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PREVALENCE OF SMALLPOX IN THE UNITED STATES

The reports indicate that smallpox is more prevalent in the United States than it was at this time last year or in 1926. For the week ended March 10, 1928, 42 States reported 1,161 cases of smallpox. For the corresponding week of 1927 these States reported 876 cases, and in 1926 they reported 864 cases for the week.

In 1925 the peak of the smallpox curve was reached about the middle of January; in 1926 the greatest number of cases was reported during the second week of February, and in 1927 the peak came after the middle of March. Some decrease in the incidence of smallpox is to be expected, but health officers should be constantly on the alert.

A FURTHER STUDY OF EXPERIMENTAL BLACKTONGUE WITH SPECIAL REFERENCE TO THE BLACKTONGUE PREVENTIVE IN YEAST

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CONTENTS

In a previous communication, Goldberger and Wheeler (1) presented some of the results of a study of the problem of an experimental animal for pellagra. They reported the production in the dog, by feeding pellagra-producing diets, of a condition considered by them to be identical with a spontaneously occurring canine disease known as blacktongue or Stuttgart dog epizootic. The similarity

of this experimental disease to human pellagra was pointed out, and was considered so striking as to be well-nigh conclusive of the identity of the two conditions. This view was supported, they believed, by the suggestion of a common etiology indicated by the successful production of the condition (blacktongue) in the dog by feeding with pellagra-producing diets. In the present paper we desire to report some further results of the same study.

METHODS

Our methods of housing, caring for, and feeding the experimental animals have been described in a preceding communication (1). It may be noted that the experimental ration was offered each animal once a day and, as a rule, freshly prepared. The amount offered was, in general, all that the dog would eat. At first, to insure this, the attempt was made to offer an excess; but in order to minimize waste this practice was, after a time, modified so that, except for a young growing animal, only enough food for the maintenance of normal body weight was offered. The animals were weighed once a week. It may be here recalled, too, that it has been our practice to use our dogs repeatedly. Depending on the purpose of the experiment, the animal was or was not reconditioned by a period of stock diet feeding between successive experiments, for which purpose our stock diet No. 156 (1) was the one most frequently used. In what follows, details of this nature will be noted in connection with the presentation of the pertinent parts of the history of each experimental animal. The diagnostic criteria of experimental blacktongue have been presented in a preceding article (1). Here we will say only that the earliest distinctive buccal lesions are a vivid red injection of the floor of the mouth or an erythema of the mucosa of the upper lip in the form of bilaterally symmetrical patches or both.

BLACKTONGUE-PRODUCING POTENCY OF A BASIC EXPERIMENTAL DIET AND OF CERTAIN OF ITS MODIFICATIONS

The composition of the diet with which Goldberger and Wheeler (1) first successfully induced experimental blacktongue is shown in Table 1. This diet was constructed as a somewhat simplified replica of the type of diet found associated with, and, unless suitably supplemented, believed to be responsible for, the occurrence of pellagra. After a number of modifications of the diet shown in Table 1 had been tested, the diet No. 123, shown in Table 2, was constructed and subsequently used as the basic blacktongue-producing diet in many of our experiments. It seems desirable, therefore, to summarize our experience with this (together with certain of its modifications) as a blacktongue-producing diet. This is done in experiments 1, 2, 3, and 4.

Basic Diet No. 123

EXPERIMENT 1

The blacktongue-producing potency of diet No. 123 (Table 2) has been tested in a considerable number of animals and under various conditions. We shall consider here only those tests, however, that were carried out either in animals after a period of reconditioning following a previous experiment and thus presumably in normal condition, or in such as were not previously subjected to experiment and were not known to have ever suffered from blacktongue. Such tests were performed in a total of 14 dogs, the significant details relating to each of which are as follows:

Dog 13.—Male. Acquired April 7, 1923, between which date and November 18, 1926, served in several experiments and suffered seven attacks of experimental blacktongue, the latest of which began July 31, 1925. Was on stock diet No. 156 for reconditioning from November 18 to December 8, 1926.

December 8, 1926: In good condition; weight, 10.1 kilograms; begins test diet No. 123.

On January 25, 1927, at the end of a period of 48 days, noted the first signs of blacktongue,[1] an injection of the floor of the mouth. Weight 9.4 kilograms. Confirmatory evidence of blacktongue noted on February 10, 1927. Course of the attack was remittent or relapsing in character, accompanied by self-imposed partial starvation. Killed with illuminating gas April 28, 1927.

Dog. 14.—Male. Acquired April 7, 1923. Between that date and September 25, 1923, served in two experiments and suffered a relapsing attack of blacktongue beginning May 18, 1923. On stock diet No. 34C, for reconditioning, from September 25 to October 16, 1923.

October 16, 1923: In good condition; weight, 9.3 kilograms; begins test diet No. 123.

On October 30, 1923, at the end of a period of 14 days noted the first signs of blacktongue, an injection of the floor of the mouth and a patch of redness on the mucosa of the upper lip opposite the base of the canine tooth on each side. Weight, 9.2 kilograms. Further history not relevant.

Dog 15.—Male. Acquired April 14, 1923. Between that date and September 25, 1923, served in two experiments and suffered a relapsing attack of blacktongue beginning August 7, 1923. On stock diet No. 34C, for reconditioning, from September 25 to October 16, 1923.

October 16, 1923: In good condition; weight, 9.4 kilograms; begins test diet No. 123.

On October 27, 1923, at the end of a period of 11 days, noted the first signs of blacktongue, an injection of the floor of the mouth and slight reddening of the mucosa of the upper lip. Weight, 9.3 kilograms. Further history not relevant.

Dog 50.—Male. Acquired September 25, 1923. On stock diet No. 34C to October 16, 1923.

October 16, 1923: In good condition; weight, 9 kilograms; begins test diet No. 123.

On October 27, 1923, at the end of a period of 11 days, noted the first signs of blacktongue, a definite reddening of the floor of the mouth. Weight, 8.8 kilograms. Further history not relevant.

[1] The experimental disease has been described in a preceding report (1).

Dog 51.—Bitch. Acquired September 25, 1923. On stock diet No. 34C to October 18, 1923.

October 18, 1923: In good condition; weight, 7.3 kilograms; begins test diet No. 123.

On October 30, 1923, at end of a period of 12 days, noted first signs of blacktongue, an injection of the floor of the mouth. Weight, 7.8 kilograms. Further history not relevant.

Dog 52.—Bitch. Acquired September 25, 1923. On a miscellaneous stock diet to October 22, 1923.

October 22, 1923: In good condition; weight, 8.5 kilograms; begins test diet No. 123.

On November 27, 1923, at the end of a period of 36 days, noted the first signs of blacktongue, an injection of the floor of the mouth. Weight, 8.5 kilograms. Further history not relevant.

Dog 53.—Bitch. Acquired September 25. 1923. On a miscellaneous stock diet to October 22, 1923.

October 22, 1923: In good condition; weight, 5.7 kilograms; begins test diet No. 123.

November 20, 1923: Weight, 5.8 kilograms.

On November 27, 1923, at the end of a period of 36 days, noted the first signs of blacktongue, an injection of the floor of the mouth and of the mucosa of the cheeks. Further history not relevant.

Dog 54.—Bitch. Acquired September 25, 1923. On a miscellaneous stock diet to October 22, 1923.

October 22, 1923: In good condition; weight, 6.2 kilograms; begins test diet No. 123.

On November 28, 1923, at end of a period of 37 days, noted the first signs of blacktongue, an injection of the floor of the mouth. Weight, 6.7 kilograms. Further history not relevant.

Dog 57.—Male. Acquired September 25, 1923. On stock diet No. 34C to October 16, 1923.

October 16, 1923: In good condition; weight, 7.7 kilograms; begins test diet No. 123.

On November 2, 1923, at the end of a period of 17 days, noted the first signs of blacktongue, an injection of the floor of the mouth. Weight, 8.8 kilograms. Further history not relevant.

Dog 58.—Bitch. Acquired September 27, 1923. On stock diet No. 34C to October 16, 1923.

October 16, 1923: In good condition; weight, 13. 5 kilograms; begins test diet No. 123.

On November 1, 1923, at the end of a period of 16 days, noted the first signs of blacktongue, an injection of the floor of the mouth. Weight, 14.3 kilograms. Further history not relevant.

Dog 79.—Bitch. Acquired June 9, 1924. On stock diet No. 156 to December 16, 1924, during which period was bred and whelped a litter of five pups which were successfully weaned.

December 16, 1924: In good condition; weight, 5.3 kilograms; begins test diet No. 123.

January 27, 1925: Weight, 5.5 kilograms.

On February 7, 1925, at the end of a period of 53 days, noted the first signs of blacktongue, a reddening of the floor of the mouth. Weight, 5.4 kilograms. Further history not relevant.

Dog 81.—Male. Acquired October 13, 1924. On stock diet No. 156 to November 21, 1924.

November 21, 1924: In good condition; begins test diet No. 123.
November 25, 1924: Weight, 9.4 kilograms.
On December 27, 1924, at the end of a period of 36 days, noted the first signs of blacktongue, a reddening of the floor of the mouth and of the mucosa of the cheeks. Weight, 10.4 kilograms. Further history not relevant.

Dog 82.—Bitch. Acquired October 13, 1924. On stock diet No. 156 to November 21, 1924.
November 21, 1924: In good condition; weight 10.7 kilograms; begins test diet No. 123.
On December 23, 1924, at the end of a period of 32 days, noted the first signs of blacktongue, reddened bands on mucosa of the upper lip on each side; reddening of mucosa of the cheeks, reddening of the floor of the mouth. Weight 11.5 kilograms.

Treated and used in a study of tomato juice from January 3, 1925, to November 18, 1926, during which period she had an attack of blacktongue beginning March 8, 1925.

On stock diet No. 156 for reconditioning from November 18, 1926, to December 8, 1926. On December 7, 1926, weighed 14.8 kilograms.
December 8, 1926: In good condition; begins a second period of test diet No. 123.
December 14, 1926: Weight, 13.9 kilograms.
January 18, 1927: Weight, 13.9 kilograms.
On January 22, 1927, at the end of a period of 45 days, noted the first signs of blacktongue, reddened patches on mucosa of the upper lip in region of canine teeth of each side; reddening of mucosa of the cheek, and reddening of the floor of the mouth. A rapidly progressive attack, untreated, terminating in death January 29–30, 1927.

Dog 109.—Bitch. Acquired October 29, 1926. On stock diet No. 156 to December 8, 1926.
December 8, 1926: In good condition; weight, 7.1 kilograms; begins diet No. 123.
December 28, 1926: Weight, 7.9 kilograms.
On December 30, 1926, at the end of a period of 22 days, noted the first signs of blacktongue, an injection of the floor of the mouth. The attack took a slowly progressive, remittent or relapsing course accompanied by self-imposed partial starvation; untreated, terminated in death April 20, 1927. Weight on day preceding death, 3.3 kilograms.

Thus all 14 of the test animals developed blacktongue, the first distinctive signs of which appeared within not to exceed 53 days after beginning the test diet. Allowed to take its course without therapeutic interference in two of the dogs, it ended in the death of both animals. One of the animals (dog 82) was subjected to the test during two widely separated periods and responded with blacktongue beginning at the end of 32 days in the first and at the end of 45 days in the second period.

Basic Diet No. 209

In diet No. 123 (Table 2) the principal component, quantitatively, is white corn meal, which forms 66 per cent of the weight of the dry ingredients of the ration. Since yellow corn has slightly different dietary properties from the white (richer in vitamin A (2)), it seemed desirable to determine what effect, if any, the substitution in diet

No. 123 of yellow corn meal for the white would have on the black-tongue-producing potency of that diet. Accordingly the following test was made:

EXPERIMENT 2

Six dogs, numbered 44, 52, 60, 63, 64, and 73, were each offered a suitable daily portion of diet No. 209, the composition of which is shown in Table 3. By comparison with Table 2 it may be seen that this differs from diet No. 123 only in that yellow corn meal is used instead of white. The significant facts in relation to each of the test animals are briefly as follows:

Dog 44.—Male. Whelped in the laboratory June 26, 1923. Up to July 17, 1925, served in a number of feeding experiments and suffered two attacks of blacktongue, the latest of which began December 27, 1924. On stock diet No. 156 for reconditioning from July 17, 1925, to August 11, 1925.

August 11, 1925: In good condition; weight, 12.9 kilograms; begins test diet No. 209.

On September 1, 1925, at the end of a period of 21 days, noted the first signs of blacktongue, a reddening of the mucosa of the upper lip and an injection of the floor of the mouth. Weight, 13.3 kilograms. Further history not relevant.

Dog 52.—Bitch. Acquired September 25, 1923. Between that date and July 17, 1925, served in several experiments and had four attacks of blacktongue, the latest of which began March 24, 1925. On stock diet No. 156 for reconditioning from July 17, 1925, to August 11, 1925.

August 11, 1926: In good condition; weight, 10.8 kilograms; begins test diet No. 209.

On October 6, 1926, at the end of a period of 56 days, noted the first signs of blacktongue, an injection of the floor of the mouth. Weight, 9.8 kilograms. Further history nor relevant.

Dog 60.—Male. Whelped in the laboratory November 4, 1923. Up to July 17, 1925, served in a feeding experiment and suffered an attack of blacktongue, which began July 14, 1925. On stock diet No. 156 for reconditioning from July 17, 1925, to August 11, 1925.

August 11, 1925: In good condition; weight, 7.2 kilograms; begins test diet No. 209.

On September 13, 1925, at the end of a period of 33 days, noted the first signs of blacktongue, an injection of the floor of the mouth and a flushing of the mucosa of the cheeks. Weight on September 15, 1925, 7.4 kilograms. Further history not relevant.

Dog 63.—Male. Whelped in the laboratory November 4, 1923. Up to July 17, 1925, served in two experiments and suffered two attacks of blacktongue, the later one of which began March 5, 1925. On stock diet No. 156 for reconditioning from July 17, 1925, to August 11, 1925.

August 11, 1925: In good condition; weight, 7.1 kilograms; begins test diet No. 209.

On August 29, 1925, at the end of a period of 18 days, noted the first signs of blacktongue, a reddening of the floor of the mouth. Weight, 7.5 kilograms Further history not relevant.

Dog 64.—Bitch. Whelped in the laboratory November 4, 1923. Up to July 17, 1925, had suffered one uncertain, but probable, attack of blacktongue

which was in evidence June 27, 1925. On stock diet No. 156 for reconditioning from July 17 to August 11, 1925.

August 11, 1925: In good condition; weight, 6.6 kilograms; begins test diet No. 209.

On September 12, 1925, at the end of a period of 32 days, noted first signs of blacktongue, a reddening of the faucial pillars, the pharynx, and the floor of mouth. Weight, 6.7 kilograms. Further history not relevant.

Dog 73.—Bitch. Acquired March 19, 1924. Up to July 17, 1925, suffered two uncertain, evanescent attacks of blacktongue, the second of which was in evidence July 12, 1925. On stock diet No. 156 for reconditioning from July 17 to August 11, 1925.

August 11, 1925: In good condition; weight, 10.7 kilograms; begins test diet No. 209.

On December 17, 1925, at the end of a period of 128 days, noted the first signs of blacktongue, a reddening of the mucosa of the upper lip and of that of the cheeks. Weight, 8.3 kilograms. Further history not relevant.

All six dogs developed blacktongue, the first distinctive signs of which appeared within not to exceed 56 days after beginning the test diet in five, and at the end of a period of 128 days in one of them.

It would appear, then, that the substitution of yellow for white corn meal made no significant difference in the blacktongue-producing potency of the test diet.

Basic Diet No. 195

In diet No. 123 and its modification, diet No. 209, sodium chloride and calcium carbonate are used to supplement the inorganic, "ash," constituents furnished by the other components of the ration. It was thought desirable to determine what effect, if any, on the blacktongue-producing potency of diet No. 123 would be produced by the substitution of a "complete" salt mixture for the sodium chloride and the calcium carbonate. For that purpose experiment 3 was carried out.

EXPERIMENT 3

Five dogs, numbered 9, 29, 83, 84, and 85, were each offered a suitable daily portion of diet No. 195, the composition of which is shown in Table 4. As may be seen by reference to Table 2, this differs from diet No. 123 only in that the well known "complete" salt mixture of Osborne and Mendel (3) replaces the sodium chloride and calcium carbonate of the latter diet. The significant facts in relation to each of the test animals were, in brief, as follows:

Dog 9.—Male. Acquired April 1, 1923, between which date and February 28, 1925, served in a number of experiments and suffered seven attacks of blacktongue, the latest of which began February 24, 1925. On stock diet No. 156 for reconditioning from February 28 to April 1, 1925.

April 1, 1925: In good condition; weight, 12.7 kilograms; begins test diet No. 195.

On May 31, 1925, at the end of a period of 60 days, noted the first signs of blacktongue, a reddening of the mucosa of the upper lip in the region of the canine teeth of each side, and an injection of the floor of the mouth. Weight, 11.4 kilograms. Further history not relevant.

Dog 29.—Male. Acquired May 9, 1923, between which date and February 28, 1925, served in a number of experiments and suffered nine attacks of blacktongue, the latest of which began February 6, 1925. On stock diet No. 156 for reconditioning from February 28, 1925, to April 1, 1925.

April 1, 1925: In good condition; weight, 11.7 kilograms; begins diet No. 195.

On April 17, 1925, at end of a period of 16 days, noted the first signs of blacktongue, a reddening of the mucosa of the upper lip and of the floor of the mouth. Weight, 11.1 kilograms. Further history not relevant.

Dog 83.—Bitch. Acquired February 20, 1925, from which date to April 1, 1925, was on stock diet No. 156.

April 1, 1925: In good condition; weight, 6.8 kilograms; begins test diet No. 195.

On April 18, 1925, at the end of a period of 17 days, noted the first signs of blacktongue, a reddening of the floor of the mouth. Weight, 7.3 kilograms. Further history nor relevant.

Dog 84.—Male. Acquired March 2, 1925, from which date to April 1, 1925, was on stock diet No. 156.

April 1, 1925: In good condition; weight, 7.8 kilograms; begins test diet No. 195.

On April 23, at the end of a period of 22 days, noted the first signs of blacktongue, reddened patches on mucosa of the upper lip opposite the canine teeth of each side. Weight, 9.1 kilograms. Further history not relevant.

Dog 85.—Male. Acquired March 2, 1925, from which date to April 1, 1925, was on stock diet No. 156.

April 1, 1925: In good condition; weight, 6.9 kilograms; begins test diet No. 195.

On April 16, 1925, at the end of a period of 15 days, noted the first signs of blacktongue, reddening of mucosa of the upper lip, of that of the cheeks, and of the floor of the mouth. Weight, 6.8 kilograms. Further history not relevant.

All five test animals developed blacktongue, the first distinctive signs of which appeared within not to exceed 60 days after beginning the test diet.

The substitution of the "complete" salt mixture for the sodium chloride and calcium carbonate of diet No. 123 made, thus, no significant difference in its blacktongue-producing potency.

Basic Diet No. 268

Although diet No. 123 (and its modifications, No. 209 and No. 195) contains a considerable amount of protein, fully one-half of which is from casein, it was thought, nevertheless, that the biological quality of the protein mixture might, perhaps, be improved by increasing the casein component, a view that was strengthened by the results of some growth tests in rats (unpublished). It seemed desirable, therefore, to determine what effect, if any, an increase in the casein component of diet No. 123, and thus, presumably, an improvement in the biological quality of its protein, would have on its blacktongue-producing potency. Experiment 4 was accordingly carried out.

EXPERIMENT 4

Eight dogs, numbered 62, 69, and 101 to 106, inclusive, were each offered a suitable daily portion of diet No. 268, the composition of which is shown in Table 5. As may be seen, this diet differs from No. 123 (Table 2) in containing 50 per cent more casein; it differs from No. 123 also in that it contains a "complete" salt mixture in the place of sodium chloride and calcium carbonate. This experiment may be considered, therefore, as a test of the effect not only of a substantial increase in protein, but also of the use, at the same time, of a complete salt mixture on the blacktongue-producing potency of that diet.

In this connection, it may be stated that this experiment was planned to serve one other purpose—namely, to secure tissues suitable for histopathological study. Believing that diet No. 268 was more nearly complete—at least for maintenance—than No. 123 or its other modifications with respect to all known dietary essentials except the specific factor or factors related to blacktongue,[2] it was thought that animals fed with it when killed at suitable intervals would furnish tissues which might show a sequence of histopathological changes which would thus be relatable to the specific dietary defect.

The significant facts in relation to each of the test animals, except as concerns the histopathology, which will form the subject of a separate report by Dr. James Denton, are briefly as follows:

Dog 62.—Male. Whelped in the laboratory November 4, 1923. Up to May 26, 1926, had one evanescent attack of blacktongue which was in evidence March 24–27, 1925. On stock diet No. 156 May 26 to June 12, 1926.

June 12, 1926: In good condition; weight, 8.8 kilograms; begins test diet No. 268.

On June 26, 1926, at the end of a period of 14 days, killed with illuminating gas for histopathological study. He presented no signs of blacktongue. Weight, 8.6 kilograms.

Dog 69.—Male. Whelped in the laboratory November 25, 1923. Up to May 26, 1926, served in two experiments, but showed no evidence of blacktongue. On stock diet No. 156 from May 26 to June 12, 1926.

June 12, 1926: In good condition; weight, 8.8 kilograms; begins test diet No. 268.

July 27, 1926: Weight, 8.7 kilograms.

July 28, 1926, at the end of a period of 46 days, noted first signs of blacktongue, a slight injection of the floor of the mouth which became more definite on August 6, and on the following day (August 7) there was noted in addition a slight reddening of the mucosa of the cheeks and of the upper lip in the region of the canines.

Animal killed with illuminating gas for histopathological study on August 7, 1926.

Dog 101.—Male. Whelped in the laboratory December 9, 1925, and reared on stock diet No. 156.

[2] The dog does not seem to require the antiscorbutic. It is probable that workers who have reported scorbutic signs in dogs were dealing with some other condition, at times, at least, with blacktongue.

June 12, 1926: In good condition; weight, 7.7 kilograms; begins test diet No. 268.
On July 10, 1926, at the end of a period of 28 days, noted first signs of blacktongue, an injection of the floor of the mouth. Weight, 7.9 kilograms. Attack slowly progressed. Animal killed with illuminating gas for histopathological study on August 7, 1926.

Dog 102.—Male. Whelped in the laboratory December 9, 1925. Reared on stock diet No. 156.
June 12, 1926: In good condition; begins test diet No. 268.
June 15: Weight, 6.10 kilograms.
July 6, 1926: Weight, 6.7 kilograms.
On July 10, 1926, at the end of a period of 28 days, noted first signs of blacktongue, an injection of the floor of the mouth. Attack progressed rapidly. Animal killed with illuminating gas for histopathological study on July 20, 1926.

Dog 103.—Male. Whelped in the laboratory December 9, 1925. Reared on stock diet No. 156.
June 12, 1926: In good condition; begins test diet No. 268,
June 15: Weight, 6.7 kilograms.
July 6, 1926: Weight, 6.4 kilograms.
On July 10, 1926, at the end of a period of 28 days, noted first signs of blacktongue, an injection of the floor of the mouth. Attack was progressive with remissions. Animal killed for histopathological study August 7, 1926.

Dog 104.—Bitch. Whelped in the laboratory December 9, 1925. Reared on stock diet No. 156.
June 12, 1926: In good condition; begins test diet No. 268.
June 15: Weight, 5.7 kilograms.
On July 6, 1926, at the end of a period of 24 days, noted first signs of blacktongue, a reddening of the floor of the mouth, of the faucial pillars, and of the mucosa of the upper lip. Weight, 5.6 kilograms. Animal killed for histopathological study July 10, 1926.

Dog. 105.—Bitch. Whelped in the laboratory December 9, 1925. Reared on stock diet No. 156.
June 12, 1926: In good condition; begins test diet No. 268.
June 15: Weight, 4.9 kilograms.
On July 15, 1926, at the end of a period of 33 days, noted first signs of blacktongue, an injection of the floor of the mouth. Weight, 5.2 kilograms. Attack mild, relapsing. Animal killed August 7, 1926, for histopathological study.

Dog 106.—Bitch. Whelped in the laboratory December 9, 1925. Reared on stock diet No. 156.
June 12, 1926: In good condition; begins test diet No. 268.
June 15: Weight, 4.3 kilograms.
On June 26, 1926, at the end of a period of 14 days, killed for histopathological study. Had presented no signs of blacktongue. Weight, 4.5 kilograms.

Of the eight test animals, two were killed at the end of a test period of 14 days for the purpose of histopathological study. Neither animal had shown any evidence of blacktongue. The period of observation was so brief that these two animals can not properly be considered in appraising the blacktongue-producing potency of the diet. The remaining six animals all developed blacktongue, the first distinctive signs of which appeared within a period of not to exceed 46 days.

It would appear, then, that the modification of diet No. 123 represented by a substantial increase in the protein combined with the

use of "complete" salt mixture was without significant effect on the blacktongue-producing potency of that diet as judged by the attack rate and duration of the feeding period before the appearance of the first distinctive signs of the disease.

