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THE DETERMINATION OF V FACTOR IN THE URINE AND TISSUES OF NORMAL DOGS AND OF DOGS WITH BLACKTONGUE BY THE USE OF *HEMOPHILUS PARAINFLUENZAE*[1]

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Fraser, Topping, and Sebrell (*1*) have shown that in the urine of dogs the excretion of a growth-promoting substance or substances for *Shigella sonnei* is influenced by the intake of nicotinic acid. Dogs suffering from blacktongue excreted relatively little, while following administration of nicotinic acid there was a marked increase in excretion. Nicotinic acid cures canine blacktongue (*2*) and is efficacious in the treatment of pellagra (*3*, *4*). The amide of nicotinic acid is an essential constituent of the coenzymes, triphosphopyridine nucleotide (TPN) (*5*) and diphosphopyridine nucleotide (DPN) (*6*, *7*). Lwoff and Lwoff (*8*) have shown that either of these coenzymes can replace V factor which is required for the growth of *Hemophilus parainfluenzae* (*9*) and that as little as 0.004 gamma can be detected by the use of this bacterium. Using *Hemophilus parainfluenzae*, Kohn (*10*) has shown that the V factor level of human blood can be raised by administration of nicotinic acid.

The results of a study of the excretion of V factor in the urine of dogs maintained on diets deficient in nicotinic acid and on diets containing varying amounts of nicotinic acid are presented in this communication. In addition, the determination of the V factor content of the tissues of a few dogs, normal and with blacktongue, and of several rats are given.

MATERIALS AND METHODS

Diets.—Twelve of fourteen dogs used in this study were also used in some exper, imental work on riboflavin by Fraser, Topping, and Isbell (*11*). In their report the diets are described in detail. Three were employed. One, stock diet No. 326, is adequate for normal development of dogs. Another, No. 515, contains the same ingredients as diet No. 326, but both liver and yeast are supplied in much greater

[1] From the Divisions of Biologics Control and Chemistry, National Institute of Health.

amounts. The third, No. 507, is deficient in nicotinic acid and riboflavin. However, during the period of the present study the dogs receiving the latter diet were given a low maintenance supplement of riboflavin. Furthermore, just before the termination of the present study, certain of the dogs were given large doses of riboflavin, but so far as we have been able to determine the intake of riboflavin had no influence on the amount of V factor excreted in the urine.

The other 2 dogs (348 and 389) were maintained on stock diet No. 326 for 301 and 275 days, respectively, before they were sacrificed.

The rats were maintained on stock diet No. 516 (*11*).

Collection of urine.—The procedure for collecting urine from dogs, previously reported by Fraser, Topping, and Sebrell (*1*), was, briefly, as follows: After voluntary urination the dog was given by stomach tube as much water as apparently it was able to retain comfortably. The amount given to different dogs varied from 360 to 700 ml. The dog was placed in a metabolism cage and during the next 4 hours the urine was collected in dark-colored bottles. Several times during the collection period the urine that had been excreted was placed in the icebox. The male dogs were catheterized for residual urine. The total amount of urine from each dog was measured and the specific gravity determined. A portion was filtered through a Berkefeld N filter for sterilization. The bacterial test for the determination of the V factor was set up as quickly as possible after collection.

Extraction of tissues.—Extractions were made from certain tissues of 6 dogs and 7 rats. Three of the dogs were suffering from blacktongue and 3 were normal. The rats were normal.

The dog tissue extracts were made at three different times, 1 dog with blacktongue and 1 normal dog being used each time. For the extraction of the tissues of the first 2 pairs of dogs the method of v. Euler and associates (*12*) was largely followed, while for the third pair certain procedures suggested by Dr. A. E. Axelrod (*13*) were followed. The procedures are as follows:

First pair of dogs: The animals were sacrificed one at a time; then, as quickly as possible, about 20 grams of each of the tissues to be studied were removed, weighed, ground in a mortar with sand, after which hot distilled water (90°–95° C.) was added to make a 10 percent suspension. The suspension was placed over a flame and, with continuous stirring, was heated at 95°–100° C. until the red color of the tissue had just turned brown. The time required was from 1 to 2 minutes. After standing for a short time the supernatant was decanted, water equal in weight to the original suspension was added, and the mixture was shaken for 1 hour. The supernatant was again decanted. The residue was washed with one-half the amount of water added for the second extraction. The two supernatants and the washing were combined and then filtered through paper and a Berkefeld N filter. The final extract represented a 1:25 dilution of the tissue.

Second pair of dogs: The procedure differed from that used with the first pair only in that the dogs were exsanguinated and the final washing of the tissue was omitted.

Third pair of dogs: These animals were also exsanguinated. From 1- to 2-gram portions of tissue were used. Immediately upon removal, the tissue was quickly frozen in a mortar sitting in a bath of solid carbon dioxide and methyl cellosolve [2] of approximately −78° C. Then it was weighed on a cold watch glass, returned to the mortar and ground, after which it was added to 29 cc. of hot water per gram of tissue. It was heated directly over a flame for approximately a minute, then cooled quickly in a cold water bath, and finally filtered through paper and a Berkefeld N filter.

[2] The methyl ether of ethylene glycol.

Rat tissue extraction: The procedure was essentially the same as for the third pair of dogs. The animals were killed by decapitation. The time elapsing between decapitation and the removal of the last tissue ranged from 1½ to 3 minutes.

The bacterial test for the determination of the V factor in the extracts was set up immediately after the extractions were completed.

Diphosphopyridine nucleotide (DPN).—The DPN was prepared by Dr. F. S. Daft, of this laboratory, according to the method of Meyerhof and Ohlmeyer (*14*). Its growth-promoting activity for *Hemophilus parainfluenzae* was slightly better than that of a preparation of triphosphopyridine nucleotide furnished to Dr. Sebrell through the courtesy of Professor O. Warburg, and the same as that of a sample of DPN prepared by Dr. J. M. Johnson, of this laboratory. The latter preparation was kindly assayed by Dr. Axelrod, who reported its activity to be the same as that of a sample of pure DPN supplied to him by Professor von Euler.

Culture.—One strain of *Hemophilus parainfluenzae*, No. 429, was used for all the bacterial work. It was isolated in 1932 from the spinal fluid of a child who had a brain abscess (*15*).

Culture medium.—The basal medium, containing no V factor, was prepared according to the formula used by Lwoff and Lwoff (*8*) except that the phosphate buffer was omitted. It consisted of Difco proteose peptone 20 gm., sodium chloride 6 gm., distilled water 1 liter, sodium hydroxide to bring it to pH 7.5, and glucose 0.5 gm. (1 ml. of a 50 percent solution) which was added after sterilization. If buffer was present in the medium a precipitate formed during incubation which interfered with the reading of the bacterial turbidity. So far as we could determine there was no difference in the amount of growth in the presence or absence of buffer. In this medium *Hemophilus parainfluenzae* multiplies only if growth factor V has been added.

Determination of V factor.—To determine the amount of V factor in urine or tissue extracts simultaneous titrations were carried out with solutions of DPN of known concentration which served as a standard. Then that dilution of the unknown which promoted bacterial growth of the same density as that promoted in the presence of a known amount of DPN was interpreted as having an amount of V equivalent to the DPN. So far as is known the test for V factor is specific for the coenzymes, DPN and TPN, but it does not distinguish between the two (*8*, *10*). The procedure for the test was as follows:

1. Twofold dilutions of the unknown solutions were prepared in the culture medium in ⅝ x 6-inch test tubes. The final volume in each tube was 3 ml.; this amount provided a relatively large surface for aeration. A larger quantity was not used since it has been shown that a definite relation exists between the amount of V factor and the amount of air required for the growth of *Hemophilus influenzae* (*16*), although the influence of aeration on the amount of V factor required to promote growth of *Hemophilus parainfluenzae* is not known.

For urine the dilutions ranged from 1:5 to 1:80. For tissue extracts they ranged from around 1:100 or lower to a dilution beyond the limit of activity. With some tissues the final dilution was as high as 1:400,000.

The sterility of each solution was ascertained by incubating an uninoculated portion of the lowest dilution.

2. In a similar manner, the control dilutions of DPN were prepared in concentrations of 1 part in 50,000,000, 100,000,000, 200,000,000, and 400,000,000.

3. Each tube was inoculated with 0.1 ml. of a 24-hour-old culture which had been grown in medium to which just enough yeast extract had been added to promote a slightly turbid growth. A control tube of medium, without V factor, similarly inoculated, showed no growth in any instance.

4. The cultures were incubated from 40 to 42 hours. After the first 24 hours they were shaken to increase aeration. Preliminary tests with DPN showed that the maximum amount of growth was not obtained until after incubation for 24 hours. Furthermore, if the amount of growth at the end of 24 hours was plotted against the dilutions of DPN approaching the limit of activity a broken line was obtained, while if the amount of growth at the end of 40 or 42 hours was similarly plotted a straight line resulted. Lwoff and Lwoff (*8*) found that when approaching the active limit of dilution of V factor the amount of bacterial multiplication is closely related to the amount of the growth factor present.

5. After incubation, the density of 4 or more dilutions of each unknown which showed decreasing amounts of growth was measured photometrically. An absorption cell, 0.242 inches in depth, and an orange-colored filter, No. 61, were employed. The actual density due to growth was obtained by subtracting from the first reading the reading of the inoculated control medium which contained

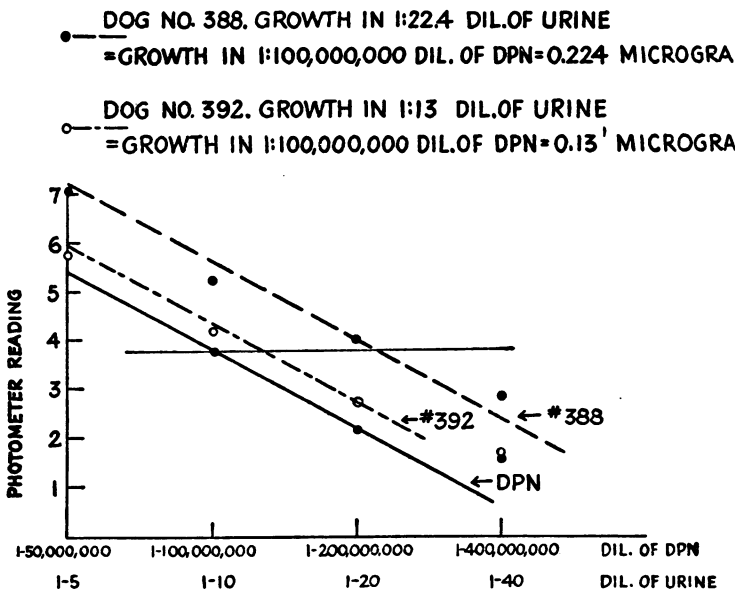

FIGURE 1.—Estimation of the amount of V factor in the urine of two dogs.

no V factor and also no growth. The density of the cultures in the 4 dilutions of DPN was similarly measured. Then the value of each was plotted against the dilution on semilogarithmic paper, and by interpolation an estimate of the V factor in the unknown was made. The point selected for interpolation was at the 1:100,000,000 dilution of DPN. Repeated tests showed that this point lay approximately in the center of that part of the curve which formed a straight line. The dilution of the unknown which promoted the same amount of growth as did this dilution of DPN was interpreted as having a corresponding amount of V factor, that is, one hundred millionth of a gram or one hundredth microgram per ml.

Figure 1 illustrates the procedure of determining the amount of V factor in 2 specimens of urine. The photometer reading of the growth in each dilution of urine and of DPN is plotted against the dilution. A horizontal bar drawn through the point at the 1:100,000,000 dilution of DPN crosses the other two curves at the 1:22.4 and the 1:13 dilutions of the urine from dogs 388 and 392, respectively. The latter points indicate the respective dilutions of urine which promoted the

same amount of growth as did the 1:100,000,000 dilution of DPN. In other words, the two specimens contained, respectively, an amount of V factor equivalent to 0.224 and 0.13 micrograms of DPN per ml.

GROWTH FACTOR V IN THE URINE OF DOGS

During a period of about 2 months, 1 to 7 determinations of the V factor in the urine of each of 11 dogs were made. In table 1 are given the diets of the respective dogs and the results of the determinations, which are expressed, first, in the dilutions of urine which promoted growth equivalent to that in the presence of a 1:100,000,000 dilution of DPN, second, in the average DPN equivalent per ml., and, third, in the average total DPN equivalent per kilogram weight of dog excreted during the 4-hour observation period.

Two of the dogs were being maintained on a blacktongue-inducing diet and developed blacktongue during the course of the experiment. Five were being maintained on the same diet supplemented with approximately 2 to 10 times the amount of nicotinic acid, which has been shown by Sebrell, Onstott, Fraser, and Daft (*17*) to be required to prevent the development of blacktongue. The remaining 4 were being kept on a diet rich in liver and yeast.

The dilutions of urine promoting growth equivalent to the designated amount of DPN varied from a low of 1:4 to a high of 1:22.4. The average dilution for an individual dog varied from 1:10 to 1:20.4. For the majority of the dogs, however, the average dilutions were very similar: 5 were from 1:14.3 to 1:14.7, and 3 others were not far from these figures, 1:13.5, 1:15.2, and 1:17.5. The remaining 3, however, showed considerable variation, 1:10, 1:11, and 1:20.4. The latter figure was obtained from only 2 determinations of urine from dog 388 after blacktongue had developed. No determination was made preceding onset of symptoms. Furthermore, on the occasion when the highest figure, 1:22.4, was obtained the forced amount of fluid was less than the usual amount. With the other dog, 358, which developed blacktongue there was no significant difference in the amount of excreted V factor before or after the onset of blacktongue symptoms. Moreover, the amount excreted by this dog on a nicotinic acid deficient diet was no different from that excreted either by 2 dogs (391 and 407) whose diets were supplemented with nicotinic acid or by 2 other dogs (431 and 432) maintained on a diet rich in liver and yeast.

Although only 2 dogs maintained on a nicotinic acid deficient diet were studied, the relative high or comparable amount of V factor excreted suggests that there is not a decrease in the amount excreted by dogs suffering from blacktongue.

