A RECENT number of the *Comptes rendus* contains an important paper by Prof. Becquerel on the light emitted spontaneously by certain salts of uranium. The light emitted is out of all proportion to the feeble radio-activity of the salts, and is most marked in those salts which phosphoresce most brilliantly when exposed to light. In the case of the double sulphate of uranyl and potassium, it was found that whilst different specimens varied in phosphorescent and luminescent power, the light emitted was the same, whether the salt had been kept in the dark during eight years or had been recently exposed to the light of an arc or to the radiations of radium salts. It is of interest to note that the author is of opinion that the study of uranium and thorium would have led, though perhaps somewhat slowly, to the recognition of most of the facts which have been brought to light by the investigation of radium and polonium.

IN the *Sitzungsberichte* of the Prussian Academy Prof. Richarz and Dr. Schenck direct attention to some very striking "analogies between radio-activity and the behaviour of ozone." Freshly prepared ozone and ozone that has been decomposed by deozonisers have the power of causing condensation in a steam jet, and impart conductivity to the air in a similar manner to those metallic salts which emit Becquerel radiation. The photographic effect of radio-active substances has also been observed in the case of ozone, and although it does not act upon barium platinicyanide or zinc oxide, it causes hexagonal zinc blende to fluoresce brightly, and this is regarded as evidence that massive ions are produced comparable with the $\alpha$ rays of radium and the canal rays of the vacuum tube. Platinum that has been in contact with ozone exhibits induced radio-activity, and it is suggested that the slight conductivity normally observed in the atmosphere and certain of the effects produced by radio-active bodies may perhaps be due to the formation and decomposition of ozone or hydrogen peroxide.

AN ingenious apparatus for measuring the electrical conductivity of aqueous solutions at high temperatures is described by Messrs. Noyes and Coolidge in the *Zeitschrift für physikalische Chemie*. The conditions to be satisfied were that the vessel should withstand, without leakage, pressures up to the critical pressure of water, that the lining of the vessel should be entirely unacted on by aqueous solutions, that the electrodes should be efficiently insulated from the walls of the vessel at temperatures exceeding 300° C., and that the temperature should be maintained constant within 0·1° C. The desired result was accomplished by using a steel bomb lined with platinum and closed by a washer of pure gold wire. The electrodes were of steel covered with platinum foil, and were bolted into the top and bottom of the bomb, from which they were insulated externally by means of mica and internally by means of rings of quartz-crystal made tight by gold washers. The whole apparatus was heated in a vapour bath, and conductivity measurements could be made with an accuracy of 0·25 per cent. up to 300° C., whilst the fouling of the solutions was inappreciable even at 1/2000 normal.

THE additions to the Zoological Society's Gardens during the past week include a Bonnet Monkey (*Macacus sinicus*) from India, presented by Mr. F. Glockler; two Yellow-winged Parrakeets (*Brotogerys virescens*) from Brazil, a Senegal Parrot (*Poeocephalus senegalus*) from West Africa, two Golden Eagles (*Aquila chrysaëtus*), European, presented by Mr. Charles E. Lister; a Royal Python (*Python regius*) from West Africa, presented by Mr. Cecil T. Reaney; a Simpae Monkey (*Semnopithecus melanophus*) from Sumatra, an Indian Brush-tailed Porcupine (*Atherura fasciculata*) from Siam, a Great-billed Weaver-bird (*Ploceus megarhynchus*) from India, deposited.

## OUR ASTRONOMICAL COLUMN.

EPHEMERIS FOR THE MINOR PLANET (7), IRIS.—The following is an extract from an ephemeris for the minor planet Iris published by Dr. J. Riem in No. 3926 of the *Astronomische Nachrichten*. It will be remembered that Prof. Wendell recently announced the discovery of a variation in the brightness of this planet, having a range of 0·5 to 1·0 magnitudes:—

| 1904 | α (h. m. s.) | δ (° ′) | log $r$ | log Δ |
|---|---|---|---|---|
| Feb. 17 | 6 36 26 | +17 41·5 | 0·332 | 0·136 |
| ,, 21 | 6 37 12 | +17 41·3 | 0·334 | 0·150 |
| ,, 25 | 6 38 30 | +17 41·1 | 0·336 | 0·164 |
| ,, 29 | 6 40 19 | +17 40·9 | 0·338 | 0·179 |
| Mar. 4 | 6 42 36 | +17 40·4 | 0·340 | 0·194 |
| ,, 8 | 6 45 17 | +17 39·6 | 0·342 | 0·208 |

Magnitude, February 5=7·9, March 8=8·5.

OBSERVATIONS OF MARS DURING 1903.—The general results of the observations of Mars made by Mr. Denning during 1903 are published in No. 3926 of the *Astronomische Nachrichten*. A 10-inch reflector with powers of 252, 312, 332, 450 and 488 was used, and the power 312 was found to be the most effective.

