TABLES, AND DIAGRAMS REPRESENTING THE SAME,

ACCOMPANYING A PAPER ENTITLED

THE CLIMATIC CAUSATION OF CONSUMPTION.

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BY HENRY B. BAKER, M.D.,

OF LANSING, MICH.

CROUP AND TEMPERATURE IN MASSACHUSETTS.

TABLE 1.—Exhibiting by months reduced to uniform length—30 days each—the number of deaths from croup in Massachusetts during 23 years, 1863-85, in comparison with the average atmospheric temperature for 48 years¹ (1790-1870) at Cambridge, Mass. Deaths computed from the 44th Registration Report of Massachusetts, 1886; and the temperature is taken from the Smithsonian tables, "Distribution and Variations of Atmospheric Temperature," 1876, p. 40.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Deaths, ²	1,469	1,290	1,181	1,023	774	559	427	435	729	1,239	1,649 ³	1,631
Av. temperature.	25.25	26.28	34.39	44.40	56.01	66.74	71.86	69.82	61.89	50.18	39.28	29.34

¹ The series is stated as follows: "Begins Jan. 1790; ends Dec. 1870; extent, 48 years and 6 months." Some of the years between 1790 and 1870 were omitted. This series is used because it is the longest available, and, therefore, most likely to give the correct "normal" curve. That it does supply a correct "norm," and that, in table 2 and diagram No. 2, the normal curve representing absolute humidity is shown, is made evident by a comparison of the curve for temperature in diagram No. 1 with the curve for absolute humidity in diagram No. 2, noting how closely the two curves resemble each other, and considering how completely the absolute humidity of the atmosphere is controlled by the atmospheric temperature. The two curves are so nearly alike that it has been thought not necessary to make any more diagrams exhibiting the absolute humidity in Massachusetts, but to let the curve representing the temperature—the controlling condition—stand also as representing the absolute humidity.

² Total deaths from croup in the 23 years, distributed by months.

³ To the author of this essay it seems probable that some proportion of the deaths recorded as from croup were from diphtheritic croup, and also that some part of the rise in the autumn, after the opening of the schools, may be due to the spreading of that communicable disease.

CROUP AND ABSOLUTE HUMIDITY IN MASSACHUSETTS.

TABLE 2.—Exhibiting by months reduced to uniform length—30 days each—the number of deaths from croup in Massachusetts during 23 years, 1863-85, in comparison with the average absolute humidity of the atmosphere at Boston during 17 years, 1870-86, computed from the tables on relative humidity and temperature, in the Report of the Chief Signal Officer, U. S. A., for 1886.⁴

	Jan.	Feb.	Mar.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.
Deaths ⁵	1,469	1,290	1,181	1,023	774	559	427	435	729	1,239	1,649	1,631
Abs. Humidity.	1.39	1.45	1.87	2.32	3.37	4.81	5.78	5.66	4.56	3.19	2.19	1.59

⁴ That this supplies satisfactory data concerning the absolute humidity of the atmosphere in that vicinity is made probable by the steadiness of the curve, as may be seen in diagram No. 2, and especially by a comparison of that curve with the one representing the atmospheric temperature at Cambridge, Mass., in diagram No. 1.

⁵ Total deaths from croup in the 23 years, distributed by months.

CONSUMPTION AND TEMPERATURE IN MASSACHUSETTS.

TABLE 3.—Exhibiting by months reduced to uniform length—30 days each—the number of deaths from consumption in Massachusetts during 23 years, 1863-85, in comparison with the average atmospheric temperature for 48 years⁶ (1790-1870) at Cambridge, Mass. (Deaths computed from the 44th Registration Report of Mass., 1886; and the temperature is taken from the Smithsonian tables, "Distribution and Variations of Atmospheric Temperature," 1876," p. 40.)

