

# WHAT WILL HAPPEN TO US THEN?

SCIENCE  
THE



This was discovered by Sir John Herschel in the Southern Hemisphere. It consists of nebulous gases intermingled with stars. The heavens are full of these cloudy masses, and recent experiments with the great Crossley reflector at the Lick Observatory show that probably more than a hundred thousand such objects, too faint to be seen by the eye, are within the reach of photography. They are scattered through the space inclosed by the Milky Way.

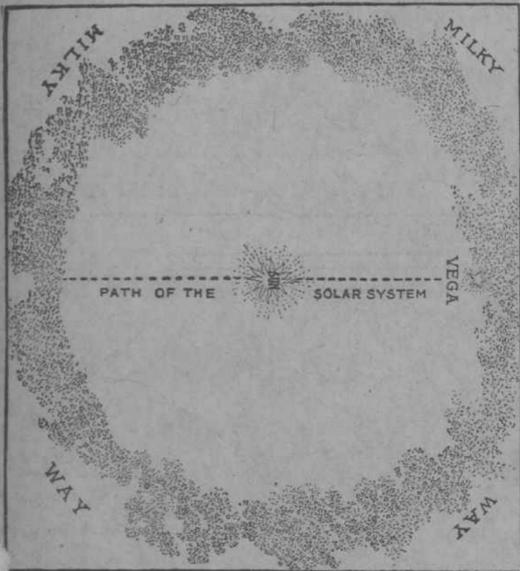


Diagram showing ring of the Milky Way and position of the Solar System, which is crossing the gap within the ring at a speed of 300,000,000 miles in a year, and has yet a journey of a million years to make.

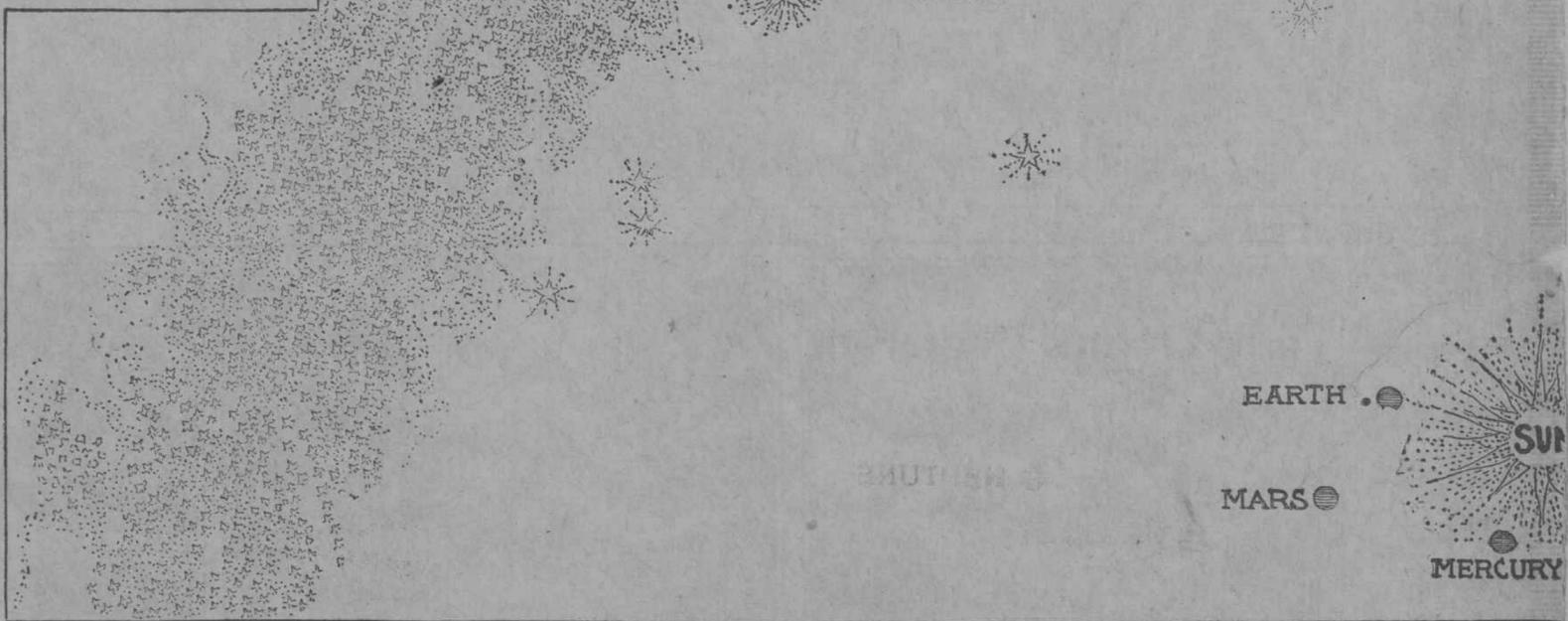


Diagram Drawn by Prof. Serviss, Showing How Our Sun and Our Little Planets

BY PROFESSOR GARRETT P. SERVISS.  
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PROFESSOR SIMON NEWCOMB, the veteran American astronomer, has just announced the results of a new investigation of the wonderful phenomenon known as the Solar Motion. The discoveries on which Professor Newcomb's calculations are based are of the most startling and vital interest and lead perhaps to the grandest conclusions of modern astronomy.