In the foregoing series of tests of the pellagra-producing potency of diet No. 123 and its modifications, a total of 33 dogs were used as test animals, and blacktongue was induced in all but two of them. The two that escaped were the two that were killed at the end of a feeding period of 14 days for the purpose of histopathological study. Disregarding these as not having had a full opportunity for the development of the disease, blacktongue was induced in every one of the other 31 test animals. In each of two of these the disease was induced on two separate occasions, so that 33 separate attacks of blacktongue were induced in the 31 animals under consideration in this series of experiments. These 33 attacks developed at the end of feeding periods that varied between 11 and 128 days in duration, but only one of the attacks developed at the end of a period of over 61 days.[3]

THE BLACKTONGUE PREVENTIVE

Dried Brewers' Yeast

It may be recalled that Goldberger and Wheeler's first success in experimentally inducing blacktongue was with a diet that differed from that previously tried without success by Goldberger and Lake in that it included no milk and was not supplemented with yeast (1). The difference in outcome led us to suspect that this might be related to the difference in the diets used. There was already reason to believe that milk possessed pellagra-preventive properties (4) (5) and thus, possibly, also blacktongue-preventive properties; but, as the amount of milk contained in the diet tested by Goldberger and Lake was very small, it seemed improbable that their failure was attributable, at least to an important degree, to the milk. Up to this time we had had no suspicion that yeast might possess pellagra-preventive properties; but in seeking for the explanation of the difference in results under consideration it seemed much more likely that, if Goldberger and Lake's failure was due to the preventive action of either food, this failure was due to the action of the yeast rather than to that of the milk. Reasoning thus, it was decided to test this view; and after some preliminary trials which it seems superfluous to detail, the following experiments were performed:

EXPERIMENT 5

In this test of the blacktongue-preventive action of yeast a commercial dried brewery yeast [4] was used. It was incorporated in

[3] In harmony with this is the additional experience with this basic diet which appears incidentally in connection with some of the experiments with yeast presented in the following section.

[4] Secured from the Harris Laboratories, Tuckahoe, N. Y.

diet No. 155, the composition of which is shown in Table 6, or was fed separately in gelatine capsules as a supplement to basic diet No. 123. Comparing diet No. 155 (Table 6) with diet No. 123 (Table 2) it will be seen that, so far as it is possible to judge, yeast-containing test diet No. 155 differs from basic blacktongue-producing diet No. 123 significantly only in that 5 per cent of the weight of the solids of the former consists of dried yeast.

Five animals, dogs 15, 30, 35, 46, and 50, were used in this experiment. The essential facts pertaining to each of the test animals are presented in the following:

Dog 15.—Male. Acquired April 14, 1923. By reference to experiment 1 it will be seen that this dog developed an attack of blacktongue on diet No. 123, the first signs of which were noted on October 27, 1923. On October 30 treatment was begun by supplementing diet No. 123 with 5.4 grams (approximately 1 per cent of the dry ingredients of diet No. 123) of the dry brewery yeast. Notwithstanding this, however, a relapse of the signs of blacktongue appeared November 24, 1923. Accordingly, on November 26 the amount of yeast theretofore included in diet No. 123 was doubled. On December 27, 1923, a small further increase in the yeast was made, and on March 11, 1924, a still further increase was made which, after slight compensatory adjustment, made diet No. 155.

The evidence of the relapse noted on November 24, 1923, faded in a few days and thereafter to November 21, 1924, the dog continued in good condition without presenting recognizable evidence of blacktongue.

On November 21, 1924, yeast-containing test diet No. 155 was discontinued and basic test diet No. 123 begun.

On December 25, 1924, or 34 days after discontinuing the yeast-containing diet, there were noted the first signs of blacktongue, a reddening of the floor of the mouth. The attack, relapsing and mild, at first slowly progressed and by February 27, 1925, was fully developed and grave. The dog now had a temperature of 40.2° C. On the latter date treatment was begun with a daily dose of 20 grams of yeast in gelatine capsules administered apart from basic diet No. 123, which continued to be offered. The animal began to refuse all food on February 21 and, aside from the yeast supplement in capsules, ate nothing until March 3. Took a little food on the latter date, after which he ate well and the signs of the attack rapidly cleared up. By March 7 virtually all evidence of the attack had disappeared and by the end of the month the dog had recovered his normal weight, 9.8 kilograms.

On March 5, 1925, the daily dose of yeast was reduced to 10 grams. This dose (approximately 1 gram per kilogram of normal body weight) was calculated as about equal to the amount that would be ingested if the yeast-containing test diet No. 155 were offered in the place of basic diet No. 123 which the animal was receiving. Thus supplemented, diet No. 123 was continued to June 19, 1925 (a period of 106 days), without the return of any signs of blacktongue.

Thus dog 15 first recovered from an attack of blacktongue on a yeast-supplemented diet, then, during a period of 255 days while on yeast-containing test diet No. 155, remained in good condition and without any signs of blacktongue. The withdrawal of the yeast-containing diet was followed, at the end of 34 days, by the appearance of the beginning signs of blacktongue which progressed to a grave

attack. Treated with yeast this attack rapidly cleared up and the animal's condition returned to normal and remained so during a further period of 104 days, at the end of which time the experiment was discontinued.

Dog 30.—Male. Acquired August 1, 1923, between which date and October 29, 1923, served in two experiments and suffered two mild attacks of blacktongue. Between October 29, 1923, and March 11, 1924, was subjected to some preliminary tests of yeast.

March 11, 1924: In good condition; weighs 11.4 kilograms; begins test diet No. 155.

February 24, 1925: In good condition; weighs 10.5 kilograms.

On February 28, 1925, diet No. 155 was replaced by diet No. 123, supplemented with a daily dose of 18 grams of yeast separately administered in gelatine capsules. The dose of yeast thus administered was approximately the same as that ingested in the daily ration of diet No. 155, so that diet No. 123 so supplemented was essentially equivalent to diet No. 155.

May 19, 1925: This animal has now for upward of 14 months been on the yeast-containing test diet No. 155 or its equivalent basic diet No. 123 supplemented with yeast. The dog has shown no recognizable evidence of blacktongue at any time during this period. He has been and is in good condition; weighs 10.7 kilograms.

Effective to-day the yeast supplement to basic diet No. 123 is discontinued.

On July 2, 1925, or 44 days after discontinuing the yeast, there were noted the first signs of an attack of blacktongue, erythematous patches on the mucosa of the upper lip in the region of the canine teeth. The further history of this animal belongs to another experiment.

Dog 35.—Bitch. Acquired August 6, 1923, between which date and March 11, 1924, served in a number of experiments including a preliminary test of yeast and suffered three attacks of blacktongue, the latest of which began December 22, 1923.

March 11, 1924: In good condition; weighs 5.8 kilograms. Begins test diet No. 155.

On March 16, 1924, the animal was found to have developed an ulcerative, infective stomatitis. Very little or none of the ration was eaten between March 14 and March 26. Beginning March 20 and thereafter daily until March 26 the dog was given a dose of 12 grams of yeast in gelatine capsules. Beginning March 26 the food consumption began to improve, and by March 30 the ulcerative stomatitis had cleared up.

April 1, 1924: Eating moderately well; mouth is normal in appearance; weighs 5.3 kilograms.

November 21, 1924: In good condition; weighs 6.9 kilograms. Has presented no recognizable evidence of blacktongue during the period of 255 days since beginning yeast-containing diet No. 155.

Effective to-day diet No. 155 is discontinued and basic diet No. 123 is begun.

On December 20, 1924, at the end of a period of 29 days on the basic diet without any yeast, there were noted the first signs of an attack of blacktongue, a reddening of the mucosa of the floor of the mouth and of that of the anterior faucial pillars.

Mild and relapsing at first, the attack slowly progressed and gained in severity. The temperature of the dog was found to have risen somewhat above normal (39.6° C.) on February 20; it reached 40° the next day, and 40.5° on February 22. At this time treatment consisting of the daily administration of 15 grams of yeast,

was begun and was continued to February 25—four days—but without perceptible effect. The dog died of blacktongue February 26, 1925.

Dog 46.—Male. Acquired August 17, 1923, between which date and March 11, 1924, served in a number of experiments including a preliminary test of yeast, and suffered three attacks of blacktongue, the latest of which began February 19, 1924.

March 11, 1924: The signs of the attack of blacktongue which began February 19, 1924, have subsided without treatment. Weighs 5 kilograms. Begins test diet No. 155.

February 28, 1925: In good condition. Has presented no recognizable evidence of blacktongue during the period of 354 days since beginning yeast-containing diet No. 155.

Effective to-day diet No. 155 is discontinued and basic diet No. 123 is begun.

On March 26, 1925, at the end of a period of 26 days, there were noted the first signs of an attack of blacktongue, an erythematous patch on the mucosa of the upper lip on each side in the region of the canine teeth and a reddening of the mucosa of the floor of the mouth.

At first mild and intermittent in its course the attack became progressively more severe and led to the death of the animal on April 28, 1925. Treatment was not attempted.

Dog 50.—Male. Acquired September 25, 1923. Developed an attack of blacktongue which began October 27, 1923, in a test of basic diet No. 123. (See experiment 1.) As a part of a preliminary study, treatment of the attack with yeast was undertaken. It was begun October 29, 1923, and continued with doses increased at intervals up to March 11, 1924. During this period the attack remained mild and relapsing; the latest of the relapses appeared on February 19, 1924, and had subsided by February 25, 1924.

March 11, 1924: Presents no evidence of blacktongue; weighs 10.8 kilograms. Begins yeast-containing test diet No. 155.

February 24, 1925: In good condition; weighs 12.3 kilograms.

February 28, 1925: Diet No. 155 is replaced by basic diet No. 123 supplemented with a daily dose of 14 grams of yeast separately administered in gelatin capsules. This dose of yeast is approximately equal to the amount ingested by this animal in the daily ration of diet No. 155.

May 19, 1925: This animal has now for upward of 14 months been on yeast-containing diet No. 155 or its equivalent, basic diet No. 123 supplemented with yeast. No recognizable evidence of blacktongue has been presented by this dog at any time during this period. Is in good condition; weighs 12 kilograms. Effective to-day the yeast is withdrawn, leaving basic diet No. 123 without supplement.

On June 14, 1925, at the end of a period of 26 days without yeast, there were noted the first signs of an attack of blacktongue, a reddened patch of mucosa on the upper lip in the region of the canine teeth and a reddening of the mucosa of the floor of the mouth. The further history of this dog belongs to another experiment.

It appears, then, that so long as the test animals were fed yeast-containing test diet No. 155, or its equivalent yeast-supplemented diet No. 123 (which was done for 255 days in two, 354 days in one, and 434 days in two), none developed recognizable evidence of blacktongue; but the discontinuance of the yeast was followed within from 26 to 44 days by the appearance of blacktongue in all five of these test animals. Since, as has been shown in the first section of this

communication, the feeding of the foregoing test diet without the yeast (namely, diet No. 123) may be expected to lead to an attack of blacktongue in 100 per cent of cases within a period only very exceptionally longer than about 60 days, it would seem clearly indicated that the yeast had exercised a definite blacktongue-preventive action.

In the course of our preliminary study of the blacktongue-preventive action of yeast we gained the impression that appreciably less of the yeast than that included in test diet No. 155 might be sufficient as a preventive of blacktongue. This impression was subsequently tested, with the result shown in experiment 6.

EXPERIMENT 6

Five dogs, numbered 42, 62, 68, 69, and 76, in good physical condition, were each offered a suitable daily portion of diet No. 123AA, the composition of which is shown in Table 7. By reference to Table 2 it will be seen that diet No. 123AA is basic diet No. 123 to which 11 grams of dried yeast have been added, and that it differs from diet No. 155 (Table 6) essentially only in that it includes somewhat less than one-half the quantity of yeast contained in the latter diet. The significant facts of the experiment relating to each of the test animals are as follows:

Dog 42.—Male. Acquired June 26, 1923. Up to April 11, 1924, served in a number of experiments and suffered three attacks of blacktongue, the latest of which began April 2, 1924. On stock diet No. 156 for reconditioning from April 11 to June 24, 1924.

June 24, 1924: In good condition; weighs 11.9 kilograms. Begins test diet No. 123AA.

May 26, 1925: In good condition; weighs 11.7 kilograms. During the period of 336 days since beginning the test diet has presented no recognizable evidence of blacktongue. The experiment is discontinued.

Dog 62.—Male. Whelped in the laboratory November 4, 1923, and reared and maintained on stock diets until June 24, 1924.

June 24, 1924: In good condition; weighs 7.9 kilograms. Begins test diet No. 123AA.

On March 24, 1925, a streaky redness of the mucosa of the floor of the mouth was noted which faded out in the course of the next two or three days. Other than this the animal presented no evidence of blacktongue at any time during the period of the experiment, which terminated May 26, 1925.

Dog 68.—Bitch. Whelped in the laboratory November 25, 1923. Reared and maintained on stock diets until June 24, 1924.

June 24, 1924: In good condition; weighs 8.2 kilograms. Begins test diet No. 123AA.

On September 27, 1924, a small erythematous patch was noted at about the center of the mucosa of the upper lip of each side. This faded within 48 hours. Other than this the animal presented no evidence suggestive of blacktongue at any time during the period of the experiment, which was discontinued May 26, 1925, at the end of 336 days.

Dog 69.—Male. Whelped in the laboratory November 5, 1923. Reared and maintained on stock diets until June 24, 1924.

June 24, 1924: In good condition; weighs 7.7 kilograms. Begins test diet No. 123AA.

On May 26, 1925, at the end of a period of 336 days, the experiment was discontinued. The dog was in good condition and weighed 8.3 kilograms. At no time during the duration of the experiment did he present any evidence of blacktongue.

Dog 76.—Male. Acquired June 9, 1924. Maintained on stock diet until June 24, 1924.

June 24, 1924: In good condition; weighs 8.5 kilograms. Begins test diet No. 123AA.

On May 26, 1925, at the end of a period of 336 days, when the experiment was discontinued, the dog was in good condition; weighed 9.2 kilograms. At no time during the duration of the experiment had this dog presented any recognizable evidence of blacktongue.

Thus of the five dogs fed yeast-containing diet No. 123AA during a period of 336 days—approximately 11 months—two (dogs 62 and 68) presented evanescent signs that may have been and probably were indicative of blacktongue. Since, as has been already shown, the feeding of this test diet without the yeast (that is, diet No. 123) may be expected to induce an attack of blacktongue in 100 per cent of dogs within a period very exceptionally longer than about 60 days, this result would seem to indicate that the small amount of yeast in diet 123AA (11 grams in a 2,400-calorie ration) had exercised a definite, well nigh complete, blacktongue-preventive action.

Yeast Extract Powder

The indication of the blacktongue-preventive action of yeast afforded by the foregoing experience naturally led us to inquire as to what it was in yeast that gave it this property. We began this inquiry with a test of the preventive action of a commercial preparation of what at the outset we were led to believe was the Osborne and Wakeman protein-free yeast fraction II (6), but what later we found to be simply a dried water (acidulated) extract of yeast. The results of this test are presented in experiment 7.

EXPERIMENT 7

The test of the preventive action of what, as has just been stated, proved to be a dried water extract of yeast [5] was carried out in three dogs, numbered 17, 38, and 40, by supplementing basic diet No.123 (Table 2) with a daily dose of the dried extract, as a rule separately administered in gelatin capsules, at the rate of approximately 1 gram per kilogram of body weight. The dosage used was an arbitrary one and, we judge, probably considerably in excess of minimal require-

[5] Marketed under the name "Yeast Vitamine-Harris Powder." One sample analyzed in the division of chemistry of the Hygienic Laboratory was found to contain 7.59, and another 7.14 per cent nitrogen.

ments. The significant details relating to the test in each of the animals are as follows:

Dog 17.—Bitch. Acquired April 14, 1923. Up to July 15, 1924, served in a number of experiments and suffered three attacks of blacktongue, the latest of which began June 14, 1924.

July 15, 1924: The attack of blacktongue, the first signs of which appeared June 14, has progressed and is now well marked and at a stage of moderate severity. There are present the distinctive reddening of the mucosa of the upper lip, of the cheeks, and floor of the mouth, with increase in buccal secretion and a rise in temperature to 39.8° C. Weight is 9.3 kilograms, which is fully 2 kilograms below the normal for this animal. Has eaten nothing in past 48 hours.

This attack, it may be noted, began a few days after beginning basic diet No. 123, but the onset of the attack is related to the immediately preceding experimental diet whose composition is not of interest here. Treatment with 10 grams of the yeast-extract powder is begun this day, supplementing basic diet No. 123.

July 16, 1924: Mouth is necrotic with a foul odor; drooling freely. Given a dose of 5 grams of the extract in solution by drench at 9 a. m. and 6 grams in capsules at 4 p. m.

July 20, 1924: Mouth lesions are improving. Has been receiving 10 grams of yeast-extract powder in capsules daily since July 16. Has taken a small amount of food (diet No. 123) during the past 24 hours.

July 22, 1924: Mouth lesions have practically healed. Has continued the daily dose of 10 grams of the extract. Food consumption has markedly increased during the past 48 hours. Weighs 8.8 kilograms.

July 15, 1925: This animal has now been receiving the yeast-extract powder, 10 grams daily, as a supplement to basic diet No. 123 for one year. When this supplement was begun the animal was suffering an attack of blacktongue of moderate severity. All evidence of this cleared up and no further signs suggestive of the disease have reappeared to date. The animal has thrived on diet No. 123 thus supplemented, and now weighs 13.7 kilograms.

Dog 38.—Male. Whelped in the laboratory June 26, 1923. Up to August 7, 1924, served in a number of experiments and suffered three attacks of blacktongue, a relapse of the latest of which began July 19, 1924.

August 7, 1924: The attack of blacktongue, a relapse of which began July 19, is now at a stage of considerable severity. The stomatitis is marked with salivation and foul buccal odor. The conjunctivæ are injected and there is a mucopurulent ocular discharge with photophobia. Has eaten nothing in two days and the temperature is 40°. The diet on which this attack developed is this day replaced by basic diet No.123 and treatment with a daily dose of 10 grams of dried yeast extract is begun.

August 10: The stomatitis seems better. Buccal odor continues foul, but salivation has diminished. Not eating. A dose of 10 grams of the dried yeast extract has been administered daily.

August 12: The mouth lesions have cleared up, especially those on the lip, the mucosa of which is now well-nigh normal. The eye condition appears to be of the nature of a keratitis and is not much changed. Took some food (diet No. 123) yesterday.

August 19, 1924: Buccal and ocular manifestations have now all cleared up. Eating well. Weighs 9 kilograms. Basic diet No. 123 supplemented with a daily dose of 10 grams of the powdered yeast extract is continued.

August 11, 1925: Has now been on diet No. 123 supplemented with a daily dose of 10 grams of the powdered yeast extract for a year. The animal is in good condition; weighs 11.4 kilograms. Since recovery from the attack at the height of which, on August 7, 1924, treatment was begun, there has been no return of recognizable evidence of blacktongue.

Dog 40.—Male. Whelped in the laboratory June 26, 1923. Up to May 19, 1924, served in a number of experiments and suffered three attacks of blacktongue, of which the latest began April 23, 1924.

May 19, 1924: The attack which began April 23 has now attained a stage of marked severity. The mouth is inflamed; there is an increase in buccal secretion and a foul odor. The temperature at 11 a. m. was 40.1°; at 4 p. m. it was 39.6°.

Treatment with the powdered yeast extract is begun. A solution of 15 grams in tap water is given by drench. The diet on which the attack developed is continued; food consumption is much reduced.

May 20: Condition is not notably changed. Temperature at 10 a. m. is 39.6°; at 3:45 p. m., 40.1°. Weighs 10 kilograms. A solution of 15 grams of the dried extract is given by drench.

May 22: The mouth lesions are better. Has eaten all of the food offered during the past 20 hours. Temperature at 10.10 a. m. 38.7°; at 4 p. m. 38.5°. Receiving 15 grams of the yeast extract in solution daily.

May 29: Mouth is virtually normal. Eating well. Continues the daily dose of the yeast extract which is now stirred into a portion of the food.

July 15, 1924: In good condition. Weighs 11.7 kilograms. Effective this day the diet on which the attack of blacktongue developed is replaced by No. 123, and the dose of the supplement of the powdered yeast extracts is made 12 grams and will henceforth be administered in capsules.

May 26, 1925: This animal is in good condition. Weighs 11.3 kilograms. It has been receiving a daily supplement of the yeast extract for upward of a year. Since recovery from the attack of blacktongue, at the height of which on May 19, 1924, treatment with the yeast extract was begun, there has been no return of recognizable indications of that condition to the present date.

Thus beginning in each of the three dogs with an animal which was severely attacked with blacktongue, the administration of the yeast extract powder was followed by prompt recovery and maintenance in good condition during an experimental period of approximately one year. Considered with the blacktongue-producing potency of basic diet No. 123 in mind, this result would seem clearly to indicate that the dried yeast extract served as an efficient preventive, and thus must have contained much if not all of the blacktongue-preventive factor of the yeast from which it was prepared.

Seidell's Activated Solid

Continuing our inquiry as to what it was in yeast that gave it its blacktongue-preventive action, we turned to the preparation known as Seidell's activated solid. This is a preparation of so-called vitamin B first devised by Seidell in 1916 (7). The method of preparation then proposed was improved by its author in 1922 (8) and, briefly, consists in the adsorption of the vitamins from an acidulated

aqueous extract of fresh brewery yeast by English fuller's earth. We are indebted to Doctor Seidell for a considerable batch of his preparation which we used in the beginning of the following experiment. Most of this study however, was carried out with activated solid prepared by a slight modification of Doctor Seidell's procedure (9). The modification consists essentially in the use of *dried* in the place of *fresh* brewery yeast in making the extract from which the vitamins are adsorbed. The nitrogen content of the activated solid prepared by us was about 2 per cent.

EXPERIMENT 8

The test of Seidell's activated solid was carried out in four dogs, numbered 5, 41, 89, 90. The activated solid was given as a supplement to basic diet No. 123 (Table 2) in a daily preventive dose at the rate of approximately 2 grams per kilogram of normal body weight.

Unless otherwise specified, the preparation was given in gelatine capsules (veterinary No. 13) and, for preventive purposes, only once a day. In the few instances in which the study was begun with the treatment of a sick animal, the preparation was at times administered by drench in watery suspension and in broken doses. The significant details relating to each test animal are as follows:

Dog 5.—Bitch. Acquired November 8, 1921. Up to February 18, 1925, served in a number of experiments and suffered four attacks of blacktongue, the latest beginning December 23, 1924. On stock diet No. 156 for reconditioning from January 18 to February 18, 1925.

February 18, 1925: In good condition; weighs 8.7 kilograms. Begins basic diet No. 123 with a supplement of 17 grams of Seidell's activated solid daily.

February 16, 1926: Weighs 8.1 kilograms.

February 18: Has completed one year on diet No. 123 supplemented with Seidell's activated solid. Has presented no recognizable evidence of blacktongue. Is in good condition. Effective to-day the supplement of activated solid is discontinued.

March 9, 1926: Presents this morning, 19 days after the withdrawal of the supplement of activated solid, the first signs of blacktongue, a reddened patch on the mucosa of the upper lip in the region of the canines on each side and an injection of the floor of the mouth. Weighs 7.9 kilograms.

March 29, 1926: The attack of blacktongue, the first signs of which were noted March 9, was allowed to develop without therapeutic interference and ended in death some time last night.

Dog 41.—Bitch. Whelped in the laboratory June 26, 1923. Up to September 8, 1924, had served in a number of experiments and had suffered at least two attacks of blacktongue, the latest of which began August 20, 1924.

September 8, 1924: The attack of blacktongue, the first signs of which appeared on August 20, is now fully developed and of considerable severity. The stomatitis is marked. There is increased buccal secretion and there are bloody liquid stools. The temperature at 10 a. m. was 39.8°; at 2.30 p. m., 39.9°. Has eaten little or nothing during the past six days. Was given by drench, in divided doses, in the course of the day, in all 22 grams of Seidell's activated solid in watery suspension.

September 9: Condition of mouth is not notably changed. Buccal odor is fetid. Bloody evacuations continue. Temperature at 10.30 a. m., 39.7°; at 2.45 p. m., 39.8°. Weighs 7.9 kilograms. The experimental diet on which the attack developed is this day replaced by blacktongue-producing diet No. 123. Not eating. Given by drench, in divided doses, 22 grams of activated solid in watery suspension.

September 13: Very definite improvement in the buccal lesions is now appreciable. Salivation is less marked. Small, bloody, diarrheal stools continue. Temperature at 9.30 a. m., 38.5°. Given 22 grams of activated solid. Not eating.

September 16: Buccal lesions far advanced in healing. Began taking food three days ago and is now eating well. Weighs 7.4 kilograms. Has been getting 22 grams of activated solid daily.

September 19, 1924: Mouth lesions virtually completely healed. Bowel movements formed. Taking 22 grams of Seidell's activated solid daily now stirred into a portion of the ration. Eating well.

September 23, 1924: Eating well. Weighs 8 kilograms.

October 21, 1924: Administration of the activated solid in gelatin capsules begins this day.

January 21, 1925: Has continued in good condition. Eating well. Two days ago, that is on January 19, weighed 10.9 kilograms. Since recovery from the attack of blacktongue, at the height of which treatment was begun, this animal has to date presented no signs of blacktongue. Effective to-day the supply of the batch of activated solid that has been in use (supplied by Doctor Seidell) having become exhausted, a new batch comes into use and the daily dose is reduced to 11 grams, or about 1 gram per kilogram of body weight.

March 3: Weighs 10.8 kilograms.

March 4: Presents this morning, 52 days after the reduction in the daily dose of activated solid, the first signs of an attack of blacktongue, a streaky reddening of the floor of the mouth.

