SCIENCE:

A WEEKLY NEWSPAPER OF ALL THE ARTS AND SCIENCES.

PUBLISHED BY

N. D. C. HODGES,

47 LAFAYETTE PLACE, NEW YORK.

SUBSCRIPTIONS.—United States and Canada..... $3.50 a year.

Great Britain and Europe..... 4.50 a year.

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VOL. XV. NEW YORK, JUNE 13, 1890. No. 384.

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Professor Davis says, further, "It is a mistake to say that the latent heat, when liberated, will warm the air enough to allow the condensed vapor to evaporate again; for the latent heat is completely expended in the work of pushing away the air that surrounds the ascending expanding mass, and therefore cannot be applied to any other task. Espy made this error for a time, but afterwards corrected himself. It is regrettable to see the error now revived by Hazen." I am sure no one could ask for a stronger confirmation of his views than this from an opponent. If the above argument amounts to any thing, it declares that the latent heat of condensation would certainly immediately re-evaporate the moisture, unless it were used up in performing *work*. If it is used for this purpose, it certainly and most emphatically cannot be used for causing a rarefaction in the cloud, and for increasing the energy of the tornado. Professor Davis is entirely wrong in his allusion to Espy. I am inclined to think that even Espy, with all his disadvantages, was too well informed to adopt such a doubtful and visionary idea as this of effective *work* performed in the free upper air. There is not one scintilla of evidence that he ever considered this question, except, possibly, to deny that any thing of the kind was to be thought of.

I challenge Professor Davis, or any one else, to show by Espy's writings that he disposed of any of his heat on this hypothesis, or that he ever thought that the latent heat would re-evaporate the moisture. He very quickly saw that the liberation of so much latent heat as his theory called for would heat up the air enormously, and was forced to dispose of it by radiation into space. It is probable that the amount of energy made effective by this so-called "work" in the free upper air is infinitesimal as regards the development of force. The explosions that Espy made in his nephelescope caused the air to rush with a velocity of perhaps a thousand feet per second. This enormous velocity caused a sufficient cooling to produce a cloud, which, however, was quickly evaporated. All reliable experiments have shown that the expansion of saturated air at velocities probably at least ten times as great as can ever occur in nature does *not* produce any cloud; and we see the reason for this in the fact that the latent heat made sensible does not permit the formation of cloud, for the condensing moisture is re-evaporated before it becomes visible.

It is a very significant fact, and one that has been borne in upon me with no little force by conversation with others, that Ferrel has introduced a long general discussion of this question of work performed by expanding air in his two lastest treatises, but has nowhere made this theory available, or even discussed it, in connection with the generation of storms or tornadoes. It would seem as though the amount of effective energy ought to be computed very closely, and its proper place given it. It is probable that an ascending cylinder of air a hundred miles in diameter would not produce any effective energy or any expenditure of heat in its centre from this cause. I am inclined to think that the total energy that can ever be developed from an ascending mass of saturated air is no whit greater than what may be called the balloon effect. If a hot-air balloon rises in the air at the rate of ten feet per second, it has carried a certain weight, say three thousand pounds, to twenty thousand feet, and there we have potential energy; but, if the balloon descends at the same rate, there will be no display of extraordinary force. If, instead of the confined mass of enormously heated air, we had a mass of air heated a few degrees above the surrounding air, it would rise; but here the air would spread over a great space, and we would not have the concentrated potential energy that we had in the balloon. To say that this air had any power of producing effective energy, or even to say that it could have arisen at all without the corresponding descent of nearly an equal amount of cooler air, is highly problematical.

4, 5. GYRATIONS IN THE UPRUSHING AIR AND A VIOLENT INRUSH.—We have already seen that the evidence for these gyrations is exceedingly contradictory, and the weight of evidence is overwhelmingly against them. It would almost seem as though this theory were introduced to avoid a serious difficulty; at all events, we hear nothing of it for nearly forty years after the first studies. It is plain that a partial vacuum, if there were one, would be filled at once by the air rushing from all sides. Has this theory been invented to provide a whirling mass having sufficient consistency to keep