

Portland, Me., which indicates the total pressure to the top of the atmosphere, is 29.93 inches in January, and 29.81 inches in July, therefore the pressure at Mount Washington must be .12 of an inch lower in July than in January. This would be vicious reasoning, however, because we have ignored the fact that it is warmer in July than in January, and consequently there is more air above the mountain in the former month. If we put the question to nature, we shall find that the pressure, instead of being less in July, is actually half an inch more on the mountain.

We might at once conclude that there is a reversal of the usual conditions, and that instead of having high pressure with low temperature, and *vice versa*, as we are accustomed to note at the earth's surface, we have on the mountain high pressure with high temperature, and *vice versa*, and extend our theory to storms and high areas. It seems to me this would again be very vicious reasoning: in fact, since there is a reversal of the law of pressures between sea-level and at some height, it would be impossible to connect directly the fluctuations of temperature and pressure at the two situations. May we not consider that when a storm approaches a station at sea-level it brings with it a high temperature, owing to the south winds that blow toward it, and that this high temperature must extend to a great elevation in the atmosphere? In other words, why may we not study temperature conditions without considering the pressure at all? We find that in a storm the temperature may rise twenty to thirty degrees at the earth. Let us take out all the cases in which there is a marked rise and fall in temperature at sea-level, say ten degrees in two days, and determine the conditions at the height of Mount Washington for the same days. In the following table I have taken out the temperature at the maximum and minimum points at Burlington, Vt., during the months October, November, and December, 1873, and January, February, and March, 1874, and also the temperature for the three days before and after these points. The corresponding temperature for exactly the same dates at Mount Washington (6,279 feet) were taken out. There were found twenty cases at the maximum point, and the same number at the minimum. The mean of each ten of these cases is given in the table.

	MAXIMUM POINT.				MINIMUM POINT.			
	1st 10 cases.		2d 10 cases.		1st 10 cases.		2d 10 cases.	
	B.	W.	B.	W.	B.	W.	B.	W.
3 days before	32	20	29	18	48	34	41	24
2 " "	32	21	32	19	50	32	40	23
1 day "	44	34	42	25	42	26	35	18
At the.....	51	37	48	29	28	17	22	10
1 day after...	42	26	42	24	43	29	33	18
2 days after..	31	18	29	20	44	33	40	22
3 " "	35	20	36	22	49	32	39	24

These results agree for each ten days, and show, that, when there is a rise of about nineteen degrees before a storm at sea-level, there is a corresponding rise of about fourteen degrees at Mount Washington; and a fall after the storm at the earth of about fourteen degrees corresponds to a fall of about twelve degrees on the mountain. The same results in an opposite direction are still more prominent on the approach and advance of a high area. These results are strictly in accord with the teachings of the most prominent meteorologists, and it seems probable that these teachings must stand against all adverse criticisms. It is very remarkable that so self-evident a truth as that a storm brings with it an increased temperature to a very great height has been sharply assailed in certain quarters. The facts are certainly strongly against these new views, and we must conclude that they could not be sustained for a moment except by ignoring the axiom laid down at the beginning of this discussion. H. A. HAZEN.

Washington, D.C., July 28.

A Scintillating Meteor.

ON Saturday, July 19, at 8.52 P.M., I saw a meteor in the eastern sky, passing through an arc of about thirty degrees in a nearly horizontal direction, at a height of twenty-one degrees above the horizon. Its course was from the south to the north; and I estimate the time during which it was visible as three seconds, rather less than more. The point where its path ended was almost due east. The light it produced was as bright as that of a common arc-lamp at a distance of some two hundred or three hundred feet. There was no sound or other marked indication of a final explosion, but there was a succession of sparks or scintillations during the latter half of its path. A luminous streak, as usual, marked the path for some little time after.

J. A. UDDEN.

Augustana College, Rock Island, Ill., July 21.

BOOK-REVIEWS.

Elementary Physics. By MARK R. WRIGHT. London and New York, Longmans, Green, & Co. 12°. 80 cents.

THE author of this text-book is head master of the Higher Grade School, Gateshead, England. The book is suited for use in our high schools and academies, and should be examined by those looking for such a work. The plan is, by experiments which can be performed with apparatus readily constructed, to make the student familiar with the facts of physical science, little attention being given to the theories. This plan will doubtless lead to good results; but it is singular to note how much the theoretical considerations assist in co-ordinating the facts in physical science. It even appears that in the past, on account of defects in theory, most careful and acute observers have sometimes been obtuse in recognizing what the facts really were. The book covers heat, sound, light, magnetism, and electricity, and is to be commended to American teachers.

Heat as a Form of Energy. By ROBERT H. THURSTON, Boston and New York, Houghton, Mifflin, & Co. 12°. \$1.25.

ONE of the influences which for the past hundred years has been helping along civilization has been that exerted by the employment of heat to do some of the world's rough work. As long as man used only wind-power or water-power to do his sawing or grinding for him, the question of energy—of capacity for doing work—could hardly be a very complicated one. That the motion of the wind-mill must be taken from the motion of the wind might be suspected, and so with the motion of the water-wheel; but when Watt and others had hitched a fire so as to turn a wheel, it began to dawn on philosophers that there was something in this phenomenon that called for explanation. It was soon found by Rumford and his followers that the capacity of heat for doing work was limited; i.e., that there is a mechanical equivalent of heat. But it was reserved for the students of the latter half of this century to show what are the essentials for the conversion of heat into work, and wherein it was possible to improve the steam-engine so as to prevent, as far as may be, the losses which have taken place in the past.

All this history of the development of the theory of the conversion of heat into work is traced in Thurston's book now before us.

Our author goes further, and tells us in plain language the nature of that newer form of heat engine, the gas-engine, which is now attracting so much attention, and shows us what the advantages and disadvantages of this machine are.

What the future may have in store our author does not venture to predict, but he draws attention to the evidence we have of the direct conversion in nature of oxidation processes into electricity, which processes may be imitated by man in due time, with the result of a more economic production of electricity than is now possible. When this shall be, it can readily be understood that electric prime-motors would be a possibility.

Our readers will know that Professor Thurston is the distinguished head of Sibley College of Cornell University, — a college which is in the very front rank of the schools of mechanical engineering, and will deem his clear exposition of the important subject of "Heat as a Form of Energy" as of especial interest in these days when the engines of the ocean greyhounds are so frequently astounding the world with their performances.