March 10: Weighs 10 kilograms. Food consumption greatly reduced during the past week.

March 11: The signs of blacktongue are now clearly marked but are still mild. As this development suggests that the reduced dose of activated solid is inadequate it is this day doubled, thus again making it 22 grams, which will continue to be administered in gelatin capsules as a supplement to diet No. 123.

March 16, 1925: Erythematous lesions of the mouth have faded completely; mouth is virtually normal in appearance.

March 11, 1926: During the year which has passed since the clearing up of the signs of blacktongue, which were first noted March 4, 1925, the animal has continued in good condition without any further recognizable evidence of the disease. Two days ago weighed 10.8 kilograms. Further history not relevant.

Dog 89.—Bitch. Whelped in the laboratory October 12, 1924. Reared and maintained on stock diet No. 156 to May 26, 1925.

May 26, 1925: In good condition. Weighs 4.3 kilograms. Begins basic diet No. 123 with a daily supplement of 9 grams of Seidell's activated solid in capsules.

October 30: In good conditon. Weighs 4.7 kilograms. The daily dose of activated solid is this day increased to 10 grams to correspond to the increased weight of the dog.

November 11, 1925: Continues in good condition. Weighs 4.6 kilograms. The daily dose of activated solid is reduced to 9 grams.

March 11, 1926: In good condition. Weighs 4.6 kilograms. The test of Seidell's activated solid is this day discontinued. At no time during the experimental period of nine and one-half months has this animal presented any recognizable evidence of blacktongue.

Dog 90.—Male. Whelped in the laboratory October 12, 1924. Reared and maintained on stock diet No. 156 to May 26, 1925.

May 26, 1925: In good condition. Weighs 5.9 kilograms. Begins basic diet No. 123 with a daily supplement of 12 grams of Seidell's activated solid.

July 30, 1925: In good condition. Weighs 6.7 kilograms. The daily dose of activated solid is increased to 13 grams.

March 11, 1926: In good condition. Weighs 6.8 kilograms. The test of activated solid is this day discontinued. At no time during the experimental period of nine and one-half months has this dog presented any recognizable signs of blacktongue.

The experience with Seidell's activated solid detailed in the foregoing experiment would seem clearly to indicate that this fuller's earth preparation of so-called vitamin B in a daily dose of approximately 2 grams per kilogram of body weight exercised a definite blacktongue-preventive action. We may state in this connection that a test of the plain fuller's earth has shown it to be devoid of preventive properties. The preventive action of the activated solid is therefore a property acquired by the fuller's earth in its contact with the aqueous yeast extract, presumably by adsorption.

Yeast Charcoal

Continuing our study of the blacktongue-preventive factor in yeast, we next tested its resistance to heat.

EXPERIMENT 9

Our first test of the effect of heat on the blacktongue-preventive factor in yeast was made with yeast heated to charring—charcoal. Dried brewery yeast from the same source as that used above in experiment 5 was heated in open porcelain dishes over a Bunsen flame until completely charred. One gram of the yeast yielded 0.283 gram of charcoal.[6] This charcoal was ground to a fine powder, packed in gelatine capsules of convenient size, and administered apart from the basic blacktongue-producing diet. Our experience with yeast (experiments 5 and 6) seemed to indicate that when supplementing diet No. 123 or one of its modifications, 1.25 grams per kilogram of body weight would be more than enough for preventive purposes. With this in mind, a daily dose of charcoal representing about 2 grams of the yeast per kilogram of body weight was decided on as a reasonably large therapeutic test dose when treatment is begun early in the attack. This, as will be seen, was deviated from

[6] This determination was kindly made for us by C. G. Remsburg, assistant chemist of the division of chemistry of the Hygienic Laboratory.

in but one of the test animals, which received a dose representing about 1.5 grams of the yeast per kilogram of body weight. The test animals were five dogs, numbered 29, 48, 83, 84, and 85, each in the beginning stage of an attack of blacktongue. Four of these animals had developed the attack on diet No. 195. (See experiment 3.) These were continued on that diet. The fifth animal, dog 48, had developed the attack on a diet of another character which was replaced by diet No. 123 at the outset of the present experiment.

The significant details relating to this test in each of the animals are presented briefly in the following:

Dog 29.—Male. Acquired May 9, 1923. Up to April 24, 1925, served in a number of experiments and suffered several attacks of blacktongue, the latest of which began April 17, 1925. Weight on April 21 was 11 kilograms.

April 24, 1925: The beginning buccal erythema of an attack of blacktongue noted a week ago has faded during the past two days. The diet (No. 195) on which the attack developed continues to be offered. Effective to-day, the daily administration of 6.7 grams of yeast charcoal representing approximately 27 grams, or over 2 grams per kilogram of body weight, of the yeast from which prepared, is begun.

April 25: Mucosa of upper lip and that of the floor of the mouth are again reddened.

April 28: Food consumption is at a reduced rate. Weighs 10.8 kilograms. The daily administration of 6.7 grams of yeast charcoal has been continued.

April 29: In addition to the reddening of the upper lip and of the floor of the mouth, the mucosa of the cheeks is now reddened.

May 1: Tends to regurgitate or vomit the capsules of charcoal; with a view of preventing this, some of the food will from now on be forcibly fed in conjunction with the charcoal.

May 5: The buccal lesions have become more pronounced. There is now a patch of superficial necrosis on the mucosa of the left cheek. Weighs 10.4 kilograms. Temperature is 38.6°.

May 12: Weight is 9.4 kilograms.

May 19: The buccal lesions which had become fairly marked have greatly improved during the past three or four days during which food consumption has been excellent. Weighs 9.7 kilograms.

May 25: During the past four days the mouth lesions have flared up again and are quite well marked to-day. The yeast charcoal in a daily dose of 6.7 grams has been regularly administered since April 24. No beneficial effect being appreciable, the charcoal is this day replaced by a daily dose of 22 grams of some of the same yeast as that from which the charcoal was prepared.

June 4: During the past four days the buccal lesions, which had become quite well marked, have rapidly improved so that to-day the condition of the mouth is virtually normal.

June 18: Eating well and gaining in weight. Two days ago weighed 11.1 kilograms. No further evidence of blacktongue. Effective to-day the daily dose of brewery yeast which has been 22 grams is reduced to 10 grams, or somewhat less than 1 gram per kilogram of body weight.

August 11: In good condition. Weighs 11.7 kilograms. Has been receiving the daily dose of 10 grams of brewery yeast for 54 days. Has presented no recognizable evidence of blacktongue since recovery from the attack the treatment of which with yeast charcoal had been without appreciable effect. Further history is not relevant.

Dog 48.—Bitch. Acquired August 20, 1923. Up to March 11, 1925, served in a number of experiments and suffered three attacks of blacktongue, the latest of which began March 10, 1925. Weight on March 10, 1925, was 6.2 kilograms.

March 11, 1925: Presents beginning buccal signs of an attack of blacktongue. The diet on which the attack developed is this day replaced by basic diet No. 123 and treatment is begun with a daily dose of 2 grams of yeast charcoal representing approximately 7 grams of the dried brewery yeast (or 1 gram of yeast per kilogram of body weight).

March 16: The buccal lesions after becoming more pronounced have receded slightly during the past 24 or 48 hours. No appreciable effect from the charcoal having been noted, the daily dose is this day increased to 4 grams, representing approximately 14 grams of the yeast from which prepared (corresponding to over 2 grams of yeast per kilogram of body weight).

March 17: Weighs 6.1 kilograms.

April 7: Mouth lesions of blacktongue have gone through alternating periods of recession and relapse. Eating very poorly. Weighs 5.2 kilograms. The condition is becoming complicated by self-imposed semistarvation. The charcoal is being continued.

May 16: Food refusals have become more and more pronounced. Weight has fallen off progressively. The buccal signs of blacktongue have persisted in mild degree. Moribund this morning; chloroformed. No benefit from the charcoal could be appreciated.

Dog 83.—Bitch. Acquired February 20, 1925. Served as one of the test animals of diet No. 195 (experiment 3) and developed an attack of blacktongue beginning April 18, 1925. Weight April 21, 7.5 kilograms.

April 22, 1925: The buccal signs of blacktongue are now quite definite but mild. Continues on diet No. 195. Begins treatment with a daily dose of 4 grams of yeast charcoal, representing approximately 14 grams of the yeast from which prepared and corresponding to nearly 2 grams of yeast per kilogram of body weight.

April 28: The blacktongue lesions have become somewhat more pronounced. Weighs 7.3 kilograms. The treatment with charcoal is being continued.

May 2: Buccal lesions have well-nigh completely faded. To minimize a recently developed tendency to vomit the capsules of charcoal, about 100 grams of food (diet No. 195) will, beginning this day, be forcibly fed in conjunction with the charcoal.

May 8: Lesions of blacktongue have gradually reappeared during the past two or three days.

May 16: Buccal lesions are more marked and show a superficial necrotic process. Temperature has risen to 39°.

May 17: Mouth lesions have become severe. Temperature at 10 a. m., 39.7°; at 3.30 p. m., 40.4°. Has been getting the charcoal daily without any appreciable effect. The attack now being grave, charcoal is this day replaced by 6 grams of brewery yeast.

May 21: A dose of 12 grams of yeast was administered on May 18, May 19, and May 20. That of May 20 was not retained. Found dead this morning.

Dog 84.—Male. Acquired March 2, 1925. Served as one of the test animals of diet No. 195 (experiment 3) and developed an attack of blacktongue, the first signs of which appeared on April 23.

April 23, 1925: Presents beginning signs of blacktongue, a slight reddening of the floor of the mouth and a faintly reddened patch on the mucosa of the upper lip in the region of the canines. Weighs 9.1 kilograms. Treatment is this day begun with a daily dose of 4 grams of yeast charcoal, corresponding to approximately 14 grams of the brewery yeast from which it is prepared and representing 1.5 grams of yeast per kilogram of body weight.

May 2: Mouth is normal except for faintly reddened patches on the upper lip. The administration of the charcoal continues, but a small amount (about 100 grams) of the basic diet is forcibly fed in conjunction with the charcoal to minimize a tendency to reject the charcoal.

May 23: During the month, since the treatment with charcoal commenced, the buccal signs of blacktongue have alternately receded and flared up. They are more pronounced this morning than at any time since first appearing. Food consumption has been at a progressively reduced rate. Weight four days ago was 8.5 kilograms.

There being no appreciable tendency to improvement, but, if anything, the contrary, the treatment with charcoal is this day discontinued and the daily administration of 12 grams of dried brewery yeast is begun.

May 26: Mouth lesions have cleared up. Weight is 8.3 kilograms.

August 11: In good condition. There has been no reappearance of any recognizable evidence of blacktongue. Has been receiving 12 grams of yeast daily. Weight has steadily increased and is 10 kilograms to-day. Further history not relevant.

Dog 85.—Male. Acquired March 2, 1925. Served as one of the test animals of diet No. 195 (experiment 3) and developed an attack of blacktongue beginning April 16, 1925: On April 14 weighed 5.4 kilograms.

April 16, 1925: Presents the first buccal signs of an attack of blacktongue. Begins treatment with a daily dose of 4 grams of yeast charcoal corresponding to approximately 14 grams of the yeast from which it is prepared and representing approximately 2.5 grams of yeast per kilogram of body weight.

May 2: After a gradual subsidence of the mouth lesions so that the appearance of the mouth was about normal on April 27, they reappeared on April 28 and are now more pronounced than at any time since their first appearance. There has appeared a tendency for the dog to reject the capsules of charcoal, so effective yesterday, a small amount of food is to be forcibly fed daily in conjunction with the charcoal.

August 9: The buccal lesions of blacktongue have repeatedly subsided and flared up during the past three months. They are now again well marked. Food consumption has fallen off and the weight has declined to 3.3 kilograms. Seems much emaciated and in poor general condition.

There being thus no appreciable tendency to recovery although the yeast charcoal has been daily administered, this treatment is this day discontinued and treatment with dried yeast is this day begun. A dose of 8 grams is administered to-day.

August 20: Mouth lesions have completely cleared up. Has received a daily dose of 4 grams of yeast since August 10 but because the food taking which at first improved has declined in the past three days, the dose of yeast is this day increased to 6 grams. On August 18 weighed 2.9 kilograms.

August 23: It being administratively inconvenient to continue to prepare diet No. 195, it is this day replaced with No. 123. The dose of 6 grams of yeast is continued. There is no recognizable evidence of black tongue.

September 29: Has presented no return of any recognizable evidence of blacktongue since the clearing up of the mouth lesions following the change to treatment with the yeast. Food consumption has been excellent and there has been a steady gain in weight during the past five weeks. Weight to-day is 5.8 kilograms. Further history not relevant.

Thus, in none of the five test animals was there any curative or arresting effect appreciable from the treatment with yeast heated to charring (charcoal), even though this was begun very early in or at the very onset of the attack, a failure that is all the more significant by reason of the favorable effect of treatment with the yeast itself subsequent to the failure of the charcoal treatment in three of four of the animals in which it was tried. It may be noted, too, that the dose of the yeast was relatively no greater or, indeed, was relatively less, than that of the charcoal. In the animal in which the yeast itself seemingly failed, this treatment was inaugurated at an advanced stage of the attack three days before the animal died—that is, at a stage when the chances of cure by any treatment may be expected to be greatly reduced. It would appear, therefore, that the effective factor in the brewery yeast was inactivated or destroyed by the charring heat.

P–P Activated Fuller's Earth (P–P Solid)

EXPERIMENT 10

Our next test of the effect of heat on the blacktongue-preventive factor in yeast was carried out with yeast heated in the steam autoclave for two and one-half hours at 15 pounds pressure, or, rather, with a fuller's earth preparation activated by treatment with an acidulated aqueous extract of such autoclaved yeast. The yeast was a grain medium grown, low temperature dried bakers' yeast.[7] In autoclaving, this yeast was put into glass petri dishes having a diameter of about 120 mm. and a depth of about 15 mm., and then the dishes, uncovered, were arranged on a series of screen shelves in the autoclave. On withdrawing from the autoclave the yeast was permitted to dry, after which it was ground to a powder sufficiently fine to pass a 40-mesh sieve. Next, 10 pounds of this powdered autoclaved yeast were stirred into 25 liters of tepid water containing 2.5 c. c. of glacial acetic acid (USP) and allowed to extract with repeated stirring for not less than one and one-half hours. This was then passed through a Sharples supercentrifuge four times, discarding the insoluble matter deposited in the bowl. Into the resulting effluent there were stirred 750 grams of English fuller's earth previously sifted through a 60-mesh sieve. This was kept agitated for about one hour and then the fuller's earth was separated by passing the suspension, first diluted with about an equal volume of distilled water, rapidly through the centrifuge.

[7] For which we are indebted to the Fleischmann Yeast Co., New York City.

This earth, from which the soft puttylike portion was separated and discarded, was dried in a current of warm air, then ground to pass a 60-mesh sieve. Nitrogen content of this fuller's earth preparation to which we shall refer as P–P solid (9) is about 1 per cent.

The test dose of this P–P solid was the same as that of Seidell's activated solid in experiment 8—namely, 2 grams per kilogram of body weight. It was administered in gelatin capsules once a day as a supplement to basic blacktongue-producing diet No. 123. The test animals were five dogs, numbered 15, 40, 52, 59, and 88. The significant details relating to each of these animals are briefly as follows:

Dog 15.—Male. Acquired April 14, 1923. Up to December 17, 1925, served in a number of experiments and suffered four attacks of blacktongue, the latest of which began December 25, 1924. Between February 28 and December 17, 1925, was on basic diet No. 123 supplemented with dried yeast.

December 17, 1925: In good condition. Weighs 9.6 kilograms. Continues basic diet No. 123 and begins a daily supplement of 20 grams of P–P solid, or at the rate of approximately 2 grams per kilogram of body weight.

December 21, 1926: Has completed one year on diet No. 123 supplemented with a daily dose of 20 grams of P–P solid. Has been in good condition throughout this period. Weight has varied between 9 and 10 kilograms. Now weighs 9.5 kilograms. Further history not relevant.

Dog 40.—Male. Whelped in the laboratory June 26, 1923. Up to December 17, 1925, served in a number of experiments and suffered three attacks of blacktongue, the latest of which began April 23, 1924. Between May 26 and December 17, 1925, on diet No. 123 supplemented with dried yeast.

December 17, 1925: In good condition. Weighs 11 kilograms. Continues basic diet No. 123 and begins a daily supplement of 22 grams of P–P solid, or at the rate of 2 grams per kilogram of body weight.

December 21, 1926: Has completed one year on diet No. 123 supplemented with 22 grams of P–P solid. Has been in good condition throughout, at no time presenting any recognizable evidence of blacktongue. Weighs 11 kilograms. Further history not relevant.

Dog 52.—Bitch. Acquired September 25, 1923. Up to December 17, 1925, served in a number of experiments and suffered several attacks of blacktongue, the latest of which began October 6, 1925. On stock diet No. 156 for reconditioning from December 7 to December 17, 1925.

December 17, 1925: Convalescing from the recent sharp attack of black tongue. Two days ago weighed 7 kilograms, whereas normally weighs about 10 kilograms. Begins diet No. 123 with a daily supplement of 20 grams of P–P solid, or at the rate of 2 grams per kilogram of normal body weight.

December 21, 1926: Has completed one year on diet No. 123 supplemented with a daily dose of 20 grams of P–P solid. General condition, which was poor at first, gradually improved with gain in weight. Now weighs 10. 5 kilograms. Has presented no recognizable evidence of blacktongue.

Dog 59.—Bitch. Whelped in the laboratory November 4, 1923. Reared and maintained on stock diets to February 2, 1926.

February 2, 1926: Has just weaned a litter of seven pups. Is in good condition. Weighs 5. 2 kilograms. Begins basic diet No. 123 supplemented with a daily dose of 11 grams of P–P solid, or at the rate of approximately 2 grams per kilogram of body weight.

February 2, 1927: Has completed a year on the P–P solid supplemented blacktongue-producing diet without presenting any recognizable evidence of blacktongue. Has been in good condition throughout. Weighs 5.5 kilograms.

Dog 88.—Male. Whelped in the laboratory October 12, 1924. Reared on stock diet. Up to February 2, 1926, served in one experiment and suffered an attack of blacktongue which began December 18, 1925. On stock diet No. 156 for reconditioning from December 21, 1925, to February 2, 1926.

February 2, 1926: In good condition. Weighs 5.4 kilograms. Begins basic diet No. 123 with a daily supplement of 10 grams of P–P solid.

February 2, 1927: Has completed one year on the P–P solid supplemented blacktongue-producing diet; in good condition. Has not presented any recognizable evidence of black tongue. Weighs 5.2 kilograms. Further history not relevant.

With the blacktongue-producing potency of basic diet No. 123 in mind (see experiment 1) it is clear that the P–P solid supplement has exercised complete preventive action. It follows, therefore, that the autoclaved yeast, the aqueous extract of which was used to activate the fuller's earth in the preparation of the P–P solid, retained much, if not all, of the blacktongue-preventive property of the yeast from which it was prepared. The effective factor in yeast is thus largely, if not completely, resistant to the heat of the steam autoclave at 15 pounds pressure and two and one-half hours' exposure and, under the conditions stated, is adsorbed by English fuller's earth.

Seven and One-half Hour Autoclaved Yeast

EXPERIMENT 11

This was another test of the effect of heat on the blacktongue-preventive factor in yeast. Dried bakers' yeast was exposed to the heat of the steam autoclave at 15 pounds pressure for a period three times as long as that in experiment 10—namely, seven and one-half hours. Some of this autoclaved yeast was incorporated in a diet, No. 223A, the composition of which is shown in Table 8. This diet, as may be seen by reference to Table 6, is diet No. 155, the dried brewers' yeast of which is quantitatively replaced by the 7½-hour autoclaved bakers' yeast. Test diet No. 223A was offered in suitable calorie portions to each of 5 test animals, dogs 29, 38, 84, 85, and 97. The significant details relating to each of these animals are briefly as follows:

Dog 29.—Male. Acquired May 10, 1923. Up to March 11, 1926, served in a number of experiments and suffered several attacks of blacktongue, the latest of which began April 17, 1925.

March 11, 1926: Has been receiving yeast in some form since May 25, 1925. Is in good condition. Weighed 11.7 kilograms two days ago. Begins test diet No. 223A.

March 15, 1927: In good condition. Weighs 9 kilograms. Has been receiving diet No. 223A for one year, during which period he has not presented any recognizable evidence of blacktongue.

Dog 38.—Male. Whelped in the laboratory June 26, 1923. Up to March 11, 1926, served in a number of experiments and suffered several attacks of blacktongue, a relapse of the latest of which began July 19, 1924.

March 11, 1926: Has been receiving yeast in some form since August 11, 1925. Is in good condition. Weighed 12.1 kilograms two days ago. Begins test diet No. 223A.

March 15, 1927: In good condition. Weighs 11.4 kilograms. Has been receiving diet No. 223A for one year, during which period he has presented no recognizable evidence of blacktongue.

Dog 84.—Male. Acquired March 2, 1925. Up to March 11, 1926, suffered one attack of experimental blacktongue which began April 23, 1925.

March 11, 1926: Has been receiving yeast in some form since May 23, 1925. Is in good condition. Two days ago weighed 10.4 kilograms. Begins test diet No. 223A.

March 15, 1927: In good condition. Weighs 10 kilograms. Has been receiving diet No. 223A for one year but has presented no recognizable evidence of blacktongue during that period.

Dog 85.—Male. Acquired March 2, 1925. Up to March 11, 1926, suffered one attack of experimental blacktongue which began April 16, 1925.

March 11, 1926: Has been receiving yeast in some form since August 9, 1925. Is in good condition. Two days ago weight was 7.1 kilograms. Begins test diet No. 223A.

March 15, 1927: In good condition. Weighs 7 kilograms. Has been receiving diet No. 223A for one year but has presented no recognizable evidence of blacktongue during that period.

Dog 97.—Male. Acquired January 18, 1926, when about 9 weeks old and maintained on stock diet No. 156 to March 11, 1926.

March 11, 1926: In good condition. Weight two days ago was 6 kilograms. Begins test diet No. 223A.

May 4, 1926: Permanent teeth have now replaced all of the milk teeth. Growth has continued. Weighs 8.5 kilograms.

March 15, 1927: Has been receiving diet No. 223A for one year. Has presented no recognizable evidence of blacktongue. Continued growth during the year. Is in good condition. Weighs 10 kilograms.

Thus, none of the five dogs developed any recognizable evidence of blacktongue during an experimental period of one year. Since test diet No. 223A differs from blacktongue-producing diet No. 123 significantly only in that the former includes some autoclaved yeast, the blacktongue-preventive action of diet No. 223A must be attributed to this yeast. It would follow, therefore, that the blacktongue-preventive factor in the yeast retained much if not all of its activity in spite of an exposure to the heat of a steam autoclave at 15 pounds pressure for seven and one-half hours.

IDENTITY OF THE BLACKTONGUE PREVENTIVE

Consideration of the results yielded, first, by the experiments with blacktongue-producing diet No. 123 and its modifications—diets No. 209, No. 195, and No. 268—and, second, by the series of experiments with yeast, leads unavoidably to the conclusion that

experimental blacktongue is due to a deficiency in diet and that yeast contains something that is capable of correcting this deficiency. It is pertinent now to inquire into the relation of this blacktongue-preventing substance in yeast to the commonly recognized dietary essentials.

Of the known dietary factors there are present in yeast in significant amounts (10) only inorganic elements or "ash," protein of good biological quality, the antineuritic or vitamin F,[8] the heat-stable substance of Smith and Hendrick (11) and the pellagra-preventive (P–P) of Goldberger and Tanner (12) (13).

That the blacktongue-preventive in yeast is not the "ash" would seem to be indicated by the fact, first, that blacktongue-producing diets No. 195 and No. 268 contain what would seem to be a liberal quota of the well known "complete" salt mixture of Osborne and Mendel (3), and, second, that charred yeast, containing the ash of the yeast, when administered in what would seem to be a liberal dosage as a supplement to diet No. 195 (which, as just remarked, already includes a "complete" salt mixture) failed, as herein above shown, to reveal any evidence of a beneficial therapeutic action.

Turning to protein as possibly the effective factor we find that blacktongue-producing diet No. 268 (Table 5) includes what would seem to be a liberal amount of protein, considerably more and doubtless of a better quality than that of diet No. 123. This is likewise true of the protein of diet No. 281 (Table 9) which, as will be shown in experiment 12, when supplemented with an antineuritic preparation is also blacktongue producing. Yet, as has been seen, when diet No. 123 is supplemented with our fuller's earth activated preparation—P–P solid—which contains but about 1 per cent of nitrogen and, thus, it would seem, can at best supply but a relatively negligible amount of protein, the deficiency is corrected and blacktongue is prevented. It would seem permissible, therefore, to exclude the protein factor from consideration in the present connection.

The evidence that the effective blacktongue factor in yeast is distinct from the antineuritic vitamin is, if anything, more convincing than is the evidence just considered, that it is not identical with either the "ash" or the protein. Aside from other considerations their nonidentity is, we believe, conclusively shown by the effectiveness as a blacktongue-preventive of autoclaved yeast which, as we have elsewhere (13) already shown by tests in rats, contains but an insignificant amount, if any, of the antineuritic vitamin. Futher evidence of this as well as of the separateness of the blacktongue-preventive and protein is afforded by the results of experiment 12.

[8] Yeast—both bakers' and brewers'—may vary considerably in its content of this factor. (Unpublished data.)

