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PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

December 5, 1937–January 1, 1938

The accompanying table summarizes the prevalence of eight important communicable diseases based on weekly telegraphic reports from State health departments. The reports from each State are published in the Public Health Reports under the section "Prevalence of Disease." The table gives the number of cases of these diseases for the 4-week period ending January 1, 1938, the number reported for the corresponding period in 1936, and the median number for the years 1932–36.

DISEASES ABOVE MEDIAN PREVALENCE

Measles.—During the 4-week period ending January 1, 1938, 32,813 cases of measles were reported, as compared with 15,867 for the preceding 4 weeks. The number was almost five times that reported for the corresponding period in 1936 and more than three times the number in 1935. The current incidence was about 2.5 times the median incidence for 1932–36, which is a better comparison, since the number of reported cases of measles was unusually low in 1936 and also during the corresponding period in 1935. In the West South Central, Mountain, and Pacific regions the incidence was about normal, and in the New England region the number of cases was relatively low, but in all other regions the disease was unusually prevalent. In the Middle Atlantic and West North Central regions the number of cases reported was approximately four times the median incidence for this period in each region; in the East North Central region the incidence was about five times the median figure; and in the East South Central region the number of cases was about nine times the normal seasonal incidence for that region. The smallest increase was reported from the South Atlantic region, but even there the incidence was more than twice the average for the preceding years.

Scarlet fever.—The 18,928 cases of scarlet fever were only slightly in excess of the number reported for the corresponding period in 1936, which was a period of about average seasonal incidence. The larger number of the cases was reported from the Middle Atlantic and North Central States, with about a 20 percent increase over the

expected incidence in the New England States. In the South Atlantic, South Central, and Western groups the incidence was about normal for this season of the year.

Influenza.—The number of cases of influenza rose from approximately 4,500 for the preceding 4-week period to approximately 7,500 for the 4 weeks ending January 1, 1938. Such an increase in this disease is normally expected at this season of the year, and the current incidence compares very favorably with the experience of recent years, being slightly below that for the corresponding period in 1936 and only about 10 percent above the 1933–36 median. More than one-half of the total number of cases were reported from the South Central States.

Number of reported cases of 8 communicable diseases in the United States during the 4-week period Dec. 5, 1937–Jan. 1, 1938, the number for the corresponding period in 1936, and the median number of cases for the corresponding period 1933–36 [1]

Geographic division	Current period	1936	5-year median	Current period	1936	5-year median	Current period	1936	5-year median	Current period	1936	5-year median
	Diphtheria			Influenza [2]			Measles [3]			Meningococcus meningitis		
United States [1]	2,551	3,031	4,013	7,481	7,985	6,760	32,813	6,801	13,942	317	405	241
New England	52	40	113	18	26	67	1,336	2,413	2,413	12	15	14
Middle Atlantic	329	355	531	97	152	133	13,459	1,344	3,589	55	62	36
East North Central	477	459	855	494	849	748	7,593	408	1,571	42	78	78
West North Central	229	184	395	316	308	353	4,521	167	1,075	18	27	27
South Atlantic	574	841	788	1,410	2,007	2,078	3,169	962	1,433	57	99	33
East South Central	269	367	409	1,415	796	809	1,219	132	132	76	47	24
West South Central	401	500	655	3,076	2,940	1,453	369	385	385	37	31	15
Mountain	80	65	95	354	441	228	857	812	1,201	7	20	10
Pacific	140	220	184	301	466	295	290	178	744	13	26	17
	Poliomyelitis			Scarlet fever			Smallpox			Typhoid fever		
United States [1]	134	201	185	18,928	17,630	18,237	1,338	636	518	497	754	754
New England	1	1	5	1,431	1,022	1,183	0	0	0	24	18	30
Middle Atlantic	8	9	31	3,638	3,385	4,241	0	76	1	89	103	103
East North Central	18	40	30	6,339	5,623	6,001	417	61	93	29	85	124
West North Central	23	19	13	3,157	2,955	1,801	438	226	171	37	68	62
South Atlantic	11	22	18	1,168	1,246	1,454	6	5	11	92	154	160
East South Central	25	25	9	523	562	589	36	1	15	27	127	93
West South Central	25	44	11	765	725	645	32	10	46	121	94	149
Mountain	5	7	5	804	735	735	249	111	76	32	59	59
Pacific	18	34	34	1,103	1,377	1,221	160	146	145	46	46	46

[1] 48 States. Nevada is excluded, and the District of Columbia is counted as a State in these reports.
[2] 44 States and New York City. The median is for the years 1933–36 only; the data for 1932 are not comparable.
[3] 46 States. Mississippi and Georgia are not included.

Meningococcus meningitis.—For the 4 weeks ending January 1, 1938, the number of reported cases of meningococcus meningitis was 371, as compared with 405 and 436 for the corresponding period in the years 1936 and 1935, respectively. The current incidence is slightly above the median incidence for this period, as the years 1934, 1933, and 1932, which fall within the median period, were years of low seasonal incidence. The disease was above the seasonal expectancy in the

Middle and South Atlantic Coast and South Central regions; below the median in the North Central and Pacific States and about normal in the New England and Mountain States.

Smallpox.—The number of cases of smallpox (1,338) reported for the current period was the highest recorded for the corresponding period in 6 years. The highest incidence was confined to States in the Mountain, Pacific, and North Central regions, with a slight rise above the normal seasonal incidence in the East South Central group of States. Of the total number of cases Indiana reported 267, Iowa 166, Illinois 121, Minnesota 115, and Idaho 101—more than one-half of the total cases occurring in those five States.

DISEASES BELOW MEDIAN PREVALENCE

Poliomyelitis.—The 134 cases of poliomyelitis reported for the current 4-week period represented a decrease from the total for the corresponding period in 1936 of about 35 percent, and was the lowest incidence reported for this period since 1932, when the incidence was approximately the same as for the current period. The West North Central region alone reported an increase over last year; in all other regions the incidence either closely approximated that of last year or fell considerably below it. The number of cases reported from the South Central States did not exceed that reported last year, but the incidence was considerably above the normal seasonal incidence for that area.

Diphtheria.—The incidence of diphtheria (2,551 cases) was the lowest recorded for this period in the 9 years for which these data are available. In the New England, North Central, and Mountain regions the current incidence was slightly above that for the corresponding period in 1936, but in relation to the 1932–36 median the current incidence was low in all sections of the country.

Typhoid fever.—Typhoid fever continued at a low level; 497 cases were reported for the current period, as compared with approximately 750 cases for the corresponding period in each of the years 1936 and 1935, and 1,039 in 1934. This disease has been considerably more prevalent in the West South Central region than it was in 1936, but that was apparently a "low" year for the disease in that region, and a better comparison is made with the 1932–36 median; the current incidence is about 20 percent below that. All other geographic divisions except the Pacific are low in relation to the 1932–36 median incidence.

MORTALITY, ALL CAUSES

The average mortality rate from all causes in large cities for the 4 weeks ending January 1, 1938, based on data received from the Bureau of the Census, was 12.2 per 1,000 inhabitants (annual basis).

The average rate for the corresponding period in the 4 preceding years was also 12.2. In 1932 an epidemic of influenza raised the rate for this period to 13.3.

THE BLACKTONGUE-PREVENTIVE VALUE OF WHOLE WHEY, DELACTOSED WHEY, AND AMERICAN CHEESE *

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Goldberger, Wheeler, Lillie, and Rogers (*1*), showed that fresh skim-milk given to dogs on a blacktongue-producing diet in daily doses of approximately 30 cc per kilo of body weight prevented blacktongue in three out of five experimental animals for 1 year. Wheeler and Sebrell (*2*) conducted a similar experiment with canned evaporated milk in comparable daily doses (15 cc per kilo of body weight) and found a considerable delay in the onset of blacktongue in four out of five experimental animals. Booher and Hansmann (*3*), using a preparation obtained from a low lactose whey powder, were able to prevent blacktongue in one dog for 138 days, and successfully treated two dogs which had what were apparently mild symptoms of blacktongue.

Therefore, it was decided to test the blacktongue-preventive value of a whole whey powder, delactosed whey powder, and cheese.

TABLE 1.—*Composition of basic blacktongue-producing diet No. 123* [1]

Article of diet	Quantity	Nutrients		
		Protein	Fat	Carbohydrate
	Grams	*Grams*	*Grams*	*Grams*
Corn meal [2]	400	38.6	18.8	296.0
Cowpeas (*Vigna sinensis*) [3]	50	10.7	.7	30.4
Casein (purified) [4]	60	52.0		
Sucrose	32			32.0
Cottonseed oil	30		30.0	
Cod-liver oil	15		15.0	
Sodium chloride	10			
Calcium carbonate	3			
Total nutrients		96.3	64.5	358.4
Nutrients per 1,000 calories		40.1	26.9	149.3

[1] The corn meal, cowpeas (previously coarsely ground), and salt are stirred into water and cooked in a double boiler of enamelware for about 1½ hours. Then the other ingredients are well stirred in, the total weight being brought to 2,400 grams with water (so that 1 gram represents 1 calorie), and this finished mixture is served to the dog ad libitum.

[2] Whole maize meal (white) sifted as for human consumption.

[3] The variety known as the California black-eyed pea.

[4] Commercial casein leached for a week in daily changes of acidulated water, according to the method of McCollum, Simmonds, Shipley, and Park (Bull. Johns Hopkins Hosp., 33: 398 (1922)).

*EDITORIAL NOTE.—This is another paper in a series of experimental studies designed to determine the blacktongue-preventive value of certain articles of food. The canine disease is thought to be identical with human pellagra.

EXPERIMENTAL

Through the courtesy of the Research Laboratories of Sealtest, Inc., and the Kraft Phoenix Cheese Corporation, we were furnished with a supply of whole whey powder, delactosed whey powder, and American cheese. The whole whey powder was obtained by the spray-drying process from milk produced in June. A portion of the same batch of whey was subjected to yeast fermentation in order to remove the lactose, and then spray-dried. The cheese was prepared in the same plant early in July. The analyses of the materials are given in table 2.

The yeast was not removed from the delactosed whey powder, and it was estimated to make up approximately 10 percent of the dry weight of the material. In the preparation of the whey powders it was calculated that 110 pounds of whole milk yielded 100 pounds of whey and 10 pounds of cheese, the whey having a dry weight of 7 pounds. After delactosing, the same quantity of whey yielded a preparation with a dry weight of 2.6 pounds. Hence, 1 gram of whole whey powder was recovered from 15.71 grams of whole milk; and 1 gram of delactosed whey powder was recovered from 42.31 grams of whole milk, while 1 gram of cheese was recovered from 11 grams of whole milk.

TABLE 2.—*Analyses of supplements*[1]

	Protein	Lactose	H_2O	Ash	Acidity as lactic acid	Ether extract	Riboflavin	
							Bourquin-Sherman units per gram	Gamma per gram[2]
	Percent	*Percent*	*Percent*	*Percent*		*Percent*		
Whole whey	12.24	72.74	4.77	7.79	2.07	0.61	10.6	36.0
Delactosed whey	35.82	.016	6.01	30.09	4.77	1.79	32.7	63.5
Cheese	23.41	.000	38.53	3.68	1.38	31.41	----------	----------

[1] The analyses and data on the preparation of the whole whey and the delactosed whey powders were furnished us by Dr. Robert P. Myers and Dr. S. M. Weisberg of the Research Laboratories of Sealtest, Inc., Baltimore, Md. The cheese was analyzed in the Division of Chemistry of the National Institute of Health.

[2] Determined by the light absorption method.

WHOLE WHEY POWDER

A group of five dogs (Nos. 261, 267, 292, 333, and 334) were placed on our basic blacktongue-producing diet No. 123, the composition of which is given in table 1. The whole whey powder was fed as a daily supplement mixed with a small portion of the ration. The original daily dose was 2.5 grams per kilo of body weight, which was calculated to represent the equivalent of 39.3 grams of whole milk.

When symptoms of blacktongue developed in any animal, the supplement of all of the animals was increased until the daily dose of whole whey powder was 7.5 grams per kilo of body weight, or the equivalent of 117.8 grams of whole milk.

Three additional dogs (Nos. 320, 342, and 348) were added to the experiment later and received the 7.5 grams of whole whey powder per kilo of body weight throughout the experiment.

The significant details in regard to each of the experimental animals are as follows:

Dog No. 261

July 17, 1936: Begins diet 123 in good condition. Weight July 14 was 8.4 kilos. Begins daily supplement of approximately 2.5 grams of whole whey powder per kilo of body weight.

August 1: Fifteen days from the beginning of the experiment presents the first signs of an attack of blacktongue. An interrupted, red, band-like lesion on each side of the upper lip. The mucosa of the cheeks is diffusely injected, and the mucosa of the floor of the mouth is intensely red. The daily supplement of whole whey is increased to 5 grams per kilo of body weight.

August 3: The area of injection of the upper lip has become a continuous red band-like lesion. The mucosa of the cheeks and the floor of the mouth is very intensely injected and covered by thin pseudomembrane. The daily supplement of whole whey powder is increased to approximately 10 grams per kilo of body weight.

August 4: Weighs 7.5 kilos.

August 6: The buccal lesions have steadily progressed until the entire mucosa of the lips, cheeks, and the floor of the mouth is covered with thick pseudomembrane. There is considerable ropy salivation. The dorsal surface of the lateral margins of the tongue are red. The general condition is poor.

August 8: Moribund.

August 9: Found dead. Necropsy shows the typical lesions of advanced blacktongue.

Dog No. 267

July 17, 1936: Begins diet 123 in good condition. Weight on July 14 was 6.25 kilos. Begins daily supplement of 16 grams of whole whey powder (2.5 grams per kilo).

August 1: The daily supplement of whole whey is increased to 31 grams (5 grams per kilo).

August 11: Shows faint reddening of the mucosa of the upper lip and cheeks of doubtful significance.

September 14: For the past forty days has shown transient, slight reddening of the buccal mucosa, suggestive of incipient blacktongue. Today the daily supplement of whole whey powder is increased to 46.5 grams (7.5 grams per kilo of body weight at beginning of experiment).

September 15: Weighs 6.6 kilos.

November 7–21: Faint red band-like lesion on each side of the upper lip and erythema of the mucosa of the cheeks and floor of mouth, characteristic of early blacktongue. The lesions spontaneously receded.

December 1–April 13, 1937: Transient, variable injection of the buccal mucosa.

April 21: Discontinues diet 123 and daily supplement of whole whey powder 278 days from the beginning of the experiment. During the test period there were repeated recurrent buccal lesions, suggestive of mild blacktongue, which never progressed to a definite acute attack.

Dog No. 292

July 17, 1936: Begins diet 123 in good condition. Weight on July 14 was 8 kilos. Begins daily supplement of approximately 2.5 grams of whole whey powder per kilo of body weight.