Most persons probably think of the sun as remaining fixed in space while the earth and the other planets revolve around it. It has been found, however, that such is not the case, and the discovery that the sun is not at rest has stupendous consequences for the earth and the human race. In truth, the sun is a swift traveller, and in its motion it carries the planets along, so that the actual track of the earth in the course of a year's revolution around the moving sun is neither a circle nor an ellipse, but an enormous spiral, such as would be traced by following the edge of the thread of a screw. This reeling path of the earth, whose true form and direction are just becoming known to astronomers, is, it will be seen, something very different from the orbit which our planet is usually represented as describing.

In travelling annually around the sun the earth moves eastward eighteen and a half miles every second. But at the same time the sun is continually speeding away, almost at a right angle, and in order to keep along with its master the earth is forced to travel northward at the rate of about ten and one quarter miles per second. This is the figure deduced from Professor Newcomb's latest investigation.

Let us endeavor to be clear in our minds on this subject, for it is one of the greatest conceptions of astronomy, leading, as already remarked, to results of immense importance. The sun is a star, looking in our eyes greater than the other stars simply because we are comparatively close to it. Revolving around the sun in regular orbits, and linked to it by gravitation in such a manner that they can never get away, are the planets. These, excluding the insignificant little bodies called asteroids, are eight in number, viz., Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune. These eight constitute the sun's family. Everything else ordinarily visible in the sky (except the moon, which is the special attendant of the earth) is entirely independent of the sun. The faintest star visible at night is his peer, because it, too, is a sun and not a mere dependent planet.

Now, the sun with its eight planets constitutes what is called the solar system. This system is very large when measured by terrestrial standards—about 5,000,000,000 (five thousand six hundred million) miles across. But it is very small when measured by astronomical standards, because the distance from the earth or the sun to the nearest star exceeds the entire width of the solar system about five thousand times. As similar, and even greater, distances separate the solar system from the other stars on all sides, it follows that the sun and his planetary family are alone in space, so far removed from the millions of stars surrounding them that those stars are diminished by distance to mere specks of twinkling light, faintly visible through the infinite night that envelops them and in which they are able to make daylight only for a few million miles adjacent to their own hearths.

But, and this fact, as will appear, is of the highest importance, the stars (distant suns) are not scattered equally over the heavens. The majority of them seem to have been gathered in a vast spiral ring, which we see completely encircling the firmament, and to which we give the name of the Milky Way, or the Galaxy. It requires a telescope to show that the Milky Way really consists of countless millions of stars so thickly crowded in places that they run into a perfect blaze of light, their glittering rays being intermingled like the sparkles from a diamond brooch.

Our sun is not a member of this splendid company. He does not belong to the immense host of the Milky Way. His place appears to be not far from

the centre of the dark abyss that is rimmed by the fires of the Galaxy. But for the motion mentioned at the beginning of this article, our situation would resemble that of a little island group in the midst of the sea, surrounded on all sides by far-off continents. Considering that it is in motion, the solar system may more correctly be likened to a fleet, having the sun for its flagship, and silently making its way across a vast, unexplored ocean, moving straight from one shore toward the other, and, at the present time, arrived at a point about midway between the beginning and the end of its voyage. And, as we are about to see, no war fleet, and no squadron of exploring vessels, ever had such momentous adventures as are in store for us.

With these explanations it becomes clear what is meant by the solar motion which Professor Newcomb has investigated. The direction of that motion, to all appearance, is along a straight line; its velocity, as already remarked, is about ten miles in a second, or more than 860,000 miles in a day. We are unconscious of it because the motion is perfectly smooth, just as we should be unconscious of the movement of an express train if there were no jolting and we did not look out of the window. In the case of the solar motion we do look out of the window, so to speak, but the only landscape we see is that of the stars, and they are so far away that even our dizzy flight of ten miles per second causes them to shift their positions so slightly that the most refined instruments of the observatories are required to detect and measure the shifting. It is by such measurements, however, that the rate and direction of the solar motion were discovered.

Whence have we come, then, and whither are we going? We are crossing the night-haunted gulf begirt by the Milky Way. We have come up out of the south and are speeding northward. Professor Newcomb's calculations and those of other astronomers enable us to point to a star, which at present, is like a beacon over our bow. It is one of the most splendid suns in the universe, the star Vega in the constellation Lyra. It is overhead in mid-Summer, but is not visible in the evenings of Winter. There exist some calculations which indicate that Lyra exceeds our sun in radiant power two or three thousand times! Lyra lies at the edge of one of the most brilliant portions of the Milky Way. It is surrounded by some of the greatest wonders of space—double stars, quadruple stars, colored stars, nebulae twisted into gleaming rings and spirals, and congregations of suns, in the midst of some of which perpetual daylight must reign if there are worlds to be lighted by them. Toward this begemmed region our sun, hurrying like one who has strayed from the line of march, is sweeping us more than three hundred million miles every year. On New Year's Day we shall be six million miles nearer to the glorious region of Lyra than we were on Christmas morning.

