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TRUTH AND LIBERTY

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an axis in about 27 hours; but this is uncertain. The rotation of the other asteroids has not as yet been detected. The distances from the sun, and the periodic times of these bodies, have been calculated.

The eccentricities of some of these orbits are much greater than those of the old planets, approaching, in their elliptic form, cometary orbits. Juno, Pallas, Iris, Hebe, Astrea, and many others, describe orbits whose eccentricities amount to nearly one-quarter of their mean distances. By reason of these great eccentricities, many of the orbits intersect one another; that is, their perihelia are often found within the orbits of others, while, by their intersections, their aphelia extend beyond. Some orbits wholly inclose others, being separated by tens of millions of miles.

These orbits are not all in one plane, but in some instances are inclined to the ecliptic at much greater angles than those of the older planets: that of Pallas, for instance, amounting to 34 deg. 37 min. 33.1 sec. These planes have no common lines of intersection; but their ascending and descending nodes are found in every variety of longitude.

Let this audience imagine eighty elliptic hoops clustered together in the centre of this tabernacle. Let the general position of their planes be from west to east, so as to intersect a true east and west plane with eighty angles, varying within the limits of 40 deg. Let some of these hoops be nearly circular; others slightly oval; others still more eccentric. Let these eighty hoops all vary in size; some intersecting others; some inclosing others. Let the lines of intersection on the true east and west plane, take eighty different positions. Next, let eighty glass beads, as large as marbles, be strung upon the eighty wire hoops; let their common direction, as they slip along the wire on their upper circumferences, be from west to east; let their eighty periods, in describing one complete revolution, be unequal. Such a condition of things would be a rude miniature representation of the asteroidal system, and convey some idea of the great complexity of this celestial mechanism.

The space between the interior and exterior orbits of these eighty bodies, and within which they all revolve, is nearly eighty millions of miles in breadth. From the rapidity of the late discoveries of these bodies, we may reasonably believe that hundreds more exist in those vast spaces between Mars and Jupiter. And we may yet find orbits interior and exterior to those already known, until the breadth of the asteroidal zone may be enlarged to two hundred or three hundred millions of miles. Indeed were our telescopes increased in power, so as to detect bodies one hundred times smaller than the smallest of the discovered asteroids, we would probably multiply these bodies by tens of thousands. And instead of being limited in our researches to the zone of the present cluster, we would doubtless find similar zones between each successive planetary orbit, from the grand solar centre to the extreme boundaries of the system. What are our meteors, but asteroidal worlds in miniature, whose orbits are intercepted by hundreds every 24 hours, as the earth wheels its way in its appointed track? Each of these snow flakes of heaven has its appointed orbit around our great central luminary, millions of which have been caught by the earth, and millions more swung from their accustomed paths which ventured too near the potent energies of terrestrial gravity.

To suppose these asteroidal bodies are the fragments of some mighty world, burst asunder by some terrific internal force, is not supported by late discoveries; but on the contrary, such discoveries show, most conclusively, the impossibility of such an origin. No conceivable bursting force could impart to fragments the differences of eccentricities, inclinations, mean distances, nodal longitudes, &c., which are known to exist among the asteroids. No mutual attractions or perturbations of the whole system, upon such bursted fragments could so alter the elements of their respective original orbits, as to make them coincide with their present elements; therefore such a catastrophe could not have been their origin.

Every Planet, Asteroid and Satellite, revolves from west to east (with one slight exception) around the common centre of gravity of our system. Does the sun revolve around this common centre also? If so, what is the direction of his revolution, and what is the nature of his orbit? The sun follows the same general law, observed by the other bodies of the system, in the direction of his orbitual motion; his course being from west to east. But his orbit is not strictly elliptic like those of the planets, but is very irregular in its shape, being compounded of several small elementary elliptic orbits. The sun has a determinate orbit for each planet and asteroid in the system. These elementary orbits, when combined and all joined in one, give an irregular resultant orbit of great intricacy, requiring no ordinary degree of mathematical skill to trace it through all its intricate windings. But notwithstanding the complexity of the problem, it has been laboriously solved. Owing to the different positions and varied distances of the planets, the sun's complex orbit is not the same for any two revolutions. Each successive revolution requires a new calculation to determine the entire path.

The sun's elementary orbits are easily calculated. For instance, he has an elementary orbit around the common centre of gravity between his centre of gravity and that of Mercury. While Mercury revolves around the common centre between the two, at the mean distance of 36,000,000 of miles, the sun revolves around the same common centre at the mean distance of 7.6 miles. When Mercury is in its perihelion, the sun is also in his perihelion on the opposite side of the centre of gravity. When Mercury is in its aphelion, the sun is in his aphelion; and when Mercury is in any particular point of its orbit, the sun is in precisely the same part of his orbit in a straight line, connecting the two centres of gravity with the common centre. The two orbits lie in the same plane—have precisely the same eccentricity, and are both described by the respective bodies in exactly the same period. When Mercury increases or decreases its velocity, the sun increases or decreases his velocity in the same proportion. Though the radius vector in each of the two orbits is constantly varying, yet, at any given instant, the product of the radius vector of Mercury into its mass is equal to the product of the radius vector of the sun multiplied into his mass. The radius vector of the sun, in describing its elementary orbit, not only sweeps over equal areas in equal times, but these areas are in one constant proportion to those of Mercury.

