

Astronomy and Geology.

IS THE MOON INHABITED ?

(From the *English Mechanic*.)

The writer of these remarks has repeatedly had the above question put to him. In return he would put the following:—What evidence have we of the habitability of the moon? Some writers have indulged in the speculation that, with the large telescopes now in existence, armies of soldiers, troops of elephants and such like may be detected on the march, and others have surmised that buildings might be seen and the styles of architecture ascertained. The ideas such extraordinary statements may induce in the minds of the uneducated render it desirable to examine a little into the probability of obtaining such results. The diameter of the moon is 2,163 miles; but, as it never remains at the same distance from the earth, being sometimes nearer and sometimes farther, it never presents the same apparent diameter as seen in the sky. When nearest the earth it is seen under the largest angle, or 33' 33"·20; but when farthest from the earth it is seen under the smallest angle, or 29' 23"·65. Now it follows from the relation between the real and apparent diameters of the moon, at its mean distance from the earth, that a second of arc, written thus (1"), is the angle under which a mile and a little more than the tenth of a mile, written thus 1·139, is seen at the centre of the moon's disc; again, as a second is pretty well the smallest distance that can be clearly discerned, it follows that a building on the moon to be clearly seen—we may say to be seen at all, must be about a square mile in extent, and then it would be seen only as a spot, light or dark according as the materials of which it was built reflected a larger or smaller quantity of light.

There are some very level plains on the surface of the moon, surrounded by mountains. One such plain has been very carefully examined; it is about sixty miles in diameter. The mountain wall rises to a height of 3,000 feet on the south, 3,200 on the west and north, and 3,800 on the east. On the wall are four lofty pinnacles of rock, three on the west and one on the east. The highest, which is on the east, rises to the height of 7,418 feet above the level interior; the next highest is on the west; its altitude is 7,258 feet; the two lower rocks are respectively 6,396 and 5,128 feet above the interior.

Let us place ourselves, in imagination, within the confines of this mountain-cinctured plain, and view from its centre its girdling rocks at a distance of 30 miles; they would appear from this point under a vertical angle of very little more than one degree, and the highest rock on the east would subtend an angle of less than three. It is believed that no other portion of the moon has undergone so close a scrutiny as this. For three years has its surface or floor been examined, during sunshine upon it, with telescopes able to bring small objects into view, and the results carefully discussed, from which it appears that nowhere on this plain has anything at all approaching the nature of a building or a collection of buildings been detected. At various intervals, as many as thirty-six small white spots have been seen during the three years, but never the whole together. Ten of these spots have been ascertained to consist of volcanic cones, the bases having an average diameter of about one mile; the base of the largest, near the centre of the plain, certainly does not exceed two miles. With the exception of these natural productions nothing sufficiently elevated above the surface to cast a shadow at sunrise or sunset exists on this plain; there are, indeed, some remarkable variations of brightness upon it: for example, about the middle of the day, when the sun is highest, it appears very dark, almost black, but there is nothing to induce the opinion that a patch of a different tint exists anywhere on this plain, such as might be supposed to arise from a collection of buildings covering a space of four or five miles in extent. From such facts as these, the results of close and unremitting observation, into which conjecture is not permitted to enter, we are forced to the conclusion that the evidence we possess of the habitability of the moon is very scanty. Indeed, it does not even furnish a clue by which we might institute a series of observations likely to lead to a positive result.

It must, however, be remembered that the walled plain, Plato, to which the foregoing remarks refer, is but a very small part of the moon's surface, and it would be manifestly unsafe to draw any conclusions on the above question from the examination of so small a part, carefully as that part has been examined. While there may be great difficulty in detecting any evidence of artificial construction, it is beginning to be ascertained that there is

not so much difficulty as formerly in detecting instances of physical change. The discovery in May, 1877, by Dr. Klein, of a dark spot north-west of Hyginus, where nothing of the kind had been seen before, combined with the celebrated case of Linné, will go far to show that changes of a physical character and of sufficient magnitude to be seen from the earth are now in operation, and will doubtless open up a line of research by which we may learn something of the nature of the forces at work within the moon, and form more accurate notions of our satellite than those to which we have been treated of late years, such as a "burnt-up crater," "a dead world," or one reduced to its last stage of existence. So far as we are able to judge of the mundane processes going on around us, there is a perpetual cycle of recurring physical events by which decay is replaced by renovation. We have, on our own globe, instances of very ancient formations and others of a most recent date: the same alternation of ancient and recent tracts are found on the moon, and it would not be difficult from careful observation to assign the epochs of some of the most striking series of changes. Indeed, a chronological arrangement of the large grey plains, of the craters in their neighbourhoods previously existing, and of those opened upon their surfaces, has been attempted upon a large scale, but it is evident that the study of the more minute objects is likely to be attended with results upon which a more correct system of lunar topography can be raised, which, in its turn, will conduct the student to a satisfactory system of selenology.

TYNDALL'S NEW VIEWS.

Professor Tyndall's latest thesis is: That it is as difficult to conceive the government of matter by the operation of spirit—as in lifting the arm by the power of the will for example—as it is difficult to conceive of the origination of life by the action or revolution of matter—no distinction, apparently, being drawn between vegetable life and soul or spirit. Well, suppose we can conceive neither process in our finite and imperfect minds—still we can appeal to facts and the visible order of things, to show that the one statement is true and the other certainly false as regards spirit. If our Saviour says, "My words are Spirit, and they are Life," and we find in practice, and by witnessing the creative power of these words, both in the world of spirit and in that of matter, that what He has asserted is true—it is of minor consequence how far we can follow the operation in our own minds. We have the general results, the fact or congeries of facts, and such will be enough for us, for we are thus convinced that spirit governs matter. Matter is certainly seen to obstruct the operations of spirit, but it does so without a particle of evidence that its action arises from the force of a living will contained in itself. In so plain a case and where we have such broad facts at our service, why fret about speculative wants? We have discovered that the government of matter by spirit is the un-failing principle of the world we inhabit. The apparent limitations do not contradict the rule.

On the other limit of his thesis, Mr. Tyndall cannot in the face of facts contend that the operation of spirit and truth enunciated by words is the work of matter, any more than that it is the original work of the human soul, when it is found so constantly to traverse the movements of that soul.

But the world is habituated and rehabilitated by these words and that which actuates them, and that entity is spirit, which we often find in a lesser or greater degree influencing kings and governors, ministers and subjects, but which we behold in manifested strength, disengaging itself from decaying or dissolving matter in the death bed of many a Christian. These are but facts in human history, and the facts he ought to lay hold of. He will say that man becomes grand by evolution, but history tells us that no people ever became great, or even achieved the beginnings of greatness, without the idea of God, which is not the fruit of evolution.

Thus we hear the sound of the spirit, and behold its living fruits on all hands, but we know not, any further than we have been told, whence it cometh or whither it goeth. HOMO.

ENORMOUS SUBMARINE PLANT.—Explorers have recently reported the discovery of an enormous submarine plant in the North Pacific ocean. It is known to botanists as the *Macrocystis pyritera*, is said to dwarf all vegetable products yet known by its prodigious proportions. It grows sometimes to such a size as to cover vast areas of sea-bed, one specimen having been discovered that occupied by measurement three square miles, while the stem was eight feet thick.