

night. The aurora was probably extensive, as the evening, notwithstanding the clouds, was nearly as bright as moonlight.

Guildford, Feb. 5

T. RAND CAPRON

### The Floods

Two of the largest districts which are most constantly flooded are, perhaps, Oxford and "The Plain of York." The same cause floods both these districts, namely, what Mr. Mackintosh has called "Colonel Greenwood's hard gorge and soft valley theory." Both these districts have been worn down by rain and rivers in the soft oolitic strata; and the Humber and the Thames have ever had, and have now, to force outlets through comparatively hard chalk gorges. The rain-flood waters, checked at these gorges, overflows and deposits alluvium behind the gorges. The same takes place in the soft strata of the Weald, behind the nine comparatively hard chalk gorges of the North and South Downs.

GEORGE GREENWOOD

Brookwood Park, Alresford, Feb. 3

### Zodiacal Light

THE evening of Feb. 2 being clear, after a long persistence of rainy cloud for many days, about 6.5 P.M. I began to notice the existence of a zodiacal light. Some time later, probably about 6.40, it was considerably brighter than any portion of the galaxy in sight at the time, though this might not have been the impression of an inattentive spectator, as the gradual melting away of its edges produced much less contrast with the ground of the sky than the better defined outline of the Milky Way. Its light was, in fact, so imperceptibly diffused that it was impossible to fix its boundaries or extent with any accuracy. Its general position was, however, undoubtedly a little below the square of Pegasus (where its upper edge fell short of  $\alpha$  and  $\gamma$ ), and beneath the three stars of Aries; but its light was here so enfeebled that its termination was quite uncertain, and it could only be said that the direction of its axis was towards the Pleiades. Its breadth where most brilliant, near Pegasus, might probably be estimated at  $8^\circ$  or  $9^\circ$ , from comparison with the distance from  $\alpha$  to  $\beta$ , and with the length of the belt of Orion; but this determination was liable to great uncertainty. It was thought to show a ruddy tinge, not unlike the commencement of a crimson Aurora Borealis; this may have been a deception, but it was certainly redder or yellower than the galaxy. At 7 I examined it with a little pocket spectroscope, which shows very distinctly the greenish band of the aurora; but nothing of the kind was visible, nor could anything be traced beyond a slight increase of general light, which, in closing the slit, was extinguished long before the auroral band would have become imperceptible. It was still visible at 8.30. The phenomenon had been previously noticed, but with less distinctness, on Dec. 30 and Jan. 11.

T. W. WEBB

Hardwick Vicarage, Herefordshire

### Magnetic Disturbance during Solar Eclipse

WITH the known relation existing between the sun and terrestrial magnetic disturbance, it is not surprising that some indication of a change in the earth's magnetism might be expected during a solar eclipse; and the case cited by the Rev. S. J. Perry, of its supposed observation by M. Lion, is not the first instance of the kind.

Shortly after the eclipse of 1870, Signor Diamilla Müller, of Florence, published a paper in the *Gazzetta Ufficiale*, No. 17, describing some magnetic observations made in Italy during the 21st, 22nd, and 23rd December, and from which it appeared that there was a slight variation in the curve of the 22nd, at the time of the eclipse, which did not appear in the curves of the preceding and subsequent days. Signor Müller at once concluded that the variation was produced by the eclipse; but it was pointed out by Senhor Capello, of the Lisbon Observatory, that the same disturbance was recorded by his self-recording instruments, but it occurred there some time before the totality. It was also recorded by the instruments here, and proved to be insignificant when compared with other disturbances continually observed.

A careful examination of the curves for the time of the 1860 eclipse has also failed to show any trace of a similar movement then occurring.

G. MATHUS WHIPPLE

Kew Observatory, Feb 5

### Circumpolar Lands

MR. HAMILTON, in NATURE of January 25, refers to a paper in which "the rising of the land at the poles is inferred as a necessary result of the cooling and contracting of the earth." He then goes on to give the substance of part of the paper, beginning as follows:—

"If a spheroid of equilibrium, in motion about an axis, contract uniformly in the direction of lines perpendicular to its surface, a new spheroid is produced, having a greater degree of eccentricity, because if equal portions are taken off the two diameters, the ratio of the equatorial diameter is increased. This is equivalent to a heaping up of matter around the equator."

The reasoning of this latter passage appears sound, but it contradicts the former one. As I have shown in my letter to which Mr. Hamilton replies, the facts, so far as known, appear to point to a relative increase of the polar diameter; he admits this, and then gives reasons for expecting a relative increase of the equatorial one. He must have made some oversight.

