Observations on the influence of rarefaction upon the moisture contained in Air. BY PROF. R. HARE.

TO THE COMMITTEE ON PUBLICATIONS.

GENTLEMEN,—The fact that air saturated with water (but not in contact with it in a liquid state) when rarefied, indicates great dessicating power, led me, at the conversation meeting in May, to express doubts of the correctness of an opinion, which I had previously sanctioned in my text book, that the transient cloud observed in a receiver, subjected to exhaustion, arises from water in the aeriform state. Having lately rarefied air to one half of its previous density, and subsequently subjected the containing vessel to a freezing mixture, until a thermometer in the axis of the vessel was three degrees below freezing, I found the hygrometer to indicate dampness about ten degrees beyond the point at which it had stood at the beginning of the process; and at the same time a deposition of moisture took place. Agreeably to Dalton's tables I find that under these circumstances about two-fifths of the vapours should be condensed, and by calculation about twenty-five degrees of heat should be imparted to the surrounding air.

It follows that the condensing influence of a freezing temperature is paramount to the dessicating influence of a reduction of density to one half of that of the atmosphere; also that in passing from the neighbourhood of the terrestrial surface to an elevation of three miles, clouds will be formed in moist air previously at seventy degrees, by a cold near the freezing point, in consequence of the condensation of aqueous vapour: the caloric previously in the vapour being transferred to the air and causing a commensurate expansion.

In an essay, published in Silliman's Journal in 1822, I had made the inference that in passing from the state of vapour to that of snow, water would impart to the air as much heat as would be yielded by twice its weight of red hot powdered glass. I must grant to Mr. Espy the merit of pointing out the probable influence of the caloric thus evolved in increasing the comparative buoyancy of the air. I cannot, however, concur with him in the opinion that any buoyancy thus created would be adequate to produce a tornado or a hurricane, or that electricity is not a principal agent in the production of storms, clouds, rain, and snow.

In the translation of the moisture and air of the Atlantic, or of the Gulf of Mexico, to the sky of the United States, as in our northeastern or southeastern gales, I infer that the source of expansion to which he has drawn attention, may be a principal agent.

Yours sincerely,
ROBERT HARE.

ERRATA.

Page 164, line 10 from bottom, for "*water*" read "*matter*."
165, " 27 " " for "*unprobable*" read "*improbable*."