August 1: Daily dose of whole whey increased to approximately 5 grams per kilo of body weight.

August 20: Thirty-four days from the beginning of the experiment presents first signs of an attack of blacktongue. Small reddened patches on the mucosa of each side of the upper lip opposite the canine teeth.

August 25: There is now a reddened band-like lesion about 1 inch wide on the left side of the upper lip, and several irregular patches of redness on the mucosa of the cheeks and the floor of the mouth.

September 1: The buccal lesions have receded.

September 8: Interrupted red band-like lesion on each side of the upper lip. Mild injection of the mucosa of the cheeks and floor of the mouth.

September 14: Whole whey powder supplement increased to approximately 7.5 grams per kilo of body weight.

September 15: Weighs 7.2 kilos.

September 16: The symptoms have progressed until now there is a continuous red band-like lesion extending along the mucosa on each side of the upper lip. The mucosa of the cheeks and the floor of the mouth is intensely red and covered by thick pseudomembrane. The scrotum presents a raised, sharply defined, desquamating area of dermatitis. There is a foul buccal odor and considerable salivation. Diarrhea.

September 17: The symptoms are progressing; the dog is in poor condition. Given 121.5 grams of whole whey powder dissolved in water by stomach tube on two occasions. Each dose was vomited.

September 18: Found dead. Necropsy reveals the typical lesions of advanced blacktongue.

Dog No. 333

July 17, 1936: Begins diet 123 in good condition. Weighed 6.8 kilos on July 14. Begins whole whey powder, 17 grams per day (2.5 grams per kilo).

July 28: Weighs 7.5 kilos.

August 1: Whole whey powder supplement increased to 34 grams per day (5 grams per kilo of body weight at beginning of experiment).

August 20–September 17: Varying degrees of slight, transient redness of the buccal mucosa of doubtful significance.

September 14: The daily dose of whole whey powder is increased to 51 grams (7.5 grams per kilo of body weight at beginning of experiment).

November 12, 1936–January 24, 1937: Again had variable slight reddening of the buccal mucosa which receded. Passed blood by bowel today.

February 18: First signs of an acute attack of blacktongue 216 days from the beginning of the experiment. Injection of the mucosa of the cheeks and each side of the upper lip. Intense injection of the mucosa of the floor of the mouth.

March 9: Intensely red patches on the mucosa of each side of the upper lip. The mucosa of the cheeks and floor of the mouth is intensely injected.

March 12: There is now a bright red band-like area on the mucosa extending along each side of the upper lip. The mucosa of the cheeks is moderately injected, and the mucosa of the floor of the mouth and the lateral surface of the tongue is intensely injected.

March 13: The buccal lesions are more intensely injected. There is now pseudomembrane covering the mucosa of the cheeks. Removed from the experiment.

Dog No. 334

July 17, 1936: Begins diet 123 in good condition. Weight on July 14 was 4.4 kilos. Begins daily supplement of approximately 2.5 grams of whole whey powder per kilo of body weight.

August 1: Whole whey powder supplement increased to approximately 5 grams per kilo of body weight.

August 25: Slight injection of the floor of the mouth. Has not eaten well for the last 30 days.

September 8: Weighs 3.1 kilos.

September 9: Found dead. Necropsy: Extensive bilateral bronchopneumonia.

Dog No. 320

September 20, 1936: Begins diet 123 in good condition. Weight on September 15 was 5.0 kilos. Begins daily supplement of 37.5 grams whole whey powder (7.5 grams per kilo).

November 7: Has been observed at coprophagy.

November 17–December 1: Varying degrees of redness of the mucosa of the upper lip, cheeks, and floor of the mouth which did not become severe enough to warrant a definite diagnosis of acute blacktongue.

January 5, 1937: First sign of an attack of acute blacktongue 107 days from the beginning of the experiment. Faint injection of the mucosa of the upper lip and cheeks. Intense reddening of the mucosa of the floor of the mouth.

January 12: The mucosa of the right side of the upper lip is intensely injected, while that of the left side has a bright red patch opposite the canine tooth. The mucosa of the cheeks, floor of the mouth, and lateral surface of the tongue is intensely injected. There is some pseudomembrane on the mucosa of the right side of the upper lip. Weighs 4.5 kilos.

January 13: The buccal lesions have progressed and there is now pseudomembrane on the mucosa of the upper lip and both cheeks. Removed from the experiment.

Dog No. 342

September 20, 1936: Begins diet 123 in good condition. Weight on September 15 was 6.5 kilos. Begins daily supplement of approximately 7.5 grams of whole whey powder per kilo of body weight.

November 3: First sign of an acute attack of blacktongue 44 days from the beginning of the experiment. A diffuse injection of the mucosa of the cheeks and floor of the mouth. Weighs 6.25 kilos.

November 21: There are brilliant red patches on the mucosa of each side of the upper lip opposite the canine tooth. The remainder of the mucosa of the upper lip is diffusely injected. The mucosa of the cheeks, the floor of the mouth, and the lateral surfaces of the tongue is moderately injected.

November 25: The buccal lesions have steadily progressed and pseudomembrane now covers the reddened mucosa of the cheeks and the upper lip. Removed from the experiment.

Dog No. 348

September 20, 1936: Begins diet 123 in good condition. Weight on September 15 was 5.2 kilos. Begins daily supplement of 39 grams whole whey powder (7.5 grams per kilo).

April 21, 1937. During the 213-day test period the animal has had recurrent transient injection of the buccal mucosa of doubtful significance. Today the mouth is entirely clear. Discontinues diet 123 supplemented by whole whey powder.

Summary.—Three of the five dogs (Nos. 261, 292, and 233) starting the experiment on the 2.5 grams per kilo of body weight supplement of whole whey powder developed blacktongue in 15 days, 34 days, and 216 days, respectively, from the beginning of the experiment. One animal (dog No. 234) died of pneumonia, and one (dog No. 267) showed fleeting redness of the buccal mucosa, suggestive of incipient blacktongue, which first appeared 25 days from the beginning of the experiment. After the whey powder was increased to 7.5 grams per kilo of body weight, he finally completed a total test period of 278 days, with only recurrent fleeting symptoms suggestive of incipient blacktongue.

Two of the three dogs (Nos. 320 and 342) that began the experiment on a daily supplement of 7.5 grams of whole whey powder per kilo of body weight developed blacktongue in 107 days and 44 days, respectively, from the beginning of the experiment. The remaining animal (dog No. 348) completed a test period of 213 days, during which time he showed recurrent, fleeting redness of the buccal mucosa, suggestive of early blacktongue.

Therefore, whole whey powder in the quantity given must be regarded as a poor source of the blacktongue-preventive factor. Since it is impracticable to give doses larger than 7.5 grams per kilo of body weight, it appears that whole whey powder does not contain enough of the blacktongue-preventive factor to be of any practical significance.

DELACTOSED WHEY POWDER

A group of five dogs (Nos. 266, 288, 330, 332 and 335) were placed on our basal blacktongue-producing diet No. 123, the composition of which is given in table 1. The delactosed whey powder was fed as a daily supplement mixed with a small portion of the ration. The original daily dose was 1 gram per kilo of body weight, which was calculated to represent the equivalent of 42.31 grams of whole milk.

When symptoms of blacktongue developed in any animal, the supplement of all of the animals was increased until the daily dose of delactosed whey powder was 3 grams per kilo of body weight, or the equivalent of 126.9 grams of whole milk.

The significant details in regard to each of the experimental animals are as follows:

Dog No. 266

July 17, 1936: Begins diet 123 in good condition. Weight on July 14 was 7 kilos. Begins daily supplement of approximately 1 gram of delactosed whey powder per kilo of body weight.

August 11: Delactosed whey powder supplement increased to approximately 2 grams per kilo of body weight.

September 27: Since August 11 has shown varying degrees of redness of the buccal mucosa, suggestive of incipient blacktongue, which spontaneously receded. Today delactosed whey powder supplement increased to approximately 3 grams per kilo of body weight.

October 3: First sign of an acute attack of blacktongue 78 days from the beginning of the experiment. A faint, red band-like lesion on the mucosa of each side of the upper lip. Mucosa of the floor of the mouth diffusely injected.

October 6: There is a red band-like lesion about one-half inch wide on the mucosa of each side of the upper lip. Small necrotic areas are scattered along this injected lesion. The mucous membrane of the cheeks and the floor of the mouth are intensely injected, and there is much pseudomembrane on the cheeks. Weighs 7 kilos.

October 7: Lesions have progressed to pseudomembrane formation on the mucosa of the upper lip and the floor of the mouth, as well as on the cheeks. There are numerous areas on the buccal mucosa showing punctate hemorrhages. General condition is poor.

October 8: The animal's condition is progressively worse. Has extensive necrosis of the mucous membrane of the lips and cheeks. The margins of the tongue are quite red, and the mucosa of the floor of the mouth shows considerable necrosis and pseudomembrane. There is much salivation.

October 10: Found dead. Necropsy shows the typical lesions of advanced blacktongue.

Dog No. 288

July 17, 1936: Begins diet 123 in good condition. Weight on July 14 was 7.8 kilos. Begins daily supplement of approximately 1 gram of delactosed whey powder per kilo of body weight.

August 8–17: Varying degrees of slight reddening of the buccal mucosa which spontaneously receded.

August 11: Delactosed whey powder supplement increased to approximately 2 grams per kilo of body weight.

September 26: First signs of an acute attack of blacktongue 71 days from the beginning of the experiment. Large, bright red patches on each side of the upper lip opposite the canine teeth. The mucosa of the cheeks and floor of the mouth is fiery red. Given 4 grams per kilo of body weight of delactosed whey today only.

September 27: Delactosed whey powder supplement increased to approximately 8 grams per kilo of body weight.

September 29: Weighs 7.8 kilos.

September 30: Continues to have bright red areas on each side of the upper lip. The cheeks and the floor of the mouth continue very red, and there is a reddened patch on the dorsum of the tip of the tongue.

October 1: Lesions have progressed and pseudomembrane now covers the reddened areas on the mucosa of the upper lip and cheeks. The mucosa of the floor of the mouth remains intensely injected.

October 3: The buccal lesions are progressing, and there is considerable salivation.

October 5: General condition is poor. There is much salivation and extensive pseudomembrane on the mucosa of the upper lip and cheeks. The lateral margins of the tongue are bright red.

October 6: Moribund. Found dead later in the day. Necropsy shows the typical lesions of advanced blacktongue.

Dog No. 330

July 17, 1936: Begins diet 123 in good condition. Weight on July 14 was 7 kilos. Begins daily supplement of 7 grams delactosed whey powder (1 gram per kilo).

August 11: Delactosed whey powder supplement increased to 14 grams (2 grams per kilo).

September 27: Delactosed whey powder supplement increased to 21 grams (3 grams per kilo).

November 17, 1936–January 12, 1937: Showed transient, slight injection of the mucosa of the upper lip, or cheeks, or both.

April 21: Discontinues diet 123 and whole whey powder supplement 278 days from the beginning of the experiment.

Dog No. 332

July 17, 1936: Begins diet 123 in good condition. Weight on July 14 was 9 kilos. Begins daily supplement of approximately 1 gram of delactosed whey powder per kilo of body weight.

August 11: Weighs 10 kilos. Daily dose of delactosed whey powder supplement increased to 2 grams per kilo of body weight at beginning of experiment.

September 27: Delactosed whey powder supplement increased to 3 grams per kilo of body weight at beginning of experiment.

October 13: Weighs 10.4 kilos.

October 17: 92 days from the beginning of the experiment shows first signs of an acute attack of blacktongue. The mucosa of the cheeks and the floor of the mouth is quite red.

October 19: Buccal lesions have progressed rapidly. There are now large, brilliant red patches covered with thick pseudomembrane on the mucosa of each side of the upper lip opposite the canine teeth. There is also an interrupted red band on the mucosa of the upper lip on each side. The mucosa of the cheeks and floor of the mouth is very red, and covered by pseudomembrane. Removed from the experiment.

Dog. No. 335

July 17, 1936: Begins diet 123 in good condition. Weight on July 14 was 8.5 kilos. Begins daily supplement of 8.5 grams delactosed whey powder (1 gram per kilo).

August 11: Delactosed whey powder supplement increased to 17 grams daily (2 grams per kilo).

September 26: Given 4 grams per kilo of delactosed whey powder supplement today only.

September 27: Delactosed whey powder supplement increased to 25.5 grams daily (3 grams per kilo).

January 30, 1937: Since December 22 has shown recurrent, transient injection of the mucosa of the upper lip, cheeks, and floor of the mouth of doubtful significance, which spontaneously receded. Passed small amount of blood by bowel today.

February 2: Weighs 9.3 kilos.

February 9: First signs of an acute attack of blacktongue 207 days from the beginning of the experiment. A red patch on the mucosa on each side of the upper lip and on each cheek. The mucosa of the floor of the mouth is slightly injected. Weighs 8 kilos.

February 10: The reddened patch on the mucosa of the left side of the upper lip is larger, and more intensely injected; that on the mucosa of the right side of the upper lip has become a brilliant red band extending the length of that side of the lip. The mucosa of the cheeks is intensely reddened and covered with pseudomembrane. The mucosa of the floor of the mouth is intensely injected, and the soft palate is quite red. Removed from the experiment.

Summary.—Four of the five dogs (Nos. 266, 288, 332 and 335) developed the first signs of blacktongue in 78 days, 71 days, 92 days, and 207 days, respectively, from the beginning of the experiment. The remaining dog (No. 330) showed transient buccal symptoms suggestive of incipient blacktongue 123 days from the beginning of the experiment, which receded and reappeared throughout the experiment, although the animal completed an experimental period of 278 days without developing a definite acute attack of blacktongue.

Therefore, delactosed whey powder in the quantity given must be regarded as a poor source of the blacktongue-preventive factor. It appeared to be inadvisable to increase the daily amount of the delactosed whey to more than 3 grams per kilo of body weight, since the interpretation of the results might be difficult because of its 10 percent yeast content.

AMERICAN CHEESE

A group of five dogs (Nos. 352, 358, 363, 365, and 367) were placed on our basal blacktongue-producing diet No. 123. The cheese was broken up in small pieces and served separately before the ration was given. It was readily taken without difficulty. The original daily dose was 5 grams per kilo of body weight, which was calculated to represent the equivalent of 55 grams of whole milk.

On the first appearance of the symptoms of blacktongue in the experimental animals in 22 days (dog No. 363) the daily supplement of cheese was increased to 10 grams per kilo of body weight. The significant details in regard to each of the experimental animals are as follows:

Dog No. 352

January 6, 1937: Begins diet 123 in good condition. Weight yesterday was 7.5 kilos. Begins daily supplement of 5 grams of American cheese per kilo of body weight.

