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Of Knowledge: Sidereal System

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Of Knowledge: Sidereal System

The stars. The sidereal system, meaning by that the star system, sometimes called the stellar universe, comprises all the stars and the nebulae outside our own solar system. This stellar universe includes not only the stars which are visible to the naked eye (about 5,000 only are so visible), but hundreds of thousands or millions besides, which are so distant that their existence is known only as they are revealed by the most powerful telescopes, and the most sensitive photographic plates.

Difference between planets and stars. As an evidence that these stars are not similar in constitution to the planets of our solar system, which shine only by the reflected light from the sun, astronomers point to the remoteness of these stars of the stellar universe. Neptune, they say (the planet of our system most distant from our sun, be it remembered), is too faint for the naked eye to see its light. Yet it is only 2,791,000,000 miles—nearly three billions of miles—from the sun; but the nearest fixed star from our earth (Alpha Centauri, meaning the star of the first magnitude of the constellation of the Centaur) is nine hundred times more distant! Hence the conclusion, that if Neptune on the frontier of our system may not be seen by the naked eye, while Alpha Centauri, nine hundred times farther away may be so seen, then the difference as to these two objects of our night sky must arise from some difference in their constitution. “The very brightness of the lucid stars” leads observers to suspect that these stars of the sidereal system, must be self-luminous like our own sun; and when their light is analyzed with the spectroscope the theory that they are suns is actually demonstrated.¹ This leads to the formula that “The sun is a star. The stars are suns.” Our sun looks big as compared with the other suns or stars of the stellar universe only because of its

¹Todd, *New Astronomy*, 421–22.

comparative nearness to us. The universe is a stupendous collection of millions of stars or suns.²

The number of the “fixed stars.” No one, of course, knows how many of these fixed stars exist in the sidereal system. Astronomers have variously estimated them from thirty, fifty, to one hundred millions but the later estimates by authorities go far beyond these figures, even into the billions. “Man,” says John W. Draper, author of the *Intellectual Development of Europe*,

man, when he looks upon the countless multitude of stars—when he reflects that all he sees is only a little portion of those which exist, yet that each is (or may be) a light and life-giving sun to multitudes of opaque, and therefore, invisible worlds—when he considers the enormous size of these various bodies and their immeasurable distance from one another, may form an estimate of the scale on which the world (universe) is constructed.³

Again Professor Samuel Kinns, Ph.D. Fellow of the Royal Academy of Arts and Sciences, says,

These distant suns are, many of them, much larger than our sun. Sirius, the beautiful Dog-star (in the constellation Canis Major) is (so far as can be judged by its amount of light) nearly 3,000 times larger, and therefore its system of dependent worlds must be so much more important than those which form our Solar System. Its planets may far exceed ours in size, and revolve at far greater distances; for such a sun would throw its beams of light and heat very much beyond a distance equal to that of our Neptune.⁴

“Our” galaxy, distance within: Professor Newcomb, in all this branch of science always a standard authority, says of these fixed stars:

Turning our attention from this system to the thousands of fixed stars which stud the heavens, the first thing to be considered is their enormous distance asunder, compared with the dimensions of the solar system, though the latter are themselves inconceivably great. To give an idea of the relative distances, suppose a voyager through the celestial spaces could travel from the sun to the outermost planet of our system in twenty-four hours. So enormous would be his velocity, that it would carry him across the Atlantic Ocean, from New York to Liverpool, in less than a tenth of a second of the clock. Starting from the sun with this velocity, he would cross the orbits of the inner

²Thomson, *Outline of Science* 1:12.

³Draper, *Intellectual Development of Europe* 2:279.

⁴Kinns, *Harmony of the Bible with Science*, 238. [In the Roberts typescript, this text was not quoted precisely; the discrepancies were insignificant and have been corrected.]

planets in rapid succession, and the outer ones more slowly, until, at the end of a single day, he would reach the confines of our system, crossing the orbit of Neptune. But, though he passed eight planets the first day, he would pass none the next, for he would have to journey eighteen or twenty years, without diminution of speed, before he would reach the nearest star, and would then have to continue his journey as far again before he could reach another. All the planets of our system would have vanished in the distance, in the course of the first three days, and the sun would be but an insignificant star in the firmament. The conclusion is, that our sun is one of an enormous number of self-luminous bodies scattered at such distances that years would be required to traverse the space between them, even when the voyager went at the rate we have supposed.⁵

Multiplicity of galaxies—universes. A still more recent statement of these wonderful things concerning the extent of the universe, the number of the fixed stars and the distance apart of these innumerable suns, is made by Professor Frank R. Moulton^a of the University of Chicago, in an address before the American Association for the Advancement of Science, on the evening of December 31, 1926. He said of our stellar galaxy, which he called the largest organism “whose evolution has ever been considered”:

Our galaxy consists of at least one billion suns, each one like our own, averaging a million times the volume of the earth. These suns occupy a disk-like or watch-shaped region in space whose thickness is the distance light travels in about 30,000 years, and light travels 186,000 miles per second! The longer diameter of the galaxy is about 200,000 light years.

The stars of this galaxy move around among one another something like bees in a swarm. This does not mean that they dart quickly from one side to another, for although our sun is moving at the rate of four hundred million miles a year, the distance between the stars are so vast that its relations to other suns have not changed appreciatively in historic time.⁶

Of course, these distances are beyond human comprehension or realization; but we can know, and do know, on the report of those competent to speak with authority, that these immense numbers, representing the distances which separate the stars from each other, are facts, and being facts, they almost overwhelm one by their immensity.

⁵Newcomb, *Popular Astronomy*, 104.

^aForest Ray (Frank) Moulton (1872-1952) was an astronomer at the University of Chicago and research associate at the Carnegie Institute. He authored many books and articles on celestial mechanics, differential equations, and astronomy.

⁶Moulton [source not found].

Universe of “magnificent distances.” Professor Moulton, continuing his lecture, showed a photograph which was taken with light that had been on its way a million years, then continued his remarks:

Until recently many astronomers thought there was only vacant space beyond our galaxy, but now it is known that there are exterior galaxies similar to our own in size and shape and the number of suns. Only about a year ago Dr. Edwin P. Hubble^b at Wilson Observatory determined the distance of an exterior galaxy which had heretofore been called the Andromeda Nebula, and found it to be a million light years. About half of the thousand million stars (suns) in our own galaxy are in size and constitution and temperature essentially similar to our own sun. It is not improbable—it is in fact probable—that a majority of them have planets circulating about them, as our earth revolves about the sun. It may be that a fraction of them, perhaps in all hundreds of millions, are in a condition comparable to that of the earth, and that they support life!⁷

One might continue to multiply authoritative statements concerning the vastness of the universe and the wonderfulness of it, but my only purpose in calling attention to all this is merely to impress the mind of the reader with the greatness of these existing stellar universes, to make it the basis of reasoning to be followed later on. What is here set down, being of unquestioned authority, may be sufficient to my purpose, to be developed in future chapters.

^bEdwin P. Hubble (1889-1953) was a lawyer who became an astronomer. Famous for his work in extragalactic astronomy, he provided the first observational evidence for the expansion of the universe. The Wilson Observatory is in the mountains above Pasadena, California.

⁷Moulton [source not found].

Further references recommended by Roberts for this lesson: Proctor, *Other Worlds Than Ours*; Serviss, *Astronomy with the Naked Eye*; Abr. 3 “and cuts with Joseph Smith’s partial translation.”