OREGON SPECTATOR.

"Westward the Star of Empire takes its way."

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From the New York Tribune.

ASTRONOMY.

LECTURE VI.—BY J. P. NICHOL, L.L.D.

Reported for the Tribune by O. Dyer, the Phonographer.

Constitution of the planets rapidly reviewed. Constitution of the moon. Prevalence there of the cause which has upheaved our earth's surface. Universality of this cause. Its nature, as indicated by the aspect of the moon, not comprehended within current geological theories. Its tremendous [illegible] caverns. What gave existence to these? Speculations [illegible] this force. Two opposite views of it. Digression concerning meteoric stones. Progress of the grand cause of upheaval. Possibility of a relation between it and the apparition of the organic families on the surface of the earth.

Ladies and Gentlemen—I now proceed with you to the last portion of those contemplations which I desired to bring under your notice. We have spoken of the general structure and apparent destinies alike of the remote heavens and of our own planetary scheme; and I wish now to offer you a few thoughts on such details in regard of the constitution of our companion orbs, as more especially manifest their connections, as derived, probably, from a common origin.

Notwithstanding the memorable power of the telescope, the information we have obtained in regard to the internal constitutions of the planets, is indeed singularly scanty. I am not sure, indeed, that we can venture to state farther in regard of them than two very general propositions. The first is, that in so far as we know aught concerning the primary planets, matter exists there in the same three normal conditions as we find it existing on the earth, viz., in the solid, the liquid, and the uniform or gaseous states. These orbs have, as far as we know, atmospheres; and we discern floating about in these atmospheres clouds, clearly indicating that there is developed in them matter in a liquid state, so that the inference is that their physical constitution is in every respect similar to that of our own earth. There is one important exception to this, however, which we are certain is manifested by one orb and which may characterize all the secondary planets. This exception refers to the moon. In the moon we find matter in the form of air. The moon has an atmosphere, though a small one. There are many doubts concerning an atmosphere in the moon, but I think, however, that the phenomena which have been observed during solar eclipses go to show that it has an atmosphere. Matter in the liquid form, however, does not exist on the moon. There is no water in this luminary, and never has been any, a truth which we shall be able to establish in the course of the lecture. The mode in which we ascertain the absence of water in the moon is very simple and accurate. It is as follows:—As we can trace the moon through all its phases, we may also trace the line of increasing or roaming light, which is the line of the beginning of morning or the close of evening, across every portion of its surface. Now if that light passed across an ocean or great lake or any collection of liquid, we would find, as is the case when our own ocean is the horizon, that it would be an even line unmarked by any ruggedness, but on the contrary this line is rugged everywhere, arising from the shadows cast by irregularities in the ground across which it stretches. The moon, indeed, has comparative flat places, such as those dark spots marked upon the map, easily seen on the moon's surface with a good telescope, but even there the ground is undulating [illegible] quite unlike any collection of water.

The second truth, however, is much more important and contains that to which, more especially this evening, I would solicit your attention.

The following fact appears to be universal. We discern it in all the planets [illegible] have been able to examine. It is that the surfaces of these orbs are broken [illegible] irregular, like the surface of the earth. In other words, we find there mountains, continents, oceans, great valleys and irregularities of every description which we find on the earth. The moon is an especial example of this. In most other planets mountains are discerned, and in some of them, such as Mars, we see even division into continent and ocean. In acknowledging the importance of [illegible] however, I do not deem that the [illegible] of what modes and distribution of land and water, of ocean and continent manifested by the surface of our globe, is that which ought to be sought during the examination; for, we cannot regard these [illegible], or we find them in the case of the Moon, unless the [illegible] to be retained in the [illegible] succession is a consequence; and that whatever [illegible] has upheaved the [illegible], it has acted throughout the whole of the planetary system, and left its impress on the face of every orb visible by the telescope.

