

Stars And Bible

Astronomy Reveals God

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FOREWORD

This little volume, prepared especially for friends of The Voice of Prophecy by the one whose gospel radio messages they enjoy from week to week, does not claim to be a treatise on astronomy which only the scientist can understand, but one that every Christian can read and appreciate with interest and profit.

All his life, H. M. S. Richards, the author, has been a keen observer and lover of nature, and his interest in God's great book of the starry heavens is second only to his devotion to the Book of books. As in his radio sermons the listener is pointed to Christ as the Savior of the world, so in these pages the reader will see beyond the countless hosts of heaven the Creator of all things. "For the invisible things of him from the creation of the world are clearly seen, being understood by the things that are made, even his eternal power and God head." Romans 1:20.

God speaks to men in various ways—in the rapturous song of the meadowlark, the pearly whiteness of the opening lily, the thundering roar of the mighty ocean or the sweet smile of the innocent babe—but in a grander and more magnificent way than all these, "the heavens declare the glory of God; and the firmament shows his handy work." Psalm 19:1.

The irreligious scientist or the unbelieving astronomer is a contradiction. There can be no such thing as scientific astronomy apart from the recognition of the Creator who brought all the heavenly bodies into being. He who sees in the heavens no trace of God is but confessing his own blindness.

The development of modern instruments and the perfection of scientific techniques have proved the truth of Biblical statements relating to astronomy which formerly were not understood and consequently thought absurd. In a realization that the scientist is but tracing the handwriting of the Creator, and with an abiding faith that His writing is intelligible and contains a divine message, such God-fearing men as Kepler and Newton laid the foundations of modern astronomy. It was the former who, upon realizing the significance of one of his great discoveries of the heavens, exclaimed, "O almighty God, I am thinking Thy thoughts after Thee!" Science must return to the Bible if it is to make lasting progress.

As we study astronomy aright, we are filled with admiration and devotion, for the One whose works declare the grandeur and glory of His exalted personality. On the other hand, in modesty and humility, we sense the limitations of our own human attainments and are led to exclaim: "When I consider thy heavens.... the moon and the stars, which thou has ordained; what is man, that thou art mindful of him?" Psalm 8:8, 4.

Equally authoritative sources differ, sometimes widely, in their statements regarding the vastness of the universe and other astronomical data. Hence some apparent discrepancies may be noted. From the mere fact that the author quotes from, or refers to, the works of certain writers on astronomy, it should not be presumed that he approves of all their religious or philosophical views.

The primary objective of this present work, THE STARS, is to acquaint the reader with Jesus, "the bright and Morning Star, that true Light, which lights every man that comes into the world." Revelation 22:16; John 1:9.

I Saw His Hand
I saw the glory of His robe
Star-spangled in the dome of night,
Where fold on fold the Milky Way

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Spreads out its glowing arch of light.
I saw His finger light the flame
Of red Andromeda's million suns,
And touch Polaris into fire

While the glittering wheel of Virgo runs
I saw His name, Creator, writ
In far star-cities swinging high;
Beyond Aldebaran's ruddy glow
I saw His hand across the sky.
I saw Him bind the Pleiades
And guide Arcturus with his train,
Where cold Orion's starry sword
Makes all our little grandeur vain.

I saw His anger lash and bum
Around the suds corona glow;
By Him the planets wheel and turn-
Are never fast and never slow.

I saw Him in the depths of space,
Behind the dark night's farthest rim,
Where shout the sons of God with joy
Some new creations glory hymn.

I saw His rainbow throne of light
Reflect in star-clouds vast and dim;
I saw the thunder of His power,
But never knew the love of Him.

I never knew until I saw
A thorn-crowned Man bear all my loss;
I gave my heart to Him because
I saw His hand upon the cross.

H. M. S. R.

1. The Heavens Are Telling

HERE is God's invitation to the study of astronomy. It is found in Isaiah 40:26: "Lift up your eyes on high, and behold who has created these things, that brings out their host by number. He calls them all by name, by the greatness of his might, for that he is strong in power, not one fails." The 100-inch telescope on Mount Wilson, California, has enabled men to obey this command of God more fully, and now the great 200-inch mirror which sweeps the heavens from Mount Palomar, California, adds to our ability to consider the heavens to lift up our eyes on high, even 1,000,000,000 light years out into the depths of space, where

Silently one by one,
In the infinite meadows of heaven
Blossomed the lovely stars,
The forget-me-nots of the angels."
Longfellow

God has two great books of inspiration. The first we call the Holy Bible; the other, the book of nature, of which the starry heavens are an important chapter. The Bible, in whole or in part, is available in over a thousand languages, but God's writing in the stars is open "to every nation and kindred, and tongue,

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and people.” Revelation 14:6. And the heavens are speaking; they are telling; they are proclaiming.