Old Forge, Dunmurry, Jan. 27 JOSEPH JOHN MURPHY

### THE HISTORY OF PHOTOGRAPHY

I TRUST you will kindly allow me space for a few lines on the subject of some rare specimens connected with the History of Photography, now in the possession of Madame Nièpce de St. Victor, whose husband it will be remembered was the first to employ glass, and a transparent medium (albumen) for the purposes of photography, thus discovering, to a great extent, the process of Photography as it exists at the present day. The first glass negative, or rather *cliché*, Madame Nièpce possesses, as likewise prints executed in 1848.

Nièpce de St. Victor was likewise one of those who have worked hard to secure *natural colours* in the camera, some very perfect specimens—photographs of coloured dolls—which prove distinctly that the solution of the problem is not impossible, as many believe, are also included in the Nièpce collection, together with some results of early photo-engraving.

Madame Nièpce and family have been left, I regret to say, in very straitened circumstances, for the busy philosopher in his lifetime had but the pay of a subordinate officer in the French Army to subsist on. She has placed in the possession of the Photographic Society this valuable collection of her late husband, and it is proposed to exhibit it at the next meeting of the Society on the 13th inst., and any institution or individual desiring to become possessed of some of the specimens will be readily furnished with information by H. BADEN PRITCHARD

### GANOT'S PHYSICS\*

GANOT'S Physics is so well known in this country that our task is very different from that of reviewing a new work, and we can do little more than compare this edition with the previous. It is unusual for any large scientific work to pass through five editions in about ten years, and the value of the book may be estimated by this fact. It has passed through more than twice the above number of editions in France, and has been translated into various European languages. In the present edition the type has been altered, and the size of the page somewhat increased, while twenty-eight new illustrations have been added, and the text has been augmented.

The doctrine of energy has of late been so largely developed that we are surprised to find so small an amount of space given to the subject. No more than two pages are devoted to it, while the term "transmutation of energy," does not appear in the index. Neither do we find the terms "Kinetics" and "Kinematics;" yet we imagine that the student who presented himself as a candidate for a Science Scholarship at any of our Uni-

\* An Elementary Treatise on Physics, Experimental and Applied. Translated and Edited from Ganot's "Éléments de Physique," by E. Atkinson, Ph.D., F.C.S. Fifth Edition, Revised and Enlarged. 828 pp. 8vo. (London: Longmans and Co. 1872.)

versities, not knowing the meaning of these terms, might find himself quite at sea in some of the questions. In-

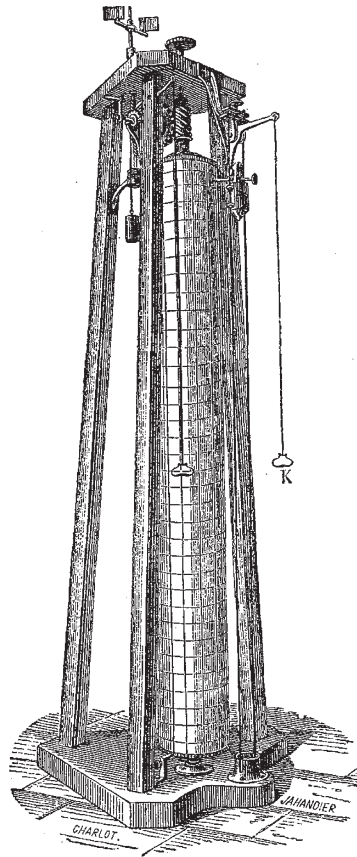


FIG. 1.

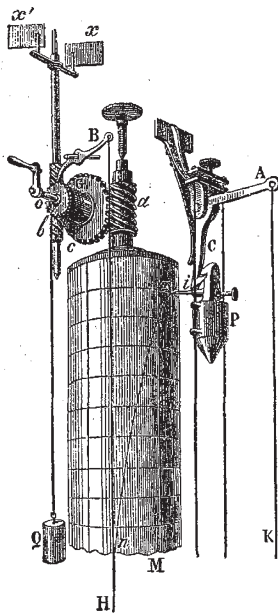


FIG. 2.

deed we do not find much introduction of the terms of the Thomsonian Physics, and this is surely to be re-

gretted; for just as the philosophy of Francis Bacon used to be called the "New Philosophy," so might the Natural Philosophy developed in the treatise of Tait and Thomson be called the "New Physics." The experimental science of the future must be based, we conceive, upon the system therein elaborated.