[illegible] fact, then, in this [illegible] we cannot avoid the conclusion that if the science of geology shall ever succeed in discerning the source of the influence that has thus diffused its results so widely, we ought through this its grand generalization to explain satisfactorily not merely the form and phenomena of upheavals as they are developed on the earth, but likewise all similar aspects recognisable among our companion planets; or if expectation so high is too ambitious for the present condition of geological science to account it hopeful, there is still the truths revealed by these foreign bodies, [illegible] wherewithal we may correct premature or [illegible] conclusions, and by whose aid we may avoid the hazard of accepting as an universal law what is a simple result of circumstances that have no universality, but belong rather to the constitution and specialty of the particular orb we examine.

The great value of our looking at the Moon and those other bodies in this point of view is that it will enable us to relieve our theories concerning the structure of the Earth from all mere speciality. It is with this view then, and not merely to gratify curiosity by an inspection of isolated wonders, that to night I solicit you to review the appearance of the Moon—a planet which of all others is most within our reach and connected with which we find almost every conceivable facility for clear and little interrupted inspection.

The Moon, of all other bodies, is situated so that we can obtain the most favorable view of it with the telescope. In the first place the entire absence of water causes the absence of clouds, hence the surface is never tinged with obscurity, or if tinged at all, only obscured in consequence of the mist floating in our own atmosphere. All the other planets are more or less obscured by clouds floating in their atmospheres. Venus, for instance, although so near us, has such a heavy atmosphere constantly surcharged with clouds that our knowledge of the orb is doubtful; while Mars, although much farther from the Earth, is, owing to the variety of its atmosphere and its freedom from clouds, seen with singular distinctness. The Moon, as before remarked, having none of these obstructions, appears clear and distinct. Beside, it is comparatively near the earth—being 240,000 miles from us, a distance which, astronomically speaking, is but a mere unit. Now taking into account what the telescope can do, the Moon is brought very near us. A nine-inch telescope, with a magnifying power of a thousand times which I for some time used, brought, as you can readily calculate, the orb within two hundred and forty miles of me. A telescope with a magnifying power of three thousand times would bring it within eighty miles, and by applying a power of ten thousand, which might be done under favorable circumstances, this luminary would be brought within the small distance of *twenty-four miles!* The audience must not compare observing the Moon at this distance of twenty-four miles with viewing an object located on the Earth, at that same distance, for the view of the earthly object would be obstructed by the lowest and densest portion of the atmosphere; but it should be compared with the view we would have of an object situated directly above us at the height of twenty four miles, when the vision would be much less affected by the atmosphere in evening, as it would be of the clearest and best quality. I hope the audience will not take such a view of the matter as a gentleman did who on hearing me state that we could go within eighty miles of the Moon, waited on me afterwards in troubled wonder, asking why we did not skip over the intervening space and go out to it all together! (Laughter.)

Such are the circumstances with which we approach the examination of the Moon. In pursuance of this object, then, and with the [illegible] object in view, let us examine with attention the upheavals which this globe (the Moon) presents; and we find them divisible into three distinct classes or orders.

I will just mention shortly, before proceeding to the description of these mountains, the means by which we ascertain their character and elevation. This is effected by measuring the shadows cast by them upon the Moon's surface. To illustrate: You observe that this pitcher casts a shadow of a certain length. Now as I raise this light the shadow grows less and less, till at length you perceive that, as the light arrives exactly over the object, it casts no shadow at all, and as the light continues to pass on, the shadow begins to appear on the opposite side of the pitcher, and it continues to grow longer and longer as the light descends. We observe the relative positions of the Sun and Earth. We mark the extremities of the long deep shadows cast by those elevations on the Moon's surface, and we find that as the Sun mounts higher and higher in the heavens, these shadows gradually recede toward the bases of the mountains, and when the Sun arrives at the zenith the shadows entirely disappear; but by-and-by, as our majestic luminary sinks to his bed in the west, the shadows come creeping out on the opposite side of the elevations, and we, by watching thus their movements, are enabled to ascertain with mathematical accuracy the character and height of these lunar mountains. There is no exaggeration in respect to our ability to measure heights and distances on the Moon. The shadows on the Moon are not like shadows on the Earth. They are black as midnight, and as clearly defined as form can be. Thus are these results reliable, and in truth we are at present better acquainted with the structure of one side of the Moon than with any hemisphere of our own globe.