Likewise, dogs that were fed different amounts of nicotinic acid showed no correlation in the amount of V factor excreted. Three

TABLE 1.—*The excretion of growth factor V in the urine of dogs*

Number of dog	Diet	Date of urine collection (1939)	Clinical condition	Dilution promoting growth equivalent to that of 1:100,000,000 dilution of DPN		DPN equivalent of average dilution (microgram/ml.)	Average 4-hour excretion of urine		
					Average		Total amount collected (ml.)	Amount per kg. weight of dog (ml.)	DPN equivalent per kg. weight of dog (microgram)
388, female, 7.5 kg.	Blacktongue inducing No. 507.	Apr. 10	Early blacktongue.	[1] 1:22.4	1:20.4	0.204	350	46.67	9.52
		Apr. 13	do	1:18.4					
358,[2] male, 11.0 kg.		Apr. 26	Normal	1:15.6	1:14.7	0.147	553	50.27	7.39
		May 2	do	1:13.3					
		May 9	do	1:15.7					
		May 16	do	1:13.7					
		June 1	Early blacktongue.	1:14.1					
		June 6	Blacktongue	1:15.9					
391, male, 13.8 kg.	Plus 0.2 mg. nicotinic acid/kg. daily.	Apr. 12	Normal	1:16.6	1:14.6	0.146	538	38.99	5.69
		Apr. 24	do	1:15.9					
		May 2	do	1:12.5					
		May 9	do	1:12.0					
		May 17	do	1:15.9					
396, male, 5.75 kg.	Plus 0.23 mg. nicotinic acid/kg. daily.	Apr. 12	do	1: 8.1	1:10.0	0.10	343	59.65	5.97
		Apr. 24	do	1:10.0					
		May 2	do	1: 9.1					
		May 9	do	1:14.8					
		May 16	do	1: 8.0					
407,[3] male, 11.1 kg.	Plus 0.2 mg. nicotinic acid/kg. daily.	Apr. 13	do	1:15.2	1:14.7	0.147	508	45.76	6.73
		Apr. 25	do	1:17.2					
		May 10	do	1:12.8					
		May 16	do	1:13.7					
		June 1	do	1:16.0					
		June 6	do	1:13.2					
392, male, 7.6 kg.	Plus 1.06 mg. nicotinic acid/kg.	Apr. 10	do	1:13.0	1:15.2	0.152	485	63.82	9.70
		May 3	do	1:15.7					
		May 17	do	1:17.6					
		June 1	do	1:16.0					
		June 6	do	1:13.6					
401, male, 8.75 kg.	Plus 1.2 mg. nicotinic acid/kg.	Apr. 17	do	1:13.6	1:11.0	0.110	595	68.0	7.48
		Apr. 25	do	1: 4.0					
		May 2	do	1: 9.6					
		May 10	do	1: 9.8					
		May 16	do	1: 9.8					
		June 1	do	1:15.0					
		June 6	do	1:15.2					
430, female, 5.5 kg.	High liver and high yeast No. 515.	Apr. 12	do	1:13.5	1:13.5	0.135	400	72.73	9.83
431, male, 12.1 kg.		Apr. 12	do	1:12.9	1:14.3	0.143	555	45.87	6.56
		Apr. 26	do	1:15.6					
432, male, 12.0 kg.		Apr. 13	do	1:14.8	1:14.4	0.144	745	62.08	8.94
		Apr. 24	do	1:15.9					
		May 3	do	1:11.6					
		May 10	do	1:14.8					
433, male, 6 kg.		Apr. 13	do	1:14.0	1:17.5	0.175	312	52.4	9.17
		Apr. 26	do	1:21.4					
		May 3	do	1:20.0					
		May 10	do	1:17.2					
		May 17	do	1:14.8					

The values presented in this table are suitable for comparing the amount of V factor in the urine of dogs on various regimes respecting nicotinic acid. They should not be interpreted as absolute quantities of V factor in the urine of dogs.

DPN = Diphosphopyridine nucleotide.

[1] 360 ml. of water were given instead of the usual amount of 480 ml.; 250 ml. of urine were collected, while the average amount preceding onset of blacktongue was 454 ml.

[2] Dog 358 was given 66 mg. of nicotinic acid on Apr. 10 for treatment of an attack of blacktongue.

[3] During each of the 4-hour periods for urinary collection there was complete retention. The specimens were collected by catheterization at the end of the 4-hour period.

dogs (391, 396, and 407) which received daily 0.2 and 0.23 mg. per kilogram showed a variation in excretion from 0.10 to 0.147 microgram DPN equivalent per ml., while 2 dogs (392 and 401) which received daily 1.06 and 1.2 mg. per kilogram showed a similar variation from 0.11 to 0.152 microgram. In addition, 4 dogs that were fed large amounts of liver and yeast showed no greater excretion than the other dogs. The amounts ranged from 0.135 to 0.175 microgram per ml.

It should be mentioned that the values presented are not to be interpreted as the absolute quantities of V factor in the urine of dogs. However, they do serve as a basis of comparison of the relative values obtained from dogs on various regimes respecting nicotinic acid.

The above observations indicate, under the conditions of our experiments, that there are some individual variations in the amount of V factor excreted in the urine of dogs, that the majority of dogs excrete a fairly equal amount and that the amount excreted is apparently not influenced by the amount or the lack of intake of nicotinic acid. In fact, when the probability of errors of technique and the limitations of the method employed are considered it is surprising to find that for 8 of 11 dogs, the greatest individual variation of the mean of 0.149 is only 0.026. Furthermore, when the values for all 11 dogs are calculated on the basis of the total DPN equivalent excreted per kg. of body weight during the 4-hour observation period, the range of variation is only from 5.69 to 9.83 micrograms with a mean of 8.0.

In contrast to our observations made with dogs, is the indication that the amount of V factor excreted in the urine of man may be influenced by the administration of nicotinic acid. Spies and Koch (unpublished work cited by Vilter, Vilter, and Spies (*18*)) report that the urine of 20 normal persons supported growth of *Hemophilus influenzae* in dilutions of 1:100 and often dilutions of 1:1,000. The urine from a patient with chronic lymphatic leukemia promoted growth in dilution of only 1:10 and after administration of nicotinic acid, 500 mg. daily, there was a transient increase in the V factor excreted in the urine. The amount of increase is not given.

GROWTH FACTOR V IN TISSUES OF NORMAL DOGS AND OF THOSE WITH BLACKTONGUE

The V factor in tissue of only 6 dogs, 3 normal and 3 suffering from blacktongue, were studied. The number examined is too small to form a basis for conclusions; however, the relative, but not absolute, values are largely in agreement with the findings of other workers.

In table 2 are presented the amounts of V factor which were found in different tissues. The tissues from the first 2 pairs of dogs were extracted by the v. Euler method and those from the third pair

were kept frozen until added to hot water. The details were given above. The slightly higher values obtained for the normal dog of the latter pair as compared with the corresponding values for the other normal animals indicate that in the frozen state the inactivation of V by enzymes is retarded.

TABLE 2.—*Growth factor V in tissues of blacktongue and normal dogs*

Tissue	V factor equivalent of DPN—microgram per gram of fresh tissue[1]					
	Blacktongue 429 (male)	Control 348 (female)	Blacktongue 388 (female)	Control 389 (female)	Blacktongue 358[2] (male)	Control 401[2] (male)
Kidney	225	225	230	92.4	208	322
Liver	67	101	68	88	81	139
Heart			32	104	32	178
Thigh muscle	15	101	84	42	36	178
Large intestine			[3] 2.8	20	73	73
Blood			48	44	32	28
Brain			33	33.6	16	32
Uterus			13	19		

[1] The values are not to be interpreted as absolute quantities of V factor in tissues of the dog.
[2] Tissues of dogs 358 and 401 were frozen immediately on removal. The amount of food given to control dog 401 was restricted to the amount consumed by blacktongue dog 358 (paired feeding principle).
[3] Mucosa showed extensive necrosis.

In each instance the values for liver, heart, and thigh muscle from the blacktongue dog were lower than those from the normal controls. For the liver they were 20 to 40 percent lower, for cardiac muscle 70 to 80 percent, and for thigh muscle 15 to 85 percent. In one instance the value was lower for the large intestine, kidney, and brain. In this particular case the large intestine showed extensive necrosis and its value was 80 percent lower than for the normal dog. The values for blood, although slightly higher for the dogs with blacktongue, were the same when corrected by the hematocrit reading.

After the completion of our work there appeared reports on the V factor content of tissues from a larger number of normal and blacktongue dogs by Kohn, Klein, and Dann (*19*) and on the coenzyme I (DPN) content of tissues from 1 normal and 2 blacktongue dogs by Axelrod, Madden, and Elvehjem (*20*). The latter used the yeast fermentation method of v. Euler and Myrbäck. Each found for the blacktongue dog a lower value for liver and muscle but not for kidney or blood. In addition, Kohn, Klein, and Dann reported no decrease in heart or brain. The actual values which we obtained for normal dogs were, as a whole, roughly about 50 percent lower than Kohn's, and about 65 percent lower than Axelrod's.

The failure of nicotinic acid to change the level of V factor in the blood of dogs is in contrast to the direct effect of nicotinic acid on the level in man, reported by Kohn (*10*) and Vilter, Vilter, and Spies (*21*). Kohn and Bernheim (*22*), however, from the results of a study of the V factor level in the blood of a large number of normal and pathological

subjects, came to the conclusion that there are factors other than diet or disease that regulate the blood level in man as well as in the dog.

GROWTH FACTOR V IN TISSUES OF NORMAL RATS

V factor determinations were made on the liver, kidney, and thigh muscle of 7 rats. The results are given in table 3. The values obtained for individual rats are in fairly close agreement. The average amounts per gram of liver, kidney, and muscle were 345, 456, and 353 micrograms, respectively. These values are higher than the combined DPN and TPN values reported by v. Euler and associates (*12*), who report 245, 200, and 240 micrograms for the respective tissues. They state, however, that the quantitative measurements of cozymase (DPN) were around 20 to 40 percent below the real values. They used the fermentation method of Myrbäck.

TABLE 3.—*Growth factor V in tissues of normal rats*

Rat (male) No.	Weight (gm.)	V factor equivalent of DPN—microgram per gram of fresh tissue [1]		
		Liver	Kidney	Thigh muscle
1	420	445	460	435
3	312	330	482	430
4	367	330	430	353
5	56	[2] 210	434	300
6	56	325	565	390
7	408	325	[3] 264	258
8	363	325	365	303
Average		345	456	353

[1] The values are not to be interpreted as absolute quantities of V factor in tissues of the rat.
[2] Tissue thawed while weighing, omitted in making the average.
[3] Some was lost while grinding, omitted in making the average.

On the other hand, our values are lower than the V factor determinations of Bernheim and Felsovanyi (*23*) and the coenzyme I (DPN) values of Axelrod and Elvehjem (*24*) which were obtained by the fermentation method. For liver, kidney, and muscle the former report 542, 510, and 522 micrograms, and the latter 1,114, 1,077, and 782 micrograms, respectively.

DISCUSSION AND SUMMARY

In the work presented in this communication, the amount of V factor excreted in the urine of 11 dogs has been determined by the growth-promoting action of the urine for *Hemophilus parainfluenzae*. It was expressed in DPN equivalent per ml. The results, under the conditions of our experiment, suggest that the excretion of V factor in the urine of dogs is not influenced by a diet either deficient or rich in nicotinic acid. Two of the dogs developed blacktongue during the course of the experiment. The average amount excreted per ml. by 8 of the dogs was in fairly close agreement. The other 3 showed con-

siderable variation but the variation could not be correlated with intake of nicotinic acid.

The amount of V factor in certain tissues of the dogs, however, did show some correlation with the intake of nicotinic acid. The liver, muscle, and heart of dogs suffering from blacktongue contained less V factor than did the corresponding tissues of normal dogs. The blood levels were not affected. Kohn, Klein, and Dann (*19*) have reported smaller amounts of V factor in the liver and muscle of blacktongue dogs, and likewise Axelrod, Madden, and Elvehjem (*20*) have reported smaller amounts of DPN in the same tissues. Both groups report no change in the blood level. Their values, however, are somewhat higher than ours.

The technique which we employed for the determination of V factor was, in many respects, similar to that of Kohn, Klein, and Dann (*19*). However, a different strain of *Hemophilus parainfluenzae* was used and whereas it was necessary to incubate our cultures for about 40 hours they were able to make readings in 20–24 hours. There were also certain differences in the basal medium.

In addition, the amount of V factor in the liver, kidney, and muscle of 7 rats was determined in a similar manner. The values which were obtained were higher than those obtained by some but lower than those obtained by other workers.

The lack of agreement of the amount of V factor or DPN in the tissues of dogs and rats, determined by different workers, serves to emphasize the difficulties that are encountered in determining the amount of a coenzyme which is so readily inactivated by both heat and certain enzymes that are present in the tissues.

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TWO NEW SPECIES OF ARGASIDAE (ACARINA: IXODOIDEA)[1]

By R. A. Cooley, *Entomologist*, and Glen M. Kohls, *Assistant Entomologist*, *United States Public Health Service*

A description is given in this paper of two new species of argasid ticks: *Ornithodoros dyeri*, collected on bat guano in Arizona, and *Otobius lagophilus*, a widespread western species that infests rabbits.

Ornithodoros dyeri n. sp.

On September 24, 1939, Dr. C. B. Philip and Max T. McKee of the Rocky Mountain Laboratory collected several hundred specimens of *Ornithodoros coprophilus* from a mine tunnel on Picacho Mountain, Pinal County, Ariz. This was the first time this tick had been observed in nature, and the significant data pertaining thereto have been reported by Philip (1939). More recently in additional

[1] From the Rocky Mountain Laboratory, Hamilton, Mont., Division of Infectious Diseases, National Institute of Health.

tick-infested guano forwarded from this same mine by Mr. L. O. Brown, 3 adults and 25 nymphs of the new species, *dyeri*, were found. The specimens showed no evidence of having fed recently and all were moderately thin. The adults all appear to be of the same sex; we are as yet uncertain as to whether they are male or female.

ADULT

Body.—Elongated, sides parallel, anterior end pointed, posterior end rounded. Length 3.57 mm.; width 1.5 mm. Margins flattened and with the structure of the integument differing from that of the dorsal and ventral surfaces. Viewed in lateral profile the dorsal body line is nearly straight. The entire dorsum is bounded by two continuous ridges, essentially parallel; there is a third (inner) ridge on each side. Within these ridges the dorsum is irregular owing to ridges and subcircular elevations, the latter being the discs.[2] Mammillae are absent. Hairs are very fine and short, more abundant posteriorly and absent outside the marginal ridges. Specimens recently put in 70 percent alcohol are light yellow-brown in color.

Legs.—Moderate in length, small, micromammillated, and with fine short hairs; on all tarsi are two parallel, ventral rows of equally spaced hairs. Length of tarsus I, 0.42 mm.; metatarsus I, 0.36 mm. Length of tarsus IV, 0.51 mm.; metatarus IV, 0.39 mm. All tarsi without humps and subapical protuberances. Stalk of the pulvillus and claws progressively longer on legs I to IV. Femur of leg IV longer than that of I, II, or III. Length of femur (including trochanter) of leg IV, 0.66 mm.; length of femur (including trochanter) of leg I, 0.54 mm.

Coxae.—Coxae II, III, and IV contiguous; coxae I and II separated. Surface of all coxae micromammillated. Hairs absent on the coxae except for a single row near the articulation with the trochanter on coxae II, III, and IV.

Movable cheeks.—Present, longer than wide, and together with a ventral projection of the tip of the dorsal body wall forming some protection for the mouth parts but never as much as in some species (e. g., *talaje*).