For each planet and asteroid the sun has a similar orbit to such planet, the size of which depends upon the relative masses of the two bodies, and their respective distances from their common centre of gravity. All the relations which we have described, as existing between the orbits of the sun and Mercury, also exist between the orbits of the sun and any other planet or asteroid.

Between the sun and any other body of the system there is a common centre of gravity; hence, there will be as many such common centres as there are planets and asteroids. The distance of the sun's centre of gravity from each of these common centres is equal to the distance between the sun and planet, divided by the sum of the masses. All these common centres of gravity with the exception of the one between the sun and Jupiter, are located far beneath the surface of the sun. The one between the sun and Jupiter is about 30,000 miles above the sun's surface. The squares of sun's periods in these elementary orbits are as the cubes of the distances from his centre to the respective common centres. Therefore, Kepler's law holds good, not only among planets and satellites, but also among the elementary orbits of the sun.

It is a universal law among all revolving bodies in a system, that both the less and greater revolve around the common centre of gravity. Both the earth and moon observe this law. Jupiter has four elementary orbits precisely similar to the four orbits of his satellites, by the combination of which his resultant orbit, around the common centre of the whole, is composed. Saturn has ten such elementary orbits; eight for his moons, and two for his rings. His resultant orbit around the common centre of his whole system, is compounded of the ten elementary ones. Uranus, in like manner, has six small orbits adjusted to the six satellite orbits of his system. Neptune follows the same law.

If two bodies do not mutually revolve around their common centre of gravity, but the smaller one is projected to revolve around the centre of the larger, then these two bodies would necessarily rush together. For the projection of the smaller one would not create an elliptic balancing orbit in the larger one; the greater body would immediately commence the pursuit of the smaller in a spiral orbit; while at the same time the smaller would be bent out of its elliptic orbit into a spiral; and thus the two bodies would soon be precipitated upon each other. Hence, when the moon was projected in its orbit, the Earth had to be projected in an opposite direction around their common centre of gravity, with a velocity exactly proportioned to that of the moon's, so as to describe its period in a smaller orbit, in the same time that the moon performs its revolution in a larger one.

When the most distant moon of Saturn was projected, its primary had also to receive an opposite projection proportioned inversely to the two masses and distances from the common centre of gravity. When the other seven moons were projected, Saturn received seven other projections, each velocity and direction adapted in the most minute particulars to the corresponding velocities and directions of the respective moons. And when the two rings received not only a rotation, but also a revolution around the common centre of gravity between them and the central planet, the latter must also receive two projections in the opposite direction, nicely suited as balancing orbits to the rings, or they would rush to destruction.

Can any one for a moment believe that all these double projections and infinitely nice adaptations of balancing orbits, were introduced into the various systems independent of law? Can any one believe that there is not a common cause from which all these most wonderful phenomena proceeded? Cannot all these projections, velocities, directions and precise adaptations, be traced to a cause as definite in its operations, as the law or force of gravitation? In our closing lecture we shall show how these balancing orbits originated—how they became elliptic—how the planes of their orbits became inclined to each other—how the planets, asteroids, satellites and rings were formed;—in other words, how the Great Creator has constructed this vast universe by certain general and universal laws, through which His infinite wisdom and power are more fully made manifest to finite beings.

THERE have been many inquiries made by our citizens respecting the time allowed to pre-emptors to enter their land. This is a question which is of general interest, and as a Resolution passed Congress recently "for the relief of settlers on the public lands," a copy of which has been kindly furnished us by Lewis S. Hills, Esq., we give it a place in our columns, that all who are interested may know exactly what time they have allowed them to make their entries. The Resolution was approved on the 3rd inst., and is as follows:

"*Resolved by the Senate and House of Representatives of the United States of America in Congress assembled*, That settlers on the public lands of the United States who have been required to make proof and payment for their lands under the act to extend the provisions of the pre-emption laws of the Territory of Colorado, and for other purposes, approved July fourteen, eighteen hundred and seventy, and by instructions from the General Land Office, under date July thirty, eighteen hundred and seventy, shall have twelve months' additional time given them under which to make such proof and payment."