There are three classes of lunar mountains.—The first class consists of isolated, separate, distinct mountains of a very curious character. The distinguishing characteristics of these mountains is this—they start up from a plain quite suddenly. On the Earth, it is well known that mountains generally go in ranges or groups. But we find these isolated lunar mountains standing up entirely apart—never having been connected with any range. Here is one (the lecturer here pointed to a splendid telescopic map of the Moon) named Pico, which [illegible] high. This mountain has the form of an immense sugar loaf; and if the [illegible] can imagine a fairly proportioned sugar loaf 9,000 feet in height, and themselves situated above it so as to be able to look down upon its apex, they will have an approximate idea of the appearance of [illegible]. There are many other mountains of similar description scattered over the Moon's surface, and these mountains not only stand apart from each other, but, what is still more remarkable, the plains on which they stand are but *slightly disturbed*. How singular, then, the influence that shot these mountains up 9,000 feet and yet scarcely disturbed the plain in their immediate neighborhood.

The second class of lunar elevations consists of mountain ranges. Now this is the principal feature of the mountains upon Earth. They are rarely found associated in any other manner than in vast ranges. This phenomenon is also found in the Moon, but there it is the *exception*; only two principal ranges are found and these appear to have been originally one range.

One is called the Appenines. It is so well seen that just as the line of light is passing through the Moon you will think it is, generally speaking, a crack on its surface, but a telescope of ordinary power will at once manifest it to be a range of mountains. Now the lunar Appenines may be compared with the loftiest ranges of mountains upon Earth. It is 19,000 feet high, and there is another range still higher—rising 25,000 feet above its base. In this feature, then, the Moon corresponds with the Earth, but with this difference—what is the *rule* on the Earth is the *exception* on the Moon.

There is, however, another very remarkable feature in which these ranges in the Moon correspond with terrestrial ranges. We find that on one side the mountains are quite steep, descending precipitously, while on the other side they slope away through an extensive highland. Now this very remarkable law holds also with respect to our terrestrial ranges. It is not universal but is so general that some of our geologists have assumed it as mainly indicative of the cause that has upheaved our mountains. The Himmalaya mountains present this feature most strikingly. On the south side they are bold and precipitous, while on the north they shelve gradually away, exhibiting in picturesque grandeur [illegible] mile of mingled mountain, valley, [illegible] declivity and rolling plain, till at last they slope gently down, and are lost in the level earth. So too the Andes exhibit this feature. It is [illegible] to remark also to be considered accidental, and assuredly the cause which produced it upon the Earth must be similar in nature to what produced it in the Moon. Now our physical geographers have usually been disposed to attribute the terrestrial phenomenon to the action of great floods or currents of water originating in different ways. And it seems no inadequate illustration of the benefit which astronomical observations might bestow upon geology that the Moon negatives this explanation at once, for on this orb, as we have said, no liquid exists and has never been.

But the prevalent form of elevation belongs to neither class. At least two-fifths of the surface of our luminary are studded with profound caverns penetrating its body, and generally engirt at the top by a great wall of rock which is surmounted or crowned with lofty peaks. These caverns, or, as they have been termed, craters, vary in diameter from fifty to sixty miles to the smallest space visible, probably one hundred and fifty feet; and the numbers increase as the distance diminishes, so that the multitude of the small ones passes enumeration.

