Bacteria and infusoria developed in great numbers and decay began in a few days. Solutions of milk in distilled water of different proportions were used, from the results of which it was inferred that the pitcher produced an alkaline substance which reacted with the acid produced in a very dilute solution of milk but was not sufficient to neutralize solutions of greater strength. There was nothing to indicate that the milk fat or protein was digested. Solutions of grape-sugar and cane-sugar of different proportions were placed in the pitchers and there were no indications of a detrimental effect upon them. With Fehling's solution the contents of the pitcher, after the sugar solution had been allowed to remain in them several days, gave a reddish precipitate of copper-oxide, indicating the presence of invert sugar. The reduction was most marked in a 10 per cent. solution of cane-sugar. Starch paste was allowed to remain in the pitchers from three to seven days, when it was removed and tested by boiling with Fehling's solution. The reddish precipitate indicated that a reduction had taken place, though it was not so marked as in the case of the cane-sugar. The addition of an antiseptic did not hinder the reduction of the cane-sugar or starch. Olive-oil and ethyl-butyrate were used to test the fat-digesting power of *Sarracenia,* but the results indicated no digestion. Fibrin was used to determine the digestive power upon protein, but the results were negative. These results as to protein correspond with those obtained by Schimper in 1882 (*Bot. Zeit.* 40: 225) and by Goebel in 1893 (*Pflanz. Biol. Schild.* 2: 186).

MARSHALL A. HOWE,
Secretary pro tem.

DISCUSSION AND CORRESPONDENCE

VERY HIGH CUMULUS CLOUDS

TO THE EDITOR OF SCIENCE: The conflagration in the city of Chelsea on April 12 caused cumulus clouds to form at a great altitude. At Blue Hill Observatory, situated 14 miles south and 630 feet higher, in the afternoon the temperature was 45° and the relative humidity 14 per cent., with a gale from the west-northwest. The sky was cloudless, except for a succession of flat, white cumulus which formed at the top of an immense inclined column of smoke that was highest over Boston harbor and about twelve miles from Chelsea. After drifting further to leeward these clouds slowly dissolved as they sank into a warmer stratum, because no longer supported by the rising smoke. Approximate angular measurements made at Blue Hill by Mr. L. A. Wells and in Boston by the writer, when combined with the direction of the smoke, gave the minimum height of these clouds between four and five miles. Their relative velocity as compared with the surface wind also indicated that they were much higher than the ordinary cumulus clouds which float at the level of about a mile.

Artificial conditions gave rise to these clouds, since the air was too dry for the convectional currents at their normal height to cool to the dew-point, even if they had not been broken up by the strong wind. The air, which was intensely heated by the fire, however, maintained its potential excess of temperature over the surrounding air long enough to ascend to so great a height that its small vapor content was condensed into cloud, when it formed not, as is usual, "the visible capital of an invisible column," but the white crown of a brown mountain.

Mr. S. P. Fergusson described in SCIENCE, Vol. X., p. 86, the formation over a fire of similar clouds whose height was also measured from two stations, but in this case the clouds had only half the altitude of those recently observed. In thunder-storms, however, the cumulo-nimbus rise into the cirrus level and their tops have been measured at Blue Hill above eight miles, or nearly twice as high as the cumulus caused by the Chelsea fire.

A. LAWRENCE ROTCH
BLUE HILL METEOROLOGICAL OBSERVATORY,
April 22, 1908

CLOUDS OVER A FIRE

THE great fire in Chelsea, Mass., on Sunday, April 12, 1908, which burned more than two square miles of city blocks, began under conditions of clear sky and high west to north-

west winds. Between two and three o'clock in the afternoon, about three hours after the fire started, the updraft was sufficiently strong to overcome the high wind and occasionally to carry water vapor to the level of cloud formation. Cumulus clouds resulted, capping the smoke, and appearing or disappearing according as the latter rose or failed to rise to the necessary altitude. So near to this altitude was the average summit of the smoke that it was possible for the writer, on seeing an especially vigorous puff from the fire, to predict the formation of a cloud some seconds in advance of its appearance. The clouds did not, as far as could be seen from a position directly to windward of the fire, attain to well-rounded, typical cumulus forms. They varied from mere flecks of white to moderately large but flattish masses and were usually dissipated within five minutes from the time they became visible. Their bases were more or less mingled with and hardly distinguishable from the summit of the smoke-cloud; it was therefore impossible to tell whether or not they were typically flat-based. The clouds appeared to be formed not directly over the fire, but a very considerable distance to leeward, where the high wind first permitted the rising air to reach its dew-point altitude.

The occurrence of these cumuli recalls a similar phenomenon over the burning coal pockets of the Boston & Maine Railroad close by at Charlestown in December, 1896, and noted by Professor R. DeC. Ward in SCIENCE for January 8, 1897. In this instance the greater concentration of the fire and the consequent greater proportion of water-vapor carried aloft, caused the development of a far more perfect cumulus cloud than that formed over the widely scattered Chelsea fire.

B. M. VARNEY

HARVARD UNIVERSITY,
April 30, 1908

THE INFALLIBILITY OF NEWTON'S LAW OF RADIATION AT KNOWN TEMPERATURES

ALTHOUGH there is no direct reference to "the absolute temperature of space" (on which hinges the whole question of the sun's *effective* surface temperature) in Professor Very's paper published in the last number of SCIENCE, it is clear that he is still inclined to favor the claim that the temperature of space is in the neighborhood of 300° C., notwithstanding the demonstration I have given, showing that the temperature is probably less that 2° C.

The title of the present article gives evidence that I wholly disagree with Professor Very when he claims that Stefan's law is in better agreement with actual observation than is Newton's law.

Just why I regard Stefan's law as wholly wrong will appear from the theoretical results given below. How such erroneous laws similar to that of Stefan's ever came to be deduced can be largely inferred from the contents of a paper on "The Earth as a Heat-radiating Planet," sent to the editor of SCIENCE on December 25, 1907, but not yet published at the time of this writing.[1] In that paper (where, for obtaining the terrestrial radiation into space, the *effective* surface-temperature of the earth is provisionally placed at 200° C.) it is made evident that according to my results "serious changes in the constants of radiation in the formulæ accepted to-day" (to quote part of a sentence from Professor Very's article) must actually be made.

I shall now demonstrate that both theoretically and experimentally *Newton's law gives uniformly consistent results when the observations are properly interpreted,* and that Stefan's law leads to absurd and unintelligible results at known temperatures.

Let us first conceive that the observations were made in free space, the two totally different expressions for the absolute temperature of space will then read

For Newton's law $t = T(d/D)^2 = 0°.7$
For Stefan's law $t = T\sqrt{d/D} = 300°$.

Since the temperature of space must be taken as constant in each case we obtain for comparison the two sets of values of T, for different values of D, given in the second and third columns of the following table:

[1] Published in SCIENCE for March 6, 1908.