January 29: Weighs 8.7 kilos. Daily cheese supplement increased to 80 grams (approximately 10 grams per kilo of body weight).

February 11: Left 30 grams of cheese supplement.

February 16: First signs of blacktongue 41 days from the beginning of the experiment. The floor of the mouth is diffusely injected and there is a faint red patch on the left side of the upper lip. Weighs 9.5 kilos.

March 6: Left 40 grams of cheese supplement.

March 9: Buccal lesions have slowly but steadily progressed and there is now a red band-like lesion on the mucosa of each side of the upper lip. The mucosa of the cheeks and floor of the mouth is moderately injected.

March 11: Left 50 grams of cheese supplement.

March 13: Left 65 grams of cheese supplement.

March 14: Left all of cheese supplement.

March 15: Buccal lesions have continued to increase in severity. There are many small hemorrhagic and ulcerated areas on the mucosa of the upper lip which is intensely red. The mucosa of the cheeks is intensely injected and covered with pseudomembrane. The mucosa of the floor of the mouth is intensely injected. There is considerable salivation, and the saliva is blood tinged. Had bloody stool today. Removed from the experiment.

Dog No. 358

January 12, 1937: Begins diet 123 in good condition. Weighs 7.2 kilos. Begins daily supplement of 36 grams of American cheese (5 grams per kilo).

January 29: Daily cheese supplement increased to 72 grams (10 grams per kilo).

February 7: Passed blood by bowel.

February 11: Passed blood-stained material by bowel.

February 10–April 2: Left an average of 16 grams of cheese supplement daily.

April 6: First signs of an acute attack of blacktongue 84 days from the beginning of the experiment; a slight redness of the mucosa of the upper lip. Weighs 9.4 kilos.

April 9: Left 34 grams of cheese.

April 10: The buccal lesions have progressed very rapidly and the mucosa of the upper lip is intensely reddened and covered with pseudomembrane. The mucosa of the cheeks is covered with dense pseudomembrane, and the mucosa of the floor of the mouth is intensely injected. There is a foul buccal odor, and much salivation. Removed from the experiment.

Dog No. 363

January 6, 1937: Begins diet 123 in good condition. Weight yesterday was 8.9 kilos. Begins daily supplement of approximately 5 grams of American cheese per kilo of body weight.

January 26: Weighs 10 kilos.

January 28: First signs of an acute attack of blacktongue 22 days from the beginning of the experiment: A sharply outlined red bandlike lesion on the mucosa of each side of the upper lip. The mucosa of the cheeks is moderately injected, and the mucosa of the floor of the mouth is rather intensely injected.

January 29: The red band on the mucosa of each side of the upper lip is wider. The cheeks are covered with thin pseudomembrane, and the mucosa of the floor of the mouth is intensely red. There is a foul buccal odor. Removed from the experiment.

Dog No. 365

January 6, 1937: Begins diet 123 in good condition. Weight yesterday was 6.8 kilos. Begins daily supplement of approximately 5 grams of American cheese per kilo of body weight.

January 29: Weight 7.2 kilos. American cheese supplement increased to approximately 10 grams per kilo of body weight.

February 16–March 25: Has had transient and varying degrees of injection of the mucosa of the cheeks and the floor of the mouth, which spontaneously receded.

March 16 to July 10: Left on an average of 4.8 grams of cheese supplement per day.

July 27: Weighs 8.4 kilos.

July 30: Discontinued diet 123 and cheese supplement in good condition 205 days from beginning of experiment. At no time did the animal have symptoms that could be definitely diagnosed as blacktongue.

Dog No. 367

January 6, 1937: Begins diet 123 in good condition. Weight yesterday was 8.4 kilos. Begins daily supplement of approximately 5 grams of American cheese per kilo of body weight.

January 29: Daily supplement of American cheese increased to approximately 10 grams per kilo of body weight (90 grams). Weighs 9 kilos.

March 1–May 18: Left on an average of 24.9 grams of cheese per day.

May 18: First sign of an acute attack of blacktongue 132 days from the beginning of the experiment: Four discrete red patches on the mucosa of the upper lip. The mucosa of the cheeks is intensely injected, and small areas are covered with pseudomembrane. The mucosa of the floor of the mouth is intensely injected.

May 21: The buccal lesions have faded spontaneously and the mouth is now practically normal.

May 18–24: Left an average of 27 grams of cheese supplement per day.

May 24: There are several bright red patches on the mucosa of the upper lip. The mucosa of the cheeks and the floor of the mouth shows a rather intense, diffuse injection.

May 25: Has a continuous bright red bandlike lesion on the mucosa of the upper lip. The mucosa of the cheeks is intensely injected, and areas are covered with pseudomembrane. The mucosa of the floor of the mouth is intensely injected. Had a semiliquid tarry stool today. Removed from the experiment. Weighs 9.2 kilos.

Summary.—Four of the five dogs (Nos. 352, 358, 363 and 367) showed the first signs of an acute attack of blacktongue in 41 days, 84 days, 22 days, and 132 days, respectively, from the beginning of the experiment. The remaining animal (No. 365) had recurrent, transient attacks of reddening of the buccal mucosa, suggestive of incipient blacktongue, beginning 41 days from the beginning of the experiment, but completed the experimental period of 205 days without having a definite acute attack of blacktongue.

Therefore, American cheese in the quantity given is a poor source of the blacktongue-preventive factor. The quantity used (10 grams per kilo) apparently approached the limit which the animals would tolerate, and it did not appear that findings with a larger amount than this would be of any practical significance.

CONCLUSION

Whole whey powder, delactosed whey powder, and American cheese are poor sources of the blacktongue- (pellagra-) preventive factor.

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RIBOFLAVIN[1] DEFICIENCY IN DOGS

By W. H. SEBRELL, *Surgeon*, and R. H. ONSTOTT, *Passed Assistant Surgeon*, *United States Public Health Service, National Institute of Health*

Sebrell, Onstott, and Hunt (*1*) have presented preliminary evidence that riboflavin[1] deficiency produces a symptom complex in dogs, characterized by sudden collapse and coma, promptly followed by death, unless treated early with adequate doses of riboflavin. The striking similarity of symptoms and the finding of yellowish coloration of the liver at autopsy in one animal suggested that the condition previously described from this laboratory by Sebrell (*2*, *3*) as "yellow liver" was due to a riboflavin deficiency.

The experimental diets Nos. 330 and 341 used by Sebrell (*3*) contained relatively large amounts of rice polishings. Diet 330 contained 180 grams of rice polishings per 2,400-calorie ration, while diet No. 341 contained 400 grams per 2,400-calorie ration. All of the five dogs on diet No. 330 died, and at autopsy all presented the characteristic findings of "yellow liver." The time of onset of symptoms in these dogs was 162, 175, 240, 275, and 335 days, respectively, from the beginning of the experiment—an average of 238 days.

On the other hand, three dogs placed on diet No. 341 completed 1 year on the diet in good condition, were killed, and at autopsy failed to show any signs of "yellow liver."

The time of appearance of the symptoms of riboflavin deficiency in the four dogs on diet 123, supplemented with rice bran filtrate K–37–A, reported by Sebrell, Onstott, and Hunt (*1*), was 171, 196, 137, and 172

[1] Upon the recommendation of its Committee on Nomenclature, the Council on Pharmacy and Chemistry of the American Medical Association has adopted the name "Riboflavin" for the compound previously known as vitamin B_2. The name indicates that this compound is a ribose derivative of isoalloxazine, and prevents confusion with many synthetic products also called flavins but which are devoid of ribose.

The Council states that, while flavin was first isolated from egg white, the evidence is rather convincing that the flavins obtained from egg white, milk, liver, pancreas, and a number of other sources are identical in structure and manifest the properties of vitamin B_2. There appears to be a fairly general agreement among investigators in the field of vitamins who have discussed this question of nomenclature that the name "flavin" should be given to a water-soluble pigment that has been demonstrated to be necessary for the normal nutrition of the rat and for growing chicks.

The report of the Council appeared in the Journal of the American Medical Association, vol. 108, No.16, p. 1340, April 17, 1937.

days, respectively—an average of 169 days from the beginning of the experiment.

With these facts in mind, it was decided to conduct an experiment similar to some of the earlier work on "yellow liver," treating the animals with a preparation of riboflavin when symptoms of "yellow liver" appeared.

EXPERIMENTAL

Diet No. 465 was constructed to contain 135 grams of rice polishings per 2,400-calorie ration. If, as according to Munsell (*4*) and interpreted by Cowgill (*5*), rice polishings contain 4.2 international units of B_1 per gram, each ration of diet No. 465 contains 527 international units of B_1 or 175.67 international units for an average 800-gram serving. Calculated according to Cowgill (*5*),[2] the requirement of a 5-kilo dog is 7.49 international units per day, that of a 10-kilo dog is 17.64 international units per day, and that of a 15-kilo dog is 34.67 international units per day. Thus, it would appear that our diet 465 contains an adequate amount of vitamin B_1 for the dogs used in this experiment.

TABLE 1.—*Composition of diet No. 465* [1]

Article of diet	Percent of dry weight	Quantity	Nutrients		
			Protein	Fat	Carbohydrate
		Grams	*Grams*	*Grams*	*Grams*
Rice polishings [2]	23.5	135.0	19.2	0.3	91.7
Casein (purified) [3]	13.9	80.0	72.5		
Sucrose	3.0	17.0			17.0
Cornstarch (commercial)	41.7	240.0			216.0
Cottonseed oil	11.5	66.0		66.0	
Cod liver oil	2.6	15.0		15.0	
Salt mixture [4]	3.8	22.0			
Total	100.0	575.0	91.7	87.3	324.7
Calories		2,400.0	368.0	732.0	1,300.0

[1] The rice polishings, cornstarch, and cottonseed oil are stirred into tap water and cooked in a double boiler of enamelware for about 1½ hours. The other ingredients are well stirred in, the total weight being brought to 2,400 grams with water (so that 1 gram represents 1 calorie), and this finished mixture is served to the dogs ad libitum.

[2] Commercial rice polishings extracted with ether until the percolate is colorless.

[3] Commercial casein leached for a week in daily changes of acidulated water, according to the method of McCollum, Simmonds, Shipley, and Park (Bull. Johns Hopkins Hosp., 33: 398 (1922).)

[4] Prepared according to the method of Osborne and Mendel (J. Biol. Chem., 37: 557 (1919)).

Five dogs (Nos. 347, 357, 360, 362, and 364) were placed on diet No. 465, the composition of which is given in table 1. On the appearance of symptoms similar to those previously observed in this labora-

[2] Vitamin B_1 (international units per day) $= \frac{0.000076 \text{ (weight gm } 2/3)}{20}$.

tory in connection with "yellow liver" of dogs (collapse or coma), each dog was treated with a preparation of riboflavin,[3] either by intramuscular or intraperitoneal injection. Several of the dogs became noticeably anemic during the experiment; and beginning on the 111th day after the experiment was started, weekly determinations of red blood cells and hemoglobin were made on all of the experimental animals. These results are shown in table 2.

TABLE 2.—*Red blood cells and hemoglobin*

Day of experiment	Dog No. 347		Dog No. 357		Dog No. 360		Dog No. 362		Dog No. 364	
	Red blood cells	Hemoglobin[1]	Red blood cells	Hemoglobin[1]	Red blood cells	Hemoglobin[1]	Red blood cells	Hemoglobin[1]	Red blood cells	Hemoglobin[1]
111	6,900,000	13.3	2,600,000	11.8	3,600,000	10.0	5,900,000	13.6	4,400,000	
118	7,300,000	13.5	[2]6,700,000	13.0	[3]6,500,000	11.5	5,200,000	12.5	[4]5,000,000	8.4
126	6,900,000	14.0			5,800,000	11.4	6,600,000	14.0	4,300,000	6.5
132	6,800,000	13.8			4,500,000	9.5	6,800,000	10.6	3,560,000	6.5
139	[5]7,800,000	13.6			5,300,000	10.5	6,400,000	13.3	5,100,000	7.4
146					5,700,000	9.6	5,700,000	12.6	5,400,000	7.8
153					6,000,000	11.5	7,000,000	11.8	4,600,000	7.8
160					5,700,000	11.5	5,600,000	15.2	4,900,000	5.8
167					[6]5,600,000	12.8	6,100,000	15.0	2,900,000	5.1
175					5,200,000	10.6	6,800,000	13.4	2,900,000	3.2
181					6,200,000	10.3	6,700,000	14.8	3,300,000	3.8
188					6,200,000	10.8	6,100,000	14.0	[7]3,600,000	3.6
195					5,700,000	10.8	6,500,000	13.6	3,600,000	4.4
202					[8]6,000,000	11.0	5,900,000	14.8	4,000,000	4.6
210							6,700,000	12.4	3,700,000	4.9
211					5,100,000	10.0				
216							6,400,000	13.6	3,700,000	4.7
217					4,800,000	10.2				
223							7,300,000	15.5	4,200,000	6.0
224					5,000,000	10.0				
230							6,600,000	14.9	4,800,000	5.5
231					[9]5,000,000	8.5				
237							6,000,000	15.5	5,400,000	7.0
238					5,600,000	9.0				
245							6,700,000	13.7	4,600,000	7.2
247					5,100,000	8.2				
252					[10]4,100,000	10.4	6,800,000	13.8	5,700,000	7.5

[1] Hemoglobin determinations according to Newcomer (J. Biol. Chem., 37: 465 (1918); 55: 569 (1923)).
[2] Acute attack 121st day. Died 122d day.
[3] Acute attack 118th day.
[4] Acute attack 125th day.
[5] Acute attack 140th day; died.
[6] Acute attack 169th day.
[7] Acute attack 188th day.
[8] Acute attack 203d day.
[9] Acute attack 235th day.
[10] Acute attack 255th day.

When it was noticed that bradycardia and a sinus type of arrhythmia was a common finding, routine heart rate determinations were made. These results are shown in table 3.

[3] Furnished through the courtesy of Mr. John Hart of the Winthrop Chemical Co., Inc.; packaged in glass sealed ampules containing 2 cc of a 0.05 percent solution and designated as L. F. 356.

TABLE 3.—*Heart rates*

Day of experiment	Dog No. 347	Dog No. 357	Dog No. 360	Dog No. 362	Dog No. 364
118			*[1] 80*		
121		*41, 40, [1] 60, 218*			
122		*160*			
125					*118*
126	120				140
132	114		[1] 100	140	120
139	104		[1] 88	112	158
140	*[1] 98, 58, [1] 72*				
146			88	120	132
153			[1] 88	104	160
160			104	[1] 84	136
167			[1] 80	96	132
169			*[1] 70, [2] 228*		
170			[1] 86		
175				120	156
181			[1] 96	104	148
188			96	112	*158, 82, 96, [3] 93*
189					147
195			[1] 92	120	132
202			84	110	158
203			*[1] 86, [1] 76*		
210			[1] 88 (211 days)	120	144
216			88 (217 days)	92	156
223			84 (224 days)	108	124
230			88 (231 days)	88	96
235			*[1] 80, [1] 74, [1] 64, [1] 84*		
237			[1] 72 (238 days)	120	136
245			96 (247 days)	108	124
252			96	116	120
255			*[1] 64, [1] 84, [1] 80, [3] 110*		

Rates in italics were taken during an acute attack.