The streaks, or canals, on the planet's surface appeared to be, without doubt, objective features, but no "doubling" was observed. Decided changes were observed to take place in the appearance of some of the markings, but Mr. Denning attributes these apparent changes to the drifting of vaporous condensations over the permanent markings rather than to any real modifications of the latter. Many brilliantly luminous areas were observed, and although they exhibited decided changes, Mr. Denning believes them to be permanent features, and urges that more definite observations of their latitudes and longitudes should be made and recorded. A curious feature of these bright markings is that they appear brighter when on the edge of the planet's disc than they do at its centre, behaving, in this respect, like faculæ on the sun's disc. One rotation period for the planet satisfies the observations of all the markings, thus proving them to be definite features of the planet's surface rather than drifting vapours such as are seen when observing Jupiter and Saturn.

Comparing the recent results with those obtained in February, 1869, Mr. Denning has determined the rotation period of Mars to be 24h. 37m. 22·7s. As this is the mean of 12,136 rotations, it should be a very accurate value. Six drawings of the Martian surface, made on different dates during 1903, accompany Mr. Denning's communication.

A CATALOGUE OF 829 SOUTH POLAR STARS.—No. 21 of the *Contributions from the Observatory of Columbia University* is devoted to a catalogue of 829 stars, all within 2° of the South Pole, compiled by Prof. Harold Jacoby, acting director of the observatory.

The star places in the catalogue have been obtained from measures of twelve plates taken at the Cape Observatory. Four of these plates overlap and cover the region within 1° of the pole; the remaining eight contain regions symmetrically arranged about the inner four at different hour angles, so that they cover the whole region within 2° of the pole. In measuring these plates the star places, as determined from each plate, were corrected for refraction, &c., and then plotted on one large chart, so that the unknown stars common to any two or more plates overlapped. The effects of errors of observation, and the uncertainty due to the possibly different scale-values of each plate, were then eliminated, and the whole chart was oriented from the known positions of some of the included stars as determined by Sir David Gill at the Cape Observatory. The relative positions thus determined should be very accurate, and are given in the catalogue for the epoch 1895, together with the catalogue number, the magnitude, the south polar distance, the C.P.D. number, and the exact precessional corrections for each star.

THE CLIMATOLOGY OF 1903.—As in former years, the meteorologist of the Juvisy Observatory, M. J. Loisel, has published the detailed results of the observations made at that observatory during the past year in the *Bulletin de la Société astronomique de France* (February).

The results are graphically depicted by a series of curves, one set of which shows and compares the rainfall, the direction of the wind, the temperature, pressure and hygrometric state of the atmosphere, the number of hours of sunshine, the state of the sky, and the declination and phase of the moon for each day. A set of tables comparing each of the four seasons with the corresponding season for each year since 1886 shows that, on the whole, the winter was warm, the spring dry, the summer cold, and the autumn warm during 1903 as compared with the mean conditions. The curve depicting the amount of the effective insolation shows that during 1903 there were two maxima, one in May the other in July, instead of one in July as shown on the curve for 1902. A comparison of the total solar radiations observed during 1902 and 1903 gives 146,115 and 140,175 calories respectively.

MERIDIAN-CIRCLE OBSERVATIONS AT THE LICK OBSERVATORY.—The results of the meridian-circle observations made at the Lick Observatory during the period August, 1896, to March, 1901, by Mr. Richard H. Tucker have just been published in one volume (*Publications* of the Lick Observatory, vol. vi., 1903). The results include about 11,700 full observations, and 2700 observations in one coordinate only, for the determination of 4500 stars.

The first part of the work consists of the results of the observations for declination of 361 latitude stars previously observed by Prof. Doolittle at South Bethlehem, Pa, and includes 107 stars from the "Standard Catalogue" of Lewis Boss. The resulting declinations are compared, where the stars are common to the catalogues, with those given in Boss's catalogue and the Berliner Jahrbuch.

The second part of the volume is devoted to the observations of 21 circumpolar stars, all above declination +82°, in compliance with a request of Dr. Auwers. Part iii. gives the results of the observations of 50 zodiacal stars, made during 1898 at the request of Sir David Gill to furnish places for his heliometer measures of the major planets.

The volume also contains a description of the observations, and their reduction and final results, of 3088 southern stars contained in the catalogue observed by Piazzi, at Palermo, during the period 1792 to 1813.

The stars in the first and second lists of the Astrophotographic Conference, of comparison stars for Eros, were observed at Lick, and the results are given and discussed in the fifth section of the volume.

The observations are concluded with the results obtained in some miscellaneous observations made during the period 1897 to 1901. These include 49 comparison stars for various purposes, 20 proper-motion stars observed for Prof. J. G. Porter, of Cincinnati, and several meridian-circle observations of Eros, Nova Persei, and two comets.

