# PAINE'S FOOTNOTE ON THE TRANSIT OF VENUS

by
Robert J. Havlik, Emeritus Librarian
University of Notre Dame



Thomas Paine ( 1737 -1809) was an English born, American political figure, philosopher and author of FOOTNOTE ON THE TRANSIT OF VENUS. The works of Thomas Paine are said to have influenced many of the founders of the United States.  Paine's The Age of Reason: Being an Investigation of True and False Theology, 1794-96, was the results of Paine's years of study and reflection on the place of religion in society. It was very popular and controversial in its time. It also touches on Paine's interest in science and astronomy. The work is still in print.

The excerpt below is part of Paine's introduction to his theories on the plurality of worlds. In it he describes the planetary system, as known at the time, in terms of Kepler's Laws. He then uses the observation of the Transit of Venus as a practical application of the laws. The footnote is presented here in **BOLD** for emphasis.

_____

Paine, Thomas,  The Age of Reason, Being an Investigation of True and Fabulous Theology, Paris, 1794. *In*, The Age of Reason by Thomas Paine, with a biographical introduction by Philip S. Foner, Secaucus, N.J., Carol Publishing Group; 1997; pp. 86 - 88.

## The Plan and Order of the Universe

That part of the universe that is called the solar system (meaning the system of worlds to which our earth belongs, and of which Sol, or in English language , the Sun, is the center) consists, besides the Sun, of six distinct orbs, or planets, or worlds, besides the secondary bodies, called the satellites or moons, of which our earth has one that attends her in her annual revolution around the Sun, in like manner as the other satellites or moons attend the planets or worlds to which they severally belong, as may be seen by assistance of the telescope.

The Sun is the center, round which those six worlds or planets revolve at different distances there from, and in circles concentric to each other. Each world keeps constantly in nearly the same track round the Sun, and continues, at the same time, turning round itself in nearly an upright position, as a top turns round itself when it is spinning on the ground and leans a little sideways.

It is this leaning of the earth (23 ½ degrees) that occasions summer and winter, and the different length of days and nights. If the earth turned round itself in a position perpendicular to the plane or level of the circle it moves in around the Sun, as a top turns round when it stands erect on the ground, the days and nights would be always of the same length, twelve hours day and twelve hours night, and the seasons would be uniformly the same throughout the year.

Every time that a planet (our earth for example) turns round itself, it makes what we call day and night; and every time it goes entirely round the Sun it makes what we call a year; consequently our world turns three hundred and sixty-five times round itself in going once round the Sun.[0]

The names that the ancients gave to those six worlds, and which are still called by the same names, are Mercury, Venus, this world that we call ours, Mars, Jupiter and Saturn. The appear larger to the eye than the stars, being many million miles nearer to our earth than any of the stars are. The planet Venus is that which is called the evening star, an sometimes the morning star, as she happens to set after or rise before the Sun, which in either case is never more than three hours.

This Sun, as before said, being the center, the planet or world nearest the Sun is Mercury; his distance from the Sun is thirty-four million miles, and he moves round in a circle always at that distance from the Sun, as a top may be supposed to spin round in the track in which a horse goes in a mill.

The second world is Venus; she is fifty-seven million miles distant from the Sun, and consequently moves round in a circle much greater than that of Mercury. The third world is this that we inhabit, and which is eighty-eight million miles distant from the Sun, and consequently moves round in a circle greater than that of Venus.

The fourth world is Mars; he is distant from the Sun one hundred and thirty-four million miles, and consequently moves round in a circle greater than that of our earth. The fifth is Jupiter; he is distant from the Sun five hundred and fifty-seven million miles, and consequently moves round in a circle greater than Mars.

The sixth world is Saturn; he is distant from the Sun seven hundred and sixty-three million miles, and consequently moves round in a circle that surrounds the circles, or orbits, of all the other worlds or planets.

The space, therefore, in the air, or in the immensity of space, that our solar system takes up for the several worlds to perform their revolutions in round the Sun, is of the extent in a straight line of the whole diameter of the orbit, or circle, in which Saturn moves round the Sun, which being double his distance from the Sun, is fifteen hundred and twenty-six million miles and its circular extent is nearly five thousand million, and its globular contents are almost three thousand five hundred million times three thousand five hundred million square miles.[0]

------------------------------------

10. Those who suppose that the Sun went round the earth every 24 hours made the same mistake in an idea that a cook would do in fact, that should make the fire go round the meat, instead of the meat turning round itself toward the fire. –*Author*

**11. It should be asked, how can man know these things? I have one plain answer to give, which is, that man knows how to calculate an eclipse, and also how to calculate to a minute of time when the planet Venus in making her revolutions around the sun will come in a straight line between our earth and the sun, and will appear to us about the size of a large pea passing across the face of the sun. This happens but twice in about a hundred years, at the distance of about eight years fro each other, and has happened twice in our time, both of which were foreknown by calculation. It can also be known when they will happen again for a thousand years to come, or to any other portion of time. As, therefore,**

man could not be able to do these things if he did not understand the solar system, and the manner in which the revolutions of the several planets or worlds are performed, the fact of calculating an eclipse, or a transit of Venus, is a proof in point that the knowledge exists; and as to a few thousand, or even a few million miles, more or less, it makes scarcely any sensible difference in such immense distances. - *Author.*

www.transitofvenus.org