EXPERIMENT 12

Each of four dogs, numbered 71, 76, 86, and 87, were offered daily suitable calorie portions of diet No. 281 (Table 9). In addition, dogs 71 and 76 were given daily a supplement of our P–P solid (see experiment 10) in gelatine capsules at the rate of 2 grams per kilogram of body weight, while dogs 86 and 87 received daily a supplement of an antineuritic preparation—corn solid No. 3 [9]—at the rate of 1.25 grams per kilogram of body weight. The significant details relating to each test animal are presented in the following:

Dog 71.—Male. Whelped in the laboratory November 25, 1923. Reared on stock diets and up to October 28, 1926, served in a number of experiments and suffered an attack of blacktongue which began September 9, 1926. On stock diet No. 156 for reconditioning from October 28, 1926, to December 8, 1926. On December 7, 1926, weighed 10.3 kilograms.

December 8, 1926: In good condition. Begins diet No. 281 with a daily supplement of 21 grams of our P–P solid, separately administered in gelatine capsules.

December 21: Has been eating well. Weighs 10.4 kilograms.

December 28: Food consumption considerably diminished during the past four days. Weighs 10 kilograms.

January 4, 1927: Food consumption has continued much reduced. Weighs 8.9 kilograms.

January 11: Has taken very little food during the past week. Weighs 8 kilograms. Is much emaciated.

January 15: Eating very little. Hind legs seem weak; walks unsteadily.

January 16: Hind limbs appear stiff in walking. Knee reflex is active.

January 17: Found this morning in a semisprawling posture. During the day had repeated convulsive seizures of a tetanic type with fore legs thrust stiffly forward, hind legs semiflexed and head retracted. Mucosa of mouth normal except for some bruising of the upper lip. Temperature (rectal) at 1.25 p. m., 30.5° C. The animal has an attack which is quite like that of the "polyneuritis" frequently observed in rats on similar diets.

January 18, 1927: Died some time during the night.

Dog 76.—Male. Acquired June 9, 1924. Up to October 28, 1926, suffered one attack of blacktongue which began September 4, 1926. On stock diet No. 156 for reconditioning from October 28, 1926, to December 8, 1926. On December 7, 1926, weighed 9.7 kilograms.

December 8, 1926: In good condition. Begins diet No. 281 with a daily supplement of 21 grams of our P–P solid separately administered in gelatine capsules.

January 27, 1927: Up to December 21, 1926, food consumption was excellent. Thereafter it declined and the weight fell off. The weight two days ago was 6.8 kilograms. The 21 grams of P–P solid has been administered daily. This morning appears much emaciated and weak. In walking, hind legs seem stiff. Knee reflex present. Later in the day it became clear that this dog had "polyneuritis."

[9] This was prepared as follows: After preparing an alcoholic extract of whole corn meal as elsewhere (13) described, there was added to the extract of each 5 kilograms of corn meal 125 grams of English fuller's earth. This was then stirred for two hours, after which it was allowed to stand over night. Then the supernatant alcoholic liquor was decanted and replaced by about 2 liters of fresh 85 per cent alcohol, after which it was vigorously stirred and then allowed to settle over night. The next day the alcohol was decanted and replaced with fresh 85 per cent alcohol. After stirring, this was again allowed to stand over night, when the procedure was repeated. After the third washing the fuller's earth was transferred to a paper filter, on which it was dried in a few hours in a current of warm air. This dried activated fuller's earth, our corn solid, was then ground to pass a 60-mesh sieve and stored for use.

January 29: Down this morning, sprawling on abdomen with hind limbs abducted and flexed, fore limbs thrust forward. Tetanic spasms at intervals, but without marked opisthotonos. Mucosa of mouth normal except for traumatic patches on upper lip.

Killed with illuminating gas when seen to be dying. Ate almost nothing during last week of life.

Dog 86.—Bitch. Whelped in the laboratory October 12, 1925. Reared on stock diets. Up to October 28, 1926, suffered two doubtful attacks of blacktongue, evidence of the latter of which was present between October 25 and October 28, 1926. On stock diet No. 156 for reconditioning from October 28 1926, to December 8, 1926. On December 7, 1926 weighed 9.6 kilograms.

December 8, 1926: In good condition. Begins diet No. 281 and a daily supplement of 12 grams of our antineuritic preparation—corn solid No. 3—administered separately in gelatine capsules.

On January 8, 1927, presented a suspicious injection of the floor of the mouth which faded out two days later to reappear on January 23. On January 24 there was present on the mucosa of the upper lip of each side a faintly reddened, broken band with a more marked reddening of the floor of the mouth, constituting evidence of a mild beginning blacktongue. No signs of polyneuritis. Further history not relevant.

Dog 87.—Bitch. Acquired October 12, 1924. Up to October 28, 1926, suffered one attack of blacktongue which began September 28, 1926. On stock diet No. 156 from October 28, 1926, to December 8, 1926. On December 7, 1926, weighed 5.6 kilograms.

December 8, 1926: In good condition. Begins diet No. 281 with a daily supplement of 7 grams of corn solid No. 3 separately administered in gelatine capsules.

January 24, 1927: Presents first signs of a beginning blacktongue, a reddened band on the mucosa of each cheek, reddening of the floor of the mouth and of faucial pillars. The dose of 7 grams of corn solid has been regularly administered. No evidence of polyneuritis. Further history not relevant.

Thus the two dogs that received the supplement of our blacktongue-preventive preparation—P–P solid—but no known antineuritic, developed the signs of an antineuritic deficiency at the end of 39 and 50 days, respectively, but no evidence of blacktongue. In contrast, the two dogs that received the supplement of our antineuritic preparation—corn solid No. 3—but no blacktongue preventive, both developed evidence of blacktongue, one at the end of 31 days and the second at the end of 47 days, without any signs of polyneuritis during the specified periods nor, we may add, during considerably longer additional periods of observation.

These results confirm and strengthen the evidence above cited indicating that the blacktongue preventive and the antineuritic factor are separate and distinct.[10]

Thus, by a process of exclusion, we come finally to the question of the relation of the blacktongue preventive to the yeast-contained thermostable factor of Smith and Hendrick (11), and to the pellagra preventive or vitamin P–P (12) (13).

[10] It may be remarked, in passing, that for growth of the young rat some of both preparations must be included in a "synthetic" diet that is complete for growth excepting only the so-called vitamin B. In the absence of either, even though the other be included in liberal amounts, the young rat will not grow (9).

With respect to its relation to the factor of Smith and Hendrick we may at once state that, on the basis of the available evidence (11) (13), which need not here be reviewed, the two are indistinguishable. As concerns its relation to the pellagra preventive, we have elsewhere (13) already briefly discussed this question and provisionally concluded that they were identical. Confining ourselves at this time, however, to a consideration of the evidence bearing on this question afforded by the results of the experiments recorded in the present communication alone, we have as a basis for judgment only the fact that the blacktongue preventive like the pellagra preventive is present in yeast. This association is suggestive, but, of course, by itself is far from conclusive of their identity. Taken in conjunction with the striking clinical similarity of blacktongue and pellagra, elsewhere discussed (1), and the suggestion of a common etiology indicated by the successful experimental production of the disease in the dog by feeding with a pellagra-producing diet (1), it increases somewhat the probability that blacktongue and pellagra are fundamentally identical conditions, and thus that the blacktongue preventive and the pellagra preventive, or vitamin P–P, are identical. Further evidence bearing on the question of this identity, to some of which we have elsewhere (13) already briefly referred, will be presented and considered in another communication.

SUMMARY AND CONCLUSIONS

The blacktongue-producing potency of a basic experimental diet and of three modifications was tested 33 times in 31 dogs with the production of 33 separate attacks of blacktongue. Only one of these attacks developed at the end of a period longer than 61 days.

Experimental blacktongue is due to a dietary deficiency which is capable of being corrected by something contained in yeast.

This something, or blacktongue preventive, in yeast is inactivated or destroyed by heat sufficient to char the yeast; retains its preventive potency in large measure, if not entirely, after heating in the steam autoclave at a pressure of 15 pounds for seven and one-half hours; and is adsorbed from an acidulated aqueous extract of either dried yeast or of yeast first autoclaved at a pressure of 15 pounds for two and one-half hours by English fuller's earth. It can not be identified with any of the older well-recognized dietary essentials, but is believed to be identical with the thermostable substance of Smith and Hendrick.

The blacktongue preventive and the pellagra preventive are both present in yeast. Taken in conjunction with certain other evidence pointing to the fundamental identity of blacktongue and pellagra, this association strengthens the probability that the blacktongue preventive and the pellagra preventive, or vitamin P–P, are identical.

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TABLE 1.—*Composition of experimental blacktongue-producing diet No. 34,*[1] *a simplified replica of the type of diet associated with pellagra*

[Total calories, 1,020]

Articles of diet	Quantity	Nutrients		
		Protein	Fat	Carbohydrate
	Grams	*Grams*	*Grams*	*Grams*
Corn meal (white commercial, unbolted)	200.0	15.0	8.4	131.8
Farina (Quaker brand)	57.0	6.3	.8	43.5
Rice (white)	28.0	2.2	.1	22.1
Cowpeas (*Vigna sinensis*)[2]	14.0	3.0	.2	8.5
Lard	21.0		21.0	
Cod-liver oil	9.5		9.5	
Cottonseed oil	18.5		18.5	
Calcium carbonate	3.0			
Sodium chloride	10.0			
Gelatine	46.9	42.0		
Tomato juice[3]	115.0			
Total nutrients		68.5	58.5	205.9
Nutrients per 1,000 calories		42.3	36.1	127.1

[1] The corn meal, farina, rice, cowpeas (previously coarsely ground), lard, and sodium chloride are stirred into a suitable amount of tap water and then cooked in a double boiler of enamel ware for about an hour and a half. At the end of this period the cooking is discontinued, the remaining ingredients are well stirred in, and the final weight of the mixture is brought to 2,000 grams by the addition of tap water with thorough stirring. 1 gram of the cooked ration represents approximately 0.8 calorie.

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

[3] Pressed from canned tomatoes.

TABLE 2.—*Composition of experimental blacktongue-producing diet No. 125*[1]

[Total calories, 2,400]

Articles of diet	Quantity	Nutrients		
		Protein	Fat	Carbohydrate
	Grams	*Grams*	*Grams*	*Grams*
Corn meal[2]	400	33.6	18.8	296.0
Cowpeas (*Vigna sinensis*)[3]	50	16.7	.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 enamel ware 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, after McCollum (14).

TABLE 3.—*Composition of experimental blacktongue-producing diet No. 209,*[1] *a modification of diet No. 123 (Table 2), from which it differs in containing yellow*[2] *in the place of white corn meal*

[Total calories, 2,400]

Articles of diet	Quantity	Nutrients		
		Protein	Fat	Carbohydrate
	Grams	*Grams*	*Grams*	*Grams*
Corn meal (yellow)[3]	400	33.6	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 enamel ware 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 (yellow) 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, after McCollum (14).

TABLE 4.—*Composition of experimental blacktongue-producing diet No. 195,*[1] *a modification of diet No. 123 (Table 2) from which it differs in having a "complete" salt mixture in the place of sodium chloride and calcium carbonate*

[Total calories, 2,400]

Articles of diet	Quantity	Nutrients		
		Protein	Fat	Carbohydrate
	Grams	*Grams*	*Grams*	*Grams*
Corn meal[2]	400	33.6	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	
Salt mixture[5]	22			
Total nutrients		96.3	64.5	358.4
Nutrients per 1,000 calories		40.1	26.9	149.3

[1] The corn meal and cowpeas (previously coarsely ground) are stirred into water and cooked 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 the 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, after McCollum (14).
[5] After Osborne and Mendel (3).

TABLE 5.—*Composition of experimental blacktongue-producing diet No. 268,*[1] *a modification of diet No. 123 (Table 2) from which it differs in containing more protein (casein) at the expense of the carbohydrate (sucrose) and a "complete" salt mixture in the place of the sodium chloride and calcium carbonate*

[Total calories, 2,400]

Articles of diet	Quantity	Nutrients		
		Protein	Fat	Carbohydrate
	Grams	*Grams*	*Grams*	*Grams*
Corn meal [2]	400	33.6	18.8	296.0
Cowpeas (*Vigna sinensis*) [3]	50	10.7	.7	30.4
Casein (purified) [4]	95	82.6	.5	
Cottonseed oil	30		30.0	
Cod-liver oil	15		15.0	
Salt mixture [5]	22			
Total nutrients		126.9	65.0	326.4
Nutrients per 1,000 calories		52.9	27.0	136.0

[1] The corn meal and cowpeas (previously coarsely ground) are stirred into water and cooked 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 the finished mixture 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 1 week in daily changes of acidulated water, after McCollum (14).
[5] After Osborne and Mendel (3).

TABLE 6.—*Composition of diet No. 155.*[1] *This is blacktongue-preventing. (It differs from blacktongue-producing diet No. 123 (Table 2) significantly only in that it contains some yeast)*

[Total calories, 2,450]

Articles of diet	Quantity	Nutrients		
		Protein	Fat	Carbohydrate
	Grams	*Grams*	*Grams*	*Grams*
Brewers' yeast [2]	30	12.5	.4	14.2
Corn meal [3]	400	33.6	18.8	296.0
Cowpeas (*Vigna sinensis*) [4]	47	10.1	.7	28.6
Casein (purified) [5]	54	46.8		
Cottonseed oil	41		41.0	
Cod-liver oil	15		15.0	
Sodium chloride	10			
Calcium carbonate	3			
Total nutrients		103.0	75.9	338.8
Nutrients per 1,000 calories		42.1	30.6	138.3

[1] The corn meal, cowpeas (previously coarsely ground), and salt are stirred into water and cooked 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 approximately 1 calorie), and the finished mixture is served to the dog ad libitum.
[2] A commercial dried brewery yeast.
[3] Whole maize meal (white) sifted as for human consumption.
[4] The variety known as the California black-eyed pea.
[5] Commercial casein leached for 1 week in daily changes of acidulated water, after McCollum (14).

TABLE 7.—*Composition of diet No. 123AA.*[1] *This is diet No. 123 (Table 2) to which 11 grams of dried yeast have been added. (Unlike diet No. 123, however, this has well-nigh, if not quite, complete blacktongue-preventive action)*

[Total calories, 2,440]

Articles of diet	Quantity	Nutrients		
		Protein	Fat	Carbohydrate
	Grams	*Grams*	*Grams*	*Grams*
Brewer's yeast [2]	11	4.5		5.2
Corn meal [3]	400	33.6	18.8	296.0
Cowpeas (*Vigna sinensis*) [4]	50	10.7	.7	30.4
Casein (purified) [5]	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		100.8	64.5	363.6
Nutrients per 1,000 calories		41.3	26.4	149.0

[1] The cornmeal, cowpeas (previously coarsely ground), and salt are stirred into water and cooked 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 approximately 1 calorie), and the finished mixture is served to the dog ad libitum.
[2] A commercial dried brewery yeast.
[3] Whole maize meal (white) sifted as for human consumption.
[4] The variety known as the California black-eyed pea.
[5] Commercial casein leached 1 week in daily changes of acidulated water, after McCollum (14).

TABLE 8.—*Composition of diet No. 223A.*[1] *(This, like diet No. 155 (Table 6), from which it differs only in the character of the yeast component, is blacktongue preventive)*

[Total calories, 2,445]

Articles of diet	Quantity	Nutrients		
		Protein	Fat	Carbohydrate
	Grams	*Grams*	*Grams*	*Grams*
Autoclaved baker's yeast [2]	30	9.0	0.8	15.6
Corn meal [3]	400	33.6	18.8	296.0
Cowpeas (*Vigna sinensis*) [4]	47	10.1	.7	28.6
Casein (purified) [5]	54	46.8		
Cottonseed oil	41		41.0	
Cod-liver oil	15		15.0	
Sodium chloride	10			
Calcium carbonate	3			
Total nutrients		99.5	76.3	340.2
Nutrients per 1,000 calories		40.6	31.1	138.8

[1] The corn meal, cowpeas (previously coarsely ground), and salt are stirred into water and cooked 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 approximately 1 calorie), and the finished mixture is served to the dog ad libitum.
[2] Dried baker's yeast, autoclaved at 15 pounds pressure for 7½ hours.
[3] Whole maize meal (white) sifted as for human consumption.
[4] The variety known as the California black-eyed pea.
[5] Commercial casein leached 1 week in daily changes of acidulated water, after McCollum (14).

TABLE 9.—*Composition of diet No. 281.*[1] *(For rats this "synthetic" diet is complete for growth except for the so-called vitamin B which is virtually completely lacking. Fed to dogs with a supplement of a preparation of the blacktongue preventive, it brings about polyneuritis. When supplemented with an antineuritic preparation, it leads to blacktongue)*

[Total calories, 2,380]

Articles of diet	Quantity	Nutrients		
		Protein	Fat	Carbohydrate
	Grams	*Grams*	*Grams*	*Grams*
Casein (purified)[2]	150	139.0	0.7	----------
Cottonseed oil	48	----------	48.0	----------
Cod-liver oil	12	----------	12.0	----------
Cornstarch	366	----------	----------	329.0
Salt mixture[3]	24	----------	----------	----------
Total nutrients	----------	139.0	60.7	329.0
Nutrients per 1,000 calories	----------	54.6	25.5	138.2

[1] One-fifth of the starch is stirred into ten times its weight of water and cooked about ½ hour. Into the resulting jelly the remaining ingredients are stirred in the following order: Salt mixture, cottonseed oil, cod-liver oil, and the remaining starch previously mixed with the casein. The final weight is brought to 1,000 grams with water (so that 1 gram of the finished mixture represents approximately 1.5 calories). Served to dogs ad libitum.

[2] Commercial casein leached 1 week in daily changes of acidulated water, after McCollum (14).

[3] After Osborne and Mendel (3).

DEATH RATES IN A GROUP OF INSURED PERSONS

RATES FOR PRINCIPAL CAUSES OF DEATH, JANUARY, 1928

The accompanying table is taken from the Statistical Bulletin for February, 1928, issued by the Metropolitan Life Insurance Co., and presents the mortality experience of the industrial insurance department of the company, by principal causes of death, for January, 1928, as compared with January, 1927, and December, 1927. The rates are based on a strength of approximately 18,000,000 insured persons in the United States and Canada.

The death rate for January in this group of persons was 9.4 per 1,000, as compared with 9.3 for January, 1927, and with 8.7 for December, 1927.

Among the epidemic diseases of childhood, measles, scarlet fever, and diphtheria registered slightly higher rates than in January a year ago. The small increases in the rates for measles and scarlet fever are unimportant, as the rates for both years are low; but some significance attaches to the increase in the rate for diphtheria, since this disease, after registering a continuous decline for five years, showed an increase in 1927. The rates for the early months this year will therefore be watched with considerable interest.

Increased death rates as compared with January, 1927, are also shown for many of the diseases of greatest numerical importance, e. g., tuberculosis, cancer, diabetes, and the three principal "degenerative" diseases—heart disease, cerebral hemorrhage, and chronic

nephritis. The mortality from pneumonia, however, declined appreciably, and that from influenza declined slightly.

The automobile fatality situation not only fails to improve but continues to grow worse. Following the rise in mortality from automobile accidents in 1927 to the highest figure ever recorded for this group of persons, January registered the unprecedented death rate for that month of 16.1 per 100,000. The former maximum rate for January was 13.6 per 100,000, for January, 1926.

Death rates (annual basis) for principal causes per 100,000, January, 1928, as compared with January, 1927, and December, 1927

[Industrial department, Metropolitan Life Insurance Co.]

Cause of death	Rate per 100,000 lives exposed [1]			
	January 1928	December 1927	January 1927	Year 1927 [2]
Total, all causes	944.9	866.0	928.2	885.4
Typhoid fever	1.8	2.8	2.4	4.6
Measles	3.8	2.0	3.6	4.1
Scarlet fever	3.6	2.5	3.0	3.1
Whooping cough	4.3	3.7	6.9	6.4
Diphtheria	14.8	14.3	13.6	10.5
Influenza	25.4	17.7	26.1	17.7
Tuberculosis:				
All forms	84.8	84.0	80.2	93.3
Of respiratory system	74.2	74.1	69.2	81.7
Cancer	74.3	73.0	72.7	74.0
Diabetes mellitus	19.0	18.1	17.1	16.7
Cerebral hemorrhage	59.4	56.0	57.8	54.9
Organic diseases of heart	150.7	135.3	146.5	132.2
Pneumonia (all forms)	111.2	83.5	118.5	77.6
Other respiratory diseases	18.9	16.4	14.9	15.4
Diarrhea and enteritis	13.0	16.1	14.1	24.5
Bright's disease (chronic nephritis)	79.4	65.7	72.3	69.3
Puerperal state	13.7	12.3	13.8	15.4
Suicides	7.4	7.2	7.6	8.3
Homicides	6.2	6.6	5.8	7.2
Other external causes (excluding suicides and homicides)	62.4	59.9	61.8	63.7
Traumatism by automobiles	16.1	16.5	12.8	18.3
All other causes	190.9	189.0	189.5	186.7

[1] All figures include infants insured under 1 year of age.
[2] Based on provisional estimate of lives exposed to risk in 1927.

COURT DECISION RELATING TO PUBLIC HEALTH [1]

Action against physician for alleged negligence in smallpox case.—(Ohio Supreme Court; Jones *v.* Stanko, Administratrix; decided January 25, 1928.) An action was brought by the defendant in error, a widow, against the plaintiff in error, a physician, to recover damages for the death of her husband, alleged to have been caused by the physician's negligence. The facts, as stated by the court, were as follows:

* * * The death of one Alexander Thompson, a neighbor of Stanko [the deceased husband], was caused by black smallpox. Dr. Jones was the sole

[1] The abstract of this decision was prepared from a copy of the decision furnished by Mr. James E. Bauman, assistant director of health of Ohio.

attending physician. He was called on Tuesday and saw the patient, Thompson, every day, and sometimes oftener than once a day, until Saturday of the same week, upon which day the patient died. It is alleged, and the evidence tends to sustain the allegation, that Mr. Stanko inquired of Dr. Jones whether Mr. Thompson was suffering from any contagious disease, and Dr. Jones assured him that Thompson was not suffering from any contagious disease, and that he, Stanko, took no risk from contagion by waiting upon Mr. Thompson in his illness. By reason of these assurances from Dr. Jones, Mr. Stanko not only waited upon Thompson prior to his death, but performed certain services with reference to his preparation for burial after death. The neighbors were in and out, doing what little they could in a friendly way to relieve the suffering of Mr. Thompson, and none of them were conscious of the fact that he was suffering from a disease that was extremely contagious, as well as infectious, to wit, black smallpox. There is no doubt that Thompson had black smallpox, and that he died as a result of that disease. It is not at all in dispute that Dr. Jones failed entirely to announce to anyone during the period mentioned that Thompson was suffering from black smallpox or any other contagious disease. It is admitted in the record that Dr. Jones failed entirely to notify the health authorities, as required by statute, of the fact that he was then treating Mr. Thompson for a contagious disease.

In the trial court a jury returned a verdict in favor of the physician. On appeal by the widow to the court of appeals, she assigned, among other errors, the refusal of the trial court to give certain requested instructions to the jury. One of the requests was, in part, as follows:

> And if you also find from the preponderance of the evidence in this case that said defendant, Washington L. Jones, was the sole physician treating said Alexander Thompson during his sickness from March 17, 1925, to March 21, 1925, inclusive, and that the fact that the said Alexander Thompson was then and there suffering from the disease of smallpox would have been known to a physician possessing the requisite qualifications and applying his skill and judgment with ordinary care and diligence to the diagnosis of the said disease, it was made under such facts, if so found by you, by the provisions of the statute, just quoted, the duty of the physician in charge of said Alexander Thompson to report said disease to the health officer within whose jurisdiction such person is found, and if you further find that said defendant failed to comply with said provisions of said statute and that such failure to comply with said provisions of the statute was the proximate cause of the death of the decedent, Stephen Stanko, as by plaintiff alleged in her second amended petition herein, your verdict must be for the plaintiff.

The other requests related to the duty of the physician to discover and to make known the character of disease that his patient was suffering from, and embraced the same statement in reference to the necessary qualifications of the physician that was contained in the above-quoted request. The court of appeals reversed the trial court's judgment solely on the refusal to give the requested instructions, and the physician appealed to the supreme court. The latter court affirmed the judgment of the court of appeals, stating in part as follows:

* * * The contention of plaintiff in error is that these requests were wrong in speaking of the qualifications of the attending physician in the terms "a physician possessing the requisite qualifications," etc.

It is said that the court should have instructed the jury, in view of the evidence in the case, that Dr. Jones was only required to have the ordinary skill possessed by general practitioners in medicine in the locality of his home, and that he was not required to possess the "requisite qualifications" to diagnose and discover a case of black smallpox such as that with which Thompson died.

* * * * * * *

The only thing in dispute here is whether Dr. Jones was negligent in not discovering that this was a case of black smallpox, and in failing to give notice thereof to the public health officials and to those who were coming into the presence of Thompson and in contact with him.

We can not sustain the construction placed by counsel for Dr. Jones upon the requests to charge. The language was not intended to say, and did not say, that Dr. Jones must possess expert skill in diagnosing beyond that possessed by other doctors in general practice in that locality, or such degree of skill as insured accuracy in all cases. Counsel for Dr. Jones claim that this, in effect at least, is what these requests did say and hence the trial court was correct in refusing to give them.