	Jan.	Feb.	Mar.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.
Deaths ⁷	9,888	10,261	10,723	10,658	10,390	9,223	9,273	9,773	9,875	9,606	9,590	9,607
Av. Temperature.	25.25	26.28	34.39	44.40	56.01	66.74	71.86	69.82	61.89	50.18	39.28	29.34

⁶ The series is stated as follows: "Begins Jan. 1790; ends Dec. 1870; extent, 48 years and 6 months." Some of the years between 1790 and 1870 were omitted. This series is used because it is the longest available, and, therefore, most likely to give the correct normal curve.

⁷ Total deaths from consumption in the 23 years, distributed by months.

SMALL-POX AND TEMPERATURE IN MASSACHUSETTS.

TABLE 4.—Exhibiting by months reduced to uniform length—30 days each—the number of deaths from small-pox in Massachusetts during 23 years, 1863-85, in comparison with the average atmospheric temperature for 48 years⁸ (1790-1870) at Cambridge, Mass. Deaths computed from the 44th Registration Report of Massachusetts, 1886; and the temperature is taken from the Smithsonian Tables, "Distribution and Variations of Atmospheric Temperature," 1876, p. 40.

	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.
Deaths ⁹	458	314	269	270	295	202	177	111	152	214	311	489
Av. Temperature.	25.25	26.28	34.39	44.40	56.01	66.74	71.86	69.82	61.89	50.18	39.28	29.34

⁸ The series is stated as follows: "Begins Jan. 1790; ends Dec. 1870; extent, 48 years and 6 months." Some of the years between 1790 and 1870 were omitted. This series is used because it is the longest available, and therefore most likely to give the correct normal curve.

⁹ Total deaths from small-pox in 23 years, distributed by months.

DIPHTHERIA AND TEMPERATURE IN MASSACHUSETTS.

TABLE 5.—Exhibiting by months reduced to uniform length—30 days each—the number of deaths from diphtheria in Massachusetts during 23 years, 1863-85, in comparison with the average atmospheric temperature for 48 years¹⁰ (1790-1870) at Cambridge, Mass. (Deaths computed from the 44th Registration Report of Mass., 1886; and the temperature is taken from the Smithsonian Tables, "Distribution and Variations of Atmospheric Temperature," 1876," p. 40.)

	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.
Deaths ¹¹	2,527	2,174	1,825	1,736	1,643	1,588	1,365	1,284	1,818	2,598	2,712	2,687
Av. Temperature.	25.27	26.28	34.39	44.40	56.01	66.74	71.86	69.82	61.89	50.18	39.28	29.34

¹⁰ The series is stated as follows: "Begins Jan., 1790; ends Dec., 1870; extent, 48 years and 6 months." Some of the years between 1790 and 1870 were omitted. This series is used because it is the longest available, and therefore most likely to give the correct normal curve.

NOTE.—The opening of Schools in the autumn may have to do with the increase culminating in November.

¹¹ Total deaths from diphtheria, in 23 years, distributed by months.

PNEUMONIA AND TEMPERATURE IN MASSACHUSETTS.

TABLE 6.—Exhibiting by months reduced to uniform length—30 days each—the number of deaths from pneumonia in Massachusetts during 23 years, 1863-85, in comparison with the average atmospheric temperature for 48 years¹² (1790-1870), at Cambridge, Mass. (Deaths computed from the 44th Registration Reports of Mass., 1886; and the temperature is taken from the Smithsonian Tables, "Distribution, and Variations of Atmospheric Temperature, 1876," p. 40.)

	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.
Deaths ¹³	6,048	6,791	7,042	6,508	4,967	2,776	1,828	1,514	1,913	2,767	4,125	5,221
Av. Temperature.	25.25	26.28	34.39	44.40	56.01	66.74	71.86	69.82	61.89	50.18	39.28	29.34

¹² The series is stated as follows: "Begins Jan., 1790; ends Dec., 1870; extent, 48 years and 6 months." Some of the years between 1790 and 1870 are omitted. This series is used because it is the longest available, and therefore most likely to give the correct normal curve.

¹³ Total deaths from pneumonia, in the 23 years, distributed by months.

SCARLATINA AND TEMPERATURE IN MASSACHUSETTS.