Capitulum.—Basis large, about as broad as long; surface irregular, having both micromammillae and irregular transverse ridges. The hairs on palpi and the posthypostomal hairs are barbed. Two groups of short heavy spines present on posterior ventral surface, one on each side of the median line.

Palpi.—Moderate in length, tapering, and with barbed hairs.

[2] In the Argasidae the "discs" and similar structures arranged in a symmetrical pattern are the external evidence of modifications of the structure of the body wall at the points of attachment of the dorsoventral muscles. They vary structurally in the numerous species. Some previous authors have indicated that "obvious" discs may be present or absent. We prefer to accept the term "disc" as appropriate in defining *any* structural modifications of the body wall at the points of attachment of the dorsoventral muscles.

Hypostome.—Short, broad, with sides nearly parallel, truncate; posthypostomal hairs long, barbed, reaching the tip of the hypostome. There is also a pair of shorter postpalpal hairs at the bases of the palpi. Denticles short, U-shaped, arranged 5/5, covering about the anterior two-thirds of the hypostome, without great difference in the sizes of the denticles; the median files are faint. Length, 0.165 mm. (measured from the large posthypostomal hairs to the anterior termination).

Folds.—The folds on the venter form an intricate pattern the main features of which are the following: Supracoxal and coxal folds continued posteriorly and meet to continue as a submarginal fold that forms a loop paralleling the posterior margin. Connected with the loop posteriorly are two folds that converge anteriorly and reach nearly to the coxal folds. From these arise two medially directed spur folds just anterior to the transverse postanal groove, which terminate at the median postanal groove. In addition to the remarkable folds in this species there is a fold or ridge above the supracoxal fold opposite legs III and IV, which is bent downward posteriorly and becomes an arc of a circle, the radial center of which would be the insertion of leg IV. The top of this arc is smooth while the surface of all other ridges is irregular. In living specimens leg IV in its movements is in contact with the smooth ridge, which is enough elevated to protect the spiracle placed just below it. Leg IV comes in contact with this smooth arc at about the trochanter.

Grooves.—Only one definite groove is present, a deep, short, transverse postanal groove.

Sexual opening.—Opening placed in a V-shaped depression at about the level of the posterior ends of coxae I.

Eyes.—Absent.

Anus.—Small, in an oval pattern.

NYMPH

The characters of the nymphs are much the same as of the adults but in the last nymphal stage there is a depression at the position of the sexual opening that approaches the definite V-shaped depression of adults. The smallest nymphs are shorter in proportion to the width. Nymphs range in size from 1.98 mm. x 1.11 mm. to 3.48 mm. x 1.44 mm.

Holotype.—A. P. 16083, from bat guano, November 3, 1939, Picacho Mountain, near Picacho, Pinal County, Ariz.

Paratypes.—Two adults and two nymphs: One (adult) deposited in the United States National Museum and one (nymph) in the collections of the Zoological Division of the Bureau of Animal Industry, United States Department of Agriculture.

The holotype and two paratypes are in the collection of the Rocky Mountain Laboratory.

This remarkable small tick from bat guano is readily separated from other species of the genus by its elongated body, the parallel marginal ridges, the pattern of ridges on the venter, and numerous other characters. We take pleasure in naming it *Ornithodoros dyeri* in honor of Dr. R. E. Dyer, Chief of the Division of Infectious Diseases of the National Institute of Health.

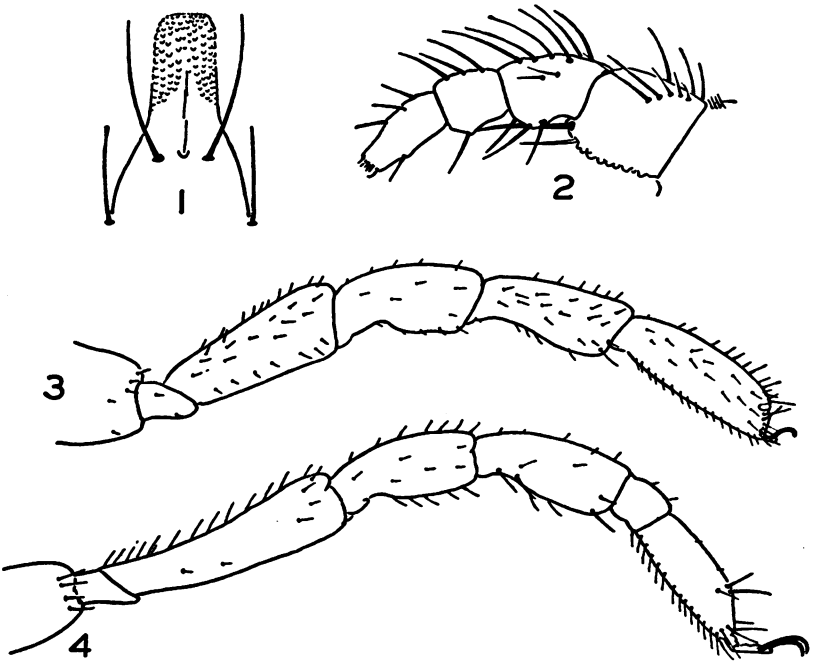

FIGURE 2.—Adult, *Ornithodoros dyeri* n. sp. 1. Hypostome (paratype). 2. Palpus in lateral view from the median side. 3. Leg I. 4. Leg IV.

Otobius lagophilus n. sp.

For some time there has been doubt about the specific identity of the *Otobius* which is fairly common on rabbits in the northwestern part of the United States. Dr. S. Hadwin (1913) recorded a tick from jack rabbits from Lethbridge, Alberta, Canada, which had been identified as *Ornithodoros megnini*. Dr. Arthur Gibson, Dominion Entomologist, has recently sent us the single specimen referred to above, collected in October 1912, as well as three others from a jack rabbit, without date of collection. Cooley (1932) states that "*megnini*" had been collected from rabbits by Dr. R. R. Parker at Powderville, Mont., in 1916 and by Morton from rabbits near Bozeman and near Musselshell in 1930. All four Canadian specimens and the Montana specimens are identical with the new species here described.

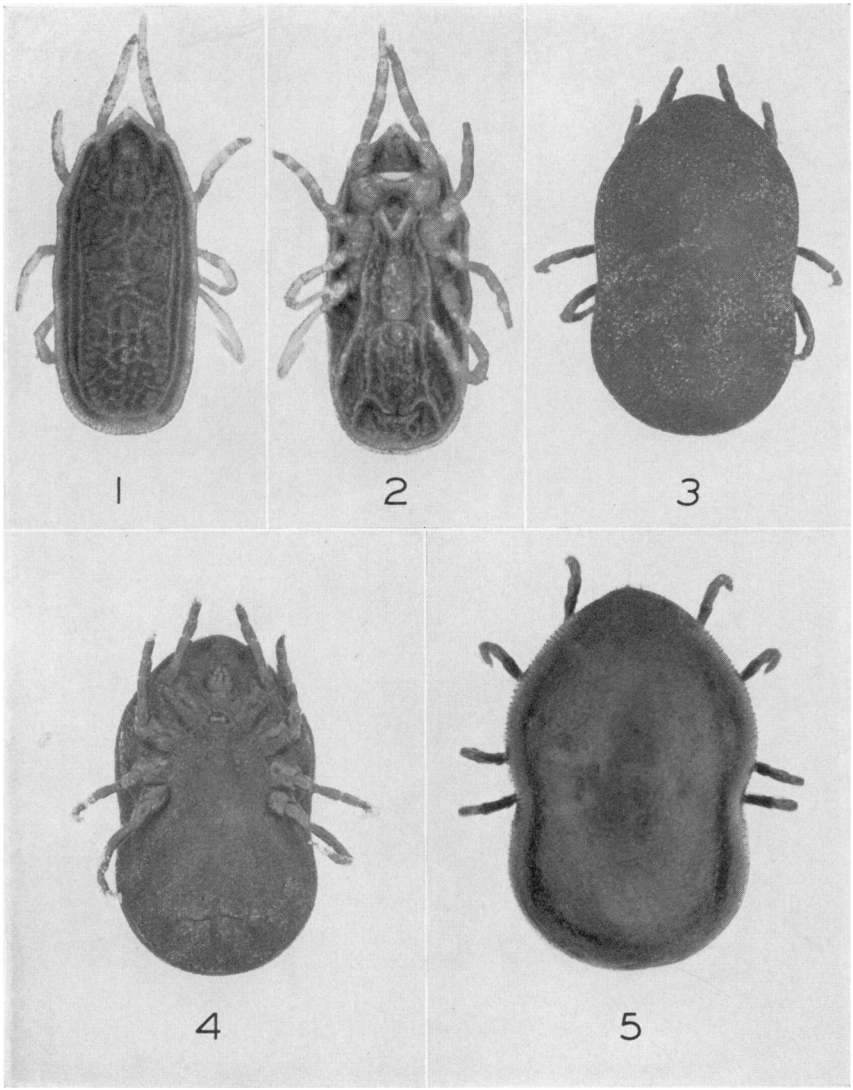

FIGURE 1.—1. *Ornithodoros dyeri* n. sp., dorsal view. 2. *Ornithodoros dyeri* n. sp., ventral view. 3. *Otobius lagophilus* n. sp. male, dorsal view. 4. *Otobius lagophilus* n. sp. male, ventral view. 5. *Otobius lagophilus* n. sp. nymph, dorsal view.

ADULT

Body.—Broadly rounded posteriorly, somewhat narrowed anteriorly, and a little constricted at the side just behind legs IV (less constricted and not as definitely panduriform as in *megnini*); widest at legs II and III. Size of female: Length 5.40 mm. to 6.25 mm.; width 3.60 mm. to 4.00 mm. Size of male: Length 4.75 mm. to 5.00 mm.; width 2.90 mm. to 3.50 mm.

Specimens of adults and nymphs preserved in alcohol are enclosed by a brittle, thin, translucent covering which is easily removed with a needle. The true character of the integument is better seen after this covering is removed.

Mammillae.—True mammillae, as defined in *Ornithodoros* by various authors, are absent. Integument on dorsal and ventral surfaces granulated, with numerous intermingled circular depressions which are larger and less definite than in *megnini*; floor of each depression with a faint central tubercle.

Hairs.—Short, fine hairs present on the dorsal surface. These hairs are situated on the tubercles in the circular depressions and are a little more apparent toward the anterior end of the tick. On the ventral surface such hairs are less apparent except near the mouth parts.

Discs.—Indefinite yet evident as a symmetrical pattern of small depressions the floors of which are irregular. The discs are less apparent than in *megnini*.

Legs.—Short and moderately heavy, with hairs few and small. All tarsi with moderate subapical dorsal projections. On tarsus IV this projection is more pronounced. Length of tarsus I, 0.45 mm.; metatarsus I, 0.39 mm. Length of tarsus IV, 0.54 mm.; metatarsus IV, 0.525 mm.

Coxae.—Coxae III and IV contiguous, the others separated. There are deep invaginations between the coxae which are shown by dissection to be the surface indications of large apodemes. Each coxa with an elongated smooth sclerite.

Hood and camerostome.—Definite hood and camerostome are not apparent though there is a moderate swelling, ventrally excavated, just anterior to the mouth parts.

Capitulum.—Basis very broad and short, curved, approaching a reniform shape with the convex border behind. Surface irregular, with fine hairs at the sides near the palpi and two groups at each side of the median line near the posterior margin.

Palpi.—Moderately heavy, with article 1 a little more swollen than the others. Hairs fine and long.

Hypostome.—Vestigial, in marked contrast with the well-developed hypostome of the nymph. Broad, short, tapering, without denticles, concave dorsally and convex ventrally, bluntly rounded or bilobed apically; length about 0.10 mm.

Folds.—Coxal and supracoxal folds present though less in evidence in well engorged specimens.

Grooves.—A short transverse postanal groove present near the

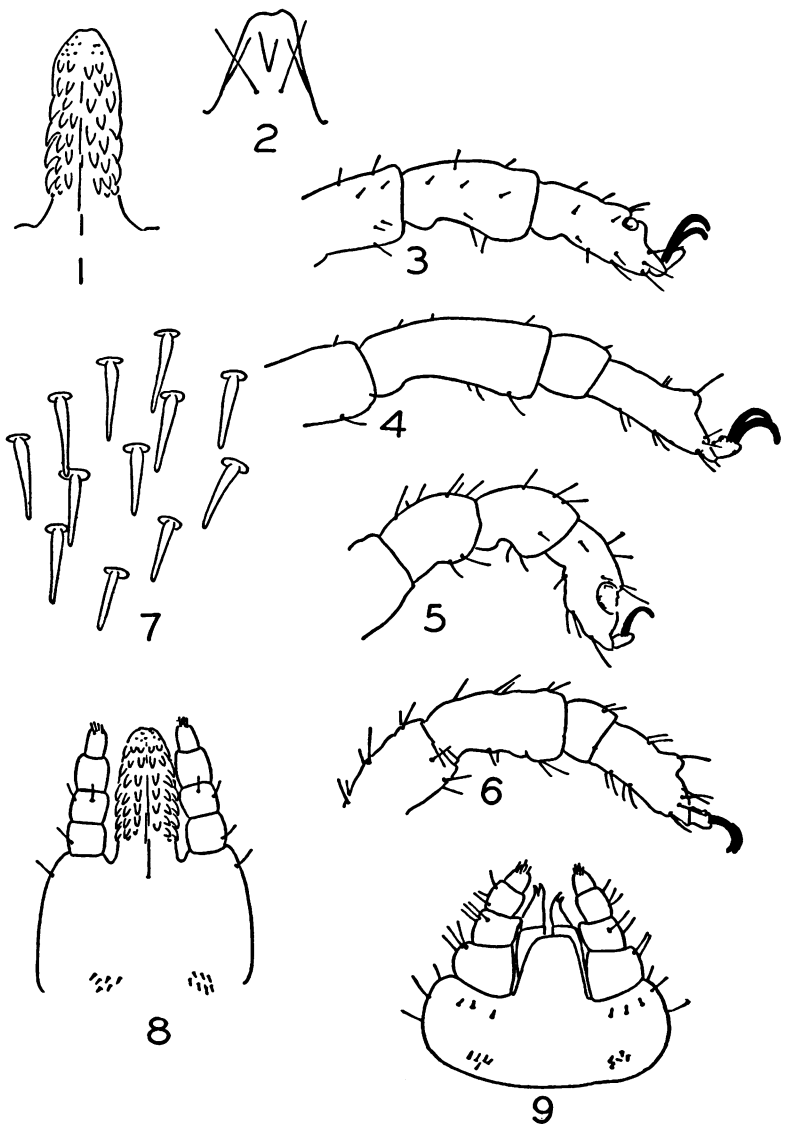

FIGURE 3.—*Otobius lagophilus* n. sp. 1. Hypostome of the nymph. 2. Hypostome of the female. 3. Adult, tarsus and metatarsus of Leg I. 4. Adult, tarsus and metatarsus of Leg IV. 5. Nymph, tarsus and metatarsus of Leg I. 6. Nymph, tarsus and metatarsus of Leg IV. 7. Nymph, spines from the anterior margin. 8. Capitulum of nymph, ventral. 9 Capitulum of adult, ventral.

posterior end. Median postanal groove faint. All other grooves are absent or negligible.

