

2d. The period of the maximum of this increase is that immediately following the setting of the sun. Starting from this time it remains stationary, or even frequently diminishes, especially when the dew is abundant.* At the time of sunrise, the increase is most frequently less than it was at sunset.

3d. The limit of elevation to which the increase of temperature extends, appears rarely to surpass the height of 100 feet, even when the sky is perfectly clear and serene. When it is very cloudy, and especially in winter, this limit is much lower.

4th. The increase of temperature in ascending, varies, both according to its intensity, and as to the limits of its elevation, according to the different seasons of the year. It is especially during the winter, and when the surface is covered with snow, that this phenomenon presents the most remarkable results.

The extraordinary severity of the last winter, enabled the author to make many observations upon the remarkable difference which may exist between the temperature of different strata of the air, but little separated from each other. The maximum of this difference amounted, on the 20th of January, to $14^{\circ}.4$ of Fahr. on a change of elevation of 50 feet. A thermometer placed at the height of two feet above the surface, indicating 3° Fahr., and another at the height of 52 feet, indicating at the same moment $17^{\circ}.4$. The mean difference, calculating upon twelve observations made during the period of excessive cold, between the temperature of two strata of air separated by an interval of 50 feet, was 10° Fahr. These differences were much less conspicuous during fine weather.

The comparison between the temperature of the air at *two* feet, and at *five* feet above the surface, perhaps presented still more remarkable results than the preceding, regard being had to their great proximity. The difference, calculating from the mean of nine observations (the surface being then covered with snow,) was $4^{\circ}.2$ in favour of the more elevated station; this difference, on the 4th of January, increased to $7^{\circ}.2$ Fahr.

A great number of trees in the neighbourhood of Geneva have suffered this winter from the intensity of the frost. The gardeners have remarked in many instances, that the lower part of the tree was frozen, whilst the upper branches remained perfectly uninjured. Localities even have been named where a great number of the trees were found frozen to the height of four or five feet, and remained green above this limit. The facts contained in this memoir of M. Marcet serve to account for these apparent anomalies.

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British Association on Halley's Comet. By Sir J. HERSCHELL.

One of the most interesting series of observations, of a miscellaneous kind, I had to make at the Cape of Good Hope, was that of Halley's comet. This comet is the great glory of modern calculation. To see the predicted return of such a body now verified for the second time, true to a single day,—nay, to a few hours—of his appointed time, after an absence of

* The author has almost constantly observed that an abundant descent of dew has a tendency to raise the heat of the strata of air which are nearest to the earth, and, consequently, to re-establish, to a certain point, an equilibrium between these strata and the superior ones.

seventy-five or seventy-six years, during which it has been subjected to the unceasing perturbations of all the planets, and especially persecuted by Jupiter and Saturn, those great stumbling blocks of comets, is really superb. However, what I have now to relate refers to a very singular and instructive fact in its physical history. I saw the comet for the first time, after its perihelion passage, on the night of the 25th of January. Mr. Maclear saw it on the 24th. From this time we, of course, both observed it regularly. Its appearance at first was that of a round, well-defined disc, having near its centre a very small bright object exactly like a small comet, and surrounded by a faint nebula. This nebula, in two or three more nights, was absorbed into the disc, and disappeared entirely. Meanwhile, the disc itself dilated with extraordinary rapidity, and by measuring its diameter at every favorable opportunity, and laying down the measures by a projected curve, I found the curve to be very nearly a straight line, indicating a uniform rate of increase; and by tracing back this line to its intersection with its axis, I was led, at the time, to this very singular conclusion,—viz. that on the 21st of January, at 2h. P. M., the disc must have been a point—or ought to have no magnitude at all! in other words, at that precise epoch some very remarkable change in the physical condition of the comet must have commenced. Well! all this was speculation. But here comes the matter of fact I refer to, and which, observe, was communicated to me no longer ago than last month by the venerable Olbers, whom I visited in my passage through Bremen, and who was so good as to show me a letter he had just received from M. Boguslawski, Professor of Astronomy at Breslau, in which he states that he had actually procured an observation of that comet on the night of the 21st of January. Well then, how did it appear? why, as a star of the sixth magnitude—a bright concentrated point, which showed no disc, with a magnifying power of 140! And that it actually *was* the comet, and no star, he satisfied himself, by turning his telescope on that point where he had seen it. It was gone! Moreover, he had taken care to secure, by actual observation, the place of the star he observed; that place agreed to exact precision with his computation: that star *was* the comet, in short. Now, I think this observation every way remarkable. First, it is remarkable for the fact, that M. Boguslawski was *able* to observe it at all on the 21st. This could not have been done, had he not been able to direct his telescope point blank on the spot, by calculation, since it would have been impossible in any other way to have known it from a star. And, in fact, it was this very thing which caused Maclear and myself to miss procuring earlier observations. I am sure that I must often have swept, with a night-glass, over the very spot where it stood in the morning before sunrise. And never was astonishment greater than mine at seeing it riding high in the sky, broadly visible to the naked eye, when pointed out to me by Mr. Maclear, who saw it with no less amazement on the 24th. The next remarkable feature, is the enormously rapid rate of dilatation of the disc and the absorption into it of all trace of the surrounding nebula. Another is the interior cometic nucleus. All these phenomena, while they contradict every other hypothesis that has ever been advanced, so far as I can see, are quite in accordance with a theory on the subject, which I suggested on the occasion of some observations of Biela's comet,—a theory which sets out from the analogy of the precipitation of mists and dews from a state of transparent vapor on the abstraction of heat. It appears to me, that the nucleus and grosser parts of the comet must have been entirely evaporated during its perihelion, and reprecipitated

