

Long.	Lat.	Long.	Lat.
179° 51' E. ...	25° 43' S. ...	139° 51' W. ...	6° 53' S.
168 19 W. ...	19 52 S. ...	137 44 W. ...	6 24 S.
160 49 W. ...	15 49 S. ...	119 52 W. ...	5 51 S.
140 46 W. ...	7 8 S. ...	108 12 W. ...	7 51 S.

By a direct calculation for a point 140° 46' W., 7° 8' S. in the longitude of the Marquesas, totality is found to commence at oh. 39m. 30s. local mean time, duration 5m. 15s., the sun at an altitude of 64°.

THE MINOR PLANETS.—The four older minor planets, Ceres, Pallas, Juno, and Vesta, are now in pretty favourable positions for observation, and Vesta, which will be in opposition on the 28th inst., is very little below an average sixth magnitude in brightness, and may probably be detected without the telescope by those who are gifted with strong sight and are acquainted with the planet's position with respect to stars in the vicinity. On the 28th it will be a very little to the left of the line joining δ and ε Virginis, and nearly equi-distant from these stars, which are of the third magnitude.

Niobe, like Euphrosyne, is occasionally situate at a considerable declination. At the beginning of November next she nearly attains 53° N. in the constellation Camelopardus. An observer who may chance to meet with a small star which he has not before seen at a great distance from the equator, must not too hastily conclude that it belongs to the list of variables.

No. 160 was discovered by Prof. Peters at Clinton, U.S., on the morning of Feb. 21; it has been observed at Marseilles by M. Borrelly.

ON THE ACTION OF LIGHT ON SELENIUM

ON the 18th of last month Dr. C. William Siemens gave a lecture to the members of the Royal Institution on the above subject.

Commencing with a general reference to light as a natural force, he showed how little the potential action of light made itself evident to our senses, as with the disappearance of the light its effects seemed entirely to vanish; he then showed a temporary effect of light by its action on phosphorescent salts, which continue to glow for a long time after the source of light is removed, and drew attention to the permanent effect produced by the decomposition of the salts of silver in photography. He next referred to the radiometer, Mr. Crookes' little machine for illustrating light effects, which he brought forward for the purpose of showing the motive power of light, and closed his introduction by a reference to some experiments which he had made on a fungus that lives in the dark, and which, on analysis, gave no evidence of containing carbon, thus helping to favour the hypothesis that it is not heat, but the ray of light which breaks up carbonic acid in the leaves of plants in order to separate the carbon.

Selenium was discovered in 1817 by Berzelius, as a bye product from the distillation of iron pyrites. It is fusible, combustible, and similar to sulphur, phosphorus, and tellurium. If melted (at 217° C.) and cooled rapidly, it presents a brown amorphous mass of conchoidal fracture, and is a non-conductor of electricity; if heated only to 100° C., and retained for some time at this temperature, it becomes crystalline, and is a slight conductor of electricity, the conductivity increasing with battery power, and varying according to the direction of the current, as lately observed by Prof. Adams.

It was on the 12th of February, 1873, that the Society of Telegraph Engineers received a communication from Mr. Loughby Smith, one of its members, of an observation made first by Mr. May, a telegraph clerk at Valentia, viz. that a stick of crystalline selenium offered considerably less resistance to a battery current when exposed to the light than when kept in the dark; this was corroborated by the Earl of Rosse, who clearly proved the action to

be due solely to light, and who also showed the effects of the light of different portions of the spectrum, and afterwards by Lieut. Sale, and conjointly by Messrs. H. N. Draper, F.C.S., and R. J. Moss, F.C.S.

About twelve months ago the matter was again taken up by two independent observers, Prof. Adams in this country, and Dr. Werner Siemens in Germany, and it was to the results obtained by the latter, and which have been communicated to the Academy of Sciences of Berlin, that the lecturer's remarks were chiefly confined.

The sensitive selenium plates made by Dr. Werner Siemens, with which experiments were made, are formed of two spirals of platinum wire, laid upon a plate of mica, in such a manner that the two wires run parallel without touching; upon the plate a drop of molten selenium is allowed to fall, and before solidifying, another plate of mica is pressed down; the two protruding ends of wire serve to insert the selenium element in a galvanic circuit. Amorphous selenium when thus tested produces no deflection of the galvanometer, either in light or darkness. If, however, a selenium disc which has been kept for some time at 100° C. and then cooled is inserted, a slight deflection of the galvanometer takes place when it is under the influence of light, but none in darkness. If now a selenium disc which has been kept for several hours at a temperature of 210° C., a point below that of the fusion of selenium, and which has been gradually cooled, is substituted for the other, a considerable deflection under the influence of light will be observed, whilst a hardly perceptible deflection takes place in the dark.

It was also explained, as the result of an experiment, that amorphous selenium did not conduct up to 80° C.; from this temperature to 210° C., its conductivity gradually increased, after which the conductivity again diminished; in cooling it followed the same law, but in a different ratio. The modification prepared by heating to 100° C. only is Dr. Werner Siemens' 1st, or electrolyte modification, whilst the other, prepared by heating to 210° C., is his 2nd, or metallic modification. In the 1st, the conductivity increases with rise of temperature; in the 2nd it decreases; the 2nd is a much better conductor, but is less stable, and its conductivity increases with the intensity of the light, as shown from the following table, in which is given the effects of different intensities of light on selenium (Modification II.) obtained by Dr. Obach in Mr. Siemens' laboratory at Woolwich on the 14th February, 1876:—

Selenium in	Relative conductivities.		Resistance in Ohms.
	Deflections.	Ratio.	
1. Dark	32	1'	10,070,000
2. Diffused daylight	110	3'4	2,930,000
3. Lamplight	180	5'6	1,790,000
4. Sunlight	470	14'7	680,000

From these experimental results an extension of Helmholtz's theory is derived, viz., that the conductivity of metals varies inversely as their total heat (Helmholtz having only the sensible heat in view), and the influence of light upon selenium is explained by a change in its molecular condition near the surface, from the first or electrolyte into the second or metallic modification, or, in other words, by a liberation of specific heat upon the illuminated surface of the crystalline selenium.

In testing the sensitive selenium plate in the different parts of the spectrum, it was shown that the actinic ray exercised no sensible effect, that the effect increases as we gradually approach the dark red, and that beyond that point the effect again decreases, reaching almost zero in the heat rays; the value of the material then for purposes of photometry is apparent.