As we read in Psalm 19:1-3: “The heavens declare the glory of God; and the firmament shows his handy work. Day unto day utters speech, and night unto night shows knowledge. There is no speech nor language, where their voice is not heard.”

Night after night they show knowledge. Day after day the heavens are telling. As the poet Addison beautifully sang: “The spacious firmament on high, With all the blue, ethereal sky, And spangled heavens, a shining frame, Their great Original proclaim: The unwearied sun from day to day Does his Creator’s power display, And publishes to every land The work of an almighty hand.”

While on his memorable expedition to Egypt, Napoleon Bonaparte stood on the deck of his ship one night listening to the conversation of his officers. These men were skeptics and they argued for hours against the truths of revelation, even the existence of the Deity. At last Napoleon turned away. As he did so, he waved his hand toward the starry midnight sky and said, “Gentlemen, your arguments may be very clever, but who made all these?” The officers made no reply, for “the heavens declare the glory of God.”

Now in the twentieth century astronomers accept the divine invitation to lift up their eyes on high and, as they turn their gigantic lenses toward the starry depths, searching out the hiding places of the boundless voids, they behold the handiwork of Him “whose goings forth have been from of old, from everlasting.” Micah 5:2. The stupendous mechanism of the universe with its mathematical perfection did not come into existence through accident. Every effect must have an adequate cause, and this universe, so vast that it appears to us to be infinite, has a cause greater than itself. That cause is God revealed in Jesus Christ. “In the beginning God created the heaven and the earth.” Genesis 1:1. No one can go back of the beginning-and “in the beginning God.”

No wonder someone said, “The unbelieving astronomer is mad”-mad because, with such a spectacle before him, he is still unbelieving. As Herschel, one of the greatest astronomers, has said: “All human discoveries seem to be made only for the purpose of confirming more strongly the truths that come from on high and are contained in the Sacred Writings.”

Notice that in His challenge, God says: “Lift up your eyes on high, and behold who hath created these things.” Isaiah 40:26. The emphasis is on God Himself. These divine words are chiseled on a marble tablet in the wall of the astronomical observatory at Williams College. I saw them also on the stone slab covering Herschel’s grave in Westminster Abbey. Even in death, that great astronomer was still pointing upward to God.

During the French Revolution an atheist official said to a Vendean peasant, “We will pull down your churches, destroy your pictures, and demolish everything that reminds you of God.” The peasant replied, “But you will leave us the stars.”

Yes, they will leave us the stars, always and forever the stars. And “the heavens declare the glory of God.”

Now, as we consider the stars and the Bible, let us mention several instances in which the stars and the Holy Scriptures speak the same language. First, the Scriptures tell us that the stars differ in glory or brilliance. This statement is in 1 Corinthians 15:41: Mere is one glory of the sun, and another glory of the moon, and another glory of the stars: for one star differs from another star in glory.”

It was once thought that the stars were all very much alike in magnitude and constitution and that one star was brighter than another simply because it was nearer to us. But there came a time when men learned that this was not a sufficient explanation. While there might be instances in which one star is brighter than another because it is nearer, it was found that sometimes a very bright star is actually many times farther away than another of less brilliance. The Bible says, “One star differs from another star in glory,” and this is now proved true. No two stars are alike. Not only do they differ in size and distance, but in actual brilliance and color.

There are more than 4,000 stars which vary in brightness from time to time. Antares, Aldebaran, Betelgeuse, and Arcturus shine with a reddish light. There are some telescopic stars which give forth a blood-red light. Vega is bluish, as are many of the stars in the Milky Way. Sirius and Procyon are white, while Capella shines with a yellowish or creamy white light.