We are glad to notice a very good account of Morin's apparatus for demonstrating the laws of falling bodies (p. 49), which does not appear in the 1868 edition. The principle of this, it will be remembered, is to cause a falling body to trace its own path upon a rotating cylinder. The accompanying diagram (Figs. 1, 2) needs no explanation. The vanes are for the purpose of producing uniformity of motion in the revolving cylinder; the falling weight is a mass of iron, P, furnished with a pencil, which presses against the paper on the revolving cylinder. The curve traced can be proved to be a parabola, and the paths

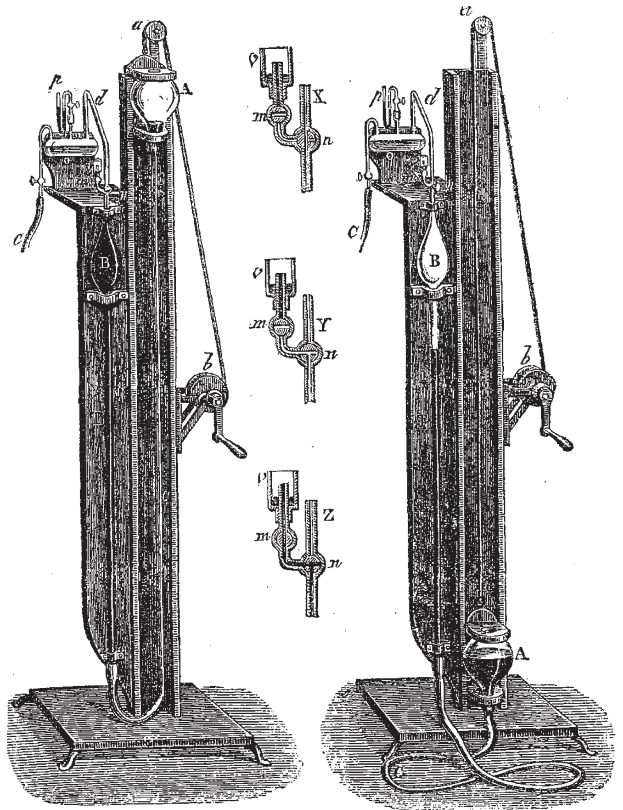


FIG. 3.

FIG. 4.

traversed in the direction of the descent are shown to vary directly as the squares of the lines in the direction of rotation.

Under the head of "Endosmose of Gases" (p. 97) we find no account of the cause of diffusion of gases, the experiments of Graham, the determination of the relative velocity of atoms by Clausius, and the explanation of such facts as the rate of diffusion of hydrogen being four times greater than that of oxygen. But it may be argued that this rather belongs to Chemistry.

We are glad to see that the law which relates to the volume of gases under varying pressures is now called after its true discoverer, "Boyle's Law," but the experiment, demonstrating at once the incompressibility of fluids and the porosity of dense bodies, is, as usual, attributed to the members of the Accademia del Cimento, while it was in reality proved twenty years earlier with

a hollow sphere of lead by Francis Bacon. Again "Mariotte's Tube," as it is called (p. 120), is described and figured by Robert Boyle fourteen years before Mariotte mentions it. Morren's mercury pump for slow but accurate exhaustion is described and figured on p. 141 (Figs. 3, 4); by its means a vacuum of one-tenth of a millimetre of mercury may be obtained.

The Acoustics has been considerably augmented, for while in the 1868 edition it occupied fifty-two pages, it now fills fifty-five larger pages. We notice, among other things, an account and woodcut of König's stethoscope, and of his cylindrical resonator; of Helmholtz's apparatus for the synthesis of sounds; and various new woodcuts of manometric flames. We do not observe any mention of singing or sensitive flames. In the section devoted to heat, we do not find an account of Prof. Guthrie's experiments on the conduction of heat by liquids; or of the recent observations regarding the heat of the moon and certain stars; and the portion relating to the "Mechanical Equivalent of Heat" is still very meagre and insufficient.

The magnetism of iron ships might with advantage be alluded to in the account of Magnetism; and M. Noë's very powerful thermo-electric battery is also worthy of notice. On pp. 596 and 597 we are glad to observe capital figures and descriptions of the electrical machines of Bertsch and Carre; the latter appears to be a most desirable addition to the Physical Laboratory, as, even without a condenser, plates of 49 centimetres diameter give sparks 18 centimetres long, and the machine is not much affected by moisture. The apparatus figured on pp. 678-679 for demonstrating the attraction and repulsion of electric currents by currents, consists of new and improved forms of those devised by Ampère, and is extremely ingenious; as is also the form of solenoid described on p. 690. (Fig. 5.)