In order to impress upon you what these objects are let us pay a visit to one of them, say the crater of Tycho. As we approach the crater we will find a very rough country. On first glance would be arrested by a wall of solid rock appearing in the horizon stretching fifty miles away. As we approach we find this wall sloping up to the height of about 3,000 feet. Suppose we ascend. What do we expect to see on the other side—a slope? On the contrary, when we arrive at the top, we find ourselves on the brink of a precipice that in one leap goes down 18,000 feet! Then we discover below that enormous depth some similar ranges of mountains, lying like terraces and stretching round the base of the wall, and a little onward beyond these lies the bottom of the chasm which is 17,000 feet from where we stand! The diameter of the cavern is about fifty five miles. If a person were standing down in its centre he would see on every side, at a distance of twenty-five miles, an appalling precipice rising up 17,000 feet—[illegible],000 feet higher than [illegible] Blanc. If there are any inhabitants there they must have some means of locomotion with which we are unacquainted. (Laughter and applause.)

Such then is Tycho, and precisely of this kind are all the craters in the Moon. Many of them are not so deep, some of them are deeper. Some to the southern part of the Moon are said to be so deep that we can never see the bottom. Whether this be so or not there are several 2,000 feet in diameter and as deep as Tycho.

Now it is evident on the very first glance that even our largest volcanic craters are not to be compared with these caverns of the Moon. The largest we have any knowledge of is in the South Sea Islands, but that is comparatively small and is situated at the top of a mountain. In order to discern aught similar upon the Earth, then, we must look to larger displays of the disrupting energy.

(The lecturer here drew a diagram of [illegible] mountains among the Alps, exhibiting the circular formation but differing from lunar craters in two points. In the [illegible] the range is broken by gaps, and [illegible] interior is not a pit, but, on the contrary, higher than the external [illegible]. He showed then how these might be explained by the presence of the [illegible] agents—rain, frost, wind, &c.—on the Earth, which are not present in the Moon; and interpreting them by this principle it seemed that the older of our terrestrial mountain formations rendered it likely that the crater form did, in the earlier epochs of the Earth's geological history, prevail likewise here.)

May it not then be that the Moon is simply in a comparatively early epoch of its development? That, as the nebular hypothesis would seem to establish, the lunar globe is younger than the Earth; and that with regard to it, [illegible] time may come when the upheaving energy will manifest itself principally—as now in the Earth—by upheaving ranges and groups of mountains instead of craters! This is probably all we can derive from a view of this portion of the subject.

To [illegible] we can form any idea regarding the nature of the power which could produce craters like Tycho? There is a feature connected with this crater which, in this respect, is of high importance. I mean those broad bands which issue from it and go across the surface of the Moon even to the distance, in one case at least, of 1,700 miles. (The lecturer here went through a minute investigation of the characteristics of these bands, which by means of diagrams on the blackboard and elaborate paintings, which we [illegible] we cannot give. He seemed to consider it probable that, like our own trade winds, these bodies consist of matter which must have come up from the interior of the Moon's mass through cracks in its solid crust. Now as these bands must have been formed by the convulsion which produced Tycho, this convulsion, then, must have been sudden as well as most violent, at once producing the cavern itself and breaking the Moon in the manner we see it. The phenomena here indeed cannot be reconciled to any gradual operation or the action of any force long continued. It must have been as sharp as violent; instantaneous after the manner of an explosion. The imagination, habituated to the comparative quiet of our time, cannot easily reach the conception of a convulsion like this. Let my audience not discredit or doubt the speculation because of the fancied oddness or the gigantic character of the force whose action it presumes. So far from being impossible, the like of it, in part at least, has passed during the progress of time in almost every region of our globe. It is clear and perfectly undisputable, that when our own granitic ranges were pushed from the Earth's interior they bore up along with them many miles of rock of vast thickness that once lay quiet at the bottom of the ocean, and over which shell fish crept, that are now entombed within their layers. Such convulsions were indeed often slow, and may have occupied ages in their progress of completion, for the rocks that were disturbed are frequently little confused, lying around the central granite mass as a graceful robe; but go with me to the Alps, or even to our own English Cumberland, or North Wales, and I could show you masses above masses which, when they were formed, lay as flat and even as the surface of that floor, and only turned from their repose and tilted upwards in the air, but, by the violence of the action that disturbed them, rolled over each other in confused heaps, presenting for miles together to the puzzled explorer the aspect of a crumpled and crushed sheet of paper. Yes! there, indeed, has been power immeasurable, as one even conceivable: but the giant earthquake has an arm capable of all this work. (Great applause.)