Some stars are suns thousands of times brighter than our sun, while others give very little light. For instance, there is Rigel, a brilliant white star in the constellation of Orion which is 14,000 times more luminous than our sun. Betelgeuse is a super giant sun a thousand times as bright as our sun, and we are fortunate that it was not placed any nearer the earth than 200 light-years, which is 200 times the distance that light will pass in a whole year, traveling at the rate of over 186,000 miles a second. Sirius is only 27 times as bright as our sun, yet it is the brightest star in the entire sky, for it is but 9 light-years away. It is a

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white star with a temperature of about 10,000 degrees. And, by the way, it is really a double star with a dark companion that is made of the heaviest material known to man.

The difference in brightness of the stars is due first to difference of distance; second, to difference of dimensions, or light-giving area; third, to difference in the brilliance of light giving surface. For instance, the dark companion of Sirius gives only about one twelve-thousandth part as much light as Sirius itself.

The different colors of the stars give us a hint as to their composition. For instance, when we bum salt, it gives a white light which later turns to yellow. We mix alcohol and boracic acid and ignite them, and a beautiful green flame results. In the same way, alcohol and nitrate of strontia give a red flame. It also has been learned that vapor affects the color of the light passing through it. When iron is heated, it is first a dull red. As it becomes hotter, it emits a white light.

The Bible statement is that "one star differs from another star in glory." We study this glory and find that the stars are as different, not only in brilliance but in color, as the flowers of this earth. As H. W. Warren said: "We are charmed with the variegated flowers of our garden of earth; but He who makes the fields blush with flowers under the warm kisses of the sun, has planted His wider garden of space with colored stars. 'The rainbow flowers of the footstool, and the starry flowers of the throne' proclaim one Being is the Author of them all." For one star differs from another star in glory.

Now we come to our second point: The Bible says that "There is one glory of the sun, and another glory of the moon!" 1 Corinthians 15:41. The sun differs from the moon in its light. Light from the sun or any self-luminous body can be reflected in any direction, but light that has once been reflected cannot be reflected again in every direction. There is one plane in which it refuses to be again reflected-at an angle of 54 degrees and 35 minutes, no light will be reflected. It is then called polarized light. To discover whether light has been reflected or not, an instrument called a polar scope is used. When, by this means, a ray of light from the moon is examined, it is discovered to be polarized, or borrowed, light. By the same means it can always be determined whether light from heavenly bodies is reflected from planets and moons, or emitted by self-luminous suns. So we see the astronomical accuracy of the Bible which 2,000 years ago declared, "There is one glory [or brilliance] of the sun, and another glory of the moon."

A spectroscope is another wonderful modern instrument by which rays of light from far-distant stars are broken up into their spectrums and thus give up their secrets as to the distance of these stars, their size and composition. These strange lines of color in the spectroscope, as H. W. Warren said, are "the alphabets to new realms of knowledge. They are produced by specific substances in the sun [or the stars]. Each substance has its own peculiar line or lines. Sodium always has two lines at a certain place in the yellow. Light passing through vapor of sodium has the vibrations that would fall on these two narrow lines in the yellow utterly destroyed, leaving instead two black spaces. Light passing through vapor of burning iron has hundreds of vibrations absorbed, leaving in their stead that number of black lines; but if the salt or iron is glowing gas, in the source of the light itself, the same lines are bright instead of dark."

We come now to our third fact which we read in God's book of the skies as well as in the Holy Scriptures: Light is parted. In Job 38:24 we read: "By what way is the light parted, which scatters the east wind upon the earth?"

When this was first written nobody had ever dreamed' of the spectroscope, for it was not invented until 1859. The modern astronomer now breaks up a ray of light from some distant star into bands of color like a rainbow and by these color bands reads the secrets of the skies. In its simplest form, the spectroscope consists of two small telescopes with a glass prism mounted between their object glasses. When a beam of light enters through a narrow slit in the first telescope, its rays are rendered parallel by the object glass. The parallel rays then pass through the prism, where they are bent or refracted at different angles, and pass out of the prism at different angles, spreading out the colors into a spectrum as the observer sees them through the second telescope. This is what the raindrops in the air do to the sunlight to give us the magnificent rainbow spectrum arching the sky. So it is by the spectroscope, like a pair of giant spectacles, that astronomers read the secrets of the skies. The Bible was right all the time-light is parted.

Now we come to the fourth fact, the infinitude of space. This is spoken of in Jeremiah 31:37: "Thus said the Lord; If heaven above can be measured, . . . I will also cast off all the seed of Israel for all that they have done, said the Lord."