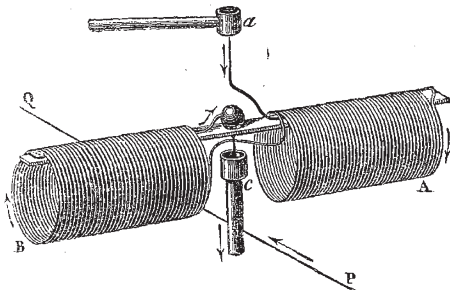


FIG. 5.

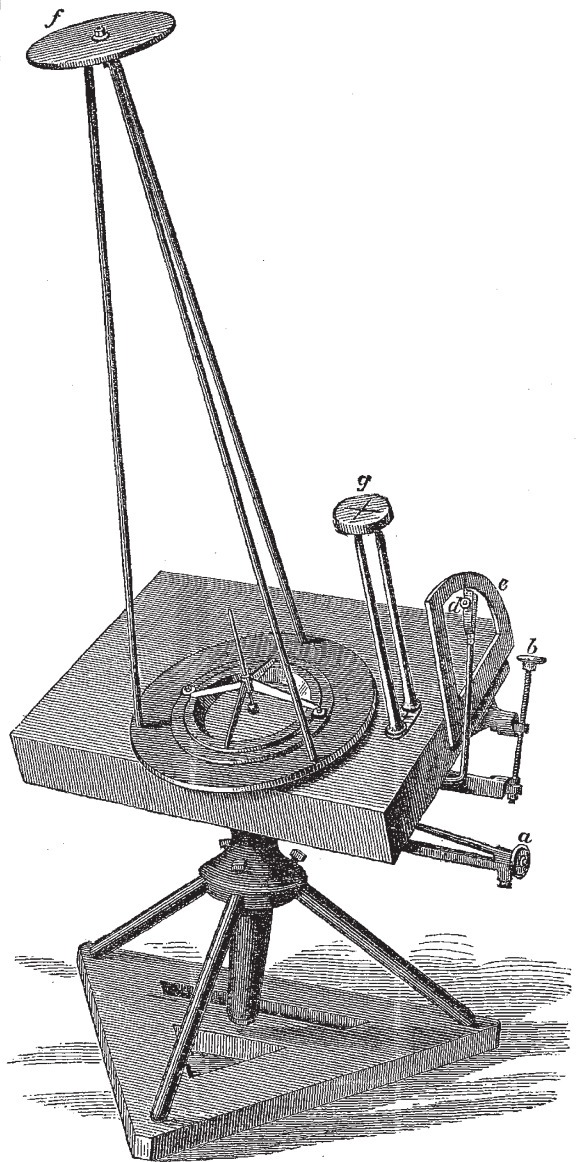
A few alterations in the text would be advisable if a table of errata is introduced; thus (p. 750) no explanation is given of the stoppage of a cube of copper when caused to rotate between the poles of a powerful electro-magnet, as soon as the magnet is made; neither is reference given to the explanation which in another form is given elsewhere. Again (p. 628) we read:— . . . "Kirchhoff has concluded that the motion of electricity in a wire in which it meets with no resistance is," &c. A very few clerical errors are observable:—p. 185, M. Costa should be M. Corti; p. 246, topmost line, "substances by which their action," &c., should read "which by their action;" p. 289, line ten from the top,  $\phi$  should be  $\psi$ ; and p. 524, line 4, we find "plain polarised light."

These, however, are quite minor matters; the book was a good one at the outset of its career, and each succeeding edition has rendered it more and more complete. The above remarks are made rather as suggestions than in any spirit of adverse criticism. Ganot's Physics is a great addition to our scientific literature, and neither student nor *savant* could spare it from his library.

G. F. RODWELL

## THE SOLAR ATMOSPHERE

THE object of the investigation discussed in NATURE (No. 101, pp. 449-452) being merely that of ascertaining whether the incandescent matter contained in the solar atmosphere transmits radiant heat of sufficient energy to admit of thermometric measurement, no particular statement was deemed necessary regarding the spectrum which appeared on the bulb of the focal thermometer after shutting out the rays from the photosphere



during the experiments. The appearance of this spectrum has in the meantime been carefully considered. Its extent and position suggest that the depth of the solar atmosphere far exceeds the limits hitherto assumed.

The accompanying illustration represents an apparatus constructed by the writer to facilitate the investigation. Evidently the expedient of shutting out the photosphere while examining the effect produced by the rays emanating from the chromosphere calls for means by which the sun