[1] Marked arrhythmia of the sinus type.
[2] Following administration of atropin sulphate.
[3] Immediately after recovery from acute attack.

The significant details in regard to each of the experimental animals are as follows:

Dog No. 347

December 8, 1936: Begins diet No. 465 in good condition. Weighs 8.4 kilos.

January 26, 1937: The skin of the scrotum, flanks, and both axillae is reddened.

January 30: The redness of the skin lesions is fading. There is desquamation of the skin of the flanks, axillae, and scrotum.

February 4: Red desquamating lesions of the abdomen and the scrotum. The lesion on the scrotum now appears very similar to the scrotal lesion described in blacktongue.

February 9: The skin lesions have cleared up.

April 27: 140 days from the beginning of the experiment.

9:30 a. m.: Appears entirely normal except for a dry, scaly dermatitis of the scrotum. Weighs 8.7 kilos.

11:35 a. m.: Found lying on side in a semicomatose condition. Eyes open, able to lift head, reflexes hyperactive, slightly spastic, heart rate 98, respirations 10 per minute. Has exaggerated sinus type cardiac arrhythmia. Given 1 mg riboflavin (L. F. 356), diluted to 10 cc with normal saline, intramuscularly.

12:30 p. m.: Is in a deep coma. There is no response to mechanical stimuli.

2:45 p. m.: Is in deep coma. Respirations shallow and rapid. The heart rate is 58 per minute, with slight irregularity. Given 1 mg riboflavin (L. F. 356), diluted to 10 cc with normal saline, intramuscularly.

4:15 p. m.: Continues in a deep coma. Heart rate is 72 per minute, continues slightly irregular. Respirations are slow, have become shallow, jerky, and labored. No response to mechanical stimuli.

5 p. m.: Condition has become steadily worse. Coma is very deep. Respirations are quite shallow.

10 p. m.: Found dead. Placed in cold room.

April 28: Necropsy at 9:15 a. m.

NECROPSY

Gross findings: The dog is well nourished. The nose and mouth are stained with fluid which appears to be bloody. The skin of the abdomen is slightly erythematous, and there is a dry, branny, scaly dermatitis of the scrotum. Brain and cord appear normal, although the meninges are covered with a fibrinous blood-tinged exudate. The lower lobe of the right lung is markedly congested. There are congested areas throughout the upper lobe. The left lung has several small areas of congestion. Liver is of normal size and consistency, and presents a yellowish, mottled surface. The cut section is uniform and yellowish brown in color.

Intestines: There is an intussusception of the proximal jejunum and duodenum into the pyloric end of the stomach. The mucosa of the duodenum and pylorus is quite red, and there is some blood stained mucus in the stomach.

(Microscopic pathology under dog No. 357.)

Discussion.—The failure of this dog to respond to treatment with riboflavin (L. F. 356) may have been due to a combination of two factors. First, the initial dose of riboflavin was only 1 mg, and there was an interval of 3 hours and 10 minutes before a second dose of 1 mg was given. At the time the second dose was given the dog appeared moribund, so that the effective amount of riboflavin administered may have been too small. Second, the riboflavin was diluted to 10 cc with normal saline. This dilution may have rendered the absorption materially slower, so that in effect the dog may have received little flavin.

Dog No. 357

December 8, 1936: Begins diet 465 in good condition. Weighs 4.4 kilos.

April 7, 1937: Apparently normal in late afternoon.

April 8: 121 days from the beginning of the experiment, found apparently dead at 8:30 a. m. The animal was cold, and there were no visible respiratory movements. At 8:40 a. m. the animal was reexamined, and was found to be alive. There were no visible respiratory movements, but the heart was beating slowly. The animal was immediately given 2 mg of riboflavin (L. F. 356) intraperitoneally.

9 a. m.: Dog breathing, respirations 10 per minute, shallow, but regular. Heart rate 41 per minute, regular. Given 2 mg of riboflavin (L. F. 356) intramuscularly.

10 a. m.: In deep coma, heart rate remains about 40 per minute. Electrocardiogram [4] is normal except for inversion of the T-wave, and the slow heart rate.

[4] Obtained through the courtesy of Capt. H. W. Smith of the Naval Medical School, Washington, D. C.

11 a. m.: Animal remains in deep coma. There is no movement, except respiration. Heart rate is 60 per mniute, but is quite irregular. Respiration 12 per minute.

1:30 p. m.: Observed having a convulsive seizure consisting of generalized tremors, clonic spasms, and opisthotonus.

5 p. m.: Still semicomatose, but attempts to rise and move about. Appears unable to move hindquarters, pulling self about the room with forelegs.

11 p. m.: Animal is in deep coma. Does not respond to stimuli.

April 9:

9:30 a. m.: Dog still alive, but is in deep coma. Heart rate 160 per minute, regular. Respiration slow and shallow. Given 1 mg of riboflavin (L. F. 356) in 200 cc of normal saline, intraperitoneally.

3 p. m.: Dog dead, without regaining consciousness. During the entire period of coma passed no urine.

NECROPSY

Gross findings: All tissues examined appear entirely normal with the following exceptions: *Brain*—Mild hyperemia of the meninges of the vault. *Lungs*—Moderate hypostatic congestion. *Liver*—The liver is normal in size and consistency. A marked yellowish mottling is present. No areas appear normal, some areas are almost a pure yellow color, others mottled yellow and pink. Cut section reveals an almost uniform yellowish gray color. *Bladder*—Collapsed and contracted. Contains no urine.

HISTOLOGIC PATHOLOGY

(By Surgeon R. D. Lillie)

In two dogs studied histologically the brain and cord showed extensive and very moderate nerve cell degeneration, respectively, with tigrolysis, nerve cell vacuolation, and deposition of fine fat droplets in the cytoplasm. In the one (347) with the more extensive cellular degeneration Marchi preparations showed also some swelling, distortion, and blackening of a more or less numerous minority of myelin sheaths in certain levels of the pyramidal tracts in brain and cord, in parts of the median longitudinal bundles and brachium pontis in the pons, in radicular or root fibers of the glossopharyngeus and accessorius nerves, and in part of the fasciculus cuneatus in the cord. Exudative inflammatory changes were absent.

The livers showed diffuse deposition of fine and medium droplets of neutral fat in the liver cells as well as the normal fat in the bile duct epithelium. In one dog (347) there were also scattered coagulated necrotic liver cells, more in the lobule centers.

This dog showed also some tubular and glomerular necrosis while the other presented only a moderate vacuologranular degeneration of the convoluted tubules and the normal fatty epithelium in the coarse loop tubules.

Nodular hemorrhagic consolidation was present in the lungs of both, more extensive in the one (347) than in the other. The heart muscle was normal in both. The spleen was anemic and atrophic.

Femoral marrow was largely fatty in both, vertebral and sternal as well in the one (357) in which it was studied. Hypophyses showed chromophil preponderance in the pars anterior. In 357, stomach, large and small intestine and bladder showed no significant lesions.

The changes noted here are similar to those described previously by Lillie and Sebrell (*6*) in "yellow liver" of dogs. They are apparently more acute and accordingly more purely degenerative in so far as the central nervous system is concerned, but otherwise suggest the neuropathologic picture described by Zimmerman and coworkers (*7*, *8*).

Discussion (*dog No. 357*).—This dog was found comatose early in the morning, and was apparently dead when removed from the kennel. It was evident that he had been comatose for some time, as his body was quite cold. The failure of this dog to respond to treatment may be explained on the assumption that the condition had progressed too far when treatment was started. The dog rallied for a short period, and lived for 30½ hours after treatment was started. This relatively long survival period suggests that the treatment was not entirely without effect. The findings in the electrocardiogram obtained on this dog indicate that the bradycardia and the exaggerated sinus arrhythmia observed are due to some extracardiac cause.

Dog No. 360

December 8, 1936: Begins diet 465 in good condition. Weighs 6.9 kilos.

March 16, 1937: Weighs 7.3 kilos. Appears entirely normal with the exception of noticeable pallor of the buccal mucous membranes.

April 5: 118 days from the beginning of the experiment.

10 a. m.: Appears entirely normal with the exception of some pallor of the buccal mucosa.

3:20 p. m.: Seen standing in kennel.

3:30 p. m.: Found in deep coma. Heart rate 80 per minute, and there is an exaggerated sinus type of cardiac arrhythmia. Respiration 12 per minute, regular. Given 5 mg of riboflavin (L. F. 356) intramuscularly.

4:30 p. m.: Semicomatose. Attempts to rise on front legs, but movements are uncoordinated.

10 p. m.: Is able to stand but is rather unsteady.

April 6: Appears entirely normal. Is very active.

April 19: Pulse 100 per minute, irregular.

May 26: 169 days from beginning of experiment and 51 days from the previous attack.

10 a. m.: Seen jumping in kennel; apparently entirely normal.

1:30 p. m.: Found down, unable to rise, conscious, and moderately spastic. The reflexes are hyperactive. Heart rate 70 per minute, the sinus type of cardiac arrhythmia persists. Respirations 18 per minute, deep and regular.

1:35 p. m.: Given 3 mg of riboflavin (L. F. 356) intramuscularly.

1:53 p. m.: Heart rate is 70 per minute; has a marked sinus type of cardiac arrhythmia. Given 1/50 grain of atropin sulfate, subcutaneously.

1:58 p. m.: The heart rate is 228 per minute and regular.

2:40 p. m.: Is very spastic, able to stand on feet when placed on them, but unable to rise.

3 p. m.: Up on feet and walks around; somewhat unsteady. Allowed to wander about, and returned to kennel voluntarily.

May 27: Appears entirely normal. Heart rate is 86 per minute, and there is a sinus type of cardiac arrhythmia.

June 1: Appears normal.

June 28: Heart rate 84 per minute. Animal appears normal.

June 29: 203 days from the beginning of the experiment and 34 days from the previous attack.

10:15 a. m.: Found down, unable to stand or move legs. Heart rate 86 per minute. There is a marked sinus type of cardiac arrhythmia. Respirations 14 per minute and irregular.

11:06 a. m.: Given 2 mg of riboflavin (L. F. 356) intramuscularly.

12:35 p. m.: Had convulsion lasting about one minute, with extreme opisthotonus and involuntary urination.

2:10 p. m.: Is able to walk around, but is rather unsteady.

June 30: Appears entirely normal.

July 30: Appears entirely normal.

July 31: 235 days from beginning of experiment and 32 days from the previous attack.

8:55 a. m.: Found down in cage, unable to rise. Is moderately spastic. Heart rate 80 per minute, quite irregular (sinus type). Respirations 14 per minute.

9:17 a. m.: Heart rate 74 per minute, sinus arrhythmia.

9:37 a. m.: Given 2 mg of riboflavin (L. F. 356) intramuscularly. Had convulsive seizure within 1 minute, with involuntary urination.

12:30 p. m.: Returned to kennel able to stand and run about; is well oriented, but slightly unsteady.

August 1: Very active. Appears entirely normal. Has a sinus arrhythmia.

August 19: Appears entirely normal.

August 20: 255 days from the beginning of the experiment and 20 days from the previous attack.

9:00 a. m.: Appeared normal.

2:25 p. m.: Seen standing in kennel in apparently catatonic condition. Moderate general spasticity. Heart rate 64 per minute. Respiration 24 per minute.

3:00 p. m.: Very spastic. Able to stand if placed on feet. Apparently has difficulty keeping eyes open. Heart rate 80 per minute; sinus arrhythmia. Respiration 54 per minute.

3:30 p. m.: Unable to stand; semicomatose. Given 0.5 mg of riboflavin (L. F. 356) intravenously and 1.5 mg intramuscularly.

3:55 p. m.: Spasticity has disappeared. Breathing normally, able to walk but is unsteady.

4:09 p. m.: Heart rate 110 per minute, exaggerated sinus type of cardiac arrhythmia. Appears weak and unsteady, but returns to kennel unassisted.

August 21: Active, jumping in kennel. Appears entirely normal.

Discussion.—This dog has been successfully treated with riboflavin (L. F. 356) in five successive attacks of coma. During one of the attacks, $\frac{1}{50}$ grain of atropin sulfate, administered subcutaneously, immediately stopped the bradycardia and the exaggerated sinus type

of arrhythmia, indicating that these cardiac dysfunctions may be due to a vagotonia.

The first dose of 5 mg of riboflavin (L. F. 356) carried the dog 51 days before a second attack. The second dose of 3 mg of riboflavin (L. F. 356) carried him 34 days before the third attack occurred. The third dose of 2 mg of riboflavin (L. F. 356) carried him 32 days before the fourth attack. The fourth dose of 2 mg carried him 20 days before the fifth attack.

Dog No. 362

December 8, 1936: Begins diet 465 in good condition. Weighs 6.3 kilos.

January 26, 1937: The skin of the chest and the abdomen is quite red. Weighs 8.2 kilos.

January 30: There is redness and partial loss of hair involving the muzzle and the entire ventral surface of the body, including the medial surface of the legs and the axillae.

February 1: Given 72 grams of American cheese by mistake.

February 16: The condition of the skin of the ventral surface of the body is unchanged. Weighs 9.1 kilos.

May 4: Condition of the skin remains unchanged. Weighs 11.8 kilos.

August 17: Weighs 14.6 kilos. 252 days from the beginning of the experiment the animal continues to have a reddened condition of the skin of the muzzle, chest, and abdomen, including the medial sides of all four legs. The hair is thin and short. Otherwise the animal appears entirely normal.

December 11: Found in coma. Given 2 mg riboflavin (L. F. 356).

December 12: Found dead. Typical "yellow liver" at autopsy.

Discussion.—This animal was on the experimental diet a total of 369 days. The dermatitis may or may not have been due to the specific deficiency under consideration. The animal was watched for coprophagy, but this was not observed. It is to be noted that this animal more than doubled his weight while on the experimental diet. The effect of the accidental feeding of 72 grams of American cheese on February 1 is difficult to evaluate. Cheese has been reported by Day and Darby (*9*) to be a good source of riboflavin.

Dog No. 364

December 8, 1936: Begins diet 465 in good condition. Weighs 4.5 kilos.

April 5, 1937: Has a small ulcerated area on the lateral surface of each foreleg over the wrist joint. Heart rate is very rapid and irregularity makes counting uncertain.

April 12: 125 days from the beginning of the experiment.