We think the language used in the requests only referred to the knowledge and skill possessed by physicians in general practice, as distinguished from the knowledge and statements of laymen present, who might venture opinions on the subject with respect to which no one would be entitled to rely for his own safety. The instruction to the jury was that, in order to find Dr. Jones liable, they must find that he was one holding himself out as a general practitioner of medicine.

The law requires a man who engages in the general practice of the medical profession to be one who has educated himself to take care of the matters incident to such practice, and one of the things that he must be held to know is whether he is dealing with a disease which is dangerously contagious. If it were a defense for such practicing physician, who had failed to discover and give due notice of the presence of such a disease, to say that he had not theretofore treated a disease of that kind, and had not observed symptoms such as the patient involved manifested, the escape from the provisions of the statute would surely be marvelously easy.

It will be noted that in each one of the requests, after speaking of a physician "possessing the requisite qualifications," the request gives the degree of care that must be exercised, by stating that it must be ordinary care and skill. A physician is not the insurer of his patient, but his patient has the right to believe that one holding himself out as qualified to practice medicine has the requisite skill to deal with that subject, and when so dealing, he must exercise ordinary skill and care relative to the matter in hand. It is that, and no more, that is required by those requests numbers 11, 12, and 15, and we quite agree with the court of appeals that this language does not present reversible error in this case. Aside from the feature of the requests mentioned—a physician possessing the requisite qualifications—it is not seriously contended that these requests are erroneous. The requests as presented should have been given, and the failure to give them was clearly error prejudicial to the plaintiff in the trial court. * * *

PUBLIC HEALTH ENGINEERING ABSTRACTS

Chloro-Phenol Tastes Pervade Chicago Water Supply. Anon. *Engineering News-Record*, vol. 100, No. 3, January 19, 1928, pp. 115–116. (Abstract by W. M. Olson.)

This is a summary of particulars concerning the bad taste of Chicago's water supply during the latter part of December, compiled from a report by Doctor Bundesen, of the Sanitary District of Chicago, and from other sources.

"One of the worst periods of taste-producing pollution of water by industrial wastes at the southern end of Lake Michigan occurred December 23–30, 1927, when the water supply of Chicago and of the Indiana cities of Gary, East Chicago, Whiting, and Hammond, farther south, was rendered undrinkable. This condition affected more than 3,000,000 people, as well as numerous industries using city water in the manufacture of edible products."

The taste-producing elements were phenol and cresol compounds of chlorine caused by the reaction between tarry acid wastes from by-product coke plants and chlorine used for disinfecting the water supplies. "The amount of phenol pollution was very great, being about 60 parts per billion."

Results of investigations of the source and motion of the wastes are summarized. Prompt and efficient chlorination control measures by the municipal division of water safety control are noted. "The absorption of chlorine by the industrial wastes and sewage was exceptionally heavy and made it necessary to use relatively large quantities of this chemical to assure a safe water based on residual chlorine control." A maximum chlorine dosage of 13.6 pounds per million gallons was carried for one hour.

"Bacterial analyses of special samples collected during the emergency indicated serious contamination by sewage organisms. The chlorinated water samples, however, showed that the dangerous pollutional organisms were killed."

The Practical Utility of Bacteriologic Control of Water Supplies. Ivan C. Hall. *Journal American Water Works Association*, vol. 19, No. 1, January, 1928, pp. 69–77. (Abstract by W. L. Havens.)

Early evidence that such diseases as typhoid fever, the paratyphoids, the dysenteries, and cholera were frequently transmitted by drinking water naturally led to the hope that the detection of such bacteria in water would serve as a criterion of its potability. However, it is very rare that these organisms can be isolated directly from naturally polluted water supplies, for the reasons that (1) the relative number of these organisms is small in proportion to nonpathogenic forms, (2) their persistence in water is transitory, and (3) they lack distinguishing characteristics from the harmless species naturally present. The sanitarian has therefore become mainly interested in discovering criteria of pollution rather than in the detection and isolation of specific disease-producing organisms. These criteria may be based upon either chemical tests for chlorides, the presence of nitrogeneous compounds, or a high oxygen demand. The more direct criteria of pollution are bacterial.

Total agar plate counts may be of practical significance in determining relative amounts of pollution, in indicating the efficiency of a purification process, and in controlling the bacterial content of swimming pools. Extreme care must be used in interpreting the results of various presumptive tests for *Bact. coli* since other organisms, such as *Bact. aerogenes*, may produce similar reactions. Having identified the presence of *Bact. coli*, which may be of either human or other animal origin, it can only be assumed that the water is potentially dangerous and precautions should be taken before it is used as a source of supply. Bacterial tests must therefore be interpreted with extreme caution unless they are used for indicative purposes only.

Manganese Interference in the Orthotolidine Test for Available Chlorine. Edward S. Hopkins. Ind. Eng. Chem., vol. 19, pp. 744–6, 1927. Abstract by Edward S. Hopkins in the *Journal American Water Works Association*, vol. 18, No. 6, December, 1927, p. 763.

"Attention is called to the fact that unstable salts of manganese will oxidize orthotolidine and produce the characteristic yellow color. Entire reliance can not be placed upon this test for available chlorine if manganese is present in a water supply. The possible chemical formulae for manganese under such conditions are discussed."

Water Purity and Fish Life. W. Rushton. *The Surveyor*, vol. 72, No. 1872, December 9, 1927, p. 574. (Abstract by H. W. Streeter.)

The care taken to preserve river water for drinking purposes and the lack of attention to preserving the natual fauna and flora when the waters are required for other purposes are the main subjects of the paper.

Pure water will not support fish life, because of the absence of a suitable food supply. Also, if certain ingredients are absent, diseases, including goiter, will appear among fish. If rivers must receive effluents from various works they should not destroy the natural fish life or permit foreign growths killing natural ones.

Comparing the fish food value of water works filter beds and impounding reservoirs, slow sand filters are shown to be good places for rearing fish, but reservoirs are often deficient in fish food.

Evidence exists that waters from producer gas plants harm small streams, owing to presence of sulphur compounds and carbon monoxide in solution. Effluents from coal-washing plants and coke ovens are known to harm river waters for fish life.

Report on Electrolux Water Softener. Anon. *Journal of State Medicine of Royal Institute of Public Health*, vol. 36, No. 1, January, 1928, pp. 49–50. (Abstract by H. V. Pedersen.)

The electrolux softener used in the experiment consisted of a tinned-copper cylinder 1 foot, 8 inches high and 5 inches in diameter, containing a special kind of earth treated in a particular manner, but composed mainly of alumina and silica. Periodically the softening material must be regenerated with dissolved common salt.

The conclusions arrived at from the experiments are as follows: "(1) By analysis it is found that all the hardness is removed from the water; (2) that no deleterious ingredient could be detected in the softened water; (3) that this method of water softening is very simple, economical, and efficacious."

The Correlation Between Differential Tests for Colon Bacteria and Sanitary Quality of Water. I. M. Lewis and E. E. Pittman. *Journal American Water Works Association*, vol. 19, No. 1, January, 1928, pp. 78–92. (Abstract by W. L. Havens.)

This article describes the several methods which have been proposed for the differentiation of fecal from nonfecal colon bacteria and gives the practical limitations of the various methods, particularly in an effort to determine which of them correlates best with the sanitary quality of the water. The supplies under consideration were obtained from deep fissure springs located along the Balcones escarpment from Austin, Texas, to Del Rio. The conclusion drawn is that the citrate test is more easily and quickly applied than the methyl red and Voges-Proskauer reactions and has been shown to correlate better with the sanitary quality of the water.

The Microscopy of Drinking Water. A review by W. C. Purdy. *Journal American Water Works Association*, vol. 19, No. 1, January, 1928, pp. 93–94. (Abstract by W. L. Havens.)

This article is a review of the fourth edition of "The Microscopy of Drinking Water," by George Chandler Whipple, as revised by Gordon M. Fair and Melville C. Whipple. The new book contains much new material and is divided into two sections, one dealing with applied microscopy and the other with determinative microscopy. The essence of the book is to determine the meaning of the presence of microscopic organisms in water and the interpretation which the sanitary engineer may safely place upon his biological findings.

Laws and Regulations for Protection of Public Water Supplies. W. J. Scott. *Water Works*, vol. 65, No. 10, October, 1926, pp. 479–484. (Abstract by Harriet S. Ryan.)

This is a review of outstanding features in the water-supply conditions in New England, given in a paper presented September 15 at the forty-fifth annual convention of New England Water Works Association.

The topography and natural water resources in New England make it necessary to use but very few water supplies at the present time which can be considered sewage polluted. General conditions are such that chlorination can be regarded as a factor of safety rather than an integral part of necessary purification processes. The absence of water filtration plants and dependence mainly upon clean watersheds and storage, necessitate legal methods of protection against dangerous watershed conditions.

The existing laws and regulations are classified under ten headings, and the status of conditions is discussed under these headings. There is a wide variation in legal methods of protection of public water supplies where no great dissimilarity exists in conditions. It is shown in the discussion that the repealing of some statutes and the adoption of others would aid considerably in furnishing safe water. The immediate charge of water supplies can properly be in the hands of local officials, but the statutes should place the supervision of public water supplies under the State department of health and no new source or no change in existing sources should be constructed without the approval of that department. The statute should place with the State department of health the authority to order owners of waterworks to undertake necessary changes, with proper provisions for appeal and for financing the necessary improvements. The legislation of Ohio is quoted. The provision in the Massachusetts law, making the granting of permits discretionary with the department of public health, seems satisfactory. There should be statutory authority to take land for watershed protection by right of eminent domain, with provision for equitable settlement. The Connecticut statute concerning the construction of a reservoir near a cemetery should be amended. The Massachusetts statute, which prohibits new cemeteries on watersheds without approval State, seems desirable. The manner of cross connections should be left to the discretion of the State department of health. The Massachusetts procedure for setting up the machinery for cities and towns for emergencies is worthy of consideration.

The First Year's Operation of the Providence, R. I., Filtration Plant. Julius W. Bugbee and Elwood L. Beam. *The American City*, vol. 37, No. 6, December, 1927, pp. 731–736. (Abstract by J. B. Harrington.)

This article describes the new Scituate project of the Providence, R. I., water supply and its operation for the first year. The new project consists of a hydroelectric plant, a 37,000,000,000 gallon impounding reservoir, an influent aerator, a head house for storage and application of coagulants, a rotary mixer, two coagulating basins of 31,000,000 gallons and 94,000,000 gallons capacity, respectively, 10 rapid sand filters with a capacity of 48,000,000 gallons a day, an effluent aerator, and a chemical storage house.

The plant was placed in operation on September 30, 1926. The results obtained by varying the chemical dosage, by increasing the retention period in

the coagulating basins, by adjusting the aerators, and by changing the length and rate of filter wash are all described briefly. Bacteriological results indicate that the raw water is practically free from *B. coli* and that the final effluent is consistently negative.

Quantitative Studies of Phenols in Water Supply. W. Donaldson and R. W. Furman. *Journal American Water Works Association*, vol. 18, No. 5, November, 1927, pp. 605–620. (Abstract by C. R. Cox.)

Recent water supply studies in Toledo, Ohio, included the analyses of industrial wastes containing phenolic compounds and also a critical review of the results secured by various workers in estimating the amount of phenol in waters and in detecting the intensity of tastes produced by phenolic compounds. It was found that the Folin-Denis reagent is sensitive to 0.02 p. p. m. phenol, cresol, cresylic acid mixture, and wood creosote, and that the Fox and Gauge reagent is sensitive to 0.01 p. p. m. phenol and cresol and to 0.02 p. p. m. cresylic acid and wood creosote. It was found in the distillation of 250 c. c. portions of the samples that only 85 per cent of pure phenol was recovered in three 50 c. c. Nessler tubes. Twenty phenol wasted were sampled as they were discharged into the Maumee River, and the phenolic content ranged from 0.004 p. p. m. to 19.0 p. p. m., with an average of 1.129 p. p. m. A concentration of 37.8 p. p. m. existed in one of the wastes being discharged into Ten Mile and Swan Creeks, with an average of 7.308 p. p. m. Maximum concentrations of between zero and 0.072 p. p. m. phenol were found present in samples of water collected from Lake Erie and the Maumee River and tributaries. It was found that pure phenol when unchlorinated could be detected by the taste when present in undiluted Lake Erie water in concentrations of 25.0 p. p. m. The three cresols or their mixtures, however, gave a taste in concentrations of 0.10 to 0.30 p. p. m. After chlorination the iodoform or chloro-phenol taste was detected when phenol was present in 0.08 p. p. m. and when the cresols were present in concentrations of 0.02 p. p. m. This is in excess of the quantities which other workers have found to produce a noticeable taste; for instance, 0.002 p. p. m. phenol is reported to have produced tastes in Milwaukee. It is shown that the ratio of the minimum concentration of pure phenol and chlorine required to give a noticeable taste in filtered Maumee River water varied with the concentration. In other words, with 0.001 p. p. m. phenol, tastes were produced with 0.092 p. p. m. chlorine, whereas with 0.025 p. p. m. phenol it required 0.675 p. p. m. chlorine to produce a taste. With larger concentrations of phenol, smaller concentrations of chlorine produced tastes; for instance, 0.800 p. p. m. phenol produced a taste with 0.075 chlorine. It was concluded in the article that the sense of taste is more sensitive than the chemical procedures used in detecting phenol in water, although quantitative methods used at Toledo are justified because of the nature of the problems being studied. The discussion of this paper emphasizes the fact that the taste method has several weaknesses, namely, that the intensity of taste depends upon the concentration of chlorine, the temperature of the water, and the physical quality of the water independent of the phenolic content.

Five Years' Operation of a Rapid Sand Filtration Plant. M. C. Whipple and H. C. Chandler. *The American City*, vol. 38, No. 1, January, 1928, pp. 133–138. (Abstract by C. R. Cox.)

This article gives a comprehensive description of the new rapid sand filtration plant of Cambridge, Mass., together with a discussion of the problems of operation. Highly colored water from two sources was coagulated during the first three years with alum in basins with a detention period of 2.5 hours. The dose of alum varied between 1.15 and 1.73 g. p. g. Provisions were made to add soda ash to the raw water when necessary to provide alkalinity, although

this treatment was seldom needed. About two years ago the use of solid sodium aluminate was begun, and improved coagulation has resulted by the use of 1.0 g. p. g. of alum and 0.2 g. p. g. of sodium aluminate. This modified treatment has permitted a reduction of about 50 per cent in the soda ash dose applied to the filtered water to prevent corrosion of the distribution system, and the water in the plant is less corrosive to the equipment. A chlorine dose of 0.25 p. p. m. produces a nearly sterile final effluent.

No mixing basin is provided, and the 2.5 hours' coagulation and sedimentation period is insufficient at times. Color in stored water is easier to coagulate than fresh color from swamps in times of flood run-off. Two and one-half-inch lead piping for alum solution requires constant attention to prevent clogging. Daily flushing under pressure, weekly bleach treatment to kill *Leptothrix*, and periodic steaming are remedies in constant use. Even then, hand cleaning becomes necessary.

Filters are washed for 2½ minutes at velocities necessary to expand sand beds 30 per cent. This requires 27 inches vertical velocity at 70° F. and 20 inches at 38° F. Wash water is thus saved in winter. Water is drawn down to below sand bed before washing, to increase agitation of sand. Sand-bed shrinkage occurs in summer, although this occurs when coagulation is best and when filtered water is clear and colorless. The theory is that good floc forms dense surface mat which resists flow and is thus compressed and pulled away from walls. Beds are hand raked every 10 days. Caustic soda treatment with 0.25 per cent solution is applied twice each year to clean the sand grains.

DEATHS DURING WEEK ENDED MARCH 10, 1928

Summary of information received by telegraph from industrial insurance companies for the week ended March 10, 1928, and corresponding week of 1927. (From the Weekly Health Index, March 14, 1928, issued by the Bureau of the Census, Department of Commerce)

	Week ended Mar. 10, 1928	Corresponding week, 1927
Policies in force	70, 512, 392	66, 961, 185
Number of death claims	14, 754	14, 258
Death claims per 1,000 policies in force, annual rate	10. 9	11. 1

Deaths from all causes in certain large cities of the United States during the week ended March 10, 1928, infant mortality, annual death rate, and comparison with corresponding week of 1927. (From the Weekly Health Index, March 14, 1928, issued by the Bureau of the Census, Department of Commerce)

City	Week ended Mar. 10, 1928		Annual death rate per 1,000 corresponding week 1927	Deaths under 1 year		Infant mortality rate, week ended Mar. 10, 1928[2]
	Total deaths	Death rate[1]		Week ended Mar. 10, 1928	Corresponding week 1927	
Total (68 cities)	8,293	14.3	14.4	885	886	[3] 73
Albany[4]	39	16.9	17.5	4	3	82
Atlanta	80	16.5	19.1	10	13	----------
White	47	----------	10.1	6	3	----------
Colored	33	(5)	40.2	4	10	----------
Baltimore[4]	241	15.2	20.0	22	41	70
White	174	----------	17.8	15	29	60
Colored	67	(5)	32.5	7	12	110

Footnotes at end of table.

Deaths from all causes in certain large cities of the United States during the week ended March 10, 1928, infant mortality, annual death rate, and comparison with corresponding week of 1927—Continued

City	Week ended Mar. 10, 1928		Annual death rate per 1,000 corresponding week 1927	Deaths under 1 year		Infant mortality rate, week ended Mar. 10, 1928
	Total deaths	Death rate		Week ended Mar. 10, 1928	Corresponding week 1927	
Birmingham	81	19.0	16.1	12	8	103
White	41		15.7	7	4	97
Colored	40	(3)	16.6	5	4	113
Boston	236	15.4	17.6	38	33	105
Bridgeport	46			4	4	73
Buffalo	181	17.0	13.9	13	17	56
Cambridge	29	12.1	10.1	1	4	18
Camden	35	13.5	18.0	3	7	48
Canton	21	9.4	6.4	2	1	43
Chicago [4]	830	13.8	12.8	81	78	69
Cincinnati	161	20.3	18.0	8	8	48
Cleveland	193	10.0	10.0	12	20	33
Columbus	68	12.0	13.4	6	6	56
Dallas	42	10.1	9.1	1	8	
White	32		8.5	1	7	
Colored	10	(3)	13.3	0	1	
Dayton	40	11.3	16.2	4	7	66
Denver	100	17.8	18.7	9	8	
Des Moines	30	10.3	9.5	5	1	83
Detroit	324	12.3	13.0	62	64	96
Duluth	20	9.0	10.5	2	5	47
El Paso	47	20.9	13.3	6	9	
Erie	26			3	4	62
Fall River [4]	32	12.5	12.6	3	2	51
Flint	36	12.6	10.2	2	11	26
Fort Worth	49	15.2	13.1	6	3	
White	33		11.2	4	2	
Colored	16	(3)	26.6	2	1	
Grand Rapids	37	11.8	14.2	2	2	30
Indianapolis	100	13.7	11.6	6	7	46
White	85		10.6	5	3	44
Colored	15	(3)	18.6	1	4	61
Jersey City	76	12.2	12.7	13	12	97
Kansas City, Kans	32	14.1	18.2	9	3	190
White	25		17.3	7	3	173
Colored	7	(3)	22.1	2	0	200
Kansas City, Mo	115	15.4	14.3	14	14	99
Knoxville	36	17.9	19.9	9	3	196
White	29		16.8	7	3	169
Colored	7	(3)	42.7	2	0	427
Los Angeles	293			26	21	74
Lowell	35	16.6	15.1	4	10	84
Lynn	15	7.4	11.9	0	4	0
Memphis	80	22.0	20.7	11	3	129
White	45		17.2	3	0	56
Colored	35	(3)	27.1	8	3	251
Milwaukee	118	11.3	12.7	16	22	71
Minneapolis	94	10.8	10.4	4	10	24
Nashville	54	20.4	20.4	7	3	110
White	29		11.6	4	2	85
Colored	25	(3)	42.9	3	1	180
New Bedford	21	9.2	10.5	5	4	108
New Haven	49	13.6	14.4	3	7	42
New Orleans	174	21.2	19.5	19	14	92
White	104		16.8	11	7	80
Colored	70	(3)	27.4	8	7	116
New York	1,622	14.1	14.9	166	165	67
Bronx Borough	199	11.0	10.4	22	21	66
Brooklyn Borough	512	11.6	14.1	52	70	52
Manhattan Borough	732	21.8	19.8	83	56	98
Queens Borough	147	9.0	10.8	8	17	32
Richmond Borough	32	11.1	17.8	1	1	18
Newark, N. J.	152	16.8	14.6	18	17	93
Oakland	62	11.8	10.1	7	6	76
Oklahoma City	33			7	4	
Omaha	57	13.4	12.8	3	3	35
Paterson	34	12.3	13.8	4	3	69
Philadelphia	592	15.0	15.8	65	57	88
Pittsburgh	227	17.7	15.2	30	12	98
Portland, Oreg	69			2	3	21

Footnotes at end of table.

Deaths from all causes in certain large cities of the United States during the week ended March 10, 1928, infant mortality, annual death rate, and comparison with corresponding week of 1927—Continued

City	Week ended Mar. 10, 1928		Annual death rate per 1,000 corresponding week 1927	Deaths under 1 year		Infant mortality rate, week ended Mar. 10, 1928
	Total deaths	Death rate		Week ended Mar. 10, 1928	Corresponding week 1927	
Providence	72	13.1	15.6	9	8	78
Richmond	50	13.4	15.2	8	6	104
White	27		11.1	4	3	81
Colored	23	(3)	25.3	4	3	147
Rochester	78	12.4	15.1	4	11	32
St. Louis	285	17.6	14.8	22	19	74
St. Paul	72	14.9	11.5	11	5	105
Salt Lake City [4]	31	11.7	7.3	11	4	179
San Antonio	87	20.9	15.0	11	11	
San Diego	51	22.3	28.5	1	5	19
San Francisco	183	16.3	14.5	11	11	60
Schenectady	16	9.0	8.4	1	1	31
Seattle	94	12.8	9.3	6	5	62
Somerville	26	13.2	9.8	3	0	104
Spokane	33	15.8	15.8	4	3	103
Springfield, Mass	34	11.9	12.4	6	1	95
Syracuse	70	18.4	13.5	12	3	146
Tacoma	21	9.9	16.5	1	3	26
Toledo	74	12.4	13.1	2	9	19
Trenton	49	18.4	19.5	6	6	102
Washington, D. C	144	13.6	17.2	13	16	74
White	93		14.3	5	8	41
Colored	51	(5)	25.7	8	8	148
Waterbury	14			1	4	29
Wilmington, Del	33	13.4	13.2	2	4	53
Worcester	43	11.4	16.5	3	7	36
Yonkers	22	9.5	11.4	7	2	160
Youngstown	28	8.4	14.2	4	8	43

[1] Annual rate per 1,000 population.
[2] Deaths under 1 year per 1,000 births. Cities left blank are not in the registration area for births.
[3] Data for 67 cities.
[4] Deaths for week ended Friday, Mar. 9, 1928.
[5] In the cities for which deaths are shown by color, the colored population in 1920 constituted the following percentages of the total population: Atlanta, 31; Baltimore, 15; Birmingham, 39; Dallas, 15; Fort Worth, 14; Indianapolis, 11; Kansas City, Kans., 14; Knoxville, 15; Memphis, 38; Nashville, 30; New Orleans, 26; Richmond, 32; and Washington, D. C., 25.

