

water and whether there is sufficient water on its surface, we have no direct evidence as on Mars.

Taking all these facts into consideration one is led to think that the planet is not a barren globe like our Moon. If it is not inhabited at present, it has, in the distant future, the prospect of a glorious career, as the residence of organic life.

Extracts from Publications.

Dr. Stromgren, of Copenhagen, according to the *Athenæum*, has computed an orbit for the minor planet Hector, taking account of the perturbations produced by Jupiter and Saturn. There are, of course, several hundreds of these small bodies whose orbits are known; but Hector is one of four which are distinguished for a particular reason. Most of the orbits lie between those of Mars and Jupiter, but in 1898, a planet, since named Eros, was found whose orbit interlaced that of Mars, and in 1906 another was discovered whose peculiarity lay in the opposite direction for it went at times well outside the orbit of Jupiter. Since then others of the same type have been discovered; so there are now four minor planets, called respectively by the names of Homeric heroes—Achilles, Hector, Patroclus and Nestor.

[*English Mechanic.*]

Here is an interesting experiment and an absolute proof of the Moon's rotation. Obtain a light spherical object, such as a boy's football, and paint half of it white. In the centre of the painted hemisphere fix a string about 4 feet long. Raise the arm above the head and swing the ball around at the 4 feet radius at a fairly good speed. The ball now assumes the conditions of the Moon's revolution; it continually presents the painted side towards the hand. Now without a sudden jerk, release the string, the ball will then fly off at a tangent, and will be observed rotating on its own axis, as it rushes through the air. If it was not rotating when revolving, whence did it get this new motion from? This simple experiment could be elaborated with ease and a little skill, and would quite crush the opposite theory.—R. W. GREEN.

[*English Mechanic.*]

In a paper presented to the Berlin Academy of Sciences, F. Kurlbaum describes a determination of the temperature of the Sun, based on observations which he had made in Egypt, near Assuan, in February and March of last year. The brilliancy of the Sun's light was compared with the brilliancy of a black body for the wave-lengths 0.651, 0.588, 0.521 and 0.486 μ with the aid of a spectro-pyrometer consisting of a Holborn-Kurlbaum pyrometer and a spectrum apparatus similar to that which Henning used in 1910. The rays were reflected into the photometer by a plate of magnesia which had a reflecting power of 0.870. The resulting Sun temperature would be 5,730 deg. C. absolute on the Holborn-Day scale or 6,390 deg. C. absolute on the Holborn-Valentiner scale.

[*English Mechanic.*

King Sirius.

When royal Rigel glitters like a gem,
 Where gleams Orion's glory in the sky ;
 And Queen Capella like a diadem
 Reigns o'er Auriga with a watchful eye,
 When Winter's thralldom rests on vale and hill,
 And skies are clear, and stars shine coldly bright,
 Ere most men dream or city's voice is still,
 King Sirius again adorns the night.

[*Popular Astronomy.*

Meteors on Christmas night.—Though few meteors have ever been recorded on the night of December 25, it is certain that some conspicuous showers are visible at that time. The dates December 21 and 22 form a little period of special activity, and some of the radiants visible then are also very active, if not at their best, on Christmas night. I may instance streams directed from—

47° + 43°	166° + 4°
47° + 65°	166° + 33°
77° + 33°	177° + 10°
130° + 19°	177° + 47°
134° + 8°	194° + 67°
145° + 7°	203° + 58°
133° + 48°	220° + 78°
159° + 27°	218° + 36°

and there are many others to be detected by prolonged watching.

December 25 this year was showery, but a north-westerly wind cleared away the clouds in the evening, and the stars

shone for some hours with a splendour rarely if ever surpassed in this climate. Meteors were interesting, if not specially abundant.

[*The Observatory.*

Thunderbolts.—The term thunderbolt is generally applied both to the rare phenomenon of ball lightning and to meteoric stones. In the latter case its only meaning is that their luminous path resembles lightning or that they cause great atmospheric disturbance. Here the term is applied only to ball lightning. The singularity of ball lightning consists in the complete isolation of a gaseous sphere having no envelope, yet within which there is energy stored by previous electrical action, which, in the end, is liberated with explosive violence.

From the few records of its appearance, these facts may be considered as established. It is observed as a luminous blue ball occurring after very intense lightning flashes, either falling slowly from clouds, or moving horizontally some feet above the Earth's surface. It is more frequently seen at sea than on land. It appears to move under the action of gravitation on a mass somewhat denser than air, or horizontally in a feeble air current or an electric field of force. The final features are significant. The ball ceases to exist, and an explosion wave travels outwards from the locus it occupied. In all cases a strong smell of ozone follows its disappearance. It is clear there can be nothing present in it but the gases of the atmosphere.

All records agree that a thunderbolt is somewhat heavier than air, and the following facts indicate that thunderbolts consist mostly of ozone in active recombination : (1) ozone is stated to be observed on their dissipation ; (2) ozone is the only gas denser than air produced under electric stress in air, as distinct from streaming spark discharge ; (3) on approaching the Earth thunderbolts are frequently deflected and travel horizontally as if repelled. The Earth's surface and ozone are both negatively charged in general ; (4) the energy liberated on the transition of ozone to oxygen in the volume of the fire-ball is sufficient to account for the explosive violence of its burst ; (5) the blue colour usually observed is associated with the sparkless electrical discharge in air which produces ozone. It has been observed that when oxygen and hydrogen combine explosively in the presence of nitrogen, the explosion flame is yellow. Hence the suggestion that the principal constituent of thunderbolts is an aggregation of ozone and partially dissociated oxygen.

[*English Mechanic.*