ant researches in stellar photography which have recently been carried out at the Harvard College Observatory, see NATURE, vol. xxxv. p. 37.

NEW MINOR PLANET.—A new minor planet, No. 265, was discovered on February 27, by Herr Palisa, at Vienna. This is the fifty-eighth that Herr Palisa has discovered.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1887 *MARCH* 6–12

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on March 6

Sun rises, 6h. 37m.; souths, 12h. 11m. 28·1s.; sets, 17h. 46m.; decl. on meridian, 5° 40′ S.: Sidereal Time at Sunset, 4h. 43m.

Moon (Full on March 9) rises, 13h. 39m.; souths, 21h. 29m.; sets, 5h. 10m.*; decl. on meridian, 17° 4′ N.

Planet	Rises h. m.	Souths h. m.	Sets h. m.	Decl. on meridian ° ′
Mercury	6 54	13 15	19 36	3 22 N.
Venus	7 20	13 35	19 50	2 16 N.
Mars	7 0	12 54	18 48	1 58 S.
Jupiter	22 19*	3 21	8 23	12 2 S.
Saturn	12 2	20 11	4 20*	22 28 N.

* Indicates that the rising is that of the preceding evening and the setting that of the following morning.

Occultations of Stars by the Moon (visible at Greenwich)

March	Star	Mag.	Disap. h. m.	Reap. h. m.	Corresponding angles from vertex to right for inverted image °	°
6	*f* Geminorum	6	0 41	1 40	131	289
8	18 Leonis	6	4 1	4 39	67	337
8	45 Leonis	6	18 24	19 14	68	185
8	ρ Leonis	4	20 50	21 54	61	111
8	49 Leonis	6	22 53	near approach	332	—
11	γ Virginis	2½	3 7	3 40	145	210
11	B.A.C. 4277	6	4 22	near approach	186	—

March	h	
12	3	Mercury stationary.
12	20	Jupiter in conjunction with and 3° 34′ south of the Moon.

Saturn, March 6.—Outer major axis of outer ring = 44″·0; outer minor axis of outer ring = 18″·3; southern surface visible.

Variable Stars

Star	R.A. h. m.	Decl. ° ′		h. m.	
U Cephei	0 52·3	81 16 N.	Mar. 7,	19 36	*m*
S Arietis	1 58·6	11 59 N.	,, 6,		*M*
T Cancri	8 50·2	20 17 N.	,, 9,		*m*
R Ursæ Majoris	10 36·7	69 22 N.	,, 11,		*M*
T Virginis	12 8·8	5 24 S.	,, 7,		*M*
S Ursæ Majoris	12 39·0	61 43 N.	,, 10,		*M*
W Virginis	13 20·2	2 48 S.	,, 12,	5 0	*M*
δ Libræ	14 54·9	8 4 S.	,, 9,	23 39	*m*
U Coronæ	15 13·6	32 4 N.	,, 6,	18 46	*m*
R Scorpii	16 10·9	22 40 S.	,, 11,		*M*
U Ophiuchi	17 10·8	1 20 N.	,, 7,	5 46	*m*
			and at intervals of	20 8	
U Sagittarii	18 25·2	19 12 S.	Mar. 9,	3 0	*m*
β Lyræ	18 45·9	33 14 N.	,, 9,	1 0	*m*
S Vulpeculæ	19 43·8	27 0 N.	,, 12,		*M*
η Aquilæ	19 46·7	0 43 N.	,, 9,	5 0	*m*
δ Cephei	22 25·0	57 50 N.	,, 12,	0 0	*m*

M signifies maximum; *m* minimum.

ON RADIANT-MATTER SPECTROSCOPY:— EXAMINATION OF THE RESIDUAL GLOW[1]

I.