PREVALENCE OF DISEASE

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

UNITED STATES

CURRENT WEEKLY STATE REPORTS

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

Reports for Weeks Ended March 19, 1927, and March 17, 1928

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended March 19, 1927, and March 17, 1928

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Mar. 19, 1927	Week ended Mar. 17, 1928	Week ended Mar. 19, 1927	Week ended Mar. 17, 1928	Week ended Mar. 19, 1927	Week ended Mar. 17, 1928	Week ended Mar. 19, 1927	Week ended Mar. 17, 1928
New England States:								
Maine	11	7	3	3	141	66	1	1
New Hampshire	----	----	----	----	----	16	----	0
Vermont	----	----	----	----	64	31	0	0
Massachusetts	91	102	22	14	270	1,860	1	5
Rhode Island	9	10	----	----	1	80	1	0
Connecticut	27	19	13	5	211	398	0	2
Middle Atlantic States:								
New York	387	345	[1] 82	[1] 60	830	2,373	5	26
New Jersey	113	124	63	28	40	1,131	3	1
Pennsylvania	232	242	----	----	804	1,415	1	12
East North Central States:								
Ohio	----	241	----	102	----	865	----	7
Indiana	19	29	21	36	200	199	0	0
Illinois	137	134	54	158	2,585	260	1	13
Michigan	108	72	----	10	286	1,619	0	2
Wisconsin	40	19	70	63	574	134	7	8
West North Central States:								
Minnesota	19	20	3	3	228	100	5	2
Iowa [2]	12	12	----	----	912	29	2	1
Missouri	51	[4] 39	11	[4] 70	254	[4] 200	4	[4] 6
North Dakota	1	4	----	----	319	----	1	2
South Dakota	----	3	1	----	270	14	0	0
Nebraska	12	9	36	52	200	15	0	2
Kansas	20	18	10	16	1,105	72	1	1
South Atlantic States:								
Delaware	----	----	----	----	6	15	0	0
Maryland [2]	46	36	370	48	61	1,189	1	1
District of Columbia	28	----	10	----	2	----	0	----
Virginia	----	----	----	----	----	----	----	----
West Virginia	16	15	37	45	218	112	0	2
North Carolina	30	35	----	----	542	3,246	2	0
South Carolina	21	20	1,977	944	94	1,020	0	0
Georgia	10	14	361	175	244	187	0	3
Florida	21	7	----	6	153	43	0	0

[1] New York City only. [2] Week ended Friday. [4] Exclusive of Kansas City.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended March 19, 1927, and March 17, 1928—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Mar. 19, 1927	Week ended Mar. 17, 1928	Week ended Mar. 19, 1927	Week ended Mar. 17, 1928	Week ended Mar. 19, 1927	Week ended Mar. 17, 1928	Week ended Mar. 19, 1927	Week ended Mar. 17, 1928
East South Central States:								
Kentucky		11		21		279		0
Tennessee	9	20	164	115	163	298	0	0
Alabama	10	15	141		231	496	3	2
Mississippi	7	22						
West South Central States:								
Arkansas	9	8	64	628	113	385	0	7
Louisiana	15	30	26	114	133	267	0	1
Oklahoma [3]	13	17	139	451	231	325	3	3
Texas	32	24	69	306	121	125	0	1
Mountain States:								
Montana		11			49	1	8	5
Idaho	10	1			64		0	2
Wyoming		1			82	56	0	0
Colorado	7	5	2	1	324	34	0	6
New Mexico	6		2		75		0	
Arizona	2	7	3		12	31	0	8
Utah [2]	10	2	2	5	234	2	0	3
Pacific States:								
Washington	14	5			230	273	4	9
Oregon	16	7	123	50	101	115	2	1
California	122	103	81	42	2,865	187	5	6

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Mar. 19, 1927	Week ended Mar. 17, 1928	Week ended Mar. 19, 1927	Week ended Mar. 17, 1928	Week ended Mar. 19, 1927	Week ended Mar. 17, 1928	Week ended Mar. 19, 1927	Week ended Mar. 17, 1928
New England States:								
Maine	1	0	20	26	0	0	8	3
New Hampshire		0		20		0		0
Vermont	0	0	4	3	0	0	0	0
Massachusetts	0	2	586	316	0	0	9	2
Rhode Island	0	0	37	46	0	0	0	0
Connecticut	0	0	151	80	0	0	0	0
Middle Atlantic States:								
New York	0	0	1,240	822	9	13	19	11
New Jersey	1	1	387	285	0	0	3	1
Pennsylvania	0	1	705	559	0	0	20	11
East North Central States:								
Ohio		2		351		48		12
Indiana	0	0	213	131	158	144	3	2
Illinois	2	1	348	389	61	54	11	16
Michigan	0	1	363	213	53	39	7	3
Wisconsin	1	0	185	235	6	21	0	2
West North Central States:								
Minnesota	1	0	257	152	1	1	6	3
Iowa [2]	0	0	77	71	47	66	1	0
Missouri	0	[4] 0	132	[4] 78	29	[4] 72	1	[4] 1
North Dakota	2	1	83	39	7	2	3	0
South Dakota	0	3	49	57	11	11	2	2
Nebraska	0	1	45	116	15	40	0	0
Kansas	2	1	205	168	58	96	2	3
South Atlantic States:								
Delaware	0	0	29	6	0	0	0	0
Maryland [3]	0	0	118	70	2	2	9	3
District of Columbia	0		29		0		1	
Virginia								
West Virginia	0	1	29	44	66	106	1	7
North Carolina	1	0	36	21	34	90	0	2
South Carolina	1	1	7	12	22	14	5	6
Georgia	0	0	12	6	88	0	1	3
Florida	0	0	14	4	52	6	14	1

[2] Week ended Friday. [3] Exclusive of Tulsa. [4] Exclusive of Kansas City.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended March 19, 1927, and March 17, 1928—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Mar. 19, 1927	Week ended Mar. 17, 1928	Week ended Mar. 19, 1927	Week ended Mar. 17, 1928	Week ended Mar. 19, 1927	Week ended Mar. 17, 1928	Week ended Mar. 19, 1927	Week ended Mar. 17, 1928
East South Central States:								
Kentucky	----	0	----	48	----	36	----	1
Tennessee	0	0	21	24	15	36	14	3
Alabama	0	1	13	15	66	9	14	7
Mississippi	1	0	16	9	3	4	6	2
West South Central States:								
Arkansas	1	1	10	16	2	2	24	3
Louisiana	1	0	4	14	15	32	9	17
Oklahoma [1]	0	0	33	44	62	174	23	13
Texas	0	0	28	28	72	121	2	3
Mountain States:								
Montana	0	0	56	18	25	15	0	1
Idaho	0	0	19	7	11	0	0	0
Wyoming	0	0	30	17	6	11	0	0
Colorado	0	0	172	67	13	4	1	2
New Mexico	0	----	15	----	4	----	1	----
Arizona	0	0	8	5	0	19	0	4
Utah [1]	0	0	21	9	9	13	1	0
Pacific States:								
Washington	0	3	91	42	36	32	3	3
Oregon	0	2	63	27	17	46	0	2
California	1	3	204	189	26	26	10	5

[1] Week ended Friday. [2] Exclusive of Tulsa.

Report for Week Ended March 10, 1928

DISTRICT OF COLUMBIA

	Cases
Diphtheria	15
Influenza	4
Measles	102
Scarlet fever	58
Smallpox	1

SUMMARY OF MONTHLY REPORTS FROM STATES

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

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
December, 1927										
Delaware	0	17	4	----	29	----	0	15	0	5
February, 1928										
Alabama	2	119	898	45	1,033	14	5	49	23	39
North Dakota	5	26	4	----	26	----	1	257	16	6
Tennessee	9	76	610	21	2,298	12	1	152	115	31
Vermont	0	3	----	----	104	----	0	59	0	1

December, 1927

Delaware:	Cases
Chicken pox	20
Mumps	30
Whooping cough	5

February, 1928

	Cases
Chicken pox:	
Alabama	167
North Dakota	55
Tennessee	135
Vermont	193
Dengue:	
Alabama	1
Dysentery:	
Tennessee	1
Lethargic encephalitis:	
Alabama	3
North Dakota	9
Tennessee	5
Vermont	1
Mumps:	
Alabama	92
North Dakota	50
Tennessee	425
Vermont	144
Ophthalmia neonatorum:	
Tennessee	7
Rabies in man:	
Alabama	1
Trachoma:	
Tennessee	18
Tularaemia:	
North Dakota	1
Tennessee	4
Typhus fever:	
Alabama	2
Whooping cough:	
Alabama	69
North Dakota	14
Tennessee	80
Vermont	79

PLAGUE-INFECTED GROUND SQUIRRELS—SANTA CRUZ, CALIF.

A report dated February 27, 1928, states that six ground squirrels shot in the outskirts of the city of Santa Cruz, Calif., have proved positive for plague. The squirrels were shot in the immediate vicinity of the place where the boy who contracted plague was engaged in trapping squirrels. (See PUBLIC HEALTH REPORTS, March 16, 1928, p. 628.)

Poisoning operations against squirrels in this vicinity are being carried out by the extensive use of thalium poisoned grain. Trapping operations directed against rats are in progress in the city of Santa Cruz, but no rat suspected of plague infection had been caught at the time of the report.

GENERAL CURRENT SUMMARY AND WEEKLY REPORTS FROM CITIES

The 98 cities reporting cases used in the following table are situated in all parts of the country and have an estimated aggregate population of nearly 30,450,000. The estimated population of the 98 cities reporting deaths is more than 30,440,000. The estimated expectancy is based on the experience of the last nine years, excluding epidemics.

Weeks ended March 3, 1928, and March 5, 1927

	1928	1927	Estimated expectancy
Cases reported			
Diphtheria:			
43 States	1,852	1,832	
98 cities	1,008	1,062	921
Measles:			
42 States	18,713	15,408	
98 cities	6,345	5,167	
Poliomyelitis:			
43 States	43	11	

Weeks ended March 3, 1928, and March 5, 1927—Continued

	1928	1927	Estimated expectancy
Scarlet fever:			
43 States	5,246	6,247	
98 cities	1,723	2,451	1,406
Smallpox:			
43 States	1,150	999	
98 cities	101	127	135
Typhoid fever:			
43 States	148	247	
98 cities	54	51	38
Deaths reported			
Influenza and pneumonia:			
93 cities	1,237	1,112	
Smallpox:			
93 cities	1	0	
Charleston, W. Va	1	0	

City reports for week ended March 3, 1928

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

If reports have not been received for the full nine years, data are used for as many years as possible, but no year earlier than 1919 is included. In obtaining the estimated expectancy, the figures are smoothed when necessary to avoid abrupt deviations from the usual trend. For some of the diseases given in the table the available data were not sufficient to make it practicable to compute the estimated expectancy.

Division, State, and city	Population, July 1, 1926, estimated	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
			Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
NEW ENGLAND									
Maine:									
Portland	76,400	4	1	2	0	0	1	11	3
New Hampshire:									
Concord	[1] 22,546	0	1	1	0	0	0	0	2
Manchester	84,000	0	2	0	0	1	4	0	0
Vermont:									
Barre	[1] 10,008	0	1	0	0	0	0	0	0
Massachusetts:									
Boston	787,000	58	48	28	1	1	589	13	43
Fall River	131,000	8	4	2	0	0	2	2	4
Springfield	145,000	4	3	2	0	0	2	51	1
Worcester	193,000	6	3	7	0	0	23	42	1
Rhode Island:									
Pawtucket	71,000	2	1	1	0	0	5	16	5
Providence	275,000	3	9	8	1	1	25	7	9
Connecticut:									
Bridgeport	[2]	0	7	4	0	0	0	1	4
Hartford	164,000	11	8	5	0	1	5	1	3
New Haven	182,000		2						

[1] Estimated, July 1, 1925.

[2] No estimate made.

City reports for week ended March 3, 1928—Continued

Division, State, and city	Population, July 1, 1926, estimated	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
			Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
MIDDLE ATLANTIC									
New York:									
Buffalo	544,000	12	13	18	-------	0	516	38	23
New York	5,924,000	265	212	308	40	17	663	47	265
Rochester	321,000	23	9	8	2	0	6	28	9
Syracuse	185,000	53	4	2	-------	0	118	24	7
New Jersey:									
Camden	131,000	2	5	4	1	1	3	8	6
Newark	459,000	30	13	23	8	0	331	30	17
Trenton	134,000	3	3	8	0	1	2	2	2
Pennsylvania:									
Philadelphia	2,008,000	111	76	81	-------	6	237	133	88
Pittsburgh	637,000	-------	21	-------	-------	6	-------	-------	24
Reading	114,800	17	3	1	-------	1	1	7	5
EAST NORTH CENTRAL									
Ohio:									
Cincinnati	411,000	8	9	12	0	3	207	1	22
Cleveland	960,000	49	28	71	32	5	44	271	21
Columbus	285,000	12	4	1	1	1	18	7	12
Toledo	295,000	53	6	5	2	2	463	29	13
Indiana:									
Fort Wayne	99,900	0	2	4	0	0	2	0	7
Indianapolis	367,000	34	8	7	0	0	102	129	15
South Bend	81,700	2	1	1	0	0	1	0	0
Terre Haute	71,900	4	1	0	0	0	0	0	1
Illinois:									
Chicago	3,048,000	148	83	96	22	9	35	37	90
Peoria	82,500	19	1	1	0	0	0	0	0
Springfield	64,700	6	1	0	1	0	0	19	2
Michigan:									
Detroit	1,290,000	67	59	35	6	4	697	79	37
Flint	136,000	14	5	2	0	1	38	244	6
Grand Rapids	156,000	0	2	1	0	2	10	14	2
Wisconsin:									
Kenosha	52,700	17	2	0	0	0	0	4	0
Milwaukee	517,000	52	17	18	1	1	7	41	9
Racine	69,400	2	2	0	1	0	1	7	1
Superior	[1] 39,671	0	0	0	0	0	1	3	1
WEST NORTH CENTRAL									
Minnesota:									
Duluth	113,000	5	0	0	0	0	0	8	2
Minneapolis	434,000	66	16	8	0	3	11	119	10
St. Paul	248,000	29	13	0	0	0	1	78	13
Iowa:									
Davenport	[1] 52,469	1	1	0	0	-------	0	0	-------
Des Moines	146,000	0	1	0	0	-------	0	0	-------
Sioux City	78,000	8	2	0	0	-------	15	17	-------
Waterloo	36,900	4	0	0	0	-------	1	3	-------
Missouri:									
Kansas City	375,000	30	7	0	0	1	13	133	15
St. Joseph	78,400	1	1	0	0	0	0	9	2
St. Louis	830,000	31	44	44	6	0	134	14	-------
North Dakota:									
Fargo	[1] 26,403	4	0	1	0	0	0	17	0
Grand Forks	[1] 14,811	8	0	0	0	-------	0	0	-------
South Dakota:									
Aberdeen	[1] 15,036	5	0	0	0	-------	0	0	-------
Nebraska:									
Omaha	216,000	20	4	3	0	0	0	3	3
Kansas:									
Topeka	56,500	21	1	2	0	1	0	2	2
Wichita	92,500	5	3	0	0	0	0	2	5

[1] Estimated, July 1, 1925.

City reports for week ended March 3, 1928—Continued

Division, State, and city	Population, July 1, 1926, estimated	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
			Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
SOUTH ATLANTIC									
Delaware:									
Wilmington	124,000	3	2	6	0	0	2	5	2
Maryland:									
Baltimore	808,000	103	29	25	29	4	803	9	37
Cumberland	[1] 33,741	0	1	0	0	0	0	0	1
Frederick	[1] 12,035	0	0	0	0	0	2	0	0
District of Columbia:									
Washington	528,000	22	15	21	0	0	113	0	24
Virginia:									
Lynchburg	30,500	0	1	4	0	1	3	0	2
Norfolk	174,000	20	2	1	0	0	27	0	13
Richmond	189,000	6	3	5	0	3	132	1	3
Roanoke	61,900	6	1	3	0	0	4	3	1
West Virginia:									
Charleston	50,700	0	0	0	0	1	0	0	2
Wheeling	[1] 56,208	5	1	1	0	0	1	0	3
North Carolina:									
Raleigh	[1] 30,371	6	1	1	0	0	84	0	4
Wilmington	37,700	0	0	0	0	1	13	1	1
Winston-Salem	71,800	7	1	2	0	0	159	20	4
South Carolina:									
Charleston	74,100	2	0	1	31	0	5	0	5
Columbia	41,800	10	1	0	0	0	62	44	6
Greenville	[1] 27,311	1	0	0	0	0	32	2	4
Georgia:									
Atlanta	[2]	15	3	4	36	6	3	7	8
Brunswick	[1] 16,809	0	0	0	0	0	16	9	1
Savannah	94,900	1	1	0	5	2	8	2	2
Florida:									
Miami	[1] 69,754	13	3	2	0	0	3	2	4
St. Petersburg	[1] 26,847		0			0			1
Tampa	102,000	7	2	0	0	0	0	3	1
EAST SOUTH CENTRAL									
Kentucky:									
Covington	58,500	1	1	1	0	0	29	2	5
Louisville	311,000		5						
Tennessee:									
Memphis	177,000	9	4	6	0	5	121	31	7
Nashville	137,000	8	1	0	0	1	15	4	9
Alabama:									
Birmingham	211,000	14	3	5	16	5	55	7	10
Mobile	66,800	0	0	1	8	5	0	0	1
Montgomery	47,000	22	0	1	2		0	3	
WEST SOUTH CENTRAL									
Arkansas:									
Fort Smith	[1] 31,643	5	1	0	0		2	0	
Little Rock	75,900	1	0	1	17	2	159	0	7
Louisiana:									
New Orleans	419,000	13	11	9	19	5	0	0	20
Shreveport	59,500	5	0	3	0	1	195	2	4
Oklahoma:									
Oklahoma City	[2]	3	2	6	7	2	14	0	4
Tulsa	133,000	33		1	0		1	40	
Texas:									
Dallas	203,000	34	6	3	2	1	0	0	11
Fort Worth	159,000	7	2	6	4	1	0	3	6
Galveston	49,100	2	1	1	0	0	3	0	2
Houston	[1] 164,954	7	3	4	0	1	21	0	9
San Antonio	205,000	0	2	2	0	15	44	0	11
MOUNTAIN									
Montana:									
Billings	[1] 17,971	0	0	0	0	0	0	0	6
Great Falls	[1] 29,883	19	1	0	0	0	1	0	1
Helena	[1] 12,037	0	0	6	0	0	0	0	1
Missoula	[1] 12,068	0	0	0	0	0	0	0	0
Idaho:									
Boise	[1] 23,042	0	0	0	0	0	0	1	0

[1] Estimated July 1, 1925.

[2] No estimate made.

City reports for week ended March 6, 1926—Continued

Division, State, and city	Population, July 1, 1926, estimated	Chicken pox, cases reported	Diphtheria: Cases, estimated expectancy	Diphtheria: Cases reported	Influenza: Cases reported	Influenza: Deaths reported	Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
MOUNTAIN—continued									
Colorado:									
Denver	285,000	59	11	9	-------	4	14	81	16
Pueblo	43,900	5	1	0	0	3	1	0	3
New Mexico:									
Albuquerque	[1] 21,000	0	0	1	0	0	49	1	1
Utah:									
Salt Lake City	133,000	17	2	6	0	3	0	5	3
Nevada:									
Reno	[1] 12,665	0	0	0	0	0	0	0	0
PACIFIC									
Washington:									
Seattle	([2])	25	6	1	0	-------	253	19	-------
Spokane	109,000	4	2	2	0	-------	2	0	-------
Tacoma	106,000	11	2	0	0	0	18	22	3
Oregon:									
Portland	[1] 282,383	27	7	1	3	0	17	1	6
California:									
Los Angeles	([2])	92	37	38	36	2	19	33	30
Sacramento	73,400	16	2	1	2	1	22	5	5
San Francisco	567,000	85	21	13	2	4	35	54	8

Division, State, and city	Scarlet fever: Cases, estimated expectancy	Scarlet fever: Cases reported	Smallpox: Cases, estimated expectancy	Smallpox: Cases reported	Smallpox: Deaths reported	Tuberculosis, deaths reported	Typhoid fever: Cases, estimated expectancy	Typhoid fever: Cases reported	Typhoid fever: Deaths reported	Whooping cough, cases reported	Deaths, all causes
NEW ENGLAND											
Maine:											
Portland	4	3	0	0	0	2	1	0	0	9	26
New Hampshire:											
Concord	1	0	0	0	0	0	0	0	0	0	8
Manchester	3	3	0	0	0	0	0	0	0	0	18
Vermont:											
Barre	1	0	0	0	0	0	0	0	0	0	2
Massachusetts:											
Boston	78	75	0	0	0	12	2	0	0	78	260
Fall River	3	12	0	0	0	4	0	0	0	0	32
Springfield	7	21	0	0	0	2	0	0	0	5	35
Worcester	10	6	0	0	0	2	0	0	0	3	56
Rhode Island:											
Pawtucket	1	1	0	0	0	0	0	0	0	0	26
Providence	9	26	0	0	0	5	0	0	0	8	78
Connecticut:											
Bridgeport	12	0	0	0	0	2	0	0	0	4	28
Hartford	6	5	0	0	0	3	0	0	0	4	46
New Haven	11	-------	0	-------	-------	-------	1	-------	-------	-------	-------
MIDDLE ATLANTIC											
New York:											
Buffalo	23	50	0	0	0	13	1	0	0	39	167
New York	302	417	0	0	0	120	7	9	1	180	1,692
Rochester	15	8	0	0	0	3	0	0	0	7	79
Syracuse	12	20	0	0	0	3	0	0	0	66	63
New Jersey:											
Camden	6	0	0	0	0	2	0	0	0	2	34
Newark	33	52	0	0	0	5	0	0	0	26	134
Trenton	5	1	0	0	0	3	0	0	0	0	35
Pennsylvania:											
Philadelphia	85	98	0	0	0	42	2	2	0	88	605
Pittsburgh	33	-------	0	-------	0	10	0	-------	0	-------	180
Reading	3	31	0	0	0	2	0	0	0	0	29

[1] Estimated, July 1, 1925.

[2] No estimate made.

City reports for week ended March 3, 1928—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
EAST NORTH CENTRAL											
Ohio:											
Cincinnati	19	20	2	1	0	10	1	0	0	2	152
Cleveland	53	40	0	0	0	9	1	1	0	94	210
Columbus	11	11	1	0	0	5	1	0	0	0	86
Toledo	14	9	2	0	0	5	0	0	0	7	88
Indiana:											
Fort Wayne	5	7	0	1	0	2	0	0	0	0	22
Indianapolis	11	25	12	4	0	6	0	6	0	2	105
South Bend	3	0	1	0	0	0	0	0	0	0	18
Terre Haute	3	0	0	9	0	2	0	0	0	0	21
Illinois:											
Chicago	140	123	3	3	0	56	3	1	0	90	830
Peoria	4	7	1	0	0	0	0	0	0	4	0
Springfield	2	38	0	2	0	1	1	0	0	2	24
Michigan:											
Detroit	98	117	2	1	0	25	1	1	0	79	320
Flint	8	12	0	6	0	6	0	2	0	13	34
Grand Rapids	11	8	1	0	0	1	1	0	0	2	39
Wisconsin:											
Kenosha	3	3	0	1	0	0	0	0	0	14	7
Milwaukee	29	52	2	0	0	6	0	0	0	14	103
Racine	4	14	1	0	0	1	0	0	0	9	17
Superior	3	3	1	0	0	2	0	0	0	0	9
WEST NORTH CENTRAL											
Minnesota:											
Duluth	8	8	1	0	0	0	0	0	0	17	19
Minneapolis	62	25	5	0	0	1	0	1	0	10	88
St. Paul	34	6	6	0	0	6	0	0	0	3	57
Iowa:											
Davenport	1	4	3	0	-------	-------	0	0	-------	0	-------
Des Moines	7	15	1	15	-------	-------	0	0	-------	0	37
Sioux City	1	2	1	0	-------	-------	0	0	-------	0	-------
Waterloo	1	14	1	1	-------	-------	0	0	-------	0	-------
Missouri:											
Kansas City	12	22	4	2	0	8	0	0	0	15	115
St. Joseph	3	4	0	10	0	2	0	0	0	0	31
St. Louis	40	24	5	2	0	22	1	1	0	24	292
North Dakota:											
Fargo	3	1	0	0	0	0	0	0	0	3	6
Grand Forks	0	2	0	0	-------	-------	0	0	-------	0	-------
South Dakota:											
Aberdeen	4	0	0	0	-------	-------	0	0	-------	0	-------
Nebraska:											
Omaha	7	13	9	6	0	1	0	1	0	0	53
Kansas:											
Topeka	3	2	0	2	0	0	0	0	0	9	14
Wichita	4	3	1	9	0	1	0	0	0	1	38
SOUTH ATLANTIC											
Delaware:											
Wilmington	5	1	0	0	0	2	0	0	0	2	21
Maryland:											
Baltimore	41	30	0	0	0	11	2	0	0	24	273
Cumberland	1	2	0	0	0	1	0	0	0	0	14
Frederick	1	0	0	0	0	0	0	0	0	0	4
Dist. of Columbia:											
Washington	26	45	1	0	0	6	1	0	0	7	144
Virginia:											
Lynchburg	1	1	0	0	0	0	0	0	0	17	9
Norfolk	3	36	0	0	0	4	0	0	0	1	-------
Richmond	3	4	0	0	0	3	0	1	0	0	56
Roanoke	1	4	1	0	0	1	0	0	0	3	12
West Virginia:											
Charleston	0	5	1	3	1	1	0	0	0	0	29
Wheeling	3	4	0	0	0	0	0	0	0	0	19
North Carolina:											
Raleigh	1	1	1	0	0	3	0	0	0	4	20
Wilmington	0	0	0	0	0	0	0	1	1	3	18
Winston-Salem	0	2	3	1	0	3	0	0	0	5	21