Sexual opening.—In line with the posterior ends of coxae I.

Spiracle.—Ovate, with surface convex.

Eyes.—Absent.

Anus.—Small, nearly circular.

NYMPH

Shape and size about as in the adult.

Mammillae.—The integumental markings of the nymph are very different from those of the adult. Entire surface, dorsal and ventral, smooth and shining, with fine reticulations and transverse striae, similar to the body wall of larval Argasidae. Striae more apparent than in *megnini.*

Spines.—Spines or hairs are present over the entire surface of the body except in the area immediately surrounding the mouth parts; more abundant and longer at the anterior end; progressively smaller toward the posterior end; more sparse on the ventral surface.

Discs.—Definite discs are absent, but corresponding depressions are sometimes evident. These depressions are free of spines, and in some a few fine punctations are visible.

Legs.—Short and moderately heavy. Subapical projections absent or small on tarsi I, II, and III, but distinct on IV. Length of tarsus I, 0.36 mm.; metatarsus I, 0.30 mm. Length of tarsus IV, 0.45 mm.; metatarsus IV, 0.45 mm.

Coxae.—Present as inconspicuous sclerites.

Hood and camerostome.—Absent.

Capitulum.—In ventral view the capitulum is in a depression formed by a circular tumescence around it which makes it difficult to get a true impression of the shape of the basis capituli unless it is dissected out. Broader than long. Palpi moderately heavy (more slender than in *megnini*), and with article 1 lacking a distinct ventral swelling. Hairs small and few in number.

Hypostome.—Large, with sides nearly parallel, denticles long and sharp, in a 3/3 arrangement with the denticles about equally long in the basal and apical regions; denticles in the corona absent or few in number. Marginal denticles absent in the subapical region. Length, 0.30 mm.

Folds.—Coxal and supracoxal folds are faint or absent.

Grooves.—True grooves are absent but the preanal and median postanal grooves are indicated by shallow elongated depressions.

Spiracle.—Circular, mildly convex. (In *megnini* it is a conical protuberance.)

Holotype.—One of four nymphs (A. P. 13263) from a jack rabbit, *Lepus townsendii,* Dillon, Mont., July 2, 1937; deposited in the collection of the Rocky Mountain Laboratory.

Paratypes.—The three remaining topotypic specimens from A. P. 13263; 30 nymphs (A. P. 11154), jack rabbit, *Lepus* sp., Dillon, Mont.,

July 13, 1935, Wm. L. Jellison; 15 nymphs (A. P. 11235), 4 jack rabbits, *Lepus townsendii*, Beaverhead County, Mont., August 6, 1935, Wm. L. Jellison; 1 male (A. P. 8474A), cottontail rabbit, *Sylvilagus* sp., August 18, 1932, Mayfield, Idaho, Carl Larson; 2 females (A. P. 8401A), jack rabbit, *Lepus californicus*, August 12, 1932, Mayfield, Idaho, Carl Larson; 16 nymphs (A. P. 8104A), 2 jack rabbits, *Lepus* sp., June 30, 1932, Mayfield, Idaho, Carl Larson; 1 nymph (A. P. 16125), jack rabbit, *Lepus* sp., October 1912, Lethbridge, Alberta, Canada; 3 nymphs (A. P. 16124), jack rabbit, *Lepus* sp., (no date), Lethbridge, Alberta, Canada.

In addition to the type materials, the collection of the Rocky Mountain Laboratory contains also the following specimens: 1 nymph (A. P. 8062), jack rabbit, *Lepus* sp., White Pine County, Nevada, April 17, 1932, Wm. L. Jellison; 5 nymphs (A. P. 8124A), jack rabbit, *Lepus* sp., Grandview, Idaho, July 3, 1932, Carl Larson; 1 nymph (A. P. 8183A), jack rabbit, *Lepus* sp., Mayfield, Idaho, July 11, 1932, Carl Larson; 4 nymphs (A. P. 8431A), jack rabbit, *Lepus californicus*, Grandview, Idaho, August 15, 1932, Carl Larson; 1 nymph (A. P. 8483A), jack rabbit, *Lepus californicus*, Mayfield, Idaho, August 21, 1932, Carl Larson; 9 nymphs (A. P. 8613A), jack rabbit, *Lepus* sp., Grandview, Idaho, September 10, 1932, Carl Larson; 1 nymph (A. P. 9042B), jack rabbit, *Lepus* sp., Mayfield, Idaho, April 25, 1933, Carl Larson; 10 nymphs (A. P. 10159), "rabbit", Deer Lodge, Mont., October 2, 1934; 3 nymphs (A. P. 11108), jack rabbit, *Lepus townsendii*, Miles City, Mont., June 6, 1935, Glen M. Kohls and Wm. L. Jellison; 2 nymphs (A. P. 11278), "rabbit," Lander, Wyo., August 2, 1935, Dr. Gordon E. Davis; 1 nymph (A. P. 14086), host unknown, Laramie, Wyo., May 20, 1938, Dr. Gordon E. Davis; 2 nymphs, jack rabbit, *Lepus townsendii*, Bozeman, Mont., June 3, 1930, F. A. Morton; 2 nymphs (A. P. 12377A), jack rabbit, *Lepus* sp., Canyon County, Idaho, June 6, 1936, C. R. Eskey; 1 nymph (A. P. 16750), cottontail rabbit, *Sylvilagus* sp., Rupert, Idaho, June 16, 1939, Wm. L. Jellison; 1 nymph (A. P. 16218), jack rabbit, *Lepus townsendii*, Cameron, Mont., January 5, 1940, Wm. L. Jellison and Glen M. Kohls; 17 nymphs (A. P. 16895) *Lepus californicus deserticola*, Barstow, San Bernardino Co., Calif., June 20, 1924, University of Michigan Museum of Zoology.

This, the second known species of *Otobius*, is easily separated from *megnini* by the following characters: Its smaller size; the heavy V-shaped spines found on the anterior surfaces in *megnini* are replaced by slender spines the same as those on posterior parts; the denticles on the hypostome are in a 3/3 pattern instead of 4/4; the legs are more slender; the spiracle of the nymph is mildly convex instead of conically protuberant. This tick, in our experience, is always found in the fur on the face above the vibrissae. All specimens collected have been

nymphs. We believe that, in common with *megnini*, the adults of *lagophilus* are not parasitic.

During recent extended studies of the Argasidae of North America we have become more familiar with the different species found on the continent, and particularly with the characters which separate them. It has been found that there is much less confusing variation in many Argasidae than occurs in the Ixodidae, and, in some cases at least, there is corroborating evidence in the biologies of related species.

In the light of these studies it becomes clear that the *Otobius* on rabbits is very distinct from *megnini* on both morphological and biological grounds.

O. megnini appears to have been introduced into the northern States numerous times on cattle and in some areas has persisted for some years in spite of the more severe northern climate. For example, it was known to be present in Big Horn County, Mont. (Cooley, 1916) not far from the locality where Parker collected ticks from rabbits in 1916 and this fact appeared to support the assumption that the ticks from rabbits might be *megnini*.

This laboratory has twenty records covering numerous specimens of *O. megnini* taken from its usual hosts in southern California, Arizona, and New Mexico, and in much of the area covered we have numerous records of various ticks from rabbits. However, the California record is the only one we have of the new species from this region. In some instances we particularly searched for this tick on rabbits in the immediate areas where we collected *O. megnini* from domestic animals. Conversely, in Powell County, Mont., where *lagophilus* appears to be rather common, we have no records of *megnini* and correspondence with veterinarians has shown that they have not known of its presence in that area.

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VITAL STATISTICS SUMMARY FOR THE UNITED STATES, 1938

The Bureau of the Census, Department of Commerce, has recently issued a summary of vital statistics for the United States for 1938,[1] from which the following statements and tables are taken.[2]

[1] Vital Statistics, Special Reports, vol. 8, No. 51, pp. 1223–1248.

[2] Preliminary mortality data for 1938, by cause, were published in the Public Health Reports for February 2, 1940, pp. 211–214.

In 1938 there were 2,286,962 births and 1,381,391 deaths in the United States, giving a birth rate of 17.6 and a death rate of 10.6 per 1,000 population. Of the total deaths, 116,702 were of infants under 1 year of age, giving an infant mortality rate of 51.0 per 1,000 live births. As previously noted, both the crude general death rate and the infant mortality rate for 1938 were the lowest ever recorded for the United States, as was also the maternal mortality rate.

Table 1 summarizes the natality, general mortality, and infant mortality data for the registration areas of the United States for the 11-year period 1928–38, inclusive, and the accompanying chart shows

TABLE 1.—*Abstract of vital statistics data for the registration areas*

Year	Percent of total population in registration areas		Number		Crude rate (number per 1,000 estimated population)		Births per 100 deaths	Death rate (number per 1,000 live births)		Death rate (number per 100,000 estimated population)		
	Birth	Death	Births	Deaths	Births	Deaths		Infant mortality	Maternal mortality	Tuberculosis	Cancer	Motor vehicle accidents
1938	100.0	100.0	2,286,962	1,381,391	17.6	10.6	166	51.0	4.4	48.9	114.6	25.0
1937	100.0	100.0	2,203,337	1,450,427	17.0	11.2	152	54.4	4.9	53.6	112.0	30.7
1936	100.0	100.0	2,144,790	1,479,228	16.7	11.5	145	57.1	5.7	55.7	111.0	29.7
1935	100.0	100.0	2,155,105	1,392,752	16.9	10.9	155	55.7	5.8	55.0	107.9	28.5
1934	100.0	100.0	2,167,636	1,396,903	17.1	11.0	155	60.1	5.9	56.6	106.2	28.5
1933	100.0	100.0	2,081,232	1,342,106	16.5	10.7	155	58.1	6.2	59.5	102.2	24.9
1932	95.2	96.3	2,074,042	1,308,529	17.4	10.9	159	57.6	6.3	62.8	102.0	23.6
1931	94.7	96.3	2,112,760	1,322,587	18.0	11.1	160	61.6	6.6	68.1	98.9	27.1
1930	94.7	96.2	2,203,958	1,343,356	18.9	11.3	164	64.6	6.7	71.5	97.3	26.7
1929	94.7	95.7	2,169,920	1,386,363	18.9	11.9	157	67.6	7.0	76.0	95.9	25.7
1928	94.3	95.3	2,233,149	1,378,675	19.8	12.1	162	68.7	6.9	79.3	96.1	23.4

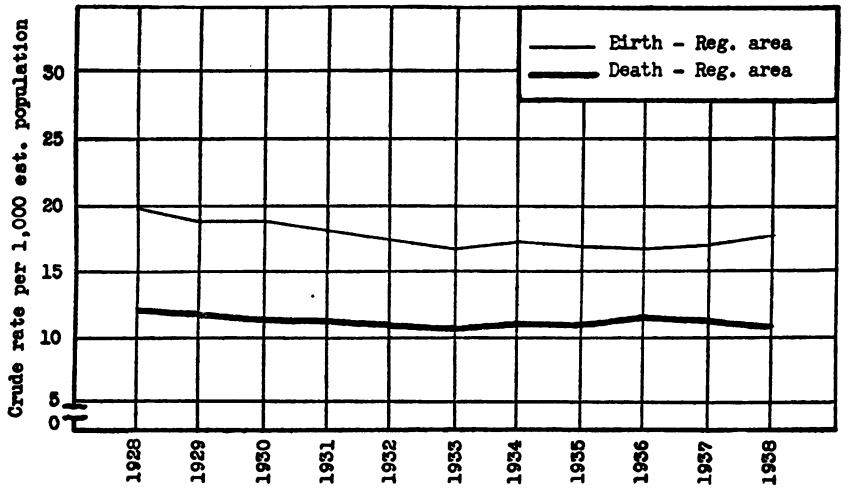

FIGURE 1.—Trends of crude birth and death rates in the United States registration areas, 1928–1938.

graphically the trends in the rates during that period. In 1938 there was a net natural increase of 7.0 per 1,000 population, the largest since 1930. The infant mortality rate has shown an interrupted decline from 68.7 in 1928 to 51.0 in 1938, while the maternal mortality rate has declined continuously during the 11-year period from 6.9 to 4.4.

In 1928 the death registration area in continental United States consisted of 42 States, the District of Columbia, and a number of cities in nonregistration States, while the birth registration area consisted of 40 States and the District of Columbia. Beginning with 1933 and since that year both areas have included the entire United States.

Table 2 summarizes the data for births, deaths, and infant mortality for 1937 and 1938 by States, and the rates by four classifications are presented graphically in the accompanying maps. In making comparisons by States, however, it must be borne in mind that the rates for different States are partly determined by the age, sex, and racial distributions of the population, and that the rates given are crude rates, which have not been adjusted for differences in these distributions.

The Bureau of the Census points out that the high death rates shown for Arizona and New Mexico, for example, are due in large measure to an excess in the number of nonresident deaths from tuberculosis; while those in the New England area result for the most part from the relatively advanced age of the population. The relatively low rates reported in some of the western and southern States result partly from the younger age composition of the population. Differences in public health conditions and the distribution of medical care also affect the death rates of the various States.

The variations in the birth rates are due to a combination of biological and social factors, such as race, age of population, and fertility; while differences in infant mortality are closely related to such factors as racial composition, standards of public health services, economic circumstances, and medical care.

The rates given for the country as a whole are computed on the estimated mid-year population for 1938, while the rates for each State are based on the estimated population for 1937, as no population estimates for States have been made by the Census Bureau for 1938. The death rates for the United States for certain selected causes, 1934–38, are shown in table 3.

Table 4 presents the numbers of births and deaths occurring by months and the monthly rates per 1,000 population.

In 1938 there were born 25,644 sets of twins, 262 sets of triplets, and 1 set of quadruplets, as compared with 24,881, 219, and 4, respectively, in 1937.