I would now, ladies and gentlemen, for one moment digress from our course and inquire, if the force that formed Tycho was so great, what became of the rocks that it blew out of Tycho? A cavern of that kind, fifty-five miles in diameter, is not an infinitesimal thing which may be easily formed. What became of those rocks? The most ready answer is that they returned again to the surface of the Moon, just as matter thrown from the craters of our volcanoes returns again to the Earth. There are circumstances, however, I think that will induce us to pause before we assent that this took place.

In the first place, the Moon being a small body does not exert such attractive power over a mass, therefore it would not take much force to drive away a body from the Moon altogether, and send it flying [illegible] through space. If this matter did go back where is it?—we certainly should see it if it were there. Therefore we may say it is probable that this matter did not go back to the Moon at all, but that the violence of the shock was sufficient to send it off to seek its own fortune through space. (Laughter and applause.) Then what became of it? It must be moving through space in elliptic orbits, in bodies of different magnitudes. The orbits of the planets are so regular that with them there is no chance for collision, but with these meteor flying round through space there is no chance to escape collision, consequently it is all but impossible that these masses could be continually coming in contact with the Earth. Then may we account for the falling of meteoric stones. This is the strange phenomenon. At least two masses must fall to the Earth per day—taking into account all that have been observed to fall—a phenomenon sufficiently large to require some important cause. Now, if this force had sent off this matter from the Moon, the meteoric stones would not be difficult to explain.

There was a theory concerning this phenomenon called the "Chemical Theory," which, so far as I ever understood it, was this. Suppose certain particles floating about in the atmosphere, then suppose particular forces should cause these particles to come in contact and unite, then particular stones would be the result. Now there are three difficulties attending this solution. First, it cannot be established that such particles were floating about in the atmosphere. Secondly, it cannot be proved that particular forces exist to unite; and thirdly, it cannot be shown that particular stones would result from their union. (Laughter.)

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There was a theory concerning this phenomenon called the "Chemical Theory," which, so far as I ever understood it, was this. Suppose certain particles floating about in the atmosphere, then suppose particular forces should cause these particles to come in contact and unite, then particular stones would be the result. Now there are three difficulties attending this solution. First, it cannot be established that such particles were floating about in the atmosphere. Secondly, it cannot be proved that particular forces exist to unite; and thirdly, it cannot be shown that particular stones would result from their union. (Laughter.)

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POPULAR SENTIMENT IN CANADA.—An observing correspondent of the N. Y. Commercial, writing from Toronto, Canada, says—

"In passing through the country I find a growing disposition to speak more favorably of the institutions of the United States than I ever knew before; and this too in a quarter where I little expected to observe it.—Indeed the subject of annexation to the United States is quite the order of the day."

Punch says that the "milk of human kindness is not to be found in the pale of society." An exchange paper adds: 'If so we think it time for all 'bands,' as Pat would say, to *kick the bucket.*'

CHOLERA.—A letter from St. Petersburg published in the London Literary Gazette states the following singular fact, which may lead to discoveries in relation to the cause of the alarming pestilence which is again threatening to invade Europe:

When the cholera broke out here, the atmosphere was so charged with electricity, that the electric machine would not emit any sparks; and a magnetic needle which generally raises twelve pounds of iron, could with difficulty raise four pounds weight.

JEALOUSY.—Tormenting yourself for fear you should be tormented by another.