City reports for week ended March 3, 1928—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
SOUTH ATLANTIC—continued											
South Carolina:											
Charleston	0	0	0	0	0	3	1	0	0	0	22
Columbia	0	1	1	0	0	0	0	0	0	3	25
Greenville	0	1	1	0	0	0	0	0	0	4	13
Georgia:											
Atlanta	4	5	7	0	0	4	0	0	0	2	94
Brunswick	0	0	0	0	0	0	0	0	0	0	4
Savannah	0	1	1	7	0	3	0	2	0	0	28
Florida:											
Miami	1	1	0	0	0	1	0	0	0	1	26
St. Petersburg	1	----	0	----	0	0	0	----	0	----	16
Tampa	1	2	0	0	0	5	2	3	1	0	24
EAST SOUTH CENTRAL											
Kentucky:											
Covington	1	3	0	0	0	3	0	0	0	0	26
Louisville	6	----	1	----	----	----	0	----	----	----	----
Tennessee:											
Memphis	4	6	3	0	0	10	1	2	0	5	68
Nashville	4	0	2	0	0	6	1	2	0	2	55
Alabama:											
Birmingham	2	2	7	0	0	5	0	6	0	0	78
Mobile	0	5	1	0	0	3	0	0	0	0	26
Montgomery	0	0	0	0	----	----	0	0	----	0	----
WEST SOUTH CENTRAL											
Arkansas:											
Fort Smith	0	2	0	0	----	----	0	0	----	1	----
Little Rock	1	3	0	0	0	1	0	0	0	0	----
Louisiana:											
New Orleans	7	6	1	1	0	16	2	5	0	9	166
Shreveport	1	3	1	0	0	1	0	1	1	7	38
Oklahoma:											
Oklahoma City	3	2	0	16	0	0	0	0	0	0	24
Tulsa	----	20	----	4	----	----	----	0	----	5	----
Texas:											
Dallas	2	5	5	3	0	2	0	1	1	3	56
Fort Worth	0	3	2	1	0	1	0	0	0	0	37
Galveston	1	0	1	0	0	1	1	0	0	0	16
Houston	1	3	3	1	0	11	0	1	0	0	56
San Antonio	1	2	1	0	0	5	0	0	0	0	116
MOUNTAIN											
Montana:											
Billings	2	0	0	0	0	0	0	0	0	1	15
Great Falls	2	0	1	1	0	0	0	0	0	2	11
Helena	0	2	0	0	0	0	0	0	0	0	4
Missoula	1	0	1	0	0	0	0	0	0	0	2
Idaho:											
Boise	1	0	1	0	0	0	0	0	0	1	13
Colorado:											
Denver	15	16	2	1	0	10	0	0	0	6	93
Pueblo	1	9	0	0	0	0	0	0	0	4	19
New Mexico:											
Albuquerque	2	0	0	0	0	6	0	0	0	0	16
Utah:											
Salt Lake City	3	2	1	2	0	1	0	1	0	11	37
Nevada:											
Reno	0	0	0	2	0	0	0	0	0	0	10
PACIFIC											
Washington:											
Seattle	11	0	5	0	----	----	1	0	----	6	----
Spokane	6	16	6	17	----	----	0	0	----	1	----
Tacoma	2	1	3	0	0	1	0	0	0	4	26
Oregon:											
Portland	7	9	10	38	0	8	0	0	1	0	79
California:											
Los Angeles	32	25	8	0	0	25	2	0	0	19	250
Sacramento	2	1	0	1	0	1	0	0	0	4	----
San Francisco	15	33	5	1	0	14	1	3	0	14	165

City reports for week ended March 3, 1928—Continued

Division, State, and city	Meningococcus meningitis		Lethargic encephalitis		Pellagra		Poliomyelitis (infantile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, estimated expectancy	Cases	Deaths
NEW ENGLAND									
Massachusetts:									
Boston	1	0	0	0	0	0	1	1	0
Worcester	0	0	1	0	0	0	0	0	0
Connecticut:									
Hartford	1	0	0	0	0	0	0	0	0
MIDDLE ATLANTIC									
New York:									
New York	9	10	7	4	0	0	1	4	1
Pennsylvania:									
Philadelphia	2	0	0	0	0	0	0	0	0
EAST NORTH CENTRAL									
Ohio:									
Cleveland	1	1	1	0	0	0	0	0	0
Toledo	0	1	0	0	0	0	0	0	0
Illinois:									
Chicago [1]	5	1	0	0	2	2	0	0	0
Michigan:									
Detroit	1	0	0	0	0	0	1	0	0
Wisconsin:									
Milwaukee	3	1	0	0	0	0	0	0	0
Racine	1	1	0	0	0	0	0	0	0
WEST NORTH CENTRAL									
Missouri:									
St. Louis	2	2	0	0	0	0	0	0	0
North Dakota:									
Fargo	0	0	2	0	0	0	0	0	0
SOUTH ATLANTIC									
Virginia:									
Lynchburg	0	0	0	0	0	1	0	0	0
Georgia:									
Atlanta	0	0	0	0	0	2	0	0	0
Savannah [2]	0	0	0	0	1	1	0	0	0
Florida:									
Tampa	0	1	0	0	0	0	0	0	0
EAST SOUTH CENTRAL									
Alabama:									
Birmingham	0	0	0	0	3	3	0	0	0
Mobile	0	0	0	0	0	1	0	0	0
WEST SOUTH CENTRAL									
Louisiana:									
New Orleans	0	0	1	0	1	0	0	1	0
Shreveport	0	0	0	0	0	1	0	0	0
Texas:									
Dallas	0	0	0	0	1	1	0	0	0
Houston	1	0	0	0	0	0	0	0	0
San Antonio	0	0	0	0	0	1	0	0	0
MOUNTAIN									
Colorado:									
Denver	4	2	0	0	0	0	0	0	0
Pueblo	2	1	0	0	0	0	0	0	0
Utah:									
Salt Lake City	1	0	0	0	0	0	0	0	0
Nevada:									
Reno	1	1	0	0	0	0	0	0	0
PACIFIC									
Washington:									
Spokane	4	0	0	0	0	0	0	0	0
Tacoma	0	1	0	0	0	0	0	0	0
Oregon:									
Portland	2	1	0	0	0	0	0	0	0
California:									
Los Angeles	1	0	0	0	0	0	0	2	1

[1] Rabies (human): 1 case and 1 death at Chicago, Ill.
[2] Typhus fever: 2 cases at Savannah, Ga.

The following table gives the rates per 100,000 population for 101 cities for the five-week period ended March 3, 1928, compared with those for a like period ended March 5, 1927. The population figures used in computing the rates are approximate estimates as of July 1, 1927 and 1928, respectively, authoritative figures for many of the cities not being available. The 101 cities reporting cases had estimated aggregate populations of approximately 31,050,000 in 1927 and 31,657,000 in 1928. The 95 cities reporting deaths had nearly 30,370,000 estimated population in 1927 and nearly 30,961,000 in 1928. The number of cities included in each group and the estimated aggregate populations are shown in a separate table below:

Summary of weekly reports from cities, January 22 to February 25, 1928—Annual rates per 100,000 population compared with rates for the corresponding period of 1927 [1]

DIPHTHERIA CASE RATES

	Week ended—									
	Feb. 5, 1927	Feb. 4, 1928	Feb. 12, 1927	Feb. 11, 1928	Feb. 19, 1927	Feb. 18, 1928	Feb. 26, 1927	Feb. 25, 1928	Mar. 5, 1927	Mar. 3, 1928
101 cities	194	190	177	167	203	175	179	174	182	[2] 173
New England	146	193	174	136	133	172	149	138	163	[3] 150
Middle Atlantic	229	278	188	230	277	234	199	224	223	[4] 236
East North Central	201	145	179	175	168	169	198	169	176	164
West North Central	123	113	154	99	164	125	109	125	115	113
South Atlantic	143	167	222	112	191	149	191	156	195	130
East South Central	127	55	61	55	86	55	117	35	81	[5] 102
West South Central	232	152	149	128	170	124	194	188	149	92
Mountain	188	106	152	44	161	186	72	71	233	186
Pacific	217	156	167	133	188	82	151	161	133	141

MEASLES CASE RATES

101 cities	570	724	652	791	810	892	862	998	880	[2] 1,090
New England	379	1,508	339	1,614	181	1,657	228	1,908	172	[3] 1,634
Middle Atlantic	41	618	45	647	68	700	74	877	67	[4] 978
East North Central	695	359	786	440	1,009	531	1,015	565	1,173	761
West North Central	453	222	683	216	564	240	960	255	952	341
South Atlantic	536	1,822	359	1,959	792	2,246	651	2,406	794	2,576
East South Central	269	1,192	451	1,132	467	1,347	461	1,202	538	[5] 1,600
West South Central	562	916	451	1,304	562	1,899	591	1,959	720	1,695
Mountain	7,217	115	7,845	186	9,665	97	10,624	168	8,132	142
Pacific	1,538	708	2,220	718	2,774	692	2,865	749	3,030	892

SCARLET FEVER CASE RATES

101 cities	403	270	390	300	438	291	424	295	418	[2] 296
New England	509	359	537	432	470	441	542	414	423	[3] 373
Middle Atlantic	433	295	423	333	581	330	531	335	532	[4] 353
East North Central	324	289	325	310	322	280	366	285	399	309
West North Central	521	247	499	290	540	265	445	275	443	261
South Atlantic	245	207	258	231	249	228	218	282	180	254
East South Central	243	130	223	135	243	190	183	185	218	[5] 116
West South Central	124	132	74	100	66	116	116	120	66	96
Mountain	1,515	380	1,246	540	1,246	345	1,192	203	1,076	257
Pacific	436	217	389	192	340	230	313	233	329	194

[1] The figures given in this table are rates per 100,000 population annual basis and not the number of cases reported. Populations used are estimated as of July 1, 1927 and 1928, respectively.
[2] New Haven, Conn., Pittsburgh, Pa., and Louisville, Ky., not included.
[3] New Haven, Conn., not included.
[4] Pittsburgh, Pa., not included.
[5] Louisville, Ky., not included.

Summary of weekly reports from cities, January 22 to February 25, 1928—Annual rates per 100,000 population compared with rates for the corresponding period of 1927—Continued

SMALLPOX CASE RATES

	Week ended—									
	Feb. 5, 1927	Feb. 4, 1928	Feb. 12, 1927	Feb. 11, 1928	Feb. 19, 1927	Feb. 18, 1928	Feb. 26, 1927	Feb. 25, 1928	Mar. 5, 1927	Mar. 3, 1928
101 cities	25	21	26	21	33	20	25	24	21	[2] 17
New England	0	0	0	0	0	0	0	0	0	[3] 0
Middle Atlantic	0	0	0	0	0	0	0	0	0	[4] 0
East North Central	22	9	15	14	28	12	15	13	21	18
West North Central	53	117	71	109	81	101	63	92	53	62
South Atlantic	43	18	63	21	60	26	45	26	52	19
East South Central	101	20	81	15	132	25	71	40	122	[5] 0
West South Central	79	12	66	16	62	20	50	8	50	20
Mountain	9	115	18	44	27	168	0	62	0	53
Pacific	63	59	76	69	94	18	104	125	13	49

TYPHOID FEVER CASE RATES

101 cities	7	7	7	7	9	5	8	5	9	[2] 9
New England	9	14	5	9	2	5	9	7	2	[3] 0
Middle Atlantic	9	5	5	6	10	3	1	5	5	[4] 6
East North Central	5	3	3	6	4	3	6	1	6	7
West North Central	4	2	6	6	10	4	8	4	10	6
South Atlantic	5	5	18	9	23	7	29	9	23	12
East South Central	5	15	10	5	30	15	25	20	41	[5] 73
West South Central	17	40	12	40	8	12	4	16	8	32
Mountain	0	9	0	0	0	0	18	0	9	9
Pacific	8	10	18	0	3	8	8	5	8	8

INFLUENZA DEATH RATES

95 cities	19	19	24	17	23	22	22	21	25	[6] 24
New England	5	9	2	7	9	11	12	7	9	[3] 8
Middle Atlantic	21	14	28	15	25	18	22	24	24	16
East North Central	9	13	22	10	19	12	17	14	23	17
West North Central	12	10	14	4	23	6	10	2	17	10
South Atlantic	27	23	23	30	31	35	41	28	47	32
East South Central	58	68	37	42	43	37	43	31	21	[5] 125
West South Central	64	45	38	57	38	90	25	74	38	103
Mountain	45	53	72	53	27	71	54	35	54	88
Pacific	7	34	21	20	17	27	17	20	17	24

PNEUMONIA DEATH RATES

95 cities	168	150	147	168	146	174	163	161	171	[6] 188
New England	188	126	165	149	102	170	184	147	202	[3] 188
Middle Atlantic	197	129	173	200	148	195	176	155	193	217
East North Central	121	129	128	114	121	137	145	156	132	148
West North Central	135	49	95	106	91	94	91	71	104	106
South Atlantic	222	198	168	224	234	216	253	228	229	217
East South Central	207	131	117	235	175	204	122	220	271	[5] 249
West South Central	149	209	144	201	204	279	161	271	183	263
Mountain	143	203	143	150	188	168	134	248	126	265
Pacific	121	128	114	182	176	172	131	115	121	155

[2] New Haven, Conn., Pittsburgh, Pa., and Louisville, Ky., not included.
[3] New Haven, Conn., not included.
[4] Pittsburgh, Pa., not included.
[5] Louisville, Ky., not included.
[6] New Haven, Conn., and Louisville, Ky., not included.

Number of cities included in summary of weekly reports, and aggregate population of cities in each group, approximated as of July 1, 1927 and 1928, respectively

Group of cities	Number of cities reporting cases	Number of cities reporting deaths	Aggregate population of cities reporting cases		Aggregate population of cities reporting deaths	
			1927	1928	1927	1928
Total	101	95	31,050,300	31,657,000	30,369,500	30,960,700
New England	12	12	2,242,700	2,274,400	2,242,700	2,274,400
Middle Atlantic	10	10	10,594,700	10,732,400	10,594,700	10,732,400
East North Central	16	16	7,820,700	7,991,400	7,820,700	7,991,400
West North Central	12	10	2,634,500	2,683,500	2,518,500	2,566,400
South Atlantic	21	21	2,890,700	2,981,900	2,890,700	2,981,900
East South Central	7	6	1,028,300	1,048,300	980,700	1,000,100
West South Central	8	7	1,260,700	1,307,600	1,227,800	1,274,100
Mountain	9	9	581,600	591,100	581,600	591,100
Pacific	6	4	1,996,400	2,046,400	1,512,100	1,548,900

FOREIGN AND INSULAR

SMALLPOX ON VESSEL

Mombasa, British East Africa—Steamship "Khandalla"—January 14, 1928.—The steamship *Khandalla* arrived at the port of Mombasa, British East Africa, with two deck passengers infected with smallpox. The cases were landed January 14, 1928. The *Khandalla* arrived at Durban, Natal, Union of South Africa, January 25, 1928, with no history of further outbreak of smallpox on board.

THE FAR EAST

Report for the week ended February 18, 1928.—The following report for the week ended February 18, 1928, was transmitted by the Eastern Bureau of the Health Section of the Secretariat of the League of Nations, located at Singapore, to the headquarters at Geneva:

Plague, cholera, or smallpox was reported present in the following ports:

PLAGUE

Egypt.—Alexandria, Suez.
Aden Protectorate.—Aden.
India.—Bassein, Bombay, Rangoon.
Ceylon.—Colombo.
Siam.—Bangkok.
Straits Settlements.—Singapore.

CHOLERA

India.—Bombay, Calcutta, Negapatam, Rangoon.
Siam.—Bangkok.
French Indo-China.—Saigon.

SMALLPOX

Aden Protectorate.—Perim.
Ceylon.—Colombo.
India.—Bombay, Calcutta, Madras, Moulmein, Negapatam, Rangoon.
French India.—Pondicherry.
Dutch East Indies.—Banjermasin, Belawan-Deli.
Straits Settlements.—Singapore.
China.—Shanghai.
Kwantung.—Dairen.
Manchuria.—Mukden.

Returns for the week ended February 18, were not received from Samarinda, Dutch East Indies, nor Vladivostok, Union of Socialist Soviet Republics.

ANGOLA

Communicable diseases—November, 1927.—During the month of November, 1927, communicable diseases were reported in Angola as follows:

Disease	Coast District	Land Frontier	Interior	Total
Ancylostomiasis	2		5	7
Beriberi	2	6		8
Bilharzia	10		12	22
Chicken pox (including alastrim)	31		32	63
Dysentery	28	15	7	50
Erysipelas	1			1

Disease	Coast District	Land Frontier	Interior	Total
Hemoglobin fever	7	1	10	18
Influenza	50	139	66	255
Leprosy	2		9	11
Malaria	293	137	113	543
Measles	84			84
Meningitis			1	1
Mumps	2			2
Puerperal septicemia		1		1
Pneumonia	16	5	15	36
Relapsing fever		2		2
Scabies	8			8
Smallpox	7		1	8
Tetanus	5			5
Tuberculosis	20	3	4	27
Trypanosomiasis	120	24	42	186
Venereal diseases	177	92	31	300
Whooping cough	22		3	25
Yaws	139	33	93	265

CANADA

Provinces—Communicable diseases—Week ended March 3, 1928.—The Canadian Ministry of Health reports cases of certain communicable diseases from seven Provinces of Canada for the week ended March 3, 1928, as follows:

Disease	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	Total
Cerebrospinal fever					2			2
Influenza	18			11	1	5		35
Poliomyelitis				1				1
Smallpox		1		36		6	16	59
Typhoid fever	2	4	24	20	2			52

Quebec—Communicable diseases—Week ended March 3, 1928.—The Provincial Bureau of Health of Quebec reports cases of certain communicable diseases for the week ended March 3, 1928, as follows:

Disease	Cases	Disease	Cases
Chicken pox	54	Scarlet fever	104
Diphtheria	56	Smallpox	12
German measles	10	Tuberculosis	33
Influenza	8	Typhoid fever	24
Measles	300	Whooping cough	15

Sydney, Nova Scotia—Vital statistics, 1927.—The medical officer of the city of Sydney, Nova Scotia, reported 790 births and 232 deaths for the year 1927.

Communicable diseases were reported for the year as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	2	Scarlet fever	27
Chicken pox	1	Tuberculosis	60
Diphtheria	9	Typhoid fever	10
Measles	39	Venereal diseases	55
Mumps	21		

CHILE

Concepcion—Vital statistics—October–December, 1927.—During the fourth quarter of the year 1927, 806 births were reported in Concepcion, Chile, and the number of deaths registered was the same.

There were 359 deaths of infants under one year of age, giving an infant mortality of 445 per 1,000 births.

The deaths included the following:

Disease	Deaths	Disease	Deaths
Bronchial pneumonia	41	Nephritis	7
Cancer	18	Pneumonia	138
Diabetes	2	Puerperal fever	4
Diphtheria	1	Syphilis	6
Dysentery	12	Tuberculosis	114
Influenza	6	Typhoid fever	5
Measles	19	Typhus fever	1

CUBA

Malaria—July, 1926, to December, 1927.—Malaria was officially reported in the city of Santiago, the Province of Oriente (including Santiago), and the Republic of Cuba, during the 18 months from July, 1926, to December, 1927, inclusive, as follows:

Quarter	Santiago de Cuba	Oriente Province	Republic of Cuba
1926			
July to September	146	883	1,857
October to December	1,587	2,538	5,662
1927			
January to March	1,757	3,296	4,938
April to June	492	776	1,161
July to September	888	1,556	1,861
October to December	1,178	1,506	2,105

Provinces—Communicable diseases—December 25, 1927–February 11, 1928.—During the period from December 25, 1927 to February 11, 1928, cases of communicable diseases were reported from the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguay	Oriente	Total
Cerebrospinal meningitis		2					2
Chicken pox	26	40	11	5	3	18	103
Diphtheria	1	25	12	8	2	15	63
Malaria		56	10	5	116	365	552
Measles		13	2		20	1	36
Paratyphoid fever		3		11	4	10	28
Scarlet fever	2	7	6	1			16
Tetanus (infantile)					1	2	3
Typhoid fever	19	97	11	37	13	60	237

GERMANY

Vital statistics—January to June, 1927.—Preliminary compilations of vital statistics of Germany for the first six months of the year 1927

show 244,496 marriages, 604,013 live births, 409,643 deaths (excluding stillbirths), and 20,362 stillbirths. As compared with similar statistics for the first six months of the year 1913, there was a decrease in the birth rate of about 29 per cent, while the death rate decreased about 16 per cent.

The infant mortality rate for the six months of 1927 was about 30 per cent lower than it was for the same period in 1913.

The following table gives a comparison of the rates for the first six months of the years 1913, 1925, 1926, and 1927:

	1913	1925	1926	1927
Marriages per annum per 1,000 population:				
First quarter	6.2	5.7	5.6	6.0
Second quarter	9.0	8.7	8.5	9.5
Births per annum per 1,000 population:				
First quarter	27.2	21.9	20.4	19.2
Second quarter	26.8	21.8	20.2	19.0
Deaths per annum per 1,000 population:				
First quarter	15.9	12.6	13.0	14.5
Second quarter	15.0	12.0	11.9	11.4
Deaths of infants under 1 year of age per 1,000 live births:				
First quarter	143	110	108	111
Second quarter	147	95	99	92

GREAT BRITAIN

England and Wales—Vital statistics, 1927.—The following table, showing birth and death rates in England and Wales for the year 1927, was prepared from figures published by the Registrar General of England and Wales:

	England and Wales	107 county boroughs and great towns	155 smaller towns	London
Birth rate per 1,000	16.7	17.1	16.4	16.1
Annual death rate per 1,000:				
All causes	12.3	12.2	11.3	11.9
Diphtheria	.07	.08	.05	.09
Influenza	.57	.49	.58	.39
Measles	.09	.12	.07	.04
Scarlet fever	.01	.01	.01	.01
Smallpox	.00	.00	.00	.00
Typhoid fever	.01	.01	.01	.01
Violence	.51	.46	.41	.51
Whooping cough	.09	.10	.08	.12
Death rate per 1,000 births:				
Diarrhea and enteritis (under 2 years)	6.3	8.3	5.0	7.5
All deaths under 1 year	69	71	68	59

London is included in the 107 county boroughs and great towns. The "smaller towns" are those with populations of from 20,000 to 50,000.

HAWAII TERRITORY

Island of Hawaii—Plague—February 16, 1928.—A death from bubonic plague occurred at Kukuihaele, Island of Hawaii, on February 16, 1928.

The last previously reported case of human plague at Kukuihaele occurred August 12, 1927, and plague has not been reported in rodents in the Island of Hawaii since December 20, 1927.

JAMAICA

Smallpox (alastrim)—January 29–February 25, 1928.—During the period January 29 to February 25, 1928, five new cases of smallpox (alastrim) were reported in the Island of Jamaica outside of Kingston.

Other communicable diseases.—During the same period other diseases were reported in Jamaica as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chicken pox		20	Puerperal fever		1
Dysentery	4	13	Tuberculosis	22	33
Erysipelas		1	Typhoid fever	22	82

Population: Kingston, 62,707; Island of Jamaica, 926,000.

PORTO RICO

Fajardo, vicinity of—Smallpox unofficially reported—March 12, 1928.—Under date of March 12, 1928, smallpox in epidemic form was unofficially reported present in the vicinity of Fajardo, Porto Rico.

UNION OF SOUTH AFRICA

Cape Province—Spread of plague infection among veldt rodents—February 10, 1928.—Information received under date of February 10, 1928, indicates serious spread of plague in veldt rodents in the Cape Province, Union of South Africa, during the past few months. The spread is stated to have taken place southward from the Calvinia district into the Ceres Basin to a point about 10 miles north of Ceres, and to the westward into Namaqualand to a line about 15 miles west of Springbok and roughly parallel with the coast. The affected area was stated to include Springbok, Garies, and Nieuwerust, extending to within a few miles of Van Rhynsdorp and about 25 miles northward of the protective belt which had been cleared of rodents along the Oliphant River and the irrigation canals. The wave of infection was stated to be spreading rapidly. Indications were noted that hares, which are numerous in that area, were playing an important part in spread of the infection.

It was stated that the spread into the Ceres Basin was especially important as that area is separated from the open gerbille-infested area on the Cape Peninsular side by a mountain barrier about 3 miles wide traversed by passes. It is intended to clear these passes of rodents and to strengthen the defences within the area.

Orange Free State—Plague—January 22–28, 1928.—During the week ended January 28, 1928, two cases of plague with one death, were reported in the Sastron district, Orange Free State. The occurrence was in natives and on a farm.

Typhus fever.—Fresh outbreaks of typhus fever were reported during the week ended January 28, 1928, in the Cape Province, in the Mount Frere district and in the Kroonstad district, Orange Free State.

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

From medical officers of the Public Health Service, American consuls, Health Section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

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

Place		July 3–30, 1927	July 31–Aug. 27, 1927	Aug. 28–Sept. 24, 1927	Sept. 25–Oct. 22, 1927	Oct. 23–Nov. 19, 1927	Week ended— Nov. 26, 1927	December, 1927					January, 1928				February, 1928			
								3	10	17	24	31	7	14	21	28	4	11	18	25
China:																				
Amoy	C	2	28	72	16															
	D		7	3																
Canton	C	8	31	36	14	12		1												
	D	5	10	25	14	11		1												
Foochow	C	P	P	P	P															
Hong Kong	C	2	P	1	P															
	D	1																		
Shanghai (settlement and concession)—																				
Foreigners only	C		1	6	3															
Including natives	C		20	74	7															
Swatow	C	72	42	P	P	P														
	D	1		P	P	P														
Tientsin	C	P	P	15	2	P			1											
Dutch East Indies: Java—Batavia	C					28	2	1												
	D					18	2	1												
India	C	46,137	45,163	31,390	20,160	23,047	8,102	5,997	5,766	5,274	4,624	3,960	3,550	3,243						
	D	24,081	22,051	15,895	10,371	12,863	4,835	3,672	3,355	3,164	2,617	2,353	2,046	1,847						
Bassein	C	16															1			1
Bombay	C	75	42	3		2										1				
	D	35	30	2		2														
Calcutta	C	95	87	76	101	199	156	119	87	66	69	42	43	22	39	36	70			
	D	48	40	39	64	138	106	77	55	43	48	34	27	16	18	24	38	32	35	42
Madras	C	424	547	59	14	13			1					1	1			1	2	
	D	204	278	48	8	7	1		1					1		3		1		
Madras Presidency	C	11,491	7,660	3,056	2,050	3,073	1,484	861	878	479	503	382	482							
	D	4,807	3,513	1,581	1,055	1,736	802	528	491	283	241	209	254							
Negapatam	C														4					
	D														4	1		1	2	2
Rangoon	C	2	1	2	6	2	3	1	2	2	1	2		1	4					
	D	2	1	2	5	5	2	1	2	1	1	1		1			1	1	3	4
Tuticorin	C				1			6		2										
	D				1	37		6	6	2										

India (French):																				
Chandernagor	C	1	1	1		6	2	2	2	2	6	3	4	1	1					
	D	1	1			6	2	2	2	2	4	2	2	1						
Karikal	C	56	18	1		1				1			6	2	9					
	D	45	12	1		1				1			4		5					
Pondicherry	C	37	12	15		1		5	3	17	4	1	2	4	2					
	D	24	11	15		1		5	1	15	6	1	2	3	2					
Indo-China: Saigon	C			1	1								2	1	1	1		2	1	5
	D												1					1	1	1
Iraq [1]																				
Japan: Yokohama	C	1																		
	D	1																		
Philippine Islands: Manila	C	1	1																	
Siam	C	81	77	40	18	110	19	29	18	32	24	24	13	49	50	33				
	D	59	53	24	11	76	11	19	13	21	18	21	5	36	34	21				
Bangkok	C	6	2	3	5	4		1	1	1	2	3	7	9	11	28	28	34	23	17
	D	1	1	1	3	2		1		1	2	1	3	5	7	16	26	17	12	11
Straits Settlements: Singapore	C					7	1	2		2	3	15	3	2	2			1		
	D					5	2			2	1	4	5	2	1					
On vessel:																				
S. S. Adrastus: At Yokohama, Japan	C		1																	
	D		1																	
S. S. Tabaristan: At Basra, Iraq	C				1															

[1] From July 19 to Dec. 26, 1927, 1,479 cases of cholera were reported in Iraq, with 1,063 deaths, as follows: Amarah Liwa, 261 cases, 205 deaths; Baghdad Liwa, 80 cases, 60 deaths; Basra Liwa, 421 cases, 330 deaths; Diwaniah Liwa, 122 cases, 72 deaths; Diyalah Liwa, 1 case, 1 death; Dulaim Liwa, 100 cases, 69 deaths; Hillah Liwa, 105 cases, 71 deaths; Kerbalah Liwa, 79 cases, 60 deaths; Kut Liwa, 66 cases, 44 deaths; Muntafiq Liwa, 244 cases, 151 deaths.