7:30 a. m.: Is quite weak, but is able to walk.

8:45 a. m.: Spastic, unable to rise to feet, but when placed on feet is able to stand. The hindquarters seem rather weak.

9 a. m.: Very spastic; unable to walk. "Settles down" gradually when placed in sitting position.

9:15 a. m.: Unable to stand. Moves legs and head with great difficulty. Head can be moved passively with difficulty due to the marked spasticity. Is conscious. Heart rate 118 per minute; regular.

9:20 a. m.: Given 2 mg of riboflavin (L. F. 356) intramuscularly.

10:40 a. m.: The dog is up on his feet, has lost all spasticity, and appears to be entirely normal in every respect. Is very active.

April 13: Appears to be entirely normal.

April 27: Weighs 4.4 kilos. Ulcers over wrist joints have completely healed.

June 14: 188 days from beginning of experiment and 63 days from the previous attack. Appears normal at 9:30 a. m. Heart rate is 158 per minute.

1:45 p. m.: Found down in cage, unable to get up.

2 p. m.: Placed on feet; walked a few steps with extreme difficulty. Heart rate 82 per minute. Respirations 20 per minute.

2:07 p. m.: Given 1 mg of riboflavin (L. F. 356) intramuscularly.

2:35 p. m.: Heart rate is 96 per minute. Neck is rigid; unable to stand; semicomatose.

3:25 p. m.: Given 1 mg of riboflavin (L. F. 356) intraperitoneally.

3:45 p. m.: Able to walk. Heart rate 93 per minute. Respirations 24 per minute.

June 15: Appears to be entirely normal (with the exception of pallor of the buccal mucosa). Heart rate is 147 per minute.

August 17: Weighs 4.3 kilos. In good condition.

Discussion.—This animal has had two attacks of collapse, and each time has made a rather dramatic response to the administration of riboflavin. The first dose of 2 mg carried him a total of 63 days before the occurrence of the second attack.

SUMMARY

All of the five dogs on experimental diet No. 465 have developed a symptom complex similar to that previously described from this laboratory by Sebrell (*2*, *3*) as "yellow liver" and by Sebrell, Onstott, and Hunt (*1*) as "riboflavin deficiency." The symptoms appeared in dogs No. 347, 357, 360, 362, and 364 in 140, 121, 118, 369, and 125 days, respectively, from the beginning of the experiment. Three of the dogs (Nos. 347, 362, and 357) died in the first attack in spite of the treatment administered. One of the remaining two dogs (No. 360) had five successive attacks of coma, and the other (No. 364) had two attacks of coma. All of these attacks were immediately relieved by treatment with riboflavin (L. F. 356).

The electrocardiogram obtained on dog No. 357 while in an attack of coma was normal with the exception of the extremely slow rate (40 per minute), an inversion of the T-wave, and a regular irregularity of the sinus type. This finding indicates that the cause of the bradycardia and arrhythmia is extracardiac.

One dog (No. 360) was treated with 1/60 grain of atropin sulfate subcutaneously during an attack. At the time of administration the pulse rate was 70 per minute and there was a marked sinus type of arrhythmia. Within 5 minutes the pulse rate was 228 per minute and regular. This suggests that the bradycardia and the arrhythmia are vagotonic in origin.

An analysis of the data given in table 2 indicates that an anemia of the hypochromic type develops in dogs on diet 465. The degree and course of the anemia, as indicated by weekly red blood cell counts and hemoglobin determinations, and the fact that there was no constant and material improvement in the blood picture following the administration of relatively large doses of riboflavin suggests that the anemia may be due to some other factor.

In our experience with riboflavin-deficient diets given dogs in this laboratory, we have never seen collapse occur in less than 102 days. It is necessary, presumably, to deplete the animal's store of riboflavin before the acute symptoms develop. During the depletion period the animals developed an inconstant dermatitis consisting of erythema, followed by a dry, flaky exfoliation. In male dogs, this dermatitis has involved the scrotum; otherwise it is apparently most common on the chest, abdomen, the insides of the thighs, and the axillae.

The symptoms characteristic of the acute attack develop rapidly, and death occurs within a few hours. There is a sudden onset of weakness with ataxia, and very soon the animal is unable to stand or move his legs. At this time there is a varying degree of spasticity, which is at times marked. Apparently the animal is fully conscious, since it will follow activity in the room with its eyes and attempt to move the head or wag the tail. There is no evidence of pain or discomfort. There is bradycardia and an exaggerated sinus type of cardiac arrhythmia (the heart speeding up on inspiration and slowing on expiration), probably due to a vagotonia. The respiration is slow and regular.

The condition advances rapidly, so that within an hour the animal has usually passed into a deep coma, in which there is no response to stimulation. The pulse becomes slower and the breathing more shallow and labored. The animal will remain in this condition for several hours until death intervenes. We have never seen an animal survive more than 12 hours without treatment with riboflavin. Before death the heart rate is slowed even more, being observed as slow as 40 per minute, and the respirations are extremely shallow and labored. Death is apparently precipitated by respiratory failure.

No accurate estimate of the amount of riboflavin necessary for the dog can be made from this data. With the relatively enormous doses given in the treatment of the animals in this experiment, it is probable that some was excreted, and the amount given therefore cannot be considered as being a minimum requirement. Then again, our diet 465 undoubtedly contains a small amount of riboflavin. It is interesting to note, however, that in two dogs receiving doses of 2 mg (the smallest successfully used) one, weighing on an average of 4.4 kilos, was carried for 63 days before the next succeeding attack; and

the other, weighing on an average of 6.9 kilos, was carried for 32 and 20 days before the next succeeding attacks.

CONCLUSIONS

1. A symptom complex in dogs, similar to that previously described from this laboratory as "yellow liver," characterized by bradycardia, cardiac arrhythmia, collapse, and coma, rapidly followed by death with characteristic necropsy findings, which include a yellow mottling of the liver and degenerative changes in the central nervous system, has been produced in dogs on a diet low in riboflavin.

2. The condition is alleviated by early parenteral administration of riboflavin.

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TOXICOLOGY OF SELENIUM

V. TOXIC AND VESICANT PROPERTIES OF SELENIUM OXYCHLORIDE[1]

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The unique chemical properties of selenium oxychloride have brought this substance into recent public notice although its use as a solvent and plasticizer has been known for some time (*1*). The pro-

[1] From the Division of Industrial Hygiene, National Institute of Health.

The preceding articles of this series are as follows:

I. A study of the distribution of selenium in acute and chronic cases of selenium poisoning. By H. C. Dudley. Am. J. Hyg., *23:* 169 (1936).
II. The urinary excretion of selenium. By H. C. Dudley. Am. J. Hyg., *23:* 181 (1936).
III. Determination of selenium in air-gas dust mixtures. By H. C. Dudley. Am. J. Hyg., *24:* 227 (1936).
IV. Effects of exposure to hydrogen selenide. By H. C. Dudley and John W. Miller. Pub. Health Rep., *52:* 1217 (1937).

jected use of selenium oxychloride in industry makes advisable a study of its toxic and vesicant action on skin contact.

Selenium oxychloride, $SeOCl_2$, is a pale yellow liquid, when pure, which gives off fumes of HCl on exposure to humid air. Some of its physical properties are as follows: Molecular weight, 166.11; melting point, 10.8° C.; boiling point at 744 mm Hg, 177.2° C. (decomposition); density, 2.42; vapor pressure, 0.048 mm at 20° C. (calculated).

On contact with water or water vapor, selenium oxychloride rapidly hydrolyzes in the following manner:

$$SeOCl_2 + H_2O \longrightarrow 2HCl + SeO_2$$
$$SeO_2 + H_2O \longrightarrow H_2SeO_3$$

Selenium oxychloride is soluble in carbon tetrachloride, chloroform, carbon disulfide, and benzol, forming physical mixtures with these solvents. It is a powerful chlorinating and oxidizing agent, reacting with many inorganic and organic materials, including protein materials, leather, wool, natural and synthetic resins, phenol-formaldehyde resins, and most metallic substances (*2*, *3*, *4*).

The studies reported here consist of the determination of the toxic dose for rabbits by skin application, and a determination of the selenium content of the blood and liver of two rabbits receiving amounts of selenium oxychloride sufficient to cause death. In addition, there are presented the results of the application of a small amount of pure $SeOCl_2$ to the forearm of a man.

A. TESTS ON RABBITS

Accurately measured quantities of selenium oxychloride (Baker's reagent) were placed on a clipped area on the backs of normal rabbits weighing from 1,688 to 3,369 gm. The quantity of the reagent was measured by standard capillary pipettes, 0.1 and 0.01 cc. The reagent was allowed to spread over as large an area as possible. The 0.01 cc portion spread over a circular area approximately 1 cm in diameter; the larger quantities gave areas of application of proportionally larger size. The rabbits, after treatment, were placed in cages and their condition and time of death were noted.

In table 1 are shown the results of the skin applications of $SeOCl_2$ to clipped areas on the backs of normal rabbits. From these data it is concluded that the amount necessary to cause the death of rabbits is less than 0.01 cc. When computed on a weight basis, the toxic dose of $SeOCl_2$, by skin application, for rabbits is less than 7 mg/kilo. The difficulties encountered in preventing rapid hydrolysis of the $SeOCl_2$ when measuring quantities less than 0.01 cc caused the results to be unreliable. For this reason, no figure for the minimum lethal dose of $SeOCl_2$ is given, except to state that this figure is less than 7 mg/kilo. When $SeOCl_2$ was dissolved in anhydrous carbon tetrachloride and applied to rabbits in a manner similar to that just

described, moderately severe burns resulted. However, there was no marked or deep tissue destruction as occurred when the undiluted $SeOCl_2$ was applied, nor was death caused even when proportionate toxic amounts were applied. For these reasons, the results of skin tests made on rabbits, using a $SeOCl_2$—CCl_4 mixture, are omitted. The results were inconclusive and misleading when compared with the action of undiluted $SeOCl_2$.

TABLE 1.—*Mortality data. Deaths resulting from skin application to rabbits of $SeOCl_2$*

Rabbit No.	Weight	$SeOCl_2$ applied	$SeOCl_2$ per kilo [1]	Results
	Grams	*Cc*	*Cc*	
1	1,945	0.20	248	Dead in 5 hours.
2	1,688	.10	143	Dead in 5 hours.
3	2,776	.04	34.9	Dead in 2 hours.
4	2,788	.03	26.0	Dead in 3 hours.
5	2,647	.02	18.2	Dead in 5 hours.
6	2,270	.01	10.6	Dead in 20 hours.
7	2,330	.01	10.4	Dead in 20 hours.
8	2,563	.01	9.4	Dead in 20 hours.
9	2,658	.01	9.1	Dead in 20 hours.
10	3,369	.01	7.2	Dead in 20 hours.

[1] Calculated from density of $SeOCl_2$, 2.42.

The course of the severe burns resulting from skin application of $SeOCl_2$ to rabbits may be summarized as follows:

5 minutes after application: Erythema at site of application.

15 minutes after application: Erythema and swelling around site of application. Red precipitated amorphous selenium at site of application.

1 hour after application: Swelling increased. Area of burn depressed, surrounded by dark ring.

2–10 hours after application: Same as 1 hour. More severe. Entire back swollen.

24 hours after application: No animals receiving 0.01 cc of $SeOCl_2$ survived as long as 24 hours.

In order to show that the toxic effects resulting from skin burns produced by selenium oxychloride are in part attributable to the selenium absorbed, two rabbits were treated with this reagent and killed 3 hours after application. Samples of whole blood and liver tissues were secured and analyses for selenium made (*5*, *6*). It has been shown that, in acute poisoning due to ingestion of seleniferous materials, selenium is largely distributed in the blood and liver (*7*).

TABLE 2.—*Results of determination of selenium in the blood and liver*

Rabbit No.	Weight	$SeOCl_2$ applied	$SeOCl_2$	Whole-blood selenium	Liver selenium
	Grams	*Cc*	*Mg/kilo*	*Ppm*	*Ppm.*
11	2,661	Control	0	0	0
12	2,769	Control	0	0	0
13	1,797	0.01	13.4	.6	2.0
14	1,952	0.03	37.2	2.2	4.3

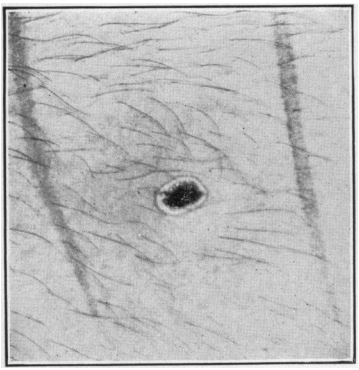

FIGURE 1.—One hour.

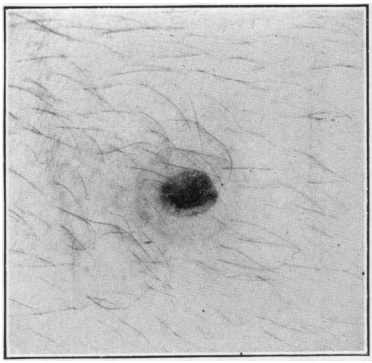

FIGURE 2.—Twenty-four hours.

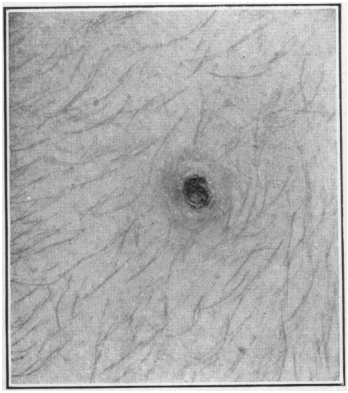

FIGURE 3.—Twelve days.

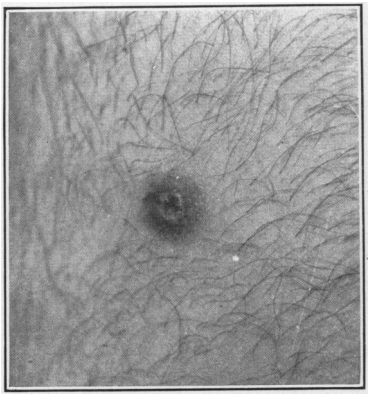

FIGURE 4.—Forty days.

Photographs of burns resulting from the application of $SeOCl_2$ to a man's forearm. (Approximately $\times 1$.)

In table 2 are shown the results of the determination of selenium on whole blood and liver tissue of two rabbits receiving 0.03 and 0.01 cc $SeOCl_2$. These results indicate that the toxic effects of selenium oxychloride are in part due to the selenium introduced into the blood stream through skin absorption.

B. TESTS ON MAN

To the forearm of a man, a minute drop, less than 0.005 cc, of pure $SeOCl_2$ was applied. The results were noted periodically, and photographs (figs. 1 to 4) were made in order to show the course of the burn and method of healing. In an identical manner, $SeOCl_2$ was applied to the forearm of the same individual and immediately rinsed with water, in order to show that prompt removal of the reagent with water will prevent serious burns.

