ASTRONOMICAL PHENOMENA FOR THE WEEK 1886 *MAY* 2-8

(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 May 2

Sun rises, 4h. 32m.; souths, 11h. 56m. 50·4s.; sets, 19h. 22m.; decl. on meridian, 15° 26′ N.: Sidereal Time at Sunset, 10h. 4m.

Moon (New on May 4) rises, 4h. 10m.; souths, 10h. 42m.; sets, 17h. 25m.; decl. on meridian, 5° 29′ N.

Planet	Rises h. m.	Souths h. m.	Sets h. m.	Decl. on meridian ° ′
Mercury	4 0	10 23	16 46	3 50 N.
Venus	3 13	9 5	14 57	2 18 S.
Mars	12 59	19 57	2 55*	10 39 N.
Jupiter	14 49	21 7	3 25*	2 43 N.
Saturn	7 26	15 38	23 50	22 51 N.

* Indicates that the setting is that of the following morning.

Occultations of Stars by the Moon (visible at Greenwich)

May	Star	Mag.	Disap. h. m.	Reap. h. m.	Corresponding angles from vertex to right for inverted image ° °
6	111 Tauri	5½	20 12	21 3	114 324
6	117 Tauri	6	21 42	22 21	88 342

Saturn, May 2.—Outer major axis of outer ring = 39″·1; outer minor axis of outer ring = 17″·4; southern surface visible.

May	h.	
2	1	Mercury in conjunction with and 0° 6′ south of the Moon.
7	1	Mercury at greatest elongation from the Sun, 26° west.

Positions of the Comet Barnard (for Berlin Midnight)

May	R.A. h. m. s.	Decl. ° ′	Log. Δ	Brightness
2	1 38 8	40 28 N.	9·956	118
4	1 39 14	40 6	9·924	136
6	1 41 34	39 23	9·889	155

Variable-Stars

Star	R.A. h. m.	Decl. ° ′		h. m.
U Monocerotis	7 25·4	9 32 S.	May 6,	0 0 *M*
R Crateris	10 55·0	17 43 S.	,, 3,	0 0 *M*
δ Libræ	14 54·9	8 4 S.	,, 2,	3 0 *m*
U Coronæ	15 13·6	32 4 N.	,, 6,	23 35 *m*
U Ophiuchi	17 10·8	1 20 N.	,, 5,	3 4 *m*
			and at intervals of	20 8
X Sagittarii	17 40·4	27 47 S.	May 5,	2 20 *m*
			,, 8,	0 0 *M*
U Sagittarii	18 25·2	19 12 S.	,, 2,	21 40 *m*
			,, 5,	21 35 *M*
β Lyræ	18 45·9	33 14 N.	,, 3,	2 25 *m*
η Aquilæ	19 46·7	0 7 N.	,, 7,	0 0 *M*

M signifies maximum; *m* minimum.

Meteor Showers

There are no showers of great importance visible during this week. Meteors from the following radiants have been observed in previous years:—From Crater, R.A. 170°, Decl. 10° S.; near α Ursæ Majoris, R.A. 170°, Decl. 62° N.; from Virgo, R.A. 202°, Decl. 9° N.; from Aquila, R.A. 290°, Decl. 10° N.; and one with radiant at R.A. 234°, Decl. 46° N.

Stars with Remarkable Spectra

Name of Star	R.A. 1886·0 h. m. s.	Decl. 1886·0 ° ′	Type of spectrum
S Coronæ	15 16 45	31 46·7 N.	III.
τ⁴ Serpentis	15 31 11	15 28·7 N.	III.
R Serpentis	15 45 26	15 28·8 N.	III.
367 Birmingham	15 59 41	47 33·1 N.	III.
47 Serpentis	16 2 58	8 50·3 N.	III.
371 Birmingham	16 3 7	8 55·1 N.	III.
δ Ophiuchi	16 8 22	3 23·9 S.	III.
V Ophiuchi	16 20 24	12 9·5 S.	IV.
α Scorpii	16 22 25	26 10·6 S.	III.
g Herculis	16 24 53	42 7·9 N.	III.
α Herculis	17 9 26	14 20·2 N.	III.

ON THE FORCES CONCERNED IN PRODUCING THE SOLAR DIURNAL INEQUALITIES OF TERRESTRIAL MAGNETISM [1]

IN an article on terrestrial magnetism in the present edition of the "Encyclopædia Britannica," I have endeavoured to show two things:—

(1) That of all the various hypotheses which have been started with the view of explaining the solar diurnal inequalities of terrestrial magnetism, the most probable is that which considers these inequalities to be caused by electric currents in the upper regions of the earth's atmosphere.

(2) That in the neighbourhood of the North Magnetic Pole (judging from observations discussed by Sabine) such currents have in all probability horizontal components flowing in from all sides towards that pole, so that on one side of the pole this component will have a direction the reverse to that which it has on the opposite side of the pole.

Dr. Schuster (see Report of Magnetical Committee of British Association) has deduced from this the legitimate inference that here we must have a vertical current or component of currents, inasmuch as without this we cannot imagine a series of strictly horizontal currents flowing in from the circumference to the centre like the spokes of a wheel.

I think it is desirable that this method of discussion should be extended to the phenomena round the magnetic equator. This magnetic equator may be regarded as approximately coincident with the terrestrial equator. It is the line all along which the freely suspended needle points horizontally, just as the magnetic pole is the place at which the freely suspended needle points vertically downwards.

Now a little to the north of the magnetic equator we have, broadly speaking, the following phenomena:—

(1) When the sun is north of the line, the influence of the sun upon the declination-needle (as represented by that oscillation which culminates an hour or two after noon) tends to drive the North Pole to the west. But when the sun is south of the line this action becomes reversed, and drives the North Pole eastwards.

(2) Whether the sun is north or south of the line, its action upon the bifilar needle (as represented by that oscillation which culminates about noon) tends to increase the horizontal force.

Now let us go a little to the south of the magnetic equator, and we find the following behaviour:—

(3) When the sun is south of the line, the influence upon the declination-needle represented as above tends to drive the North Pole to the east. But when the sun is north of the line this action becomes reversed, and the North Pole is driven westwards.

(4) Whether the sun is north or south of the line, its action upon the bifilar needle, represented as above, shows that it tends to increase the horizontal force.

It is, indeed, well known that there is a north-hemisphere and a south-hemisphere action of the sun upon the declination-needle, the one being the reverse of the other, and the southern limit of the first action being the northern limit of the second. And furthermore this boundary line oscillates backwards and forwards, so that, when the sun is in the north, a station near the equator, but north of it, exhibits a more distinctively northern character of oscillation, while, when the sun is in the south, it will exhibit a more or less southern character in its oscillation.

If we now venture to ascribe the actions represented in (1), (2), (3), and (4) to currents in the upper atmospheric regions, we shall have—

(1) when the sun is north, caused by a positive current going from south to north;

(2) caused by a positive current going from west to east;

(3) when the sun is south, caused by a positive current going from north to south;

(4) caused by a positive current going from west to east.

The resultant of (1) and (2) would be a horizontal positive current going in a direction not far from south-west, and the resultant of (3) and (4) a similar current going in a direction not far from north-west. The analogy in direction as well as oscillation to the two systems of anti-trades is at once apparent, and it will be strengthened if we reflect that, in the magnetical as well as the meteorological system, we must have a vertical current at the equator. This current might probably be repre-

[1] Being the substance of a Paper recently read before the Literary and Philosophical Society of Manchester, by Prof. Balfour Stewart, F.R.S.