TABLE 2.—*Summary of natality, mortality, and infant mortality data for each State, 1937–38*

Area	Total births		Total deaths		Infant deaths		Rate per 1,000—					
							Estimated population				Live births	
							Births		Deaths		Infant deaths	
	1938	1937	1938	1937	1938	1937	1938[1]	1937	1938[1]	1937	1938	1937
United States	2,286,962	2,203,337	1,381,391	1,450,427	116,702	119,931	17.6	17.0	10.6	11.2	51.0	54.4
Alabama	62,032	61,611	29,536	30,843	3,772	3,844	21.4	21.3	10.2	10.7	60.8	62.4
Arizona	10,878	10,494	6,002	6,919	1,075	1,267	26.4	25.5	14.6	16.8	98.8	120.7
Arkansas	37,182	35,236	16,971	18,364	1,912	1,919	18.2	17.2	8.3	9.0	51.4	54.5
California	101,844	94,230	76,187	80,256	4,450	5,070	16.5	15.3	12.4	13.0	43.7	53.8
Colorado	20,599	19,610	12,615	13,833	1,240	1,441	19.2	18.3	11.8	12.9	60.2	73.5
Connecticut	23,783	22,774	17,382	17,892	864	921	13.7	13.1	10.1	10.3	36.3	40.4
Delaware	4,431	4,355	3,199	3,290	234	278	17.0	16.7	12.3	12.6	52.8	63.8
Dist. of Columbia	12,938	12,343	7,962	8,727	622	751	20.6	19.7	12.7	13.9	48.1	60.8
Florida	31,096	29,507	21,024	20,960	1,802	1,765	18.6	17.7	12.6	12.6	57.9	59.8
Georgia	64,636	64,061	33,783	34,446	4,376	3,952	21.0	20.8	11.0	11.2	67.7	61.7
Idaho	11,277	10,369	4,545	4,752	503	453	22.9	21.0	9.2	9.6	44.6	43.7
Illinois	122,562	115,282	84,769	87,739	5,016	4,967	15.6	14.6	10.8	11.1	40.9	43.1
Indiana	60,192	56,087	38,573	40,929	2,560	2,789	17.3	16.1	11.1	11.8	42.5	49.7
Iowa	43,221	42,105	25,623	26,485	1,752	1,862	16.9	16.5	10.0	10.4	40.5	44.2
Kansas	29,574	29,325	18,583	19,204	1,272	1,302	15.9	15.7	10.0	10.3	43.0	44.4
Kentucky	61,878	56,163	29,310	30,899	3,794	3,321	21.2	19.2	10.0	10.6	61.3	59.1
Louisiana	48,867	46,006	24,767	25,010	3,278	3,020	22.9	21.6	11.6	11.7	67.1	65.6
Maine	15,218	15,246	10,507	11,465	856	996	17.8	17.8	12.3	13.4	56.2	65.3
Maryland	29,013	27,739	20,847	22,083	1,616	1,705	17.3	16.5	12.4	13.2	55.7	61.5
Massachusetts	61,262	61,736	49,606	52,248	2,446	2,723	13.8	13.9	11.2	11.8	39.9	44.1
Michigan	96,963	91,539	50,687	53,472	4,320	4,386	20.1	19.0	10.5	11.1	44.6	47.9
Minnesota	50,062	48,036	26,179	26,905	1,940	1,961	18.9	18.1	9.9	10.1	38.8	40.8
Mississippi	53,694	52,095	22,800	23,856	3,042	3,066	26.5	25.8	11.3	11.8	56.7	58.9
Missouri	58,567	56,951	42,558	44,974	3,018	3,219	14.7	14.3	10.7	11.3	51.5	56.5
Montana	10,673	10,248	5,684	6,128	486	518	19.8	19.0	10.5	11.4	45.5	50.5
Nebraska	22,401	22,270	11,964	13,199	815	937	16.4	16.3	8.8	9.7	36.4	42.1
Nevada	1,888	1,742	1,272	1,322	90	70	18.7	17.2	12.6	13.1	47.7	40.2
New Hampshire	7,830	7,633	6,400	6,528	373	367	15.4	15.0	12.5	12.8	47.6	48.1
New Jersey	56,043	54,607	43,831	45,003	2,216	2,154	12.9	12.6	10.1	10.4	39.5	39.4
New Mexico	14,290	13,837	5,962	6,422	1,554	1,711	33.9	32.8	14.1	15.2	108.7	123.7
New York	189,559	185,502	147,106	153,772	7,693	8,369	14.6	14.3	11.4	11.9	40.6	45.1
North Carolina	79,934	79,080	33,599	33,981	5,487	5,180	22.9	22.6	9.6	9.7	68.6	65.5
North Dakota	13,041	12,637	5,208	5,440	649	662	18.5	17.9	7.4	7.7	49.8	52.4
Ohio	112,667	107,576	74,899	80,189	4,878	5,332	16.7	16.0	11.1	11.9	43.3	49.6
Oklahoma	44,188	41,456	19,957	21,313	2,167	2,345	17.3	16.3	7.8	8.4	49.0	56.6
Oregon	16,245	15,457	11,784	12,341	636	642	15.8	15.1	11.5	12.0	39.2	41.5
Pennsylvania	165,984	161,288	107,282	114,949	7,623	8,109	16.3	15.8	10.5	11.3	45.9	50.3
Rhode Island	10,536	10,240	8,276	8,334	462	487	15.5	15.0	12.2	12.2	43.8	47.6
South Carolina	41,120	40,643	20,718	20,540	3,303	3,074	21.9	21.7	11.0	11.0	80.3	75.6
South Dakota	11,826	11,908	5,482	5,959	518	608	17.1	17.2	7.9	8.6	43.8	51.1
Tennessee	53,651	51,938	29,288	30,232	3,405	3,171	18.5	18.0	10.1	10.5	63.5	61.1
Texas	121,156	116,057	60,208	65,448	7,889	8,575	19.6	18.8	9.8	10.6	65.1	73.9
Utah	13,214	12,693	4,853	4,989	618	526	25.5	24.5	9.4	9.6	46.8	41.4
Vermont	6,301	6,326	4,591	4,981	305	313	16.5	16.5	12.0	13.0	48.4	49.5
Virginia	53,495	51,950	29,579	31,119	3,540	3,619	19.8	19.2	10.9	11.5	66.2	69.7
Washington	26,767	25,036	18,528	19,094	1,035	998	16.1	15.1	11.2	11.5	38.7	39.9
West Virginia	42,434	42,240	17,766	19,190	2,643	2,610	22.8	22.6	9.5	10.3	62.3	61.8
Wisconsin	55,004	53,543	30,704	31,973	2,301	2,324	18.8	18.3	10.5	10.9	41.8	43.4
Wyoming	4,946	4,530	2,235	2,430	256	252	21.0	19.3	9.5	10.3	51.8	55.6

[1] Rate for each State is based on the 1937 estimated population; no estimate made for 1938.

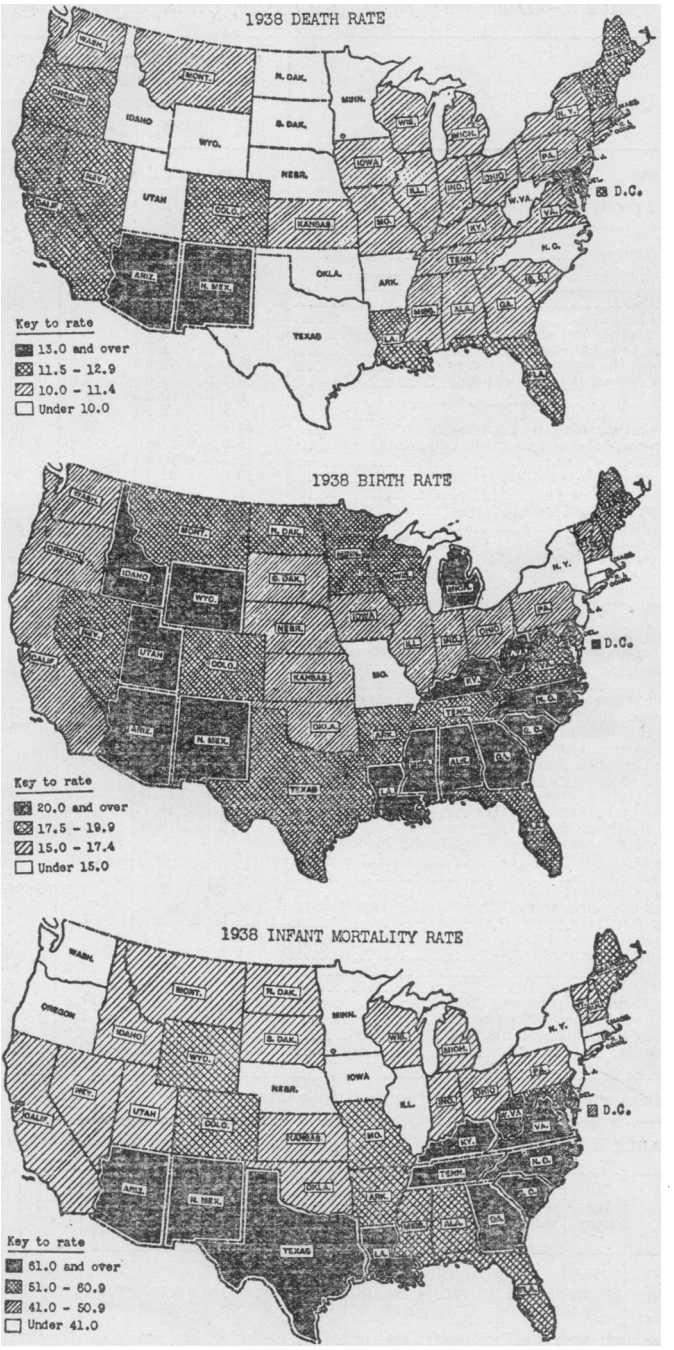

FIGURE 2.—Death, birth, and infant mortality rates, shown by four rate classifications by States.

TABLE 3.—*Death rates for selected causes, United States, 1934–38*

Cause of death [1]	Death rate (number per 100,000 estimated population)				
	1938	1937	1936	1935	1934
All causes	1,060.9	1,122.1	1,151.8	1,092.2	1,103.2
Typhoid and paratyphoid fever (1, 2)	1.9	2.1	2.5	2.8	3.3
Measles (7)	2.5	1.2	1.0	3.1	5.5
Scarlet fever (8)	.9	1.4	1.9	2.1	2.0
Whooping cough (9)	3.7	3.9	2.1	3.7	5.9
Diphtheria (10)	2.0	2.0	2.4	3.1	3.3
Influenza (11)	12.7	29.4	26.3	22.1	17.3
Dysentery (13)	2.3	2.3	2.4	1.9	2.7
Erysipelas (15)	.5	1.0	1.6	1.7	1.5
Acute poliomyelitis and acute polioencephalitis (16)	.4	1.1	.6	.8	.7
Epidemic cerebrospinal meningitis (18)	.8	1.7	2.4	2.1	1.0
Tuberculosis of the respiratory system (23)	44.6	49.0	50.6	49.8	51.1
Tuberculosis (all other forms) (24–32)	4.4	4.6	5.0	5.2	5.5
Syphilis (34)	9.7	10.2	9.8	9.1	9.3
Malaria (38)	1.8	2.1	3.1	3.5	3.6
Cancer of digestive tract and peritoneum (46)	54.4	53.6	53.1	52.1	51.7
Cancer of uterus, other female genital organs (48, 49)	15.5	15.5	15.4	15.1	14.9
Cancer of the breast (50)	11.1	10.8	10.7	10.4	10.4
Cancer (all other forms) (45, 47, 51–53)	33.6	32.1	31.8	30.4	29.1
Acute rheumatic fever (56)	1.6	1.5	1.7	1.8	1.8
Chronic rheumatism, osteoarthritis (57)	1.3	1.4	1.4	1.3	1.3
Diabetes mellitus (59)	23.8	23.7	23.7	22.2	22.1
Pellagra (62)	2.5	2.5	2.9	2.8	2.8
Alcoholism (acute or chronic) (75)	2.0	2.6	2.9	2.6	2.9
Progressive locomotor ataxia (tabes dorsalis), general paralysis of insane (80, 83)	4.1	3.9	4.2	4.3	4.7
Cerebral hemorrhage, cerebral embolism and thrombosis (82)	85.7	86.5	90.8	85.5	85.4
Chronic rheumatic heart diseases (90a, 92c, 93e, 95c)	7.2	5.8			
Diseases of coronary arteries and angina pectoris (94)	59.5	54.0	265.8	244.9	239.9
Heart diseases (all other forms) (90b, 91, 92a, b, 93a–d, 95a, b)	202.2	208.3			
Arteriosclerosis (except coronary), idiopathic anomalies of blood pressure (97, 102)	17.1	17.8	18.6	17.5	18.5
Pneumonia (all forms) (107–109)	67.5	85.1	93.0	81.9	79.4
Ulcer of stomach and duodenum (117)	6.5	6.8	6.7	6.6	6.1
Diarrhea and enteritis (under 2 years) (119)	10.8	11.1	12.2	10.4	13.4
Diarrhea and enteritis (2 years and over) (120)	3.4	3.5	4.2	3.7	4.9
Appendicitis (121)	11.0	11.9	12.8	12.7	14.3
Hernia, intestinal obstruction (122)	9.7	10.1	10.5	10.3	10.3
Cirrhosis of the liver (124)	8.3	8.5	8.2	7.9	7.7
Biliary calculi and other diseases of the gall bladder and biliary passages (126, 127)	6.5	6.7	6.9	6.7	7.0
Nephritis (130–132)	77.2	79.6	83.2	81.2	84.2
Puerperal septicemia (140, 142a, 145)	2.6	2.9	3.6	4.1	4.0
Puerperal albuminuria and eclampsia, other toxemias of pregnancy (146, 147)	1.9	2.1	2.2	2.1	2.4
Other puerperal causes (141, 142b–144, 148–150)	3.1	3.3	3.7	3.6	3.8
Congenital malformations (157)	9.3	9.2	9.4	9.3	10.0
Suicide (163–171)	15.2	14.9	14.2	14.3	14.9
Homicide (172–175)	6.8	7.6	8.0	8.3	9.5
Automobile accidents (primary) (210)	23.5	28.8	27.8	26.8	26.8
Other motor vehicle accidents (206, 208, 211)	1.5	1.9	1.8	1.7	1.7
Other accidents (176–195, 201–205, 207, 209, 212–214)	47.0	50.7	56.0	49.7	51.2
All other causes	139.5	145.5	152.6	149.0	153.4

[1] Figures in parentheses are disease title numbers of the International List of the Causes of Death, 1929.