during its recess from the sun, as it came into a colder region; and that the first moment of this precipitation was precisely that I have pointed out as the limit of the existence of the disc,—viz. on the 21st of January, at 2 P. M., or perhaps an hour or two later.

Athenæum.

On some Preparations of the Eye. By Mr. CLAY WALLACE, of New York.

Sir David Brewster laid before the Section a series of beautiful preparations of the eye, made by Mr. Clay Wallace, an able oculist in New York, calculated to establish some important points in the theory of vision. As no paper accompanied these preparations, which had reached him at Newcastle, Sir David Brewster explained to the meeting their general nature and importance. Mr. Clay Wallace, he stated, considers that he has discovered the apparatus by which the eye is adjusted to different distances. This adjustment is, he conceives, effected in two ways,—in eyes which have *spherical lenses* it is produced by a *fulciform*, or hook-shaped muscle attached only to one side of the lens, which by its construction brings the crystalline lens nearer the retina: In this case, it is obvious that the lens will have a slight motion of rotation, and that the diameter, which was in the axis of vision previous to the contraction of the muscle, will be moved out of that axis after the adjustment, so that at different distances of the lens from the retina different diameters of it will be placed in the axis of vision. As the diameters of a sphere are all equal and similar, Mr. Clay Wallace considered that vision would be equally perfect along the different diameters of the lens, brought by rotation into the axis of vision. Sir David Brewster, however, remarked that he had never found among his numerous examinations of the lenses of fishes any which are perfectly spherical, as they were all either *oblate* or *prolate* spheroids, so that along the different diameters of the solid lens the vision would not be similarly performed. But independent of this circumstance, he stated that in every solid lens there was only one line or axis in which vision could be perfectly distinct, namely, the axis of the optical figure, or series of *positive* and *negative* luminous sectors, which are seen by the analysis of polarized light. Along every other diameter the optical action of the lens is not symmetrical. When the lens is not a *sphere*, but *lenticular*, as in the human eye or in the eyes of most quadrupeds, Mr. Clay Wallace considers that the apparatus for adjustment is the ciliary processes, to which this office had been previously ascribed, though not on the same scientific grounds as those discovered by Mr. Wallace. One of the most important results of Mr. Wallace's dissections is the discovery of *fibres in the retina*. These fibres may be rendered distinctly visible. They diverge from the base of the optic nerve, and surround the *foramen ovale* of Soemmering at the extremity of the eye. Sir John Herschel had supposed such fibres to be requisite in the explanation of the theory of vision, and it is therefore doubly interesting to find that they have been actually discovered. Sir David Brewster concluded his observations by expressing a hope that anatomists in this country would turn their attention to this subject; and that with this view he would place the preparations of Mr. Clay Wallace in the Exhibition Rooms at Newcastle during the week.

Ibid.