TABLE 7.—Exhibiting by months reduced to uniform length—30 days each—the number of deaths from scarlatina in Massachusetts during 23 years, 1863-85, in comparison with the average atmospheric temperature for 48 years¹⁴ (1790-1870), at Cambridge, Mass. (Deaths computed from the 44th Registration Report of Mass., 1886; and the temperature is taken from the Smithsonian Tables, "Distribution, and Variations of Atmospheric Temperature, 1876," p. 40.)

	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.
Deaths ¹⁵	2,340	2,253	2,313	2,209	2,017	1,655	1,224	1,026	953	1,247	1,704	1,964
Av. Temperature.	25.25	26.28	34.39	44.40	56.01	66.74	71.86	69.82	61.89	50.18	39.28	29.34

¹⁴ The series is stated as follows: "Begins Jan., 1790; ends Dec., 1870; extent, 48 years and 6 months." Some of the years between 1790 and 1870 were omitted. This series is used because it is the longest available, and therefore most likely to give the correct normal curve.

¹⁵ Total deaths from Scarlatina, in 23 years, distributed by months.

TEMPERATURE AND SICKNESS FROM PNEUMONIA IN U. S. ARMIES.

TABLE 8.—Exhibiting by months for a series of years the average atmospheric temperature at six stations representing approximately the latitude and longitude of the Aggregate forces of the Armies of the United States in the war of the Rebellion, in comparison with the average number of cases of sickness from pneumonia per 10,000 ("mean strength") of those forces, by months (of uniform length) during the four years, 1862-65.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Cases per 1,000 of Mean Strength	38.1	41.7	38.1	28.4	15.9	10.5	8.1	7.2	7.7	14.1	23.8	29.1
Average Atmospheric Temperature.	36	38	45	54	66	74	78	76	69	56	46	38

SICKNESS FROM CONSUMPTION IN WHITE TROOPS, U. S. ARMY, AND TEMPERATURE.

TABLE 9.—Exhibiting, by months reduced to uniform length—30 days each—for the four years, 1862-65, the average number of cases of consumption per 10,000 soldiers ("mean strength") of the white troops of the U. S. Army in the war of the Rebellion, in comparison with the average atmospheric temperature at six stations representing approximately the latitude and longitude of the aggregate forces of the Armies of the United States.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Aver. cases per 10,000 of Mean Strength	5.63	5.95	5.92	5.08	4.33	4.52	4.69	4.59	4.02	4.26	4.47	4.31
Average Temperature at Six Stations.	31	38	45	54	66	74	78	76	69	56	46	38

DEATHS FROM CONSUMPTION IN WHITE TROOPS, U. S. ARMY, AND TEMPERATURE.

TABLE 23.—Exhibiting, by months reduced to uniform length—30 days each—for the four years, 1862-65, the average number of deaths from consumption per 100,000 soldiers ("mean strength") of the white troops of the U. S. Army in the war of the Rebellion in comparison with the average atmospheric temperature at six stations representing approximately the latitude and longitude of the aggregate forces of the Armies of the United States.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. No. of Deaths per 100,000 of M. Str.	19.55	22.47	24.23	19.63	17.00	16.07	17.38	15.75	14.96	17.62	17.13	18.66
Av. Temperature at Six Stations.	36	38	45	54	66	74	78	76	69	56	46	38

SICKNESS FROM DIPHTHERIA IN MICHIGAN, AND TEMPERATURE.

TABLE 24.—Exhibiting by months for a period of nine years, 1877-85, the relation of sickness in Michigan from diphtheria to the average atmospheric temperature.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Per cent. of Weekly Reports.	29	25	22	21	18	16	15	16	19	27 ¹⁶	30 ¹⁶	29
Average Temperature.	20.77	23.89	29.76	44.14	56.23	65.30	70.73	68.23	61.73	50.72	36.23	27.28

¹⁶ It would seem possible that this sudden great increase of sickness from diphtheria may, in part, be due to the spreading of the disease incident to the opening of schools in the autumn.

NOTE.—Data for this table and the diagram illustrating it are found in Exhibit XIII, p. 122; and in the upper line of Exhibit V, p. 24, Annual Report of the Michigan State Board of Health, for 1886.