TABLE 4.—*Number of births and deaths by month, United States, 1938*

Subject	January	February	March	April	May	June	July	August	September	October	November	December
Births:												
Number	194,557	180,052	196,177	184,263	188,010	183,822	203,183	205,742	196,692	192,035	179,917	182,512
Rate	17.6	18.0	17.7	17.2	17.0	17.2	18.4	18.6	18.4	17.4	16.8	16.5
Deaths:												
Number	131,369	115,621	125,980	117,322	116,329	107,192	107,852	106,288	103,027	112,636	112,055	125,720
Rate	11.9	11.6	11.4	11.0	10.5	10.0	9.8	9.6	9.6	10.2	10.5	11.4

TABLE 5.—*Number of births, deaths, and infant deaths (under 1 year of age), by race and sex, United States, 1938*

Subject	Total	White		Negro		Other races	
		Male	Female	Male	Female	Male	Female
Births	2,286,962	1,030,398	975,557	135,328	132,372	6,815	6,492
Deaths	1,381,391	665,559	529,872	94,659	83,914	4,684	2,703
Infant deaths	116,702	54,090	40,395	11,603	9,252	769	593

TABLE 6.—*Number of deaths under 1 year, by age, registration area*

Year	Number					Percent of total			
	Total deaths under 1 year	Under 1 day	Under 1 week	Under 1 month	Under 6 months	Under 1 day	Under 1 week	Under 1 month	Under 6 months
1938:									
Total	116,702	32,348	54,250	67,735	99,203	27.7	46.5	58.0	85.0
White	94,485	27,910	46,054	56,758	81,218	29.5	48.7	60.1	86.0
Negro	20,855	4,270	7,857	10,500	17,000	20.5	37.7	50.3	81.5
Other races	1,362	168	339	477	985	12.3	24.9	35.0	72.3
1937	119,931	32,413	54,491	68,887	101,881	27.0	45.4	57.4	84.9
1936	122,535	32,297	55,210	69,869	103,781	26.4	45.1	57.0	84.7
1935	120,138	32,237	54,877	69,834	102,252	26.8	45.7	58.1	85.1
1934	130,185	33,300	57,265	73,841	109,528	25.6	44.0	56.7	84.1
1933	120,887	31,413	54,744	70,658	102,237	26.0	45.3	58.4	84.6
1932	119,431	31,050	54,082	69,496	101,457	26.0	45.3	58.2	85.0
1931	130,134	31,786	55,958	73,092	109,005	24.4	43.0	56.2	83.8
1930	142,413	33,062	59,922	78,657	118,794	23.2	42.1	55.2	83.4
1929	146,661	33,258	60,869	80,063	121,572	22.7	41.5	54.6	82.9

Table 5 gives the number of births, deaths, and infant deaths (under 1 year of age), by race and sex, and table 6 shows the number and percentage of deaths under 1 year of age from 1929 to 1938, tabulated by certain subdivisions of the first year of life. Of the total infant deaths in 1938 nearly one-third occurred before the infant was 1 day old, nearly one-half under 1 week, and more than four-fifths under 6 months of age.

In table 7 are tabulated the infant deaths by important causes. For a single cause, premature birth stands highest in the list, while pneumonia, diarrhea and enteritis, and congenital malformations come next in the order named. These four causes were responsible for 70,456, or 60 percent, of the 116,702 deaths of infants under 1 year of age in 1938.

The number of deaths from cancer according to principal anatomical site of the tumor are given in table 8 for 1938 and certain prior years.

The cancer death rate in the United States has increased from 104.1 in 1934 and 112.0 in 1937 to 114.6 in 1938 (table 3). Some of the increase in cancer mortality over a period of years is undoubtedly due to the aging of the population. The death rate for cancer for any particular State or locality is partly determined by the age dis-

tribution in that area. It shows considerable variation in the different States, some of which may be accounted for by factors other than age distribution.

TABLE 7.—*Number of deaths under 1 year from selected causes, by age, United States, 1938*

Cause of death	Total deaths under 1 year	Under 1 day	1 day	2 days	3–6 days	1 week	2 weeks	3 weeks	Under 1 month	1–12 months
All causes	116,702	32,348	8,302	5,231	8,369	6,000	4,005	3,480	67,735	48,967
Measles (7)	718	2	3	2	3	8	16	23	57	661
Scarlet fever (8)	58	------	------	------	1	2	1	1	5	53
Whooping cough (9)	3,095	------	------	------	1	12	52	112	177	2,918
Diphtheria (10)	234	1	------	1	4	4	5	3	18	216
Influenza (11)	2,120	4	3	5	31	49	62	66	220	1,900
Dysentery (13)	1,146	------	1	------	2	13	19	22	57	1,089
Erysipelas (15)	154	------	------	1	3	7	13	16	40	114
Encephalitis (lethargic or epidemic) (17)	16	------	------	------	------	1	------	------	1	15
Meningitis (epidemic cerebrospinal) (18)	196	------	------	------	2	2	1	2	7	189
Tetanus (22)	143	------	1	6	38	71	6	4	126	17
Tuberculosis of respiratory system (23)	246	1	------	------	------	1	1	2	5	241
Tuberculosis of meninges (24)	201	------	------	1	------	1	3	2	7	194
Other forms of tuberculosis (25–32)	123	------	------	------	------	------	1	1	2	121
Syphilis (34)	1,444	231	64	47	86	86	56	57	627	817
Purulent infection, septicemia (36)	137	------	------	------	8	6	18	12	44	93
Malaria (38)	201	3	3	1	3	7	6	7	30	171
Other infectious, parasitic diseases (1–6, 12, 14, 16, 19–21, 33, 35, 37, 39–44)	243	1	------	1	4	13	14	4	37	206
Rickets (63)	155	3	2	1	1	3	5	5	20	135
Diseases of the thymus gland (67)	1,050	101	77	74	108	64	41	42	507	543
Hemorrhagic conditions (70)	215	17	5	22	56	34	15	7	156	59
Anemias (71)	198	13	5	9	18	28	6	6	85	113
Encephalitis (nonepidemic) (78)	84	2	3	------	3	1	2	3	14	70
Meningitis (79)	558	1	1	5	11	14	17	16	65	493
Cerebral hemorrhage, cerebral embolism and thrombosis (82)	243	3	6	4	7	2	1	4	27	216
Convulsions (86)	400	20	28	35	67	45	18	10	223	177
Diseases of ear, mastoid process (89)	501	------	------	------	1	6	10	7	24	477
Other diseases of nervous system and sense organs (80, 81, 83–85, 87, 88)	212	10	8	3	17	14	6	6	64	148
Diseases of circulatory system (90–103)	475	11	8	10	26	30	21	15	121	354
Pneumonia (all forms) (107–109)	16,014	63	113	148	512	592	634	709	2,771	13,243
Other diseases of respiratory system (104–106, 110–114)	1,276	20	18	16	49	59	57	62	281	995
Diseases of buccal cavity and annexa, pharynx, tonsils (115)	257	1	------	1	1	10	14	9	36	221
Diseases of stomach (117, 118)	389	2	1	5	34	35	29	26	132	257
Diarrhea and enteritis (119)	11,415	10	21	22	113	282	435	436	1,319	10,096
Hernia (122a)	119	------	3	2	6	6	3	5	25	94
Intestinal obstruction (122b)	884	1	1	14	43	49	28	32	168	716
Peritonitis (cause not specified) (129)	149	------	------	1	5	7	13	14	40	109
Other diseases of digestive system (116, 121, 123–128)	210	2	2	4	15	18	7	11	59	151
Diseases of genitourinary system (130, 131, 133–139)	388	10	4	5	32	30	24	23	128	260
Diseases of skin, cellular tissue (151–153)	263	3	------	------	11	37	44	15	110	153
Congenital malformations (157)	10,338	2,463	820	743	1,284	882	490	427	7,109	3,229
Congenital debility (158)	3,229	635	198	132	258	224	194	162	1,803	1,426
Premature birth (159)	32,689	19,826	4,144	1,855	2,503	1,825	909	520	31,582	1,107
Injury at birth (160)	9,994	5,390	1,509	1,080	1,320	390	136	77	9,902	92
Other diseases of early infancy (161)	5,194	2,072	684	574	935	488	160	106	5,019	175
External causes (172–195, 201–214)	2,382	137	52	52	68	58	85	103	555	1,827
Unknown, ill-defined causes (199, 200)	6,379	1,274	508	341	652	467	310	268	3,820	2,559
All other causes (45–62, 64–66, 68, 69, 72–77, 154–156)	567	15	6	8	27	17	17	20	110	457

TABLE 8.—*Number of deaths from cancer, by sex and site: Registration area*

Cause of death	1938		1935		1930 [1]		1925 [1]		1920 [1]	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Cancers and other malignant tumors (45–53)	69,857	79,357	62,933	74,716	51,777	63,488	41,865	53,639	30,933	41,998
Cancer of the buccal cavity and pharynx (45)	4,030	901	3,982	923	3,685	869	3,475	759	2,335	462
Lip	657	63	671	56	540	46	483	70	393	44
Tongue	943	172	878	198	800	147	749	117	609	69
Mouth	440	130	441	109	335	104	285	56	176	61
Jaw	718	192	776	223	811	240	888	223	856	204
Other and unspecified parts of buccal cavity	485	143	466	134	411	109	295	76	211	56
Pharynx	787	201	750	203	788	223	775	217	90	28
Cancer of the digestive tract, peritoneum (46)	38,126	32,681	35,224	31,237	30,431	27,381	25,375	24,080	19,058	19,285
Esophagus	1,952	546	1,715	541	1,464	432	1,307	352	871	232
Stomach and duodenum	16,288	10,814	16,077	11,027	14,847	10,561	[2]	[2]	[2]	[2]
Intestines (except duodenum, rectum, anus)	7,585	9,103	6,428	8,037	4,826	6,170	[2]	[2]	[2]	[2]
Rectum and anus	4,727	3,718	3,824	3,237	2,764	2,431	2,082	1,959	1,373	1,443
Liver and biliary passages	4,303	5,763	4,434	6,045	4,452	5,936	4,028	5,530	3,450	5,193
Pancreas	2,737	2,169	2,309	1,809	1,656	1,313	991	911	665	515
Mysentery and peritoneum	511	529	424	526	398	497	349	471	259	425
Others under this title	23	39	13	15	24	41	25	45	20	34
Cancer of the respiratory system (47)	6,065	2,056	4,478	1,723	2,688	1,160	[2]	[2]	[2]	[2]
Larynx	1,197	143	987	165	854	129	636	138	409	90
Lungs and pleura	3,669	1,631	2,951	1,405	1,673	980	989	739	527	429
Other respiratory organs	1,199	282	540	153	161	51	[2]	[2]	[2]	[2]
Cancer of the uterus (48)	------	16,291	------	15,853	------	14,132	------	12,377	------	9,848
Cancer of other female genital organs (49)	------	3,944	------	3,345	------	2,290	------	1,674	------	949
Ovary and Fallopian tube	------	3,312	------	2,795	------	1,833	------	1,218	------	652
Vagina and vulva	------	577	------	509	------	409	------	398	------	247
Other female genital organs	------	55	------	41	------	48	------	58	------	50
Cancer of the breast (50)	145	14,315	162	13,064	138	10,774	138	8,373	88	6,577
Cancer of the male genitourinary organs (51)	13,539	------	11,702	------	8,661	------	[2]	------	[2]	------
Kidneys and suprarenals (male)	1,414	------	1,178	------	924	------	717	------	439	------
Bladder (male)	3,216	------	3,014	------	2,512	------	2,095	------	1,494	------
Prostate	8,069	------	6,765	------	4,648	------	3,068	------	1,597	------
Testes	482	------	412	------	270	------	227	------	143	------
Scrotum	32	------	34	------	30	------	16	------	[2]	------
Other male genitourinary organs	326	------	299	------	277	------	[2]	------	[2]	------
Cancer of the skin (52)	2,039	1,301	2,113	1,278	1,852	1,167	1,636	988	1,505	862
Cancer of other or unspecified organs (53)	5,913	7,868	5,272	7,293	4,322	5,715	[2]	[2]	[2]	[2]
Kidneys and suprarenals (female)	------	937	------	870	------	705	------	541	------	381
Bladder (female)	------	1,535	------	1,485	------	1,172	------	913	------	650
Brain	977	646	654	487	467	337	223	200	96	88
Bones (except of jaw)	1,134	977	889	875	858	753	591	558	343	406
Other or unspecified organs	3,802	3,773	3,729	3,576	2,997	2,748	[2]	[2]	[2]	[2]

[1] The percent of population included in the death registration area for 1920 was 82.3; 1925, 89.6; and 1930, 96.2.
[2] Not comparable.

In the distribution of puerperal mortality (maternal deaths per 1,000 live births) by cause, the toxemias of pregnancy stand the highest, with puerperal septicemia, septic conditions following abortion, other accidents of childbirth, and puerperal hemorrhage following in the order named. These five causes were responsible for 85 percent of the deaths of mothers due to puerperal causes in 1938.

TABLE 9.—*Number of deaths from puerperal causes and death rates, by race: United States, 1938*

Cause of death	Number				Death rate (number per 1,000 live births)			
	Total	White	Negro	Other races	Total	White	Negro	Other races
All puerperal causes (140-150)	9,953	7,566	2,305	82	4.4	3.8	8.6	6.2
Abortion with septic conditions (140)	1,380	1,070	302	8	.6	.5	1.1	.6
Accidents of pregnancy (141, 142b, 143)	898	678	209	11	.4	.3	.8	.8
Puerperal hemorrhage (144)	1,320	1,104	206	10	.6	.6	.8	.8
Puerperal septicemia (ex. 140) (142a, 145)	1,953	1,385	550	18	.9	.7	2.1	1.4
Toxemias of pregnancy (146, 147)	2,521	1,820	683	18	1.1	.9	2.6	1.4
Puerperal phlegmasia, etc. (148)	524	450	70	4	.2	.2	.3	.3
Other accidents of childbirth (149)	1,338	1,048	279	11	.6	.5	1.0	.8
Other puerperal causes (150)	19	11	6	2	(1)	(1)	(1)	.2

[1] Less than 1/10 of 1 percent per 1,000 live births.

TABLE 10.—*Number of deaths from motor vehicle accidents, by day of accident: United States, 1938*

Type of accident	Total	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Unk.
Total	32,582	6,203	3,781	3,321	3,498	3,602	4,009	6,294	1,874
Railroad and automobile (206)	1,489	252	209	146	189	193	206	238	56
Street car and automobile (208)	165	29	17	12	15	10	37	39	6
Automobile (210)	30,564	5,833	3,520	3,129	3,258	3,367	3,720	5,950	1,787
Motorcycle (211)	364	89	35	34	36	32	46	67	25

The number of deaths due to motor vehicle accidents, by days of the week, shows a preponderance of such deaths occurring during the week end, as might be expected, the largest numbers in 1938 occurring on Saturday and Sunday and the lowest on Tuesday. The death rate for automobile accidents in the United States for 1938 (23.5 per 100,000 population) was the lowest since 1933 (23.3). In 1937 the rate was 28.8.

SOURCES OF INFECTION IN CASES OF TRICHINOSIS IN SAN FRANCISCO

A recent news release by Dr. J. C. Geiger, director, Department of Public Health, city and county of San Francisco, gives interesting information concerning the sources of infection in cases of trichinosis in San Francisco during the 11-year period 1929 to 1939, inclusive. The type of pork involved and the number of cases were as follows:

Kind of pork involved	*Number of cases*
Pork sausage	58
Salami	54
Mettwurst	30
Fresh pork	36
Ground pork and meat loaf	11
Raw pork	8
Pork chops or steaks	5
Ham	4

Other types of pork involved were imported sausage, head cheese. mixed Chinese pork food, pickled pork, raw bacon, and smoked pork, In 13 cases, it was not possible to ascertain the kind of pork responsible. In 7 cases, infection was acquired from bear meat.

