greatest discoveries have been made while that luminary was in the utter darkness of a total eclipse. In fact, the best knowledge which a man can acquire under any circumstances, is most incomplete and unsatisfying to the earnest and intelligent seeker after knowledge.

THE SUN.

"THE GLORY, NATURE AND MAGNITUDE OF THE SUN."

It is easy, said the lecturer in opening, to estimate in figures the magnitude of the sun and its distance from the earth, but it is difficult to convey to the mind any correct idea of what those figures really represent. The lecturer had in early life endeavoured to gain some idea of the magnitude of the American continent; yet he had but recently been able to form any really adequate idea of it—and that was accomplished only through crossing it by rail. It is easy to say that the sun is from ninety-two to ninety-three millions of miles distant; but a railroad journey that distance would require 500 years. A cannon ball, moving at its initial velocity, would require thirteen years to get there, while the report would not reach the sun until half a year later. Another interesting illustration in this direction has been given by supposing a human arm extending from the earth to the sun; 130 years would be required for the nerves to inform the head that the fingers were burned by coming in contact with the solar surface. The sun possesses a most

WONDERFUL POWER OF GRAVITY.

It controls the entire solar system and keeps all the planets in their order as they continue in their grand, silent progress through space. So great is its powers of attraction, that a half-ounce weight, if raised above the surface of the sun and dropped from rest would acquire a velocity of 435 feet in the first second. Its magnitude is 108 times the diameter of the earth, and exceeds it in volume 1,222,700 times.

THE HEAT OF THE SUN.

To form an approximate idea of the heat of the sun we must remember that it is estimated it would require the heat from 11,700 trillions of tons of coal, consumed in every second, to produce a heat equal to that diffused by the sun in the same space of time. Of all this immense emission of heat, only one part in 230 millions falls upon the earth. All the rest appears to us to be wasted in space. Yet this seeming waste has doubtless a meaning, and is probably subservient of some other kind of work or good, associated with the great whole of the universe. Without the heat which results from solar rays, every form of life on earth would cease. The same is true, relatively, of all stars, which are suns to other systems. A beam of

THE SUN'S LIGHT

Is 120 times more intense than that of the lime-light—such as the lecturer was using to project his illustrations upon the screen. We know this, in degree, from the fact that when the lime-light is placed between the observer's eyes and the sun, the lime-light appears as a black object. Even the intense light of the electric arc is one-third less than that of the sun. The sun is brighter in parts than it appears to the eye. Floating in its upper atmosphere are clouds of intense brightness, many times brighter than the average glow of that luminary. These clouds are technically known as "rice grains," which give to the sun, as viewed through a telescope, a fine mottled appearance. This was beautifully shown upon the screen. These clouds are thought to emit 90% of the sun's light. But instead of being composed of the vapor of water of clouds in our atmosphere, they are the vapors of iron, magnesium, calcium, copper, etc., heated to an intense degree of luminosity. Another class of most important and interesting phenomena is what is known as

SUN SPOTS.

Which was shown in a most strikingly vivid manner from photographs of the sun's face, as taken by Dr. Rutherford. These views were telescopic, and portrayed the lights and shades of the sun's surface in a most striking manner, showing the spots with long, cirrous threads, now radiating *from* the spots and again seeming to reveal an inward draft towards the sun's centre. The physical characteristics connected with these phenomena were briefly alluded to and explained so far as science has penetrated into their mysteries. Every change in one of these spots, said Mr. Proctor, must be accompanied with atmospheric turmoil and disturbance, to which the most terrific phenomena of tornadoes and volcanic eruptions upon earth are but gentle zephyrs and harmless detonations. The terrific noise by which they must be accompanied is such as no human ear could bear; but which is utterly lost by the great void between us and the sun, through which no sound wave can pass. The great advantages of photography in observations of this kind were alluded to by the lecturer, as the constantly and rapidly shifting forms prevented any possibility of accurate study when received directly; while a photograph taken with only one-sixteen hundredth part of a second exposure, fixed permanently any given shape for study at leisure. Until within a few years the spots had to be studied by the aid of drawings only which were generally quite imperfect. The lecturer here jocularly alluded to such exaggerations in a book on the sun, published a few years ago "by a man named Richard A. Proctor." the question,

OF WHAT THE SUN IS COMPOSED?

Was briefly discussed. Some progress has been made in the solution of this question, but only enough to discover that we know but very little about it. The principle of spectrum analysis was explained by beautifully illuminated diagrams in colors; also the manner in which the principle was made applicable to determining the nature and composition of the heavenly bodies. By the use of the spectroscope it has been most unmistakably shown that quite a number of elements known on the earth existed also in the sun, and that some elements existed there which are not known on the earth. Among the elements common to both were sodium, calcium, magnesium, aluminium, hydrogen and several others. The existence of oxygen in the sun was somewhat uncertain in the minds of many; while others including the speaker, Prof. Young and several other prominent astronomers believed that its presence in our luminary had been fully proven. One new metal unknown here was instanced, and had been named by Prof. Young, helium, from *helios*, the Greek for sun,

SOLAR PROTUBERANCES.

Perhaps the most interesting portion of the lecture was that part devoted to solar protuberances. These were most beautifully shown and elucidated by projections upon the screen. This class of phenomena was first observed at times of a total solar eclipse when for a few moments the sun's disc was completely shut out from view by the intervening body of the moon, as shown in the annexed diagram, No. 1. By examining that figure, small jets, shown in shade, just beyond the disc of the moon, will be seen to issue out from the body of the sun in the form of flames. When properly observed, the jets have a red, flame-like appearance, and the spectroscope has revealed to us the fact that they are really tongues of flame or incandescent gas, which are now known to shoot up from all parts of the sun's surface to the distance of fifty, an hundred, and even, in one case, at least, to the enormous altitude of 210,000 miles. Astronomers are now enabled to make their observations at any time, without any regard to the presence of an eclipse. These flames are supposed to be caused by explosions or eruptions from within the more solid portions of the sun's body. The lecturer gave it as his opinion that the flames seen, which are known to consist of hydrogen, sodium and magnesium gases, merely mark the track of more solid, but unseen matter—molten material—just as the flame and smoke which issues from the mouth of a cannon, marks the track of the unseen ball.

ANIMALS OR PLANTS?

In the course of a lecture on "Plants that prey upon Animals, and Animals that fertilise Plants," delivered at Leeds, by the Rev. W. H. Dallinger, the lecturer explained that there were animals—definitely proved to be such, and with which every zoologist was familiar—that were so lowly in their being that they possessed no definite form. They revealed to the most refined scrutiny no organization. They moved, but without muscle; they crept, but without limbs; they felt, but without discoverable nerves; they devoured without mouths; they digested without stomachs; and they had all the properties of life, but were without trace of organised structure. It was their habit to associate with even these lowly creatures, because they were animals, a measure, at least, of consciousness and volition. But, on the other hand, there were plants of the highest and most compact structure in which delicacy of organisation, refinement of mechanical contrivances, and adaptation of means to ends were combined; and yet, because they were vegetables, they were accustomed to assume that they were without consciousness, and devoid of will. But what were the facts? Zoology at the present day was in the highest sense a science. Its facts had a precision and value unrivalled, and from these they were bound to say that the old land-marks were utterly incompetent. The animal and vegetable kingdoms could not be separated, and the two marched on in one organic whole. To the popular mind he