The results of skin application of a minute drop of $SeOCl_2$ to the forearm of a man may be stated as follows:

5 minutes: Tissue destruction. Stinging pain. Area of application ⅛ inch diameter.

15 minutes: Erythema. Swelling in form of wheal, ¼ inch diameter. Center of burn depressed.

1 hour: Wheal ½ inch in diameter. Radiating erythema 1½ inch diameter.

3 hours: Increased swelling of entire area surrounding burn. Painful. Precipitated Se at site of application.

8 hours: Swelling of forearm. Painful. After 8 hours, pain and swelling subsiding.

24 hours: Swelling subsiding. Induration of subcutaneous tissue.

3 days: Swelling subsided. Induration of subcutaneous tissue.

5–10 days: Healing progressed. No secondary infection. Scab formation.

10 days: Healing well progressed. No pain. Depressed erythematous area around scab.

10–20 days: Unchanged.

20 days: Slight secondary infection. Treated with tincture of iodine.

25 days: Healing. Infection cleared.

30 days: Healed. Scab off. Scar tissue at site of application.

Photographs (figs. 1 to 4) taken at intervals of 1 hour, 24 hours, 12 days, and 40 days are shown in order to illustrate the course of the wound.

When a small drop of undiluted $SeOCl_2$ was applied to the skin of the same individual as tested above, and immediately flushed with water, no burn resulted. When using $SeOCl_2$ it seems advisable to have large quantities of water available for immediate use. A general treatment for burns resulting from $SeOCl_2$ should include immediate flushing with water, followed by some weak alkali, as sodium bicarbonate or dilute ammonia water.

SUMMARY AND CONCLUSIONS

1. Selenium oxychloride, $SeOCl_2$, is toxic and extremely vesicant. When 0.01 cc is applied to the skin of rabbits, death occurs in less than 24 hours.

2. The toxic action of selenium oxychloride is in part attributable to the selenium absorbed, as evidenced by the presence of the element in the blood and liver of animals so treated.

3. Selenium oxychloride produces a third degree burn when applied to the skin of man. The burn is painful and slow to heal. Immediate flushing with water will hydrolyze the $SeOCl_2$ rapidly so that no burn results. Treatment with weak alkali, as sodium bicarbonate or dilute ammonia water, is suggested as a general primary treatment.

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DEATHS DURING WEEK ENDED JAN. 1, 1938

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

	Week ended Jan. 1, 1938	Corresponding week, 1937
Data from 86 large cities in the United States:		
Total deaths	9,456	10,425
Average for 3 prior years	8,926	
Total deaths, 52 weeks	446,524	448,888
Deaths under 1 year of age	588	685
Average for 3 prior years	537	
Deaths under 1 year of age, 52 weeks	28,485	28,826
Data from industrial insurance companies:		
Policies in force	69,942,678	69,023,395
Number of death claims	12,854	11,799
Death claims per 1,000 policies in force, annual rate	9.6	8.9
Death claims per 1,000 policies, 52 weeks, annual rate	9.7	9.7

MORTALITY SUMMARY FOR LARGE CITIES, 1937

Provisional number of deaths and infant mortality for a group of 86 large cities of the United States for the 52-week period from Jan. 2, 1937, to Jan. 1, 1938, and comparison with provisional and final figures for 1936

[From the weekly Health Index, Bureau of the Census, Department of Commerce]

City	Number of deaths			Infant mortality					
				Number			Rate		
	Provisional		Final	Provisional		Final	Provisional		Final
	1937 [1]	1936 [1]	1936 [2]	1937 [1]	1936 [1]	1936 [3]	1937 [3]	1936 [3]	1936 [4]
Total (86 cities)	446,524	448,888	454,857	28,485	28,826	30,232	47	50	52
Akron	2,245	2,190	2,220	202	186	195	50	46	48
Albany	1,940	1,932	1,942	135	130	131	54	53	53
Atlanta	4,464	4,812	4,864	392	419	433	64	74	77
White	2,331	-------	2,529	207	-------	-------	52	-------	-------
Negro	2,131	-------	2,335	185	-------	-------	85	-------	-------
Other	2	-------	0	0	-------	-------	0	-------	-------
Baltimore	11,793	11,434	11,516	832	880	893	59	66	67
White	8,959	-------	8,616	525	-------	-------	49	-------	-------
Negro	2,822	-------	2,892	307	-------	-------	93	-------	-------
Other	12	-------	8	0	-------	-------	-------	-------	-------
Birmingham	3,784	3,771	3,827	369	389	402	74	82	85
White	1,905	-------	1,847	200	-------	-------	66	-------	-------
Negro	1,877	-------	1,980	169	-------	-------	86	-------	-------
Other	2	-------	0	0	-------	-------	0	-------	-------
Boston	11,552	11,400	11,504	802	807	822	50	52	52
Bridgeport	1,672	1,676	1,708	105	98	103	41	38	40
Buffalo	7,715	7,594	7,704	524	465	488	53	48	50
Cambridge	1,438	1,422	1,435	114	98	102	44	47	49
Camden	1,720	1,618	1,620	165	151	154	53	49	50
Canton	1,238	1,141	1,162	95	110	110	44	51	53
Chicago	36,217	37,900	38,541	1,820	1,851	1,885	37	39	39
Cincinnati	7,397	7,364	7,452	476	475	485	59	60	61
Cleveland	10,297	10,540	10,620	609	580	610	41	41	43
Columbus	4,487	4,672	4,605	250	285	307	53	58	62
Dallas	3,458	3,611	3,660	336	361	387	59	71	77
White	2,569	-------	2,771	252	-------	-------	56	-------	-------
Negro	889	-------	887	84	-------	-------	87	-------	-------
Other	0	-------	2	0	-------	0	-------	-------	0
Dayton	2,933	2,832	2,861	216	203	208	49	51	55
Denver	4,725	4,536	4,673	356	311	345	59	61	63
Des Moines	1,709	1,706	1,996	133	84	147	41	28	49
Detroit	14,182	14,712	14,816	1,184	1,371	1,420	43	52	53
Duluth	1,215	1,186	1,199	55	56	60	29	32	34
El Paso	1,496	1,403	1,413	275	213	212	105	81	81
Erie	1,582	1,510	1,414	109	78	87	45	34	40
Evansville	1,344	1,608	1,641	120	108	112	69	63	66
Fall River	1,591	1,603	1,612	84	87	87	41	45	45
Flint	1,405	1,406	1,418	176	202	211	49	56	58
Fort Wayne	1,307	1,315	1,325	78	72	77	37	35	38
Fort Worth	1,944	2,152	2,142	163	171	180	55	61	65
White	1,538	-------	1,705	126	-------	-------	50	-------	-------
Negro	406	-------	431	37	-------	-------	86	-------	-------
Other	0	-------	6	0	-------	-------	-------	-------	-------
Grand Rapids	1,803	1,718	1,732	138	116	115	47	45	44
Hartford	2,162	2,183	2,215	115	150	159	46	65	42
Houston	4,334	4,253	4,227	403	345	346	58	67	56
White	3,031	-------	2,905	283	-------	-------	50	-------	-------
Negro	1,302	-------	1,320	120	-------	-------	93	-------	-------
Other	1	-------	2	0	-------	-------	-------	-------	-------
Indianapolis	5,637	5,717	5,616	407	369	376	65	63	63
White	4,759	-------	4,752	334	-------	-------	61	-------	-------
Negro	876	-------	859	73	-------	-------	95	-------	-------
Other	2	-------	5	0	-------	-------	-------	-------	-------
Jersey City	3,614	3,531	3,560	229	227	236	53	34	35
Kansas City, Kans	1,715	1,888	1,871	98	144	139	47	79	63
White	1,344	-------	1,483	78	-------	-------	43	-------	-------
Negro	370	-------	387	20	-------	-------	71	-------	-------
Other	1	-------	1	0	-------	-------	0	-------	-------
Kansas City, Mo	5,336	5,628	5,680	304	310	322	53	53	56

See footnotes at end of table.

Provisional number of deaths and infant mortality for a group of 88 large cities of the United States for the 52-week period from Jan. 2, 1937, to Jan. 1, 1938, and comparison with provisional and final figures for 1936—Continued

City	Number of deaths			Infant mortality					
				Number			Rate		
	Provisional		Final	Provisional		Final	Provisional		Final
	1937 [2]	1936 [1]	1936 [2]	1937 [1]	1936 [1]	1936 [2]	1937 [3]	1936 [3]	1936 [4]
Knoxville	1,514	1,504	1,507	157	183	190	70	77	86
White	1,196	-------	1,233	129	-------	-------	63	-------	-------
Negro	318	-------	274	28	-------	-------	137	-------	-------
Long Beach	1,693	1,585	1,601	74	81	86	27	33	35
Los Angeles	17,985	16,650	16,774	1,002	977	988	53	56	56
Louisville	4,318	4,093	4,795	161	233	360	30	45	68
White	3,254	-------	3,720	139	-------	-------	29	-------	-------
Negro	1,063	-------	1,075	22	-------	-------	37	-------	-------
Other	1	-------	0	0	-------	-------	0	-------	-------
Lowell	1,469	1,369	1,393	98	86	94	49	72	53
Lynn	1,065	1,052	1,063	37	30	38	27	23	32
Memphis	4,421	4,702	4,798	360	439	454	69	89	93
White	2,319	-------	2,513	202	-------	-------	64	-------	-------
Negro	2,100	-------	2,282	158	-------	-------	77	-------	-------
Other	2	-------	3	0	-------	-------	0	-------	-------
Miami	1,851	1,632	1,649	124	101	118	51	48	53
White	1,356	-------	1,198	83	-------	-------	44	-------	-------
Negro	490	-------	448	41	-------	-------	71	-------	-------
Other	5	-------	3	0	-------	-------	0	-------	-------
Milwaukee	5,570	5,366	5,409	391	421	428	39	44	46
Minneapolis	5,172	5,713	5,823	279	295	339	34	38	44
Nashville	2,679	2,965	2,978	235	254	289	68	67	76
White	1,683	-------	1,989	168	-------	-------	64	-------	-------
Negro	996	-------	1,109	67	-------	-------	79	-------	-------
New Bedford	1,266	1,304	1,307	77	101	102	45	58	58
New Haven	2,081	2,116	2,118	69	62	102	33	29	34
New Orleans	8,005	8,719	8,811	749	825	834	79	92	93
White	4,892	-------	5,237	379	-------	-------	66	-------	-------
Negro	3,113	-------	3,565	370	-------	-------	97	-------	-------
Other	0	-------	9	0	-------	-------	0	-------	-------
New York	77,135	77,022	77,687	4,449	4,447	4,500	44	45	45
Bronx Borough	12,011	11,938	12,048	645	626	625	41	41	42
Brooklyn Borough	26,004	25,900	26,057	1,674	1,648	1,670	42	42	42
Manhattan Borough	27,730	27,946	28,303	1,597	1,669	1,700	50	53	53
Queens Borough	8,975	8,863	8,834	421	421	421	38	40	41
Richmond Borough	2,415	2,375	2,435	112	83	84	46	36	36
Newark, N. J.	5,038	5,027	5,106	267	306	316	35	42	44
Oakland	3,636	3,570	3,611	221	183	186	46	44	44
Oklahoma City	2,306	2,428	2,434	192	167	238	80	44	64
Omaha	2,926	3,132	3,068	172	222	226	44	52	53
Paterson	1,743	1,739	1,764	91	110	121	35	42	46
Peoria	1,568	1,577	1,593	179	141	145	66	59	61
Philadelphia	25,186	24,895	25,105	1,350	1,387	1,418	45	47	48
Pittsburgh	9,358	8,953	9,035	700	617	630	52	50	51
Portland, Oreg.	4,305	4,192	4,224	174	163	173	36	37	39
Providence	3,456	3,255	3,284	256	206	210	47	39	40
Richmond	2,824	3,216	3,237	222	231	244	66	75	76
White	1,688	-------	1,882	106	-------	-------	47	-------	-------
Negro	1,136	-------	1,352	116	-------	-------	105	-------	-------
Other	0	-------	3	0	-------	-------	0	-------	-------
Rochester	3,731	3,959	3,997	166	195	197	32	39	40
St. Louis	11,601	12,286	12,326	463	419	641	34	33	50
St. Paul	2,982	3,175	3,207	136	147	207	25	29	41
Salt Lake City	1,894	1,764	1,801	132	142	149	36	41	43
San Antonio	3,578	3,712	3,728	604	620	613	102	108	105
White	3,285	-------	3,412	578	-------	-------	102	-------	-------
Negro	290	-------	311	26	-------	-------	114	-------	-------
Other	3	-------	5	0	-------	-------	-------	-------	-------
San Diego	2,556	2,431	2,431	112	138	139	32	45	44
San Francisco	9,244	8,969	9,028	246	282	302	31	39	41
Schenectady	1,054	1,023	1,042	66	62	66	47	44	48
Seattle	4,801	4,877	4,919	207	169	174	40	34	34
Somerville	895	962	965	46	44	46	38	37	36
South Bend	925	896	919	65	61	67	39	40	44
Spokane	1,705	1,652	1,663	81	121	127	34	56	57
Springfield, Mass.	1,875	1,844	1,855	102	126	138	39	53	55
Syracuse	2,675	2,438	2,458	157	159	164	42	44	46
Tacoma	1,567	1,585	1,595	58	71	74	29	39	40

See footnotes at end of table.

Provisional number of deaths and infant mortality for a group of 86 large cities of the United States for the 52-week period from Jan. 2, 1937, to Jan. 1, 1938, and comparison with provisional and final figures for 1936—Continued

City	Number of deaths			Infant mortality					
				Number			Rate		
	Provisional		Final	Provisional		Final	Provisional		Final
	1937 [1]	1936 [1]	1936 [2]	1937 [1]	1936 [1]	1936 [2]	1937 [3]	1936 [3]	1936 [4]
Tampa	1,269	1,293	1,316	94	79	84	56	49	51
White	918	--------	968	71	--------	--------	52	--------	--------
Negro	343	--------	348	23	--------	--------	73	--------	--------
Other	8	--------	0	0	--------	--------	0	--------	--------
Toledo	3,828	3,818	3,840	261	215	223	52	46	48
Trenton	1,885	1,890	1,755	115	131	129	46	54	54
Utica	1,394	1,396	1,427	93	86	92	50	45	50
Washington, D. C	8,704	9,031	9,094	746	834	847	61	71	72
White	5,448	--------	5,610	342	--------	--------	41	--------	--------
Negro	3,241	--------	3,469	403	--------	--------	102	--------	--------
Other	15	--------	15	1	--------	--------	25	--------	--------
Waterbury	941	879	1,059	74	73	94	37	53	51
Wilmington, Del	1,590	1,485	1,609	122	108	122	49	51	57
Worcester	2,705	2,635	2,653	155	167	168	45	49	51
Yonkers	1,241	1,169	1,222	71	80	85	43	47	50
Youngstown	1,882	1,889	1,883	158	127	139	49	42	48

[1] Based upon telegraphic reports received each week from city health officers.
[2] Calendar year; tabulation of transcripts received from State registrars' offices.
[3] The provisional infant mortality rate is computed from deaths under 1 year as reported each week, per 1,000 estimated live births for 1936 and 1937, respectively.
[4] Calendar year; the final infant mortality rate is the number of deaths under 1 year of age per 1,000 live births.