A relatively large number of cases were traced to salami and mettwurst, products which are customarily eaten without cooking by the consumer. Dr. Geiger reports that in 1934 many of the cases were traced to salami and that control measures were instituted for the preparation and sale of this product. Products of this sort constitute very dangerous avenues for trichina infection unless such products are prepared in packing houses or establishments operating under the Federal meat inspection regulations or equivalent regulations. The Federal regulations provide for the processing of the pork contained in products customarily eaten without cooking by the consumer so that any trichina parasites contained in the pork are rendered nonviable and incapable of causing trichinosis.

The Department of Public Health of San Francisco has been very diligent in its attempts to control trichinosis. Control regulations provide for the display of placards in butcher shops and in the kitchens of restaurants and hotels urging the thorough cooking of pork, supervision over hog ranches supplying pork to the San Francisco abattoirs, and a laboratory check on fresh pork slaughtered in such establishments. These attempts are reflected in a reduction during the past 5 years of cases of trichinosis occurring in the city.

COURT DECISION ON PUBLIC HEALTH

Inspection by city health officer of bakeries outside of city limits held unauthorized.—(Texas Court of Criminal Appeals; *Ex parte Ernest*, 136 S.W.2d 595; decided December 20, 1939; rehearing denied February 21, 1940.) An ordinance of the city of Winters, among other things, required an inspection by the city health officer of a bakery before the granting of a permit for the sale by it in the city of bread and certain other bakery products. For a bakery located within the corporate limits of the city the permit, license, and inspection fee was $12.50, while for a bakery outside the said limits there was to be added, to the fee of $12.50, $2.40 for each mile that such bakery was distant from the city.

A habeas corpus proceeding was brought by one charged with having unlawfully sold and delivered bread prepared in a bakery located in Fort Worth, Tex., the owner of which had not obtained from the health officer of Winters a permit to sell or deliver such bread within the city as provided by the ordinance. The court of criminal appeals said that the only question involved was whether

the city of Winters, by ordinance, could require bakeries located in Fort Worth and elsewhere to pay to the authorities of Winters the sum of $2.40 per mile. The conclusion reached by the court was that the ordinance in question, insofar as it authorized the health officer of Winters to enter the domain of another city to inspect bakeries located therein and require the operator thereof to pay an inspection fee of $2.40 per mile as a prerequisite to sell its bread in Winters, was void because the city had no power, under any legislative grant, to pass such an ordinance. The court pointed out that the jurisdiction of an incorporated city was ordinarily limited to its boundaries, unless the legislature expressly granted it extraterritorial powers, and observed that it was obvious that the city of Winters, by the ordinance in question, was attempting to exercise extraterritorial jurisdiction over bakeries located outside of its territory when the legislature had neither expressly nor impliedly granted any such power or authority.

DEATHS DURING WEEK ENDED MAY 4, 1940

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

	Week ended May 4, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	8,458	8,117
Average for 3 prior years	8,268	
Total deaths, first 18 weeks of year	166,713	166,756
Deaths under 1 year of age	491	469
Average for 3 prior years	513	
Deaths under 1 year of age, first 18 weeks of year	9,193	9,727
Data from industrial insurance companies:		
Policies in force	65,621,253	67,459,306
Number of death claims	12,312	15,602
Death claims per 1,000 policies in force, annual rate	9.8	12.1
Death claims per 1,000 policies, first 18 weeks of year, annual rate	10.6	11.7

PREVALENCE OF DISEASE

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

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 18, 1940

Summary

For the week ended May 18, slight increases are shown in the numbers of cases of diphtheria, measles, meningococcus meningitis, poliomyelitis, smallpox, and typhoid fever as compared with the preceding week, while slight decreases are recorded for influenza, scarlet fever, and whooping cough. However, both the current incidence and the total reported cases to date of each of these nine diseases, except influenza and poliomyelitis, are below the 5-year (1935–39) median expectancy.

As compared with the preceding week, the number of cases of meningococcus meningitis increased from 45 to 64, with 11 cases reported in Pennsylvania (9 in Luzerne County), and 19 cases in New Mexico. The number of cases of poliomyelitis increased from 14 to 26, with 3 cases in Mississippi, 4 in California, and 7 cases in Washington State. The incidence of smallpox increased from 48 to 61 cases, of which 16 cases were reported in Colorado (7 last week) and 10 cases in Alabama, where none was reported last week. For the country as a whole the smallpox incidence remains unusually low, with a total of only 61 cases for the current week as compared with a 5-year median expectancy of 237, and with only 1,441 cases this year to date as compared with a median expectancy of 6,239.

Of 13 cases of Rocky Mountain spotted fever reported for the current week, 2 cases occurred in eastern States, which is probably indicative of the beginning of the seasonal rise of the disease in the East. Colorado reported 8 cases of Colorado tick fever. Of 18 cases of endemic typhus, 8 cases occurred in Texas and 5 cases in Georgia.

The Bureau of the Census reports 8,390 deaths in 88 large cities for the week ended May 18, as compared with 8,009 for the corresponding week last year and with 8,185 for the 3-year (1937–39) average.

Telegraphic morbidity reports from State health officers for the week ended May 18, 1940, and comparison with corresponding week of 1939 and 5-year median

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

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39
	May 18, 1940	May 20, 1939		May 18, 1940	May 20, 1939		May 18, 1940	May 20, 1939		May 18, 1940	May 20, 1939	
NEW ENG.												
Maine	1	1	1	-------	14	1	417	155	155	0	0	0
New Hampshire	0	0	0	-------	-------	-------	7	3	34	0	0	0
Vermont	0	0	0	-------	-------	-------	1	83	83	0	0	0
Massachusetts	6	7	6	-------	-------	-------	766	1,254	716	1	4	4
Rhode Island	0	1	1	-------	-------	-------	162	80	80	0	1	0
Connecticut	3	2	2	-------	3	3	35	832	233	0	1	1
MID. ATL.												
New York	18	25	28	[1] 14	[1] 9	[1] 7	923	2,251	2,876	5	5	10
New Jersey	8	10	12	5	7	7	887	67	845	1	0	2
Pennsylvania	15	22	23	-------	-------	-------	498	138	1,728	11	4	5
E. NO. CEN.												
Ohio	16	5	12	30	-------	24	29	19	586	0	0	6
Indiana	3	7	10	1	33	14	13	11	229	0	1	2
Illinois	15	22	37	2	17	29	203	54	346	0	0	4
Michigan [2]	3	8	12	2	4	-------	802	564	564	0	0	0
Wisconsin	2	1	2	44	48	53	1,065	816	816	0	1	1
W. NO. CEN.												
Minnesota	3	2	2	9	3	1	89	266	370	0	0	0
Iowa	4	2	6	-------	1	-------	284	152	152	2	0	1
Missouri	5	5	12	2	-------	36	31	7	48	1	1	1
North Dakota	1	0	0	2	81	3	3	56	15	0	0	0
South Dakota	3	1	0	-------	2	-------	1	240	5	0	0	0
Nebraska	5	1	1	-------	-------	-------	12	213	213	0	0	2
Kansas	3	4	6	1	3	4	453	79	79	1	1	1
SO. ATL.												
Delaware	0	1	1	-------	-------	-------	4	11	14	0	0	0
Maryland [2,3]	1	1	5	4	3	3	5	318	318	1	0	2
Dist. of Col	2	1	10	-------	-------	-------	3	391	107	0	0	2
Virginia	11	6	7	108	107	-------	203	861	502	6	0	5
West Virginia [2]	7	5	5	16	26	24	30	2	78	0	1	4
North Carolina [3]	6	6	14	2	-------	3	107	472	272	[6] 1	0	2
South Carolina [4]	5	7	2	179	366	72	31	11	13	0	1	0
Georgia [4]	2	4	4	40	149	-------	109	132	0	0	0	1
Florida	3	1	2	2	16	3	83	97	25	0	0	0
E. SO. CEN.												
Kentucky	4	10	7	46	9	9	152	36	158	0	1	9
Tennessee	4	2	4	45	58	42	166	57	57	3	0	2
Alabama [4]	3	8	8	53	188	49	100	176	122	1	0	0
Mississippi [2,4]	6	5	5	-------	-------	-------	-------	-------	-------	4	0	0
W. SO. CEN.												
Arkansas	3	4	5	34	29	29	52	142	73	0	3	0
Louisiana	7	13	12	7	4	6	14	67	37	1	0	1
Oklahoma	8	6	5	28	60	60	15	224	86	1	0	1
Texas [4]	28	23	35	199	410	211	1,580	432	325	4	3	3
MOUNTAIN												
Montana [3]	0	8	2	10	69	45	78	153	62	0	0	0
Idaho [3]	1	0	0	-------	-------	3	19	131	23	0	1	0
Wyoming [3]	0	0	0	-------	-------	-------	28	83	23	0	0	0
Colorado [3,5]	6	8	6	4	4	-------	78	237	237	0	2	0
New Mexico	0	0	1	8	1	9	99	10	44	19	1	0
Arizona	2	0	0	53	47	27	187	13	18	0	0	0
Utah [3]	0	0	0	-------	3	-------	607	151	52	0	0	0
PACIFIC												
Washington	0	0	1	-------	-------	-------	486	1,067	414	0	0	1
Oregon [3]	4	3	3	15	35	19	503	78	78	0	0	0
California	11	35	26	49	40	44	420	2,513	1,714	2	2	4
Total	238	283	370	1,014	1,849	871	11,840	15,205	15,205	65	34	102
20 weeks	6,650	8,751	10,388	163,176	145,395	134,728	150,987	273,815	273,815	[6] 823	968	2,843

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended May 18, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39
	May 18, 1940	May 20, 1939		May 18, 1940	May 20, 1939		May 18, 1940	May 20, 1939		May 18, 1940	May 20, 1939	
NEW ENG.												
Maine	0	0	0	8	11	21	0	0	0	1	1	1
New Hampshire	0	0	0	0	4	11	0	0	0	0	0	0
Vermont	0	0	0	8	5	7	0	0	0	0	0	0
Massachusetts	1	0	0	189	153	218	0	0	0	3	2	2
Rhode Island	0	0	0	7	4	19	0	0	0	1	1	0
Connecticut	0	0	0	107	53	86	0	0	0	0	1	1
MID. ATL.												
New York	0	0	1	1,042	554	774	0	0	0	11	3	8
New Jersey	0	0	0	388	229	181	0	0	0	1	3	3
Pennsylvania	2	0	0	389	295	413	0	0	0	16	4	5
E. NO. CEN.												
Ohio	0	0	0	351	274	274	0	3	0	0	10	5
Indiana	0	0	0	85	137	115	4	29	19	3	3	3
Illinois	0	2	1	744	394	570	1	17	16	4	6	6
Michigan [2]	0	0	0	385	460	384	1	4	4	2	4	4
Wisconsin	0	0	0	130	128	309	1	3	3	0	2	1
W. NO. CEN.												
Minnesota	0	0	0	70	76	137	1	8	8	0	1	0
Iowa	1	0	0	41	77	96	5	26	26	0	1	1
Missouri	1	0	0	52	68	127	0	20	24	2	0	3
North Dakota	0	0	0	12	17	24	1	2	3	0	0	0
South Dakota	0	0	0	5	11	25	1	16	11	0	0	0
Nebraska	0	0	0	10	25	56	0	5	9	0	0	0
Kansas	0	1	0	49	47	98	1	6	6	1	1	3
SO. ATL.												
Delaware	0	0	0	4	6	6	0	0	0	0	1	0
Maryland [2 3]	0	0	0	49	30	43	0	0	0	0	2	2
Dist. of Col.	0	0	0	33	12	14	0	0	0	0	0	0
Virginia	0	0	1	31	18	17	0	0	0	2	5	5
West Virginia [2]	1	0	0	38	25	35	0	0	0	6	0	5
North Carolina [3]	1	0	1	22	10	17	0	0	0	0	8	4
South Carolina [4]	0	28	0	2	3	3	0	0	0	1	3	3
Georgia [4]	0	0	0	16	13	14	2	2	0	5	6	10
Florida	0	1	1	6	10	4	0	0	0	2	13	6
E. SO. CEN.												
Kentucky	1	0	0	49	47	25	1	1	1	5	10	5
Tennessee	0	1	1	65	57	17	1	7	0	5	2	4
Alabama [4]	0	0	0	7	6	5	10	0	0	7	11	6
Mississippi [2 4]	3	0	0	7	3	5	2	1	1	2	0	2
W. SO. CEN.												
Arkansas	0	2	0	6	10	4	1	16	5	2	2	2
Louisiana	0	1	1	6	16	7	0	1	0	7	15	13
Oklahoma	0	0	0	6	16	16	0	33	4	2	5	5
Texas [4]	0	3	1	33	32	46	5	4	8	5	7	14
MOUNTAIN												
Montana	0	0	0	19	12	12	0	0	8	1	2	1
Idaho [3]	0	0	0	10	2	8	0	0	3	1	0	0
Wyoming [3]	0	0	0	5	5	5	0	1	1	0	0	0
Colorado [3 5]	1	0	0	38	30	58	16	3	3	3	1	1
New Mexico	0	0	0	2	7	7	0	3	0	1	0	0
Arizona	0	0	0	9	12	12	0	5	0	1	1	3
Utah [3]	2	0	0	20	30	30	0	0	0	1	2	0
PACIFIC												
Washington	7	0	0	46	56	48	0	1	7	0	0	1
Oregon [3]	1	0	0	8	18	22	1	8	8	1	2	3
California	4	3	3	134	164	210	6	12	12	5	9	9
Total	26	42	19	4,743	3,672	5,616	61	237	237	110	150	154
20 weeks	465	413	412	96,417	97,895	134,892	1,441	7,015	6,239	1,670	2,360	2,360

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended May 18, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Whooping cough	
	Week ended—	
	May 18, 1940	May 20, 1939
NEW ENG.		
Maine	22	48
New Hampshire	14	4
Vermont	27	22
Massachusetts	176	119
Rhode Island	9	86
Connecticut	33	41
MID. ATL.		
New York	322	409
New Jersey	112	275
Pennsylvania	276	297
E. NO. CEN.		
Ohio	203	71
Indiana	35	44
Illinois	110	198
Michigan [2]	215	156
Wisconsin	135	170
W. NO. CEN.		
Minnesota	51	27
Iowa	30	26
Missouri	19	16
North Dakota	2	16
South Dakota	1	2
Nebraska	8	43
Kansas	30	32
SO. ATL.		
Delaware	6	8
Maryland [2 3]	127	29
Dist. of Col	5	15
Virginia	57	45
West Virginia [2]	50	21
SO. ATL.—continued		
North Carolina [3]	112	218
South Carolina [4]	21	105
Georgia [4]	28	78
Florida	11	57
E. SO. CEN.		
Kentucky	115	14
Tennessee	45	22
Alabama [4]	16	65
Mississippi [2 4]	----------	----------
W. SO. CEN.		
Arkansas	11	32
Louisiana	24	42
Oklahoma	26	2
Texas [4]	366	184
MOUNTAIN		
Montana [3]	2	28
Idaho [3]	23	7
Wyoming [3]	3	2
Colorado [3 5]	13	47
New Mexico	48	19
Arizona	23	11
Utah [3]	217	72
PACIFIC		
Washington	43	15
Oregon [3]	8	34
California	501	283
Total	3,731	3,557
20 weeks	62,687	80,002

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Rocky Mountain spotted fever, week ended May 18, 1940, 13 cases as follows: Maryland, 1; North Carolina, 1; Montana, 2; Idaho, 2; Wyoming, 4; Colorado, 1; Oregon, 2.
[4] Typhus fever, week ended May 18, 1940, 18 cases as follows: South Carolina, 3; Georgia, 5; Alabama, 1; Mississippi, 1; Texas, 8.
[5] Colorado tick fever, week ended May 18, 1940, Colorado, 8 cases.
[6] Only 1 case of Meningococus Menengitis in North Carolina, instead of 2 cases, should have been shown for the week ended May 11, 1940, Public Health Reports of May 17, p. 604.