When shall we arrive there? Fortunately it is possible to give an approximate answer to that question. The distance of Vega, the greatest star in Lyra, is probably something over a hundred million of millions of miles, one estimate says 117,000,000,000,000. Other stars in that region are more distant. Call the average distance 300,000,000,000,000. Then the earth, travelling 300,000,000 miles in a year, will arrive amid the wonders of Lyra in one million years. Will the human race survive so long? Some geologists think it has already existed on the earth for as long a time as that. If so, why should not our descendants yet be dwelling upon this planet when, led by the sun, it joins the procession of the Milky Way? Man's greatest days, and the earth's likewise, do not lie in the past, but in the far future.

Yet there are many adventures, and perchance perils, in store for us on the long journey. As our solar flagship directs his course continually into untraversed stretches of the universal abyss, strange things rise and dart forward to meet him and us. It is thus that he captures wandering comets. Frequently strange bolides, compact of iron and many minerals, plunge into the atmosphere, blaze for a few seconds with superheated fury, and then fall with repeated explosions and a hissing roar to the ground. Many of these may have been wandering like sea monsters in the deep until the flying solar system forced its prow into their dark gulfs and drew them to swift destruction.

But the danger may sometimes threaten the earth rather than the things

"Would Shatter Our Globe."

obstruction which would shatter our little globe. Now and then astronomers surveying the surrounding heavens see a new star suddenly blaze forth. The phenomena attending such appearances frequently present an irresistible suggestion that a collision was the cause of the outburst. There is reason to think that space may contain as many dark bodies as it possesses shining ones. A collision between the earth and another wanderer as massive as itself, or only half as massive, would bring all wars and all empires to a sudden end and wipe clean the slate of human achievement. Even to plunge into a great cloud of nebulous matter or of dust—and the telescope, aided by photographs, reveals hundreds of thousands of such things about us—might mean destruction swift and sure, either through a flash of unendurable flame or in consequence of the introduction into the atmosphere of deleterious and poisonous vapors and gases. In fact, it has sometimes been held by scientists that the earth in the past, during its immense journey from the southern edge of the Milky Way, must have run through regions of space that modified its atmosphere and the conditions prevailing on its surface in a fundamental manner. The broken records of geology may contain the proof of such long-past catastrophes.

These perils exist, but the earth may escape them. Civilization having reached its present stage may never again be interrupted by a universal disaster, and when the million years are gone and the sun presents himself with his travelling companions at the diamond gates of the Galaxy, the inhabitants of the earth who behold that happy termination may possess unbroken records, libraries of annals, carrying the story back through thirty thousand generations to our time, when the solar system is speeding alone in the dark midway and cheerless isolation of its tremendous journey. And yet I should not use the word "termination" to describe the arrival of the solar system at the place where Vega now shines. The journey may never end. The sun may pass on through the Milky Way, or it may turn in its course, or it may become a satellite to some grander sun. True rest it will never know.

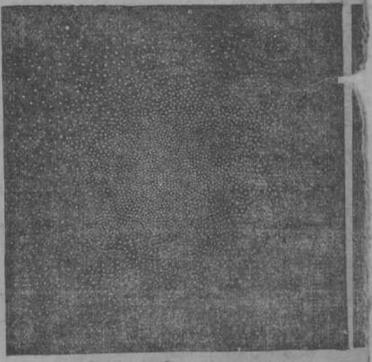
Even the Milky Way, with its half-concealed radiance, does not mark the real limits of space. The telescope and photography unite in testifying that beyond the Galaxy, beyond all the banks and shoals of stars that form its twinkling sands, there is black nothingness and empty gloom unfathomable. Real night which knows no star reigns there. It is a desert that engulfs creation. Yet even it may not attain to the ultimate walls of immensity. Across that rayless chasm, whose yawning depths appear here and there like black holes in the shimmering scarf of stars, may lie unnumbered other universes invisible to our

peculiar method of clearing a church debt.

THE Euclid Avenue Methodist Episcopal Church of Oak Park, near Chicago, dedicated the chapel of a new edifice in Washington boulevard the other day, and, at the same time, by a novel method, raised a sufficient amount of money to pay for a large part of the property.

After the dedicatory service the church could boast that it owned the property on which it stood. J. Clayton Youker is the pastor, and it was through a plan of his that the money poured in.

When a congregation gathered in the morning and filled the little chapel to its capacity it was noticed that a huge thermometer, eight feet in height, stood at one side of the pulpit. After the dedication Mr. Youker explained that the enthusiasm of the meeting was expected to wax so warm that the mercury in the thermometer would rise to a \$12,000 mark at the top of the scale. For each \$100 contributed the mercury would rise one degree. Before the morning service was over the thermometer registered \$5,200. In the afternoon it began to snow outside as the service opened within. In spite of this the column in the thermometer rose steadily, and last night Mr. Youker estimated the total of gifts at \$10,000.



SECTION OF THE MILKY WAY.



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