PREVALENCE OF DISEASE

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

UNITED STATES

CURRENT WEEKLY STATE REPORTS

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

In these and the following tables a zero (0) is to be interpreted to mean that no cases or deaths occurred while leaders (-----) indicate that cases or deaths may have occurred, although none was reported.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Jan. 8, 1938, and Jan. 9, 1937

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Jan. 8, 1938	Week ended Jan. 9, 1937	Week ended Jan. 8, 1938	Week ended Jan. 9, 1937	Week ended Jan. 8, 1938	Week ended Jan. 9, 1937	Week ended Jan. 8, 1938	Week ended Jan. 9, 1937
New England States:								
Maine	2	1	13	41	74	99	0	0
New Hampshire	-----	-----	-----	-----	42	24	0	0
Vermont	1	-----	-----	-----	237	10	0	0
Massachusetts	5	7	-----	-----	115	930	2	8
Rhode Island	-----	1	-----	-----	-----	146	0	1
Connecticut	7	4	14	67	17	170	2	8
Middle Atlantic States:								
New York	24	62	[1] 23	[1] 1,783	294	375	5	9
New Jersey	17	22	22	118	1,028	437	6	5
Pennsylvania	37	50	-----	-----	2,633	83	1	5
East North Central States:								
Ohio	23	28	7	10	594	31	5	3
Indiana	38	16	22	346	200	10	1	2
Illinois	48	30	22	390	2,627	19	3	9
Michigan [2]	19	11	-----	66	320	19	2	2
Wisconsin	4	7	28	655	390	27	1	8
West North Central States:								
Minnesota	5	12	1	25	7	38	1	2
Iowa	4	4	2	2,854	51	6	4	8
Missouri	42	11	118	621	1,212	2	0	3
North Dakota	2	2	5	66	31	-----	0	0
South Dakota	12	-----	1	42	-----	5	0	0
Nebraska	2	-----	10	51	8	1	2	3
Kansas	12	-----	10	876	101	8	5	1
South Atlantic States:								
Delaware	-----	4	-----	8	6	184	0	0
Maryland [2 3]	19	18	15	61	11	230	8	5
District of Columbia	6	17	2	15	14	16	1	6
Virginia	19	48	-----	-----	199	112	5	8
West Virginia	18	12	66	76	361	28	0	2
North Carolina [4]	43	45	24	34	831	43	0	2
South Carolina [4]	2	13	533	720	168	16	1	2
Georgia [4]	17	15	-----	-----	246	-----	0	3
Florida [4]	13	13	4	7	132	3	4	7

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Jan. 8, 1938, and Jan. 9, 1937—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Jan. 8, 1938	Week ended Jan. 9, 1937	Week ended Jan. 8, 1938	Week ended Jan. 9, 1937	Week ended Jan. 8, 1938	Week ended Jan. 9, 1937	Week ended Jan. 8, 1938	Week ended Jan. 9, 1937
East South Central States:								
Kentucky	13	14	69	----	262	199	7	19
Tennessee	17	13	147	318	361	9	6	4
Alabama [4]	12	27	377	250	77	2	8	3
Mississippi [3]	11	5	----	----	----	----	3	0
West South Central States:								
Arkansas	8	2	92	283	49	2	1	2
Louisiana	13	13	42	47	3	7	5	0
Oklahoma [4]	19	8	87	140	7	14	1	0
Texas [4]	66	86	427	756	51	160	1	2
Mountain States:								
Montana	4	1	----	637	8	2	0	4
Idaho	----	----	3	39	9	102	0	0
Wyoming	1	7	----	----	4	1	0	0
Colorado	12	5	----	77	174	6	1	1
New Mexico	4	5	2	22	57	10	1	1
Arizona	9	5	106	283	6	78	2	5
Utah [3]	12	----	----	----	48	126	2	0
Pacific States:								
Washington	5	2	----	7	17	32	0	1
Oregon	2	1	56	171	23	8	1	0
California	45	30	78	183	43	126	2	10
Total	694	677	2,423	12,145	13,148	3,956	95	143

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid and paratyphoid fevers		Whooping cough
	Week ended Jan. 8, 1938	Week ended Jan. 9, 1937	Week ended Jan. 8, 1938	Week ended Jan. 9, 1937	Week ended Jan. 8, 1938	Week ended Jan. 9, 1937	Week ended Jan. 8, 1938	Week ended Jan. 9, 1937	Week ended Jan. 8, 1938
New England States:									
Maine	0	0	26	22	0	0	1	2	131
New Hampshire	0	0	20	4	0	0	0	0	6
Vermont	0	0	15	9	0	0	0	1	50
Massachusetts	0	0	240	228	0	0	2	2	180
Rhode Island	0	0	26	24	0	0	0	0	36
Connecticut	0	0	78	68	0	0	2	1	49
Middle Atlantic States:									
New York	1	2	549	687	0	3	4	5	349
New Jersey	0	0	117	197	0	0	1	4	215
Pennsylvania	0	0	248	508	0	0	6	11	206
East North Central States:									
Ohio	2	0	318	234	6	4	1	12	42
Indiana	0	0	190	174	34	15	1	2	23
Illinois	1	3	658	473	32	12	1	9	104
Michigan [3]	0	2	331	421	0	0	2	1	99
Wisconsin	0	1	181	274	1	11	2	0	121
West North Central States:									
Minnesota	1	0	132	131	61	13	0	0	66
Iowa	0	0	193	100	55	33	0	1	32
Missouri	0	0	224	126	38	47	2	2	48
North Dakota	0	0	26	30	8	25	0	0	25
South Dakota	0	0	31	54	5	2	0	1	19
Nebraska	1	0	38	37	1	8	2	2	16
Kansas	0	0	201	167	19	13	2	3	104
South Atlantic States:									
Delaware	0	0	21	19	0	0	0	0	8
Maryland [2 3]	0	0	54	106	0	0	4	2	55
District of Columbia	0	1	20	18	0	0	0	0	17
Virginia	0	0	34	58	0	0	2	1	118
West Virginia	0	2	75	60	1	0	7	2	72
North Carolina [4]	2	0	58	52	0	0	7	4	328
South Carolina [4]	0	0	3	10	0	0	4	4	65
Georgia [4]	1	1	18	7	0	0	3	3	9
Florida [4]	0	0	9	14	5	0	2	1	2

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Jan. 8, 1938, and Jan. 9, 1937—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid and paratyphoid fevers		Whooping cough
	Week ended Jan. 8, 1938	Week ended Jan. 9, 1937	Week ended Jan. 8, 1938	Week ended Jan. 9, 1937	Week ended Jan. 8, 1938	Week ended Jan. 9, 1937	Week ended Jan. 8, 1938	Week ended Jan. 9, 1937	Week ended Jan. 8, 1938
East South Central States:									
Kentucky	0	0	72	63	64	0	1	8	90
Tennessee	1	2	50	50	7	0	1	3	29
Alabama [4]	0	0	14	22	2	0	3	4	22
Mississippi [5]	0	0	13	11	1	1	0	1	-------
West South Central States:									
Arkansas	1	1	13	18	9	0	1	2	22
Louisiana	1	1	10	29	0	1	4	11	-------
Oklahoma [6]	2	0	101	17	9	0	4	2	14
Texas [4]	1	1	95	79	0	4	22	9	140
Mountain States:									
Montana	0	0	37	35	13	26	1	0	67
Idaho	1	0	25	28	12	7	3	0	32
Wyoming	0	0	28	18	5	4	0	0	14
Colorado	0	0	33	58	12	3	1	0	10
New Mexico	0	0	16	35	0	0	3	9	19
Arizona	1	0	10	15	0	0	4	1	19
Utah [2]	0	0	77	8	0	0	0	0	20
Pacific States:									
Washington	0	1	48	50	23	5	1	3	134
Oregon	1	0	41	34	11	27	3	3	10
California	2	3	207	285	25	12	13	5	390
Total	20	21	5,024	5,167	459	276	123	137	3,627

[1] New York City only.
[2] Week ended earlier than Saturday.
[3] Rocky Mountain spotted fever, week ended Jan. 8, 1938, Maryland, 1 case.
[4] Typhus fever, week ended Jan. 8, 1938, 26 cases, as follows: North Carolina, 4; South Carolina, 3; Georgia, 12; Florida, 1; Alabama, 2; Texas, 4.
[5] Figures for 1937 are exclusive of Oklahoma City and Tulsa.

SUMMARY OF MONTHLY REPORTS FROM STATES

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

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
October 1937										
Alaska	-------	-------	24	-------	-------	-------	0	-------	0	0
November 1937										
Alaska	-------	-------	4	-------	-------	-------	0	-------	0	0
Mississippi	3	97	3,824	2,110	146	177	13	80	8	20
Wisconsin	-------	21	199	-------	298	-------	13	851	14	4
December 1937										
Connecticut	4	35	14	1	29	-------	1	316	0	3
New Jersey	6	64	63	1	2,824	-------	1	415	0	9
North Carolina	10	170	46	24	1,904	30	0	241	1	17
West Virginia	14	57	127	-------	503	-------	2	268	1	6

Summary of monthly reports from States—Continued

October 1937	Cases
Alaska:	
Chicken pox	54
Mumps	30
Whooping cough	52
November 1937	
Chicken pox:	
Alaska	16
Mississippi	428
Wisconsin	2,098
Dengue:	
Mississippi	13
Dysentery:	
Mississippi (amoebic)	71
Mississippi (bacillary)	260
Hookworm disease:	
Mississippi	482
Impetigo contagiosa:	
Alaska	3
Mumps:	
Alaska	39
Mississippi	105
Wisconsin	430
Ophthalmia neonatorum:	
Mississippi	5
Puerperal septicemia:	
Mississippi	20
Rabies in animals:	
Mississippi	13
Rabies in man:	
Mississippi	4
Septic sore throat:	
Wisconsin	20
Trachoma:	
Mississippi	3
Tularaemia:	
Mississippi	3
Wisconsin	1

November 1937—Continued	Cases
Undulant fever:	
Mississippi	1
Wisconsin	8
Whooping cough:	
Alaska	97
Mississippi	425
Wisconsin	821
December 1937	
Chicken pox:	
Connecticut	701
New Jersey	2,224
North Carolina	1,013
West Virginia	165
Dysentery:	
Connecticut (amoebic)	1
Connecticut (bacillary)	25
New Jersey (amoebic)	1
New Jersey (bacillary)	1
Encephalitis, epidemic or lethargic:	
Connecticut	1
New Jersey	4
German measles:	
Connecticut	15
New Jersey	54
North Carolina	35
Lead poisoning:	
Connecticut	2
Mumps:	
Connecticut	621
New Jersey	426
West Virginia	4

December 1937—Continued	Cases
Ophthalmia neonatorum:	
Connecticut	2
New Jersey	15
Paratyphoid fever:	
Connecticut	2
New Jersey	1
Rabies in animals:	
Connecticut	3
New Jersey	8
Rocky Mountain spotted fever:	
North Carolina	1
Septic sore throat:	
Connecticut	20
New Jersey	11
North Carolina	15
Tetanus:	
New Jersey	2
Trichinosis:	
New Jersey	1
Tularaemia:	
New Jersey	3
North Carolina	1
West Virginia	1
Typhus fever:	
New Jersey	1
North Carolina	8
Undulant fever:	
Connecticut	7
New Jersey	4
West Virginia	1
Whooping cough:	
Connecticut	189
New Jersey	589
North Carolina	889
West Virginia	173

PLAGUE INFECTION IN FRESNO COUNTY, CALIF.

Under date of December 28, 1937, Dr. W. M. Dickie, director of public health of California, reported that plague infection had been proved, by animal inoculation and cultural tests, in 29 fleas taken from 5 *beecheyi* squirrels collected on November 3 in the Shaver Lake area, Fresno County, Calif.

WEEKLY REPORTS FROM CITIES

City reports for week ended Jan. 1, 1938

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table. Weekly reports are received from about 700 cities, from which the data are tabulated and filed for reference.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	268	1,200	156	1,447	978	1,572	16	384	26	981	----
Current week [1]	162	286	79	2,539	849	1,192	43	350	32	742	----
Maine:											
Portland	1	----	0	0	8	2	0	1	0	10	36
New Hampshire:											
Concord	0	----	0	9	1	0	0	1	0	2	17
Manchester	0	----	1	0	0	0	0	0	0	0	19
Nashua	0	----	----	0	----	0	0	----	0	0	4
Vermont:											
Barre	0	----	0	0	0	0	0	0	0	0	4
Burlington	0	----	0	0	0	0	0	0	0	7	9
Rutland	0	----	0	0	0	1	0	0	0	2	4
Massachusetts:											
Boston	1	----	0	51	20	81	0	6	2	6	206
Fall River	1	----	0	0	5	1	0	1	0	16	38
Springfield	0	----	1	1	4	14	0	2	0	3	48
Worcester	0	----	0	1	7	4	0	3	0	5	65
Rhode Island:											
Pawtucket	0	----	0	0	0	3	0	0	0	0	17
Providence	0	----	0	0	7	15	0	1	0	18	71
Connecticut:											
Bridgeport	0	2	1	1	4	6	0	1	0	0	40
Hartford	0	----	0	1	5	17	0	1	0	2	41
New Haven	0	----	0	0	1	5	0	0	0	4	42
New York:											
Buffalo	0	----	1	3	19	13	0	6	0	14	171
New York	39	17	8	46	125	163	0	72	7	115	1,465
Rochester	0	----	0	4	11	2	0	4	0	4	88
Syracuse	0	----	0	0	5	2	1	0	0	5	50
New Jersey:											
Camden	2	2	2	22	4	2	0	2	0	1	45
Newark	1	5	0	4	8	12	0	8	0	21	100
Trenton	0	1	1	129	4	5	0	3	1	5	52
Pennsylvania:											
Philadelphia	3	10	8	121	36	83	0	17	5	23	482
Pittsburgh	5	----	3	301	35	50	0	6	1	20	198
Reading	0	----	0	4	2	7	0	1	0	0	18
Scranton	1	----	----	23	----	3	0	----	0	0	----
Ohio:											
Cincinnati	1	----	3	11	15	14	0	5	0	9	157
Cleveland	1	18	1	99	16	36	0	13	0	27	203
Columbus	1	2	2	6	7	6	0	4	0	6	91
Toledo	0	1	1	53	6	5	0	4	0	0	80
Indiana:											
Anderson	0	----	0	0	2	3	0	1	0	1	17
Fort Wayne	2	----	0	0	8	5	0	3	0	0	23
Indianapolis	9	----	2	7	16	13	0	2	0	1	116
Muncie	0	----	1	12	3	3	2	1	0	0	14
South Bend	0	----	0	0	3	2	0	1	0	4	16
Terre Haute	0	----	0	0	0	1	0	0	0	0	27
Illinois:											
Alton	0	----	0	5	3	11	0	1	0	0	10
Chicago	7	14	2	471	55	175	1	38	0	23	878
Elgin	0	----	0	0	3	7	0	0	0	1	18
Moline	0	----	0	29	2	10	0	0	0	0	6
Springfield	0	----	0	2	0	5	1	1	0	0	19
Michigan:											
Detroit	9	2	1	196	27	100	0	16	0	44	288
Flint	2	----	0	0	6	25	0	0	0	6	31
Grand Rapids	0	----	0	5	6	22	0	0	0	7	35
Wisconsin:											
Kenosha	0	----	0	0	0	5	0	0	0	2	8
Madison	0	----	0	2	1	8	0	0	0	2	10
Milwaukee	3	----	0	190	16	20	0	1	0	23	148
Racine	0	----	0	6	1	5	0	0	0	4	12
Superior	0	----	0	0	0	4	0	0	0	0	13

[1] Figures for Little Rock estimated; report not received.