By this it will be seen that pre-emptors have twelve months' additional time given them under which to make proof and payment. Under the old law the time allowed for proving up and entering their claims was to the fourteenth of July, 1871, by this resolution it is now extended to the same date 1872. While this extension of time may prove an advantage to many persons, it may have the effect to encourage a feeling of procrastination and apathy in others, and cause them to neglect paying promptly for their land. There has been an occasional manifestation of a disposition to jump claims in this vicinity, and it is not probable that this disposition will decrease, if opportunities for its exercise offer themselves. To prevent this, and to avoid all chance for difficulty, every man who has pre-empted land should enter it as quickly as he possibly can, and secure his title from the Government for it, and then there is an end to uneasiness. This he should do without waiting for the extended time allowed by Congress in which to pay for it. No pre-emptor should suffer himself, in consequence of the additional time granted, to be led into a feeling of carelessness upon this subject; but be as determined to enter his land as early as he can raise the funds to do so, as if the old law upon the subject were still in force. The remedy against jumping, however, is for the settler and claimant to actually live on the premises according to law. Actual residence and possession are very hard to contend against.

WE have received a letter from Hon. Wm. H. Hooper, the Delegate of Utah Territory in the House of Representatives, in which he alludes to the Joint Resolution which we published on Friday. He says:

"As much interest is felt by my constituents in regard to paying for their lands, and I am written to frequently to know whether Congress has passed or will pass any Act extending the time beyond July next. Yesterday I mailed you and some thirty others copies of the enclosed Joint Resolution No. 21 [which did not reach us until Saturday morning, but which by the politeness of a friend we were enabled to lay before our readers on Friday. Ed. D. E. N.] which is the legislation supposed to be wanted give to another year's time to make payment. The wording of the Resolution, however, being somewhat ambiguous, as well as the Act of which it is amendatory, I thought it best to write to the Land Comissioner on the subject, and to-day received the enclosed reply. Will you please publish in your paper the law of July, 1870, of which this Resolution is an amendment, and the letter of the Commissioner, which will give information much needed."

The following is the law referred to, and which is embodied in Public Notice No. 742, issued from the General Land Office.

"*Be it enacted by the Senate and House of Representatives of the United States of America in Congress Assembled*, That the privileges of the act of May thirtieth, eighteen hundred and sixty-two, entitled "An act to reduce the expenses of the survey and sale of the public lands in the United States" be, and the same are hereby, extended to Colorado; and the proviso of the first section of the act approved June second, eighteen hundred and sixty-two, entitled "An act to establish a land office in the Territory of Colorado, and for other purposes," is hereby repealed.

SEC. 2.—And be it further enacted, That nothing in the Act of Congress approved March twenty-seven, eighteen hundred and fifty-four, entitled an Act for the relief of settlers on lands reserved for railroad purposes," shall be construed to relieve such settlers from the obligation to file the proper notices of their claims, as in other cases; and all claimants of pre-emption rights shall hereafter, when no shorter period of time is now prescribed by law, make the proper proof and payment for the lands claimed, within eighteen months after the date prescribed for filing their declaratory notices shall have expired: *Provided*, That where said date shall have elapsed before the passage of this act, said pre-emptors shall have one year after the passage hereof in which to make such proof and payment.

This act leaves the provisions of law as heretofore respecting "OFFERED LANDS," viz: filing within *thirty days*, and payment within *twelve months after settlement*.

The settler on surveyed "unoffered land" must file his or her declaratory statement within three months from the date of his or her settlement on such land, and, within eighteen months from the expiration of said three months, make the proper proof, and pay for such land.

Where settlers had already filed before the passage of the act, they are required to make proof, and payment within one year from such passage; therefore, all filings made prior to that date will expire, by limitation of law, upon unoffered lands, on the 14th of July, 1871.

The settler on "unsurveyed land" must file his or her declaratory statement within three months from the date of the receipt at the district land office of the approved plat of the township embracing the tract upon which he or she has settled, and, within eighteen months from the expiration of said three months, make the proper proof, and pay for such tract.

The proviso of the act of June 2, 1862, requiring filing within six months from survey in the field, and providing for filing with the Surveyor General, is repealed.

Circular instructions to registers and receivers, giving more specific details, will shortly be issued. In the meantime, those officers will be governed by this notice.

JOSEPH S. WILSON,
Commissioner.

The following is the reply of the Commissioner of the General Land Officer, Hon. Willis Drummond, to the letter of inquiry, addressed him by Hon. W. H. Hooper:

Department of the Interior,
General Land Office,
March 18, 1871.

Hon. W. H. Hooper:
House of Representatives:

Sir:—In reply to your letter of yesterday, I have the honor to state that this office and the Department have regarded the act of July 14, 1870, (to which you refer) as of general application, as will appear by the terms of our circular, Public Notice No. 742, issued 30th of July last, referred to by *Joint Resolution* No. 21, approved 3d instant. I enclose a copy of said notice No. 742.

Very respectfully,
WILLIS DRUMMOND,
Commissioner.

AGRICULTURAL.

DR. H. LATHAM has written a very excellent letter to the Omaha *Herald*, on the peculiar advantages of the country this side of the Missouri river for