## *M. BLONDLOT'S n-RAY EXPERIMENTS.*[1]

IN his experiments on the rapidity of propagation of the Röntgen rays, the French academician, M. R. Blondlot, discovered a new kind of rays, which he called *n*-rays, after the place Nancy, in which they were first observed.[2] These rays are said to be emitted by an Auer burner, or better still by a Nernst lamp of 200 watt-power. Like the Röntgen rays, they are said to pass through aluminium with ease, but on the other hand to be absorbed by the slightest film of water, like the longer heat-waves. Although they are stated to be absorbed by cold platinum, they readily pierce red-hot platinum.

Blondlot has recently found that these *n*-rays are emitted by the wire of the Nernst lamp even after this has been extinguished for several hours, and that, moreover, flints which have been exposed to the sun's rays have a distinct effect in the sense of the *n*-rays.

In all these observations of Blondlot the action of the *n*-rays consists in general of a brightening of a source of light under these rays, or rather of a darkening when the rays are cut off by interposing either the hand or a lead screen between the source of light and the source of the *n*-rays. The analysing source of light may be a small spark, a bluish flame, a phosphorescent surface, a dark platinum plate at dull red heat, or the surface of paper feebly illumined by a source of light. The dimensions of all these analysing sources of light are very small (the illumined paper, for instance, being 2 mm. by 16 mm. in size), and the observation is carried on in a dark room.

Although the change in brightness is said to be considerable, neither Blondlot (*C. R.*, cxxxvii., 167, 1903), Rubens (Ebenda) nor others (*Phys. Zeitsch.*, iv., 732 and 733, 1903) have hitherto succeeded in demonstrating objectively the corresponding transformation of energy. At the same time the phenomena observed subjectively by Blondlot could not be perceived by Rubens and others in repeating the latest experiments with slightly illuminated or phosphorescent surfaces.

Without wishing, for the present, to dispute the objective existence of these *n*-rays, I should like in what follows to bring forward the fact that a whole set of Blondlot's experiments may be almost exactly imitated in their effects *without employing any source of illumination whatever*, and that the changes in form, brightness, and colour respectively of the analysing luminous surface observed by Blondlot under a stream of rays, and the interception of a diaphragm (Abblendung) may be referred to processes taking place in the eye itself, and, in fact, to the *contest between the rods and cones of the retina in seeing in the dark*.

It has been known for some time that the layer of rods and cones in the retina is the structure which is sensitive to light whereby this form of energy, from without, is transformed into nerve-stimulation. While, however, experiments on sharpness of vision have led to the assumption that the power of vision is due to the agency of the cones alone, the almost identical anatomical structure of the rods admits of the conclusion that they also play their part in vision. But on the ground of more recent physiological researches on vision in dim light, and the influence of the visual purple contained in the rods on colour-perception, we have been enabled to distinguish, more and more clearly, the respective modes of action of these two elements of the retina and to ascribe to them their different functions. A. König[1] had already ascribed to the rods the colourless vision of the totally colour blind in every degree of brightness, the non-perception of colour in a very dim light of those otherwise able to perceive colours, and the perception of blue. J. v. Kries[2] went further, and disposed of the still existing difficulties and contradictions by putting forward the hypothesis that the cones form our colour-perceiving "light apparatus" ("Hellapparat") and the rods our totally colour blind "dark apparatus" ("Dunkelapparat"). According to this theory of Kries the cones render vision possible in a very bright light, and their stimulation by light-waves arouses in the brain the perception of colour, while the purple containing rods are totally colour blind, and only come into action in a very dim light, and are endowed with the property of considerably increasing their sensitiveness in the dark. These properties of the rods are called by Kries "adaptability to the darkness" (Dunkeladaptation). Before the cones perceive coloured light, the rods bring about in the brain the impression of colourless light.

We know from the anatomy of the eye[3] that the fovea centralis contains cones only and no rods, and that the rest of the retina has rods as well as cones, the former predominating towards the periphery, and it is also well known

[1] Translation of "Notes in Elucidation of the Most Recent Researches of M. R. Blondlot on the *n*-Rays." By O. Lummer. Read at the sitting of the German Physical Society, November 27, 1903.

[2] R. Blondlot, "Sur de nouvelles actions produites par les rayons *n*; généralisation des phénomènes précédemment observés" (*C. R.*, cxxxvii., 684, 1903). "Sur l'emmagasinement des rayons *n* par certains corps" (*C. R.*, cxxxvii., 729, 1903).

[1] "Über den menschlichen Sehpurpur und seine Bedeutung beim Sehen (*Sitzber.* d. Berl. Akad d. Wissensch., S. 577, 1894).

[2] "Über die Funktion der Netzhautstänchen (*Zeitsch.* f. Psych. u. Physiol. d. Sinnesorgane, ix., 81–123, 1894).

[3] R. Greef, "Die mikroskopische Anatomie des Sehnerven und der Netzhaut." Aus dem "Handbuch der Augenheilkunde" von Graefe u. Samisch. 2 Aufl., I. Bd., V. Kap. (Berlin, 1901.)