Diagram 1.—Croup and Temperature in Massachusetts.

Deaths ——— Average Temperature ———

* The numbers of deaths are compiled from the 44th Registration Report of Mass., 1886. The Average Temperature is compiled from a table on page 40 of the Smithsonian Tables "Distribution and Variations of the Atmospheric Temperature". It is for a period of 48 years, between 1790-1870 at Cam-

Diagram 2.-Group and Absolute Humidity in Massachusetts.

Deaths ———. Average Absolute Humidity ————.

*The numbers of deaths are compiled from the 44th Registration Report of Mass., 1886. The Average Absolute Humidity is compiled from the Relative Humidity and Temperature in the Report of the Chief U.S. Signal Officer for 1886. The curve represents the normal, at Boston, for 17 years, 1870-86.

Diagram 3.- Consumption and Temperature in Massachusetts.

Deaths ———. Average Temperature ———.

*The numbers of deaths are compiled from the 44th Registration Report of Mass., 1886. The Average Temperature is compiled from a table on page 40 of the Smithsonian Tables "Distribution and Variations of the Atmospheric Temperature". It is for a period of 48 years between 1790-1870 at Cambridge Mass.

Diagram 4.—Small-pox and Temperature in Massachusetts.

Deaths —————. Average Temperature —————.

*The numbers of deaths are compiled from the 44th Registration Report of Mass., 1886. The Average Temperature is compiled from a table on page 40 of the Smithsonian Tables "Distribution and Variations of the Atmospheric Temperature". It is for a period of 48 years between 1790-1870, at Cambridge, Mass.

Diagram 5. Diphtheria and Temperature in Massachusetts.

Deaths ————— Average Temperature —————
 *The numbers of deaths are compiled from the 44th Registration Report of Mass., 1886. The Average Temperature is compiled from a table on page 40 of the Smithsonian Tables "Distribution and Variations of the Atmospheric Temperature." It is for a period of 48 years, between 1790-1870 at

Diagram 6.—Pneumonia and Temperature in Massachusetts.

Deaths ———. Average Temperature ———.

*The numbers of deaths are compiled from the 44th Registration Report of Mass., 1886. The Average Temperature is compiled from a table on page 40 of the Smithsonian Tables "Distribution and Variations of the Atmospheric Temperature." It is for a period of 48 years between 1790-1870, at Cambridge, Mass.

Diagram 7.—Scarlatina and Temperature in Massachusetts.

Deaths —————. Average Temperature — — — — —
 *The numbers of deaths are compiled from the 44th Registration Report of Mass., 1886. The Average Temperature is compiled from a table on page 40 of the Smithsonian Tables "Distribution and Variations of the Atmospheric Temperature." It is for a period of 48 years between 1790-1870, at Cambridge, Mass.

Diagram 8. Temperature, and Sickness from Pneumonia in U.S. Armies.

Pneumonia ———. Average Temperature — — —
 *The temperature curve is made from the normals at six stations representing approximately the localities occupied by the armies of the United States, during the war of the rebellion.

Diagram q.—Sickness from Consumption in White Troops, U.S. Army, and Temperature

Sickness ———. Average Temperature — — — — —
 * The temperature curve is made from the normals at six station representing approximately the localities occupied by the Armies of the United States.

No 10. Temperature, and Deaths from Phthisis in London.

Deaths ———. Average Temperature ———.
 About 291,000 deaths from Phthisis are represented in this diagram data for which are from *Journal of Scottish Met. Soc., New Series Nos XIII, XIV, XV, XVI, pages 252 and 263.*

No. 11 Temperature and Sickness from Consumption in Michigan.

No 12.—Temperature and Deaths from Bronchitis in London.

Deaths ————— Average Temperature - - - - -
 About 176,000 deaths from Bronchitis are represented
 in this diagram data for which are from *Journal of Scottish Med. Soc.*
New Series Nos. XLIII, XLIV, XLV, XLVI. pages 253 and 263