with phenyluraminocystine and phenyluramino cystein and for comparison some figures from Lewis and Root. It is to be noted in both these tables that in these experiments cystine and cystein act in identical manner.

TABLE II

CYSTINE AND CYSTEIN PHENYLURAMINO SULFUR ELIMINATION.

	Tot. S mg.	"SO_4 S mg.	RSH S mg.	Tot. S mg.	"SO_4 S mg.	RSH S mg.
Lewis and Root		I			II	
Av. control days	45	35	10	24	14	10
Cystine days	121	55	66	115	38	77
Do. less control	76	20	56	91	24	67
Lag days less control	12	0	12	23	7	16
Cystine S eliminated	88	20	68	114	31	83
Per cent cystine S eliminated: I 65.6, II 87.0.						
Per cent of this S as total "SO_4: I 21.3, II 27.0.						
Sherwin and Rose		I			II	
Av. control days	88	53	35	64	36	29
Cystine days	424	257	168	399	184	215
Do. less control	160	97	63	207	76	128
Lag days less control	9	9	0	40	23	17
Second lag day less control	50	15	35	16	4	12
Cystine S eliminated	219	121	99	263	103	157
Per cent cystine S eliminated: I 69.5, II 79.0.						
Per cent of this as total "SO_4: I 55.0, II 39.0.						

Phenyluraminocystine given by Lewis and Root, 1 gram in one day; by Sherwin and Rose, 0.8 gram on each of three days. The second experiment by Sherwin and Rose is with the cystein derivative.

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A quantitative study of the destruction of vitamin B by heat.

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Using the rat growth method with the system of controls and precautions developed by Dr. Edgeworth, Dr. Spohn and the authors, studies were made of the percentage destruction of vitamin B at the temperatures 100°, 110°, 120°, 130° C when

in each case the heating was continued for 4 hours and the vitamin was contained in a water solution (tomato juice) at the natural acidity of the tomato juice, namely pH = 4.3.

The juice of canned tomatoes was chosen as a suitable form in which to study vitamin B and for the further reason that the results here obtained would thus become directly comparable with the results of the studies, previously made in our laboratory, upon the heat destruction of vitamin C.

For descriptions of methods and for experimental data and their discussion, reference must be made to the original papers in the Journal of the American Chemical Society.[1] In the paper of which the present communication is an abstract the effects of different amounts of vitamin B upon the weight curve of the young rat are shown quantitatively and the percentage of vitamin destroyed by heat at each temperature is computed from the experimental determination of the quantity of heated juice which shows the same vitamin value as a given standard quantity (usually 4 cc. per rat per day) of the unheated juice. It is also explained that the percentage destruction computed from the experimental data may differ slightly according as we accept as coincident those results which approximate each other within close limits of experimental error (method A) or "correct" such results by computing what change in the quantities of juices fed would have brought the final points of the weight curves into exact theoretical coincidence (method B). These two methods of interpreting the experimental data yield respectively the following results:

Percentage of vitamin B destroyed in 4 hours heating at pH = 4.3 at temperatures stated—

	100°	110°	120°	130°
Method A	20	33	47	55
Method B	24	33	45	58

[1]Sherman, H. C., LaMer, V. K., and Campbell, H. L. The quantitative determination of antiscorbutic vitamin (vitamin C). *J. Am. Chem. Soc.* 1922, xliv, 165.

LaMer, V. K., Campbell, H. L., and Sherman, H. C. The effect of temperature and the concentration of hydrogen ions upon the rate of destruction of antiscorbutic vitamin (vitamin C). *J. Am. Chem. Soc.* 1922, xliv, 172.

Sherman, H. C., and Edgeworth, H. Experiments with two methods for the study of vitamin B. *J. Am. Chem. Soc.* 1923, xlv, 2712.

Sherman, H. C., and Spohn, A. A critical investigation and an application of the rat growth method for the study of vitamin B. *J. Am. Chem. Soc.* 1923, xlv, 2719.

Sherman, H. C., and Grose, M. R. A quantitative study of the destruction of vitamin B by heat. *J. Am. Chem. Soc.* 1923, xlv, 2728.

If from these data we compute the temperature coefficient for the rate of heat destruction through each temperature interval of 10° C we obtain:

	Method A	Method B
Q_{10} (100°—110°)	33/20 = 1.6	33/24 = 1.4
Q_{10} (110°—120°)	47/33 = 1.4	45/33 = 1.3
Q_{10} (120°—130°)	55/47 = 1.2	58/45 = 1.3
Q_{10} (Avg. 100°—130°)	1.4	1.33

In whichever way interpreted the results plainly show that vitamin B is very much more stable than vitamin C; but that the heat destruction of vitamin B does proceed at a measurable rate at 100° C and at an increasing rate as the temperature is raised. The effect of increased temperature upon the rate of heat destruction of vitamin B is (as was also found for vitamin C) less than in the case of most chemical reactions. A rise of 10° C in temperature increased the rate of heat destruction of vitamin B in slightly acid water solution only 1.3 to 1.4-fold, whereas most chemical reactions are increased about 2-fold.

Our experiments give no confirmation to the conclusion of earlier workers that there is a rapid rise in the rate of heat destruction in the neighborhood of 120° C. We find no evidence of departure from the orderly course of a chemical reaction under the accelerating influence of heat; but do find a less than average temperature coefficient.

In respect to its low temperature coefficient the heat destruction of the vitamin is in marked contrast with the heat coagulation of typical proteins and with the heat destruction of such typical enzymes as have been investigated.