City reports for week ended Jan. 1, 1938—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	------	1	0	3	7	0	2	1	8	27
Minneapolis	1	------	0	3	6	18	0	2	0	0	102
St. Paul	0	------	0	2	10	5	25	4	0	1	70
Iowa:											
Cedar Rapids	0	------	--------	0	-------	1	0	-------	0	1	--------
Davenport	0	------	--------	18	-------	1	0	-------	0	0	--------
Des Moines	0	------	--------	0	-------	24	0	-------	0	0	33
Sioux City	0	------	--------	0	-------	3	0	-------	0	2	--------
Missouri:											
Kansas City	1	2	1	14	10	17	0	8	1	0	120
St. Joseph	2	------	0	0	1	1	0	0	0	0	21
St. Louis	9	------	2	468	33	41	6	8	2	2	306
North Dakota:											
Fargo	0	------	0	0	0	1	0	0	0	0	9
Grand Forks	1	------	--------	0	-------	6	0	-------	0	0	--------
Minot	0	------	0	0	0	1	0	0	0	4	5
South Dakota:											
Aberdeen	0	------	--------	0	-------	0	0	-------	0	1	--------
Nebraska:											
Omaha	0	------	0	0	5	0	0	2	0	0	43
Kansas:											
Lawrence	0	------	0	0	1	1	0	0	0	1	4
Topeka	0	------	1	3	2	4	0	0	0	12	30
Wichita	0	2	0	2	6	4	0	0	0	2	25
Delaware:											
Wilmington	0	------	0	0	2	5	0	1	0	5	34
Maryland:											
Baltimore	1	8	1	2	26	19	0	7	2	38	265
Cumberland	0	------	0	0	0	0	0	0	0	0	17
Frederick	0	------	0	0	0	0	0	0	0	0	6
District of Columbia:											
Washington	5	5	3	8	20	15	0	12	1	8	195
Virginia:											
Lynchburg	1	------	0	0	4	2	0	1	1	3	18
Richmond	0	------	6	1	9	6	0	1	0	2	82
Roanoke	2	------	0	1	1	1	0	0	1	2	23
West Virginia:											
Charleston	0	3	1	13	7	1	0	1	0	0	26
Huntington	0	------	--------	26	-------	0	0	-------	0	0	--------
Wheeling	0	------	0	3	4	2	0	1	-------	4	28
North Carolina:											
Gastonia	0	------	--------	0	1	0	0	-------	0	0	--------
Raleigh	0	------	0	0	4	0	0	0	0	41	34
Wilmington	0	------	0	0	5	0	0	1	0	9	12
Winston-Salem	0	------	0	0	5	1	0	2	1	10	17
South Carolina:											
Charleston	1	41	1	34	4	2	0	1	0	1	24
Florence	0	------	0	0	0	0	0	0	0	0	9
Greenville	0	------	0	0	2	1	0	0	0	12	3
Georgia:											
Atlanta	1	21	4	81	15	9	0	4	0	17	106
Brunswick	0	------	0	0	0	0	0	0	0	0	5
Savannah	0	74	3	0	3	1	0	1	0	0	34
Florida:											
Miami	1	2	0	27	1	0	0	4	0	4	40
Tampa	4	3	3	1	3	1	0	1	0	1	33
Kentucky:											
Covington	0	1	0	0	3	0	0	0	0	1	14
Lexington	0	2	1	0	3	0	0	2	0	0	24
Louisville	3	2	1	52	16	35	0	3	0	8	96
Tennessee:											
Knoxville	0	4	3	4	6	0	0	0	1	1	31
Memphis	2	4	0	101	8	6	0	3	0	10	84
Nashville	3	------	1	0	9	0	0	1	0	1	64
Alabama:											
Birmingham	1	16	0	8	9	2	0	4	0	0	79
Mobile	0	------	1	0	1	0	0	1	0	0	38
Montgomery	2	------	--------	0	-------	0	0	-------	0	0	--------

City reports for week ended Jan. 1, 1938—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	------	--------	0	-------	2	0	-------	0	0	--------
Little Rock	--------	------	--------	--------	-------	--------	--------	-------	--------	--------	--------
Louisiana:											
Lake Charles	0	------	0	0	0	0	0	0	0	0	2
New Orleans	4	17	4	0	30	5	0	10	2	7	191
Shreveport	1	------	0	0	4	2	0	1	0	0	30
Oklahoma:											
Muskogee	0	------	--------	0	-------	2	0	-------	0	0	--------
Oklahoma City	1	------	1	0	5	6	0	1	0	0	48
Tulsa	1	------	--------	0	-------	1	3	-------	0	6	--------
Texas:											
Dallas	3	2	2	0	12	3	0	0	0	2	78
Fort Worth	5	------	3	0	6	9	0	0	0	0	36
Galveston	0	------	0	0	2	1	0	0	0	0	15
Houston	3	------	2	0	13	5	0	4	0	0	82
San Antonio	1	------	1	0	11	0	0	8	1	0	78
Montana:											
Billings	0	------	0	0	1	2	0	0	0	0	6
Great Falls	0	------	0	0	1	0	2	0	0	3	7
Helena	0	------	0	0	0	0	0	0	0	3	7
Missoula	0	------	0	0	0	0	0	0	2	0	10
Idaho:											
Boise	0	------	0	0	0	0	6	0	0	0	5
Colorado:											
Colorado Springs	0	------	0	0	5	2	0	0	0	1	9
Denver	6	------	0	75	12	20	0	2	0	0	95
Pueblo	0	------	1	0	0	0	0	0	0	0	8
New Mexico:											
Albuquerque	0	------	0	48	2	1	0	5	0	8	10
Utah:											
Salt Lake City	0	------	0	1	2	9	0	2	0	4	30
Washington:											
Seattle	2	------	0	1	9	4	0	3	0	29	111
Spokane	0	------	0	0	5	3	0	0	0	10	39
Tacoma	0	------	0	0	1	8	1	2	0	8	34
Oregon:											
Portland	0	------	0	2	2	7	0	3	0	2	75
Salem	0	------	--------	0	-------	1	0	-------	0	0	--------
California:											
Los Angeles	17	13	3	6	28	29	0	18	0	17	384
Sacramento	2	------	0	0	1	0	0	0	1	25	28
San Francisco	1	------	1	1	14	6	0	9	0	22	182

State and city	Meningococcus meningitis		Poliomyelitis cases	State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Maine:				Missouri:			
Portland	1	0	0	St. Joseph	0	1	0
Massachusetts:				Maryland:			
Boston	0	1	0	Baltimore	3	2	0
New York:				Florida:			
Buffalo	4	0	0	Miami	1	0	0
New York	4	1	0	Kentucky:			
Pennsylvania:				Louisville	0	0	1
Philadelphia	2	0	0	Tennessee:			
Ohio:				Memphis	1	0	0
Cincinnati	6	1	0	Alabama:			
Cleveland	5	1	0	Birmingham	2	1	0
Illinois:				Louisiana:			
Chicago	2	1	1	New Orleans	2	1	0
Michigan:				Shreveport	0	1	0
Detroit	0	0	1	California:			
Minnesota:				Los Angeles	0	0	1
Minneapolis	0	0	1	Sacramento	0	1	1
Iowa:							
Des Moines	2	0	0				

Encephalitis, epidemic or lethargic.—Cases: Providence, 1; New York, 1; Syracuse, 1; Baltimore, 1; San Antonio, 1.

Pellagra.—Cases: Atlanta, 8; Savannah, 8; Birmingham, 1; Houston, 1.

Typhus fever.—Cases: Savannah, 2; Montgomery, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—2 weeks ended December 4, 1937.—During the 2 weeks ended December 4, 1937, 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				3	2	1		1	1	8
Chicken pox		9	2	304	533	210	109	39	164	1,370
Diphtheria		8	7	188	28	2	3	5		241
Erysipelas				12	3		2	3	1	21
Influenza		15		7	10				57	89
Lethargic encephalitis				2	1					3
Measles		24	10	392	342	34	107	73	194	1,176
Mumps		5			159	20		4	28	216
Paratyphoid fever		6			1					7
Pneumonia		7			58		7		19	91
Poliomyelitis			1	2	5	4	15	3	3	33
Scarlet fever		35	5	312	267	54	110	52	60	895
Tuberculosis	2	11	16	90	115	51	2		28	315
Typhoid fever		1	4	116	15	7	8	1	5	157
Undulant fever				2	3			1		6
Whooping cough		7		549	103	70	43	4	65	841

CUBA

Habana—Communicable diseases—4 weeks ended December 18, 1937.—During the 4 weeks ended December 18, 1937, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	4		Scarlet fever	1	
Leprosy		3	Tuberculosis	7	
Malaria	[1] 33		Typhoid fever	[1] 14	1
Poliomyelitis	[1] 3				

[1] Includes imported cases.

GREAT BRITAIN

England and Wales—Infectious diseases—13 weeks ended October 2, 1937.—During the 13 weeks ended October 2, 1937, certain infectious diseases were reported in England and Wales as follows:

Disease	Cases	Disease	Cases
Diphtheria	13,289	Puerperal pyrexia	1,810
Ophthalmia neonatorum	1,407	Scarlet fever	21,167
Pneumonia	5,735	Typhoid fever	588
Puerperal fever	496		

England and Wales—Vital statistics—Third quarter 1937.—During the quarter ended September 30, 1937, 158,647 live births and 100,295 deaths were registered in England and Wales. The following statistics are taken from the Quarterly Return of Births, Deaths, and Marriages, issued by the Registrar General of England and Wales, and are provisional:

Birth and death rates in England and Wales, quarter ended September 30, 1937

Annual rates per 1,000 population:		Annual rates per 1,000 population—Continued.	
Live births	15.4	Deaths from—Continued.	
Stillbirths	.58	Influenza	.03
Deaths, all causes	9.7	Measles	.01
Deaths under 1 year of age	[1] 43	Scarlet fever	.01
Deaths from:		Typhoid fever and paratyphoid fever	.0
Diarrhea and enteritis (under 2 years of age)	[1] 5.6	Violence	.54
Diphtheria	.06	Whooping cough	.03

[1] Per 1,000 live births.

YUGOSLAVIA

Communicable diseases—4 weeks ended December 5, 1937.—During the 4 weeks ended December 5, 1937, certain communicable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	28	6	Paratyphoid fever	24	2
Cerebrospinal meningitis	9	5	Poliomyelitis	3	---
Diphtheria and croup	1,265	76	Scarlet fever	383	2
Dysentery	68	5	Sepsis	7	5
Erysipelas	199	2	Tetanus	15	11
Leprosy	1	---	Typhoid fever	668	61
Lethargic encephalitis	2	---	Typhus fever	6	---
Measles	67	1			

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

NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for December 31, 1937, pages 1952-1965. Similar cumulative tables will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

China.—During the week ended January 1, 1938, 1 case of cholera was reported in Hong Kong and 3 cases of cholera were reported in Shanghai.

French Indochina.—During the week ended January 1, 1938, cholera was reported in French Indochina as follows: Annam Province, 5 cases; Tonkin Province, 15 cases.

Plague

Brazil.—During the month of November 1937, 5 cases of plague with 3 deaths were reported in Pernambuco, Brazil, making a total of 22 cases of plague with 9 deaths reported in Pernambuco since January 1, 1937, and a total of 34 cases of plague with 15 deaths in all of Brazil for the same period.

Egypt—Asyut Province—Deirout District.—During the week ended January 1, 1938, 1 case of plague was reported in Deirout District, Asyut Province, Egypt.

Hawaii Territory—Island of Hawaii—Hamakua District—Hamakua Mill Sector.—A rat found on December 30, 1937, in Hamakua Mill Sector, Hamakua District, Island of Hawaii, Hawaii Territory, has been proved positive for plague.

Island of Maui—Wailuku District—Puunene.—One death from plague at Puunene, Island of Maui, was reported on January 13, 1938. The death occurred on January 5, in a Filipino laborer, who lived in a sugar company camp 3 miles from the port of Kahului, where sanitary conditions are reported good and the rat population is said to be low. No information was available regarding localities visited prior to illness.

India—Bassein.—During the week ended January 1, 1938, 1 case of plague was reported in Bassein, India.

United States—California.—A report of plague infection in California appears on page 105 of this issue of PUBLIC HEALTH REPORTS.

Smallpox

Siam—Uttradhani Province.—During the week ended January 1, 1938, 35 cases of smallpox were reported in Uttradhani Province, Siam.

Typhus Fever

Netherlands—Rotterdam.—During the week ended December 18, 1937, 1 suspected case of typhus fever was reported in Rotterdam, Netherlands.

Yellow Fever

Colombia—Santander Department—Velez.—During the week ended December 25, 1937, 1 death from yellow fever was reported in Velez, Santander Department, Colombia.

Gold Coast.—During the period December 23–30, 1937, yellow fever was reported in Gold Coast as follows: Agormanya, 1 case; Ho, 2 cases; Keta, 1 case; Yeji, 1 suspected case.

Sudan (French).—During the week ended January 1, 1938, 1 case of yellow fever was reported in French Sudan, locality not specified.

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