														
	D	1	2														
Liberia: Monrovia	C				[2] 3			4	3	1	3	3	3	2			
	D				2			2	2	1		2	1				
On vessel:																	
S. S. Victoria, at Manaos, from Para, Brazil	C			1													
	D			1													

[1] 29 cases of yellow fever with 14 deaths were reported at Rio de Janeiro during January, 1929, mostly suburban.
[2] Imported.
[3] Suspected cases.