Place		July, 1927	August, 1927	September, 1927	October, 1927	November, 1927			December, 1927			January, 1928			Feb. 1–10, 1928
						1–10	11–20	21–30	1–10	11–20	21–31	1–10	11–20	21–31	
Indo-China (French):															
Annam	C	911	1,628	640	226	13	75	38	16	2		79	95	93	23
Cambodia	C	87	89	75	180	56	1	28	21	12	39	30	9	15	38
Cochin-China	C	257	68	144	178	21	27	52	17	38	58	46	119	130	178
Laos	C	20	190	36	67	10									
Tonkin	C	1,093	180	24	1			1			2	1			
Kwangchow-wan	C		1	15											

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

PLAGUE

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

Place		July 3–30, 1927	July 31–Aug. 27, 1927	Aug. 28–Sept. 24, 1927	Sept. 25–Oct. 22, 1927	Oct. 23–Nov. 19, 1927	Week ended— Nov. 26, 1927	December, 1927 3	10	17	24	31	January, 1928 7	14	21	28	February, 1928 4	11	18	25	Mar. 3, 1928
Algeria: Oran	C		4	1		2															
	D		3	1																	
Arabia: Aden	C													19	13	22	54	89	63	45	
	D													7	8	6	33	58	50	31	
Argentina:																					
Bahia Blanca district	C						1	1	1									2			
Buenos Aires	C																				
Cordoba Province	C		2		P	P	10				1	1									
Entre Rios	C		5																		
Firmat	C									1											
Quilino	C						1	1	1												
Rosario	C						1	1	1	1	2	3				4			1		
Santiago Province	C																		1		
Ucacha	C									1											
Azores: St. Michaels Island	C	2	2	2	3	3	1	1	1		1		1		3	1	2	2			
	D			1	1				1					1	1	1	1	1			
Brazil:																					
Port Alegre [1]																					2
Rio de Janeiro	C														1		1	2			
British East Africa:																					
Tanganyiki	C	P	P		P	P	P	P	P	P	P										
Uganda	C	528	456	226	99	99	24	27	16												
	D	413	345	158	88	96	21	25	15												
Canary Islands:																					
Las Palmas	C				9		1			2			2	1	1				1		
	D													1	1						
Teneriffe	C														1	5	3	3			
	D														1			3			
Ceylon: Columbo	C		1	3	1		1	1		4	3	2	1	1	1	1	1		3	3	
	D			3					2	4	3	1	1	1	1	1			1	3	
China:																					
Amoy	C	P																			
Tientsin	C		2																		
Tungliao	D				200																

Dutch East Indies:																						
Balik-Papan	C											1										
	D											1										
Celebes—Makassar	C					6	1		1		2	1		3	2	1	1	1		1		
	D					6	1		1		2	1		2	2	1	1	1		1		
Java	D			432	779	829	291	275	251	200	209	179										
Batavia and West Java	C	40	71	68	130	132	45	43	32	34	32	36	24	36	46							
	D	40	71	68	129	132	44	43	32	33	32	36	24	36	44							
Cheribon	C							i														
	D							1														
East Java and Madura	C	29	28	18	17	10	5	3			3	2	1	1								
	D	29	27	18	17	10	5	3			3	2	1	1								
Pasoeroean Residency	C						P	P	P													
Surabaya Residency	C							P														
Surakarta Residency	C					P	P	P														
Egypt:																						
Alexandria	C		2	1			5	3	2	2	3	2					1		1			
	D						5	2			1	1					1		1			
Suez	C			1										1	1		3		3	4		
	D													1	1		1		3	3		
Greece:																						
Athens and Piræus	C		1	3	1							2	1									
	D				1							1										
Mitylene	C		1	5	1	3	1	1	1													
Patras	C		2	2	1	1																
	D				1	1																
Hawaii Territory: Hawaii	D		1																1			
India	C	404	1,391	2,710	3,246	3,600	1,193	1,228	1,348	1,749	1,085	1,197	2,596	2,219								
	D	241	836	1,428	1,792	2,065	668	742	773	1,085	733	899	1,804	1,498								
Bassein	D	23	12	14	8	4	3			1	2	13	2		3	3		2	1	2		
Bombay	C	14	14	7	4							1		2	5	4	2					
	D	13	11	5	3							1		1	2	2	3	2	6	14		
Calcutta	C			18												1						
	D			10																		
Madras Presidency	C	255	620	465	583	470	190	158	220	223	174	167	56	153								
	D	115	321	230	298	282	111	61	108	79	69	27	38	72								
Rangoon	C	21	15	6	11	11	5	2	6	2	2	4	4	7	8	9						
	D	20	14	6	11	11	5	2	5	3	2	3	4	7	7	7	6	10	12	15		
Indo-China: Saigon	C			2		1																
Iraq: Baghdad	C														1	1						
	D														1							
Nigeria: Lagos	C					17	4	3	4	2	2	1	1	6	2	3	3	2	2			
	D					17	4	3	3	3	1	1	1	5	3	3	3	2	2			
Senegal:																						
Baol	C	41	23	72	95	P		P														
	D	22	13	38	40																	
Cayor	C	126	227	463	176	48																
	D	74	166	233	88	28																
Dakar	C	67	46	20	1																	
	D	41	32	12	1																	
Louga	C			5	8																	
	D			4																		

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

PLAGUE—Continued

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

Place		July 3–30, 1927	July 31–Aug. 27, 1927	Aug. 28–Sept. 24, 1927	Sept. 25–Oct. 22, 1927	Oct. 23–Nov. 19, 1927	Week ended— Nov. 26, 1927	December, 1927 3	10	17	24	31	January, 1928 7	14	21	28	February, 1928 4	11	18	25	Mar. 3, 1928
Senegal—Continued.																					
M'Bour	C	28																			
	D	22																			
Rufisque	C	104	44	16																	
	D	82	38	12																	
Thiès	C	7		9	1	1															
	D	3		7																	
Tivaouane	C	43																			
	D	29																			
Siam	C				13	1	2			1	1	7	4	4	5						
	D				9		1			1	1	1	5	4	1						
Bangkok	C				2							1				1			1		
	D					1						1				1			1		
Straits Settlements: Singapore	C					1												1	1	1	
	D					1												1	1	1	
Turkey: Constantinople	C			1	1		1	1													
	D				1			1													
Union of South Africa:																					
Cape Providence	C					2			2						1						
	D					2			1						1						
Orange Free State	C	4				1	8	P								2					
	D	4				1	6									1					
U. S. S. R.:																					
Chita district	C				1																
	D				1																
Northern Caucasus	C			14	1																
	D			10																	
On vessel:																					
At La Plata, from Rosario, Argentina	C											1									
S. S. Aghios Gerasimos at Vigo, Spain	C					3															

Beirut, Syria, 1 case, Dec. 1–10.

Place		July	August	September	October	November	December	January
Algeria: Algiers	C				2			
British East Africa: Kenya	C	13	61	21	18	28	16	
Ecuador: Guayaquil	C	5	7	3	4	9	5	4
	D					3	2	4
Indo-China (French)	C			14	3	3	4	7
Madagascar	C	46	98	170	166	209	317	
	D	43	89	154	155	189	261	
Ambositra Province	C	6	1		6	1	18	
	D	6	1		6	1	10	
Antsirabe Province	C		34	5	19	18	72	
	D		34	4	19	17	72	
Itasy Province	C	14	11	21	16	26	62	
	D	14	7	20	15	25	54	
Madagascar—Continued.								
Moramanga Province	C	5	4	3	24	46	25	
	D	5	4	3	20	41	22	
Tananarive Province	C	21	48	142	99	170	139	
	D	19	43	127	93	153	108	
Mauritius	C			1				
Nigeria	C	9	8	15	27	16	20	16
	D	7	8	14	27	16	18	16
Peru	C	8	11	15	14	6	14	
	D	7	6	6	5	2	4	
Callao	D	3					3	
Lima	C						7	
	D				1	1	1	

SMALLPOX

Place		July 3–30, 1927	July 31–Aug. 27, 1927	Aug. 28–Sept. 24, 1927	Sept. 25–Oct. 22, 1927	Oct. 23–Nov. 19, 1927	Week ended— Nov. 26, 1927	December, 1927: 3	10	17	24	31	January, 1928: 7	14	21	28	February, 1928: 4	11	18	25	Mar. 3, 1928
Algeria	C	376	459	382	683	661		68	55	47	81	26				18	11				
Algiers	C									3	3	4			2	3	1	7				
Oran	C	14	9	16	11	20	9	11	10	9	8	15	2	4	2	2	4				
Arabia: Aden	C	2				1		1	1	1	1								1		
	D	1																			
Brazil:																					
Para	C		1																		
Rio de Janeiro	C	4	6	10		1															
	D	4	4	9		1															
British East Africa: Tanganyiki	D		21	8	P	P	P	P	P				2	6	4						
British South Africa:																					
Northern Rhodesia	C	48	55	39	164	185	57	15	125	55	2	81	141	12	3						
	D	2	1	2	11	64	18	7	28	9		8	23								
Southern Rhodesia	C					3				2	1										
Canada:																					
Alberta	C	42	17	17	23	10	7	3	3	6		3	3	5	1	19	1	6		3	
Calgary	C	5	1																		
Edmonton	C				1	1	6		1	1			3	2	1			2	1		11
British Columbia: Vancouver	C			2					4		1	3	3	1	11	3	1	11	2	1	
Manitoba	C		13	9	7	19	1	3	1	2	2	2	2	5		1					
Winnipeg	C	3	5	4	2	2			1	1	1			1	1	1					
New Brunswick	C			2							1									1	
Nova Scotia	C			1	1																
Halifax	C				1																

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

SMALLPOX—Continued

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

Place		July 3–30, 1927	July 31–Aug. 27, 1927	Aug. 28–Sept. 24, 1927	Sept. 25–Oct. 22, 1927	Oct. 23–Nov. 19, 1927	Week ended— Nov. 26, 1927	December, 1927 3	10	17	24	31	January, 1928 7	14	21	28	February, 1928 4	11	18	25	Mar. 3, 1928
Canada—Continued.																					
Ontario	C	63	60	22	96	264	71	90	82	104		53	83	76	52	77	63	51	40	51	
Hamilton	C					1		2										1			
Kingston	C										1										
Ottawa	C	37	27	40	67	134	10	19		34	18	9	10	23	20	16	23	9	11	3	1
Toronto	C	5		2	10	34		25	14		7		11	10	8	5	1	6	4	4	2
Windsor	C				9																
Quebec	C	12	1		8	25	8	5	3		14	3	10	17	7		11	8	11	13	
Montreal	C					1					1		1	6	3	4	1		5	1	3
Quebec	C							2		2		2		3		5				2	5
Riviere du Loup	C					3															
Saskatchewan	C	25	14	68	31	34	9	15	19	15	12	13	15	12	39	15	9	34	7	8	
Moose Jaw	C		10	16	3					1		1	2	1	4	2	3	2		2	6
Regina	C	2	8		5	1				1											
Saskatoon	C								2			4			13	1		1		2	
Ceylon: Colombo	C		1			1		2							1			2	2	1	
	D		1					1							1						
China:																					
Antung	C	3												1							
Canton	C			1																	
	D			1																	
Chefoo	C			1	P		P														
	D			1																	
Foochow	C	P	P	P	P	P	P		P	P	P	P		P		P					
Hong Kong	C	3	1	2										1	1					3	
	D	3	1	2									1			1				1	
Manchuria—																					
Changchun	C	4					1									4					
Dairen	C				1	2				1			2	3					1		
	D				1																
Fushun	C	1		1		1															
Harbin	C	1								2		1				2					
Mukden	C	3			2	1										1		3	18		
Pensihu	C	1			1																
Shanghai—																					
Foreigners only	C														1	2		2			
Including natives	D														3	2	3			4	
Tientsin	C	11		4	13	8	4	1	2	2	2			6	20	10	10	8			
Curaçao (Alastrim)	C														2				3		

Dutch East Indies:																					
Borneo—																					
Samarinda District	C					P															
South and East Borneo Residency	C		P																		
Java—																					
Batavia and West Java	C	2	4		4	25															
	D					15															
East Java and Madura	C	8	4	22	8	9	4	3	2			3	1	1							
	D				1																
Sumatra: Medan	C									3		8		1		3	5				
	D									2		1		2		4	4				
Egypt	C	4		3				4				4									
	D			1	1				1												
Cairo	C						1	1													
Great Britain:																					
England and Wales	C	721	568	508	473	902	233	366	230	212	255	247	275	398	405	370	386	369	369	392	
Birmingham	C		1		1										14	17	11	2	1		
Bradford	C					11	9	6	2	2	2	2	4	24	6	9	7	2	7	1	
Bristol	C				6	4	2	4	2							2		1			
Cardiff	C					1							1								
Leeds	C	2	5	3	7	5	3	3	6	4	4	6	1		1			2	1	2	
Liverpool														1							
London	C														2		1	5	10	1	
Manchester	C				3	6	2	5	10	8		1	2	2	11	6	4	4	1	4	
Newcastle upon Tyne	C	1	1	2	6	9	28	18	5	4	2	13	2	5	14	3	4	6	4	1	
Nottingham	C												7	6	4	8	6	9	6	1	
Sheffield	C	11	2	1	10	6	1	8			3		1	10	4		4		1	2	
Stoke on Trent	C		1										3	1			1		2	4	
Greece: Saloniki	D	1	2																		
Guinea (French): Beyla	C	9																			
India	C	11,340	5,911	4,398	3,153	4,052	1,031	1,556	1,939	2,205	2,225	2,502	2,664	3,285							
	D	3,140	1,668	1,120	715	927	307	359	465	519	515	578	551	785							
Bassein	C		1															1			
	D		1																		
Bombay	C	38	33	12	10	4		4		5		4	4	6	10	23	10	18	29	23	
	D	21	19	8	2	3		1		1					2	8	7	7	15	13	
Calcutta	C	93	27	22	5	5	4	3	11	7		17	9	14	14	11	23	10	9	18	
	D	70	25		6	2	2	1	6	2		17	4	6	10	7	10	7	5	11	
Madras	C	4	6	7	8	7	2	2	5	2	2		11	8	9	16	20	29	15	33	
	D	1		2		2	1	1	1		1		4	1	3	2	2	1	3	3	
Nagapatam	C	3	3	1										5		4	2	2	1		
	D	2	2	1										3		2	1				
Rangoon	C	37	14	9	17	6	5	2	1	6	36	28	23	49	41	34	103	97		82	
	D	11	3	2	3	1	1	1		2	5	13	4	9	13	10	18	23		24	
Vizagapatam	C	11		3									3		2	1	5	2		1	
	D	4		2											6	1		1			
India (French):																					
Karikal	C	2	3	1	2	P															
	D	2	3	1	2																
Pondicherry	C	22	39	37	38	42	15	6	6	14	6	16	25	18	15						
	D	20	31	37	38	42	15	6	6	14	6	14	12	18	15						
Indo-China: Saigon	C	1	1	1						1		1	1	1							

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

SMALLPOX—Continued

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

Place		July 3–30, 1927	July 31–Aug. 27, 1927	Aug. 28–Sept. 24, 1927	Sept. 25–Oct. 22, 1927	Oct. 23–Nov. 19, 1927	Week ended— Nov. 26, 1927	December, 1927 3	10	17	24	31	January, 1928 7	14	21	28	February, 1928 4	11	18	25	Mar. 3, 1928
Iraq:																					
Baghdad	C			1	7	5	1	5	7	12	9	9	3	2	7						
	D			1	4	4		5	4	5	7	3	2		3						
Basra	C	1	1	4	2	3		2	2			2									
	D	1	1	4	2	1		2	1			1									
Italy (Rome and vicinity)	C	1		1																	
Jamaica[1] (outside Kingston)	C	15	6	9	9	7	1		1	1		2				4		1	1	3	
Kingston	C			3	2																
Japan:																					
Nagasaki	C	17	2																		
	D	5	1																		
Tokyo	C														2	1					
	D															1					
Mexico:																					
Acapulco	C			2		1															
	D			2		1															
Chihuahua	D												1								
Guadalajara	D						1			1											1
Manzanillo	D													1							
Mexico City and surrounding territory	C						1	1	1	1							1	1	2		
Monterey	C	6																			
	D	4																			
San Luis Potosi	D	4	1																		
Tampico	C																		1		
Torreon	C		1		2																
Palestine: Jerusalem	C							1								1					
Paraguay	D	2																			
Persia: Teheran	D	2																			
Poland	C	7	2							1	5	1					1				
	D	2	1																		
Porto Rico[2]																					
Portugal:																					
Lisbon	C	4		3	8	4		3	3	4	1	2	4	5	5	2	2				
	D									1											
Oporto	C			1																	
Siam	C	34	51	27	6	1		8		1	2	5	8	8	13	7					
	D	9	10	15						1			2		1	1					
Bangkok	C	5		3		1		1				1	2								
	D	1		1									1								

Spain:																						
Malaga	D					1	1								1							
Seville	D																					
Valencia	C				1								1	1								
Straits Settlements: Singapore	C					1																
Switzerland	C											2										
Tunisia: Tunis	C												2	2		3						
Union of South Africa:																						
Cape Province	C	P	P		P																	
Orange Free State	C		P			P	P	P	P	P	P				P							
Transvaal	C				P	7																
Venezuela: Maracaibo	D	1		2	1															1		

Place		July, 1927	August, 1927	September, 1927	October, 1927	November, 1927			December, 1927			January, 1928			February, 1-10, 1928
						1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20	21-31	
Algeria	C	376	459	382	682										
Oran	C	14	10	16	11										
Indo-China	C	19	3	21	25	13	3	22	10	4	20		40	18	
Syria:															
Aleppo	C										1		1		
Beirut	C								1		1			15	11
Damascus	C		3	5	22		13		4	6	2	11	2		

Place		July	August	September	October	November	December	January
Angola	C	42	2	5	73	71		
	D				2			
Congo	C			5	77			
Cuanza-Norte	C			1				
Cuanza-Sul	C				2			
Loanda	C			1				
Zaire	C			3	4	1		
Brazil: Porto Alegre	C	5	3	3	4	1		
British East Africa: Zanzibar	C				2			
	D				1			
Chosen	C	19	2		2	2		
	D	6				1		
Ecuador, Guayaquil	C		2	2	1	1	4	2
France	C	23	6	8	7	4	14	11
Gold Coast	C	1	1	5	4			

Place		July	August	September	October	November	December	January
Greece	C	3	3	4	4		5	6
Latvia	C				2			
Mexico	D	93	73	55				
Morocco	C	53	76	51	81	140	401	55
Nigeria	C	492	91	237	223	38		
	D	83	20	70	51	30		
Persia	D					2		
Spain: Madrid	D					1		
U. S. S. R.:								
Railways, etc	C	11	6	9	7	11		
Other territories in Europe	C	146	111	109	220			
Transcaucasus, Siberia, and Central Asia	C	36	29	15	40	21		
Ukraine	C	16	4	7	11	20		

[1] Smallpox reported as alastrim.

[2] An epidemic of smallpox near Fajardo, Porto Rico, was unofficially reported Mar. 12, 1928.

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

TYPHUS FEVER

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

Place		July 3–30, 1927	July 31–Aug. 27, 1927	Aug. 28–Sept. 24, 1927	Sept. 25–Oct. 22, 1927	Oct. 23–Nov. 19, 1927	Week ended— Nov. 26, 1927	December, 1927					January, 1928				February, 1928		
								3	10	17	24	31	7	14	21	28	4	11	18
Algeria:																			
Algiers	C															1			
Oran	C										1	1	1	1		2			
Austria: Vienna	C																1		
Bulgaria: Sofia	C				17	6				1	1	4	1		1				
	D					1													
Chile:																			
Antofagasta	D	1			1														
Talcahuano	D	1																	
Valparaiso	C	2		1		1	1	1						1					
	D		2	1		2													
China:																			
Manchuria—Harbin	C	3	2			1													
Tientsin	C	1		2															
Egypt	C	24	2		12	4	1	7	3	3	1								
	D	1	3		5			5	1	2									
Cairo	C								1	1									
	D								1										
Port Said	C				1			1											
Ireland (Irish Free State):																			
Cork County	C	1							3				1						
Donegal County, Letterkenny	C				4														
Mexico:																			
Guadalajara	D						1												
Mexico City, including municipalities in Federal District	C	16	17	19	18	28	7	6	4		4	4	4	3	2	1		2	1
	D					2				1	1	3	1						
Morocco	C												107	235	257	214	370	210	
Palestine	C	2	11	1	5	3	5	1	2	1				8		2	2		
Poland	C	99	50	35	19	64	13	28	17	35	26	33	68	68	101	92	87		
	D	10	6	2	4	11	1	5		4	1	3	6	6	4	3	5		
Portugal: Oporto	C		1			1												1	
Rumania	C	27	36	16	17	22	6	8	8	13	32	17	19						
	D	4	1		2							2	1						

Place		1927				November, 1927			December, 1927			Jan. 1-10, 1928
		July	August	September	October	1-10	11-20	21-30	1-10	11-20	21-31	
Algeria	C	67	33	10	12							
	D	13			1							
Algiers	C	2	2	6	2							
Bulgaria	C	12	24	7	2						2	7
	D		1	2	1						1	
Morocco	C	148	76	7	11	5	14	7	5	6	75	
	D											

Place		July	August	September	October	November	December	January
Argentina	C					1		
	D						1	
China: Shanghai	D					1		
Chosen	C	72	17	1	16	26		
	D	8			1	2		
Chemulpo	C	1	2					
Gensan	C	2						
Seoul	C	2	3		2			
	D	1			1			
Czechoslovakia	C	6		6	1		6	
Greece: Athens	C	1		2			1	2
Japan	C	1						
Latvia	C	6						

Place		July	August	September	October	November	December	January
Lithuania	C	44	18	7	9	18	27	
	D	5	8	1	1	1	1	
Mexico	D	12	38	14	36			
Peru:								
Arequipa	D		2	1	2			
Lima	D	8						
U. S. S. R.:								
Railways, etc	C	30	22	25	23	33		
Transcaucasus, Siberia, and Central Asia	C	79	69	60	61	49		
Ukraine	C	96	85	114	151	198		
Other territories in Europe	C	732	552	555	521			
Yugoslavia	C	11	9		1	1		7
	D	4	1					3

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

YELLOW FEVER

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

Place		July 3–30, 1927	July 31–Aug. 27, 1927	Aug. 28–Sept. 24, 1927	Sept. 29–Oct. 22, 1927	Week ended— Oct. 29, 1927	November, 1927 5	12	19	26	December, 1927 3	10	17	24	31	January, 1928 7	14	21	28	Feb. 4, 1928
Ashanti: Obuasi	C		1																	
	D		1																	
Belgian Congo:																				
Boma	C														3					
	D														2					
Matadi	C														6	12	11	1	5	1
	D														2	6	8	2	5	
Dahomey:																				
Grand Popo	C									1										
	D									1										
Porto Novo	C	1																		
	D	1																		
Ivory Coast	C	1												1						
	D	1												1						
Liberia: Monrovia	C			1																
Nigeria	C			2																
	D			2																
Senegal	C	3	10	21	31	9	16	6	6	7										
	D	3	9	21	31	8	10	4	4	6										
Dakar	C	1			12	3	6		5	2	1	4			1	1				
	D				7	2	4		4	2	1	4			1	1				
Togoland	C		1																	
	D		1																	

Place		July	August	September	October
Gold Coast	C	15	2	6	1
	D	4	2	4	1