WEEKLY REPORTS FROM CITIES

City reports for week ended May 4, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	138	137	52	6,858	648	2,171	22	402	24	1,262	-------
Current week	74	103	27	2,878	385	2,108	2	343	11	975	-------
Maine:											
Portland	0	------	0	161	0	0	0	0	0	4	33
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	14
Manchester	0	------	0	3	2	4	0	1	0	0	14
Nashua	0	------	0	4	0	0	0	0	0	0	4
Vermont:											
Barre	0	------	0	0	2	0	0	0	0	0	2
Burlington	0	------	0	0	0	0	0	0	0	2	9
Rutland	0	------	0	0	1	0	0	0	0	0	3
Massachusetts:											
Boston	0	------	0	95	12	57	0	10	0	58	218
Fall River	0	------	0	43	0	1	0	0	0	6	22
Springfield	0	------	0	3	1	6	0	0	0	4	40
Worcester	0	------	0	37	7	7	0	0	0	1	44
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	17
Providence	1	------	0	107	3	10	0	2	0	17	62
Connecticut:											
Bridgeport	0	------	0	4	3	2	0	3	0	1	44
Hartford	2	------	0	0	6	16	0	0	0	1	52
New Haven	0	1	0	0	0	2	0	0	0	6	56
New York:											
Buffalo	0	------	1	1	13	12	0	6	0	3	142
New York	12	16	3	171	69	790	0	79	5	113	1,555
Rochester	1	2	0	6	1	12	0	1	0	9	74
Syracuse	0	------	0	0	4	14	0	0	0	6	53
New Jersey:											
Camden	0	------	0	0	0	9	0	1	0	0	27
Newark	0	------	0	463	2	26	0	1	0	28	75
Trenton	0	------	0	0	5	4	0	0	0	1	35
Pennsylvania:											
Philadelphia	0	1	0	69	19	128	0	24	2	40	509
Pittsburgh	1	10	1	5	8	35	0	11	0	15	174
Reading	1	------	0	1	1	0	0	0	0	14	17
Scranton	0	------	-------	1	-------	5	0	-------	0	0	-------
Ohio:											
Cincinnati	2	------	0	0	6	19	0	8	0	39	126
Cleveland	3	14	1	3	11	38	0	14	1	38	208
Columbus	0	------	0	2	1	12	0	0	0	8	81
Toledo	0	------	0	0	5	35	0	2	0	8	75
Indiana:											
Anderson	1	------	0	1	1	1	0	1	0	6	13
Fort Wayne	0	------	0	1	2	2	1	0	0	0	31
Indianapolis	4	------	1	2	15	21	0	4	0	8	112
Muncie	0	------	0	0	2	0	0	0	0	0	9
South Bend	1	------	-------	4	1	0	0	0	0	3	22
Terre Haute	0	------	0	0	0	2	0	1	0	0	19
Illinois:											
Alton	0	1	1	1	1	3	0	0	0	1	10
Chicago	13	3	2	65	29	490	0	29	0	32	706
Elgin	0	------	0	1	0	1	0	0	0	0	6
Moline	0	------	0	3	0	0	0	0	0	0	4
Springfield	0	------	0	1	3	3	0	0	0	8	29
Michigan:											
Detroit	0	------	1	133	9	86	0	11	0	48	238
Flint	0	------	0	9	11	26	0	2	0	10	45
Grand Rapids	0	------	0	2	0	20	0	0	0	27	39
Wisconsin:											
Kenosha	0	------	-------	58	-------	2	0	-------	0	0	-------
Madison	0	------	1	8	0	1	0	0	0	8	5
Milwaukee	0	------	0	49	4	29	0	2	0	0	104
Racine	0	------	0	4	0	3	0	1	0	0	14
Superior	0	------	0	107	0	3	0	0	0	0	11

City reports for week ended May 4, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0	------	0	28	0	0	0	0	0	0	24
Minneapolis	1	------	0	1	3	15	0	0	0	5	86
St. Paul	0	1	1	2	8	8	0	2	0	5	66
Iowa:											
Cedar Rapids	0	------	--------	56	-------	0	0	-------	0	0	--------
Davenport	0	------	--------	8	-------	2	0	-------	0	0	--------
Des Moines	3	------	0	24	0	10	0	0	0	0	24
Sioux City	0	------	0	2	-------	1	0	-------	0	0	--------
Waterloo	1	------	--------	11	-------	2	0	-------	0	0	--------
Missouri:											
Kansas City	2	------	0	10	6	12	0	5	0	1	94
St. Joseph	0	------	0	0	2	1	0	0	0	0	21
St. Louis	3	------	0	3	11	13	1	10	0	12	197
North Dakota:											
Fargo	0	------	0	0	2	0	0	0	0	0	5
Grand Forks	0	------	--------	1	-------	0	0	-------	0	3	--------
Minot	0	------	0	0	0	0	0	0	0	0	11
South Dakota:											
Aberdeen	0	------	--------	0	-------	2	0	-------	0	0	--------
Sioux Falls	0	------	0	0	0	1	0	0	0	0	2
Nebraska:											
Lincoln	0	------	--------	1	-------	1	0	-------	0	2	--------
Omaha	0	------	1	1	2	4	0	4	0	4	50
Kansas:											
Lawrence	0	------	0	1	0	0	0	0	0	0	4
Topeka	0	2	2	18	6	1	0	0	0	0	28
Wichita	0	1	0	15	3	0	0	0	0	8	29
Delaware:											
Wilmington	0	------	0	0	1	7	0	1	0	1	31
Maryland:											
Baltimore	0	3	0	0	12	11	0	16	0	127	213
Cumberland	0	------	0	0	1	0	0	0	0	0	12
Frederick	0	------	0	0	1	0	0	0	0	0	--------
Dist. of Col.:											
Washington	0	------	0	3	7	35	0	23	1	4	180
Virginia:											
Lynchburg	1	------	0	2	0	1	0	1	0	9	19
Richmond	0	------	0	1	3	1	0	1	0	1	38
Roanoke	1	------	0	9	1	3	0	0	0	0	15
West Virginia:											
Charleston	0	------	0	0	1	0	0	0	0	0	14
Huntington	0	------	--------	0	-------	1	0	0	-------	1	--------
Wheeling	0	------	--------	1	-------	4	0	-------	0	2	--------
North Carolina:											
Gastonia	0	------	--------	0	-------	0	0	-------	0	0	--------
Raleigh	0	------	0	0	0	0	0	0	0	0	7
Wilmington	0	------	0	0	1	0	0	0	0	0	7
Winston-Salem	1	------	0	0	2	1	0	3	0	0	18
South Carolina:											
Charleston	0	13	0	0	1	1	0	0	0	0	15
Florence	0	------	0	0	2	0	0	0	0	0	12
Greenville	0	------	0	0	2	0	0	0	0	1	11
Georgia:											
Atlanta	0	------	1	6	6	3	0	2	0	0	80
Brunswick	0	------	0	0	0	0	0	0	0	0	5
Savannah	0	23	0	0	1	0	0	2	0	0	36
Florida:											
Miami	0	------	0	2	1	0	0	0	0	0	29
Tampa	0	1	1	55	0	1	0	1	0	0	21
Kentucky:											
Ashland	1	------	0	0	1	0	0	0	0	9	7
Covington	0	------	0	3	0	2	0	0	0	0	16
Lexington	0	------	0	10	0	3	0	1	0	5	18
Louisville	0	------	0	10	7	30	0	6	0	72	69
Tennessee:											
Knoxville	0	------	0	12	2	15	1	0	1	0	21
Memphis	0	1	3	21	0	12	0	1	0	9	85
Nashville	0	------	1	12	4	1	0	1	0	0	41
Alabama:											
Birmingham	0	2	0	5	2	2	0	5	0	1	64
Mobile	0	2	1	12	1	0	0	0	0	0	25
Montgomery	1	------	--------	8	-------	0	0	-------	0	2	--------

City reports for week ended May 4, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Arkansas:											
Fort Smith	0	3		0		0	0		0	0	
Little Rock	0	3	0	0	5	1	0	2	0	0	
Louisiana:											
Lake Charles	0		0	0	1	0	0	0	0	0	5
New Orleans	1	1	1	4	5	4	0	12	0	9	135
Shreveport	0		0	1	3	0	0	1	0	0	36
Oklahoma:											
Oklahoma City	0	1	0	1	1	0	0	1	0	0	28
Tulsa	1			1		3	0		0	35	
Texas:											
Dallas	1		0	363	3	1	0	3	0	33	66
Fort Worth	0		0	7	2	0	0	3	0	23	38
Galveston	0		0	0	2	1	0	1	0	0	13
Houston	3		0	22	3	6	0	3	0	7	91
San Antonio	0		1	22	5	1	0	4	0	1	72
Montana:											
Billings	0		0	0	0	0	0	0	0	0	7
Great Falls	0		0	20	0	3	0	0	0	0	5
Helena	0		0	0	0	1	0	0	0	0	3
Missoula	0		0	0	0	0	0	0	0	0	6
Idaho:											
Boise	0		0	1	0	0	0	0	0	1	3
Colorado:											
Colorado Springs	0		0	3	0	0	0	1	0	2	11
Denver	14		1	37	2	8	0	3	0	1	72
Pueblo	0		0	1	0	1	0	0	0	0	2
New Mexico:											
Albuquerque	0		0	0	1	0	0	3		5	11
Utah:											
Salt Lake City	0		1	237	1	3	0	0	0	77	40
Washington:											
Seattle	0		2	295	6	8	0	2	0	10	105
Spokane	0		0	22	2	5	0	0	1	1	32
Tacoma	0		0	8	1	4	0	0	0	2	24
Oregon:											
Portland	2		0	186	2	2	0	4	0	7	82
Salem	0			1		1	0		0	0	
California:											
Los Angeles	2	2	0	16	3	30	0	14	0	56	284
Sacramento	2	1	0	15	2	1	0	2	0	20	24
San Francisco	1		0	3	6	9	0	8	1	20	153

State and city	Meningococcus meningitis		Poliomyelitis cases	State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
New Hampshire:				Minnesota:			
Nashua	1	0	0	Minneapolis	0	0	1
Massachusetts:				Missouri:			
Boston	1	0	0	St. Louis	1	0	0
Rhode Island:				Maryland:			
Pawtucket	1	1	0	Baltimore	0	0	1
Providence	1	0	0	West Virginia:			
New York:				Huntington	1	0	0
Buffalo	2	2	0	North Carolina:			
New York	4	2	0	Gastonia	0	0	1
Ohio:				Texas:			
Toledo	1	0	0	Dallas	1	0	0
Michigan:				California:			
Detroit	1	1	0	Los Angeles	1	1	0

Encephalitis, epidemic or lethargic.—Cases: San Francisco, 2.
Pellagra.—Cases: Charleston, S. C., 2; Savannah, 2; Miami, 1.
Rabies in man.—Deaths: Pittsburgh, 1.
Typhus fever.—Cases: New York, 2; Atlanta, 1; New Orleans, 1. Deaths: Atlanta, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended April 20, 1940.—During the week ended April 20, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				4	3			1		8
Chickenpox		1	4	233	352	34	14	7	54	699
Diphtheria			2	14	1	6		2		25
Dysentery				1						1
Influenza		24	1		187				7	219
Measles		16		189	500	634	269	2	114	1,774
Mumps		2		50	334	18	56	1	15	526
Pneumonia		19			17	5	5		4	50
Poliomyelitis				1						1
Scarlet fever		28	6	195	143	22	9	15	5	423
Tuberculosis	1	5	8	58	49	2				123
Typhoid and paratyphoid fever			14	5	2	5	1			27
Whooping cough		42		103	129	56	59	9	24	422

ITALY

Communicable diseases—4 weeks ended January 28, 1940.—During the 4 weeks ended January 28, 1940, cases of certain communicable diseases were reported in Italy as follows:

Disease	Jan. 1-7	Jan. 8-14	Jan. 15-21	Jan. 22-28
Anthrax	6	9	10	11
Cerebrospinal meningitis	27	48	39	44
Chickenpox	290	347	294	237
Diphtheria	584	610	577	552
Dysentery (amœbic)	9	18	20	14
Dysentery (bacillary)			2	1
Hookworm disease	4	29	6	15
Lethargic encephalitis	1	1	1	2
Measles	717	878	765	950
Mumps	151	300	278	244
Paratyphoid fever	47	91	52	38
Poliomyelitis	24	42	26	12
Puerperal fever	13	26	35	26
Scarlet fever	147	208	195	213
Typhoid fever	246	295	261	224
Undulant fever	47	60	51	54
Whooping cough	165	302	319	446

JAMAICA

Communicable diseases—4 weeks ended April 13, 1940.—During the 4 weeks ended April 13, 1940, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	6	15	Puerperal fever	----	3
Diphtheria	6	3	Scarlet fever	1	3
Dysentery	6	22	Tuberculosis	17	73
Erysipelas	----	1	Typhoid fever	3	60
Poliomyelitis	1	3			

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of April 26, 1940, pages 745-749. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Plague

Hawaii Territory—Island of Hawaii—Hamakua District—Hamakua Mill Area.—A rat found on April 17, 1940, near Paauilo, and another rat found on April 18, 1940, in Kukaiau, both in Hamakua Mill Area, Hamakua District, Island of Hawaii, T. H., have been proved positive for plague.

Smallpox

Ecuador—Guayaquil (vicinity of).—During the week ended May 4, 1940, 1 case of smallpox was reported in a town in the vicinity of Guayaquil, Ecuador.

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