THE duration of phosphorescence after cessation of the exciting cause is known to vary within wide limits of time, from several hours in the case of the phosphorescent sulphides to a minute fraction of a second with uranium glass and sulphate of quinine. In my examinations of the phosphorescent earths glowing under the excitement of the induction discharge *in vacuo*, I have found very great differences in the duration of the residual glow. Some earths continue to phosphoresce for an hour or more after the current is turned off, while others cease to give out the light the moment the current stops. Having succeeded in splitting up yttria into several simpler forms of matter differing in basic power (Roy. Soc. Proc. vol. xl. pp. 502-509, June 10, 1886), and always seeking for further evidence of the separate identity of these bodies, I noticed occasionally that the residual glow was of a somewhat different colour to that it exhibited while the current was passing, and also that the spectrum of this residual glow seemed to show, as far as the faint light enabled me to make out, that some of the lines were missing. This pointed to another difference between the yttrium components, and with a view to examine the question more closely I devised an instrument similar to Becquerel's phosphoroscope, but acting electrically instead of by means of direct light.

The instrument, shown in Fig. 1, A and B, consists of an opaque disk, *a b c*, 20 inches in diameter, and pierced with twelve openings near the edge as shown. By means of a multiplying wheel, *d*, and band, *e f*, the disk can be set in rapid rotation. At each revolution a stationary object behind one of the apertures is alternately exposed and hidden twelve times. A commutator, *g* (shown enlarged at Fig. 1, B), forms part of the axis of the disk. The commutator is formed of a hollow cylinder of brass round a solid wooden cylinder. The brass is cut into two halves by a saw cut running diagonally to and fro round it, so as to form on each half of the cylinder twelve deeply cut teeth interlocking, and insulated from those on the opposing half cylinder by an air space about 2 mm. across. Only one half, *h h h*, of the cylinder is used, the other, *i i i*, being idle; it might have been cut away altogether were it not for some little use that it is in saving the rubbing-spring, *j*, from too great friction when passing rapidly over the serrated edge. To a block beneath the commutator are attached two springs, one, *k*, rubbing permanently against the continuous base of the serrated hemicylinder *h h*, and the other, *j*, rubbing over the points of the teeth of *h h*. By connecting these springs with the wires from a battery it will be seen that rotation of the commutator produces alternate makes and breaks in the current. The spring, *j*, rubbing against the teeth is made with a little adjustment sideways, so that it can be said to touch the points of the teeth only, when the breaks will be much longer than the makes, or it can be set to rub near the base of the teeth, when the current will remain on for a much longer time and the intervals of no current will be very short. By means of a screw, *l l*, attached to the spring, any desired ratio between the makes and the breaks can be obtained. The intermittent primary current is then carried to an induction coil, *m*, the secondary current from which passes through the vacuum tube, *n*, containing the earth under examination. When the commutator, the coil-break, and the position of the vacuum tube are in proper adjustment, no light is seen when looked at from the front if the wheel is turned slowly (supposing a substance like yttria is being examined), as the current does not begin till the tube is obscured by an intercepting segment, and it ends before the earth comes into view. When, however, the wheel is turned more quickly, the residual phosphorescence lasts long enough to bridge over the brief interval of time elapsing between the cessation of the spark and the entry of the earth into the field of view, and the yttria is seen to glow with a faint light, which becomes brighter as the speed of the wheel increases.

To count the revolutions, a projecting stud, *o*, is fastened to the rotating axis, and a piece of quill, *p*, is attached to the fixed support, so that at every revolution a click is produced. With a chronograph watch it is easy in this way to tell the time, to the tenth of a second, occupied in ten revolutions of the wheel.

Under ordinary circumstances it is almost impossible to detect any phosphorescence in an earth until the vacuum is so high that the line spectrum of the residual gas begins to get faint; otherwise the feeble glow of the phosphorescence is drowned by the greater brightness of the glowing gas. In this phosphoroscope, however, the light of glowing gas does not last an appreciable time, whilst that from the phosphorescent earth endures long enough for it to be caught in the instrument. By this means, therefore, I have been able to see the phosphorescence of yttria, for example, when the barometer gauge was 5 or 6 mm. below the barometer.

When the earth under examination in the phosphoroscope is yttria free from samaria, and the residual emitted light is ex-

[1] Paper read before the Royal Society by Mr. William Crookes, F.R.S., on Feb. 17.