Here it is suggested that the heavens cannot be measured. It is beyond the power of man to do so. Astronomers do not use miles to measure distances, but light-years. The reason for this is that miles are too short. There would be too many of them, and we would have no comprehension of their number. A light-year is the distance that a ray of light travels in one year at an estimated speed of more than 186,000 miles a second, or over 11,000,000 miles a minute, making the inconceivable total of nearly 6,000,000,000,000

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miles a year. Multiply this by 4.113 and you have the distance in miles of the very nearest star, Alpha Centauri. Multiplied by 47, it gives the distance to Polaris, the North Star, which is 47 light-years away from the earth. That is, the light that reaches the earth tonight from the North Star left it 47 years ago. The light from Antares takes 370 years to reach the earth, and some portions of the Milky Way are said to be 100,000 light-years distant. The Great Nebula in Andromeda is 600,000 light years distant. This is inconceivable to the mind of man.

What does it mean? It means that during the time of just one radio broadcast of The Voice of Prophecy, the light from Andromeda will travel over 330,000,000 miles, but it will still have to travel over 600,000 years at the rate of more than 186,000 miles a second before it reaches Los Angeles, or the spot where Los Angeles once stood. No human mind can conceive such immensity. While one is taking two ordinary steps, light will travel a distance equal to eight times around the world, or nearly 200,000 miles.

Suppose we open Websters International Dictionary, which contains over 3,000 pages of three columns each, and begin to read as rapidly as we can. Let us imagine a ray of light leaving Alpha Centauri, the nearest fixed star, at the instant we begin. By the time we have finished reading one page, the light from that star will have sped toward the earth no less than 100,000,000 miles and, if we should keep right on reading without stopping day or night, just as light travels, how many pages do you suppose we would have read by the time that ray of light reaches the earth? We would have read the entire dictionary through, not once nor twice, but nearly a hundred times! If that nearest star friend of ours should be wiped out of existence today, its light would still be coming toward us, and it would continue to shine in its accustomed place for more than four years to come. Surely we can exclaim in the words of Holy Scripture, "Behold the height of the stars, how high they are!" Job 22:12.

Now our fifth fact: The Bible teaches that the sun, as well as the earth, moves. We read Psalm 19:4-6: In them hath he set a tabernacle for the sun, which is as a bridegroom coming out of his chamber, and rejoices as a strong man to run a race. His going forth is from the end of the heaven, and his circuit unto the ends of it: and there is nothing hid from the heat thereof."

Modern astronomers have discovered that this Bible statement is literally true. The sun, with all the solar system following him, is traveling at a speed of 12 miles a second toward a point in the constellation of Hercules. The mighty sun, so vast that if we were to drive around it in a car at 500 miles a day, it would take us fourteen years, ten months, and two weeks to arrive back at our destination; the sun, with a volume 1,300,000 times greater than the Earth's, on the surface of which the earth would sink like a man in the ocean. As Lord Byron wrote:

"He sinks into thy depths with bubbling groan, Without a grave, unknelled, uncoffined, and unknown."

This sun, rotating eastward on its own orbit once in every 25 days, and throwing out a ceaseless stream of energy to the earth at an average rate of 643,000 horsepower per square mile, is moving.

Remember, our galaxy, or island universe, is called the Milky Way. We look up at night and see the edge of it like an arch of stars above us. It is shaped like a lens. We look out the sides, which are thinner, and do not see so many stars. But the edges naturally are farther away from us, and this gives us the appearance of the Milky Way itself. We are told that this disk of stars has a thickness of the order of 6,000 light-years, and a diameter ten or twelve times as great. It contains 50,000,000,000 stars. The local star cloud to which our sun belongs is at present perhaps 2,000 or 3,000 light-years from the center of the galaxy, revolving around its center at the rate of from 200 to 300 miles a second. This circuit will probably take 50,000,000 years to complete. Such is the interpretation of the scientists. Yes, the sun does move!

You must remember that our sun is a star and, just as other stars are moving, so it is moving apparently in a straight line toward a point in the sky not very far from the bright blue star, Vega, at about the rate of 63,000 feet a second. Every time the clock ticks the solar system is about 12 miles, to Vega. The sun is moving in our galaxy at the rate of about 400,000,000 miles a year.

Our galaxy seems to be almost 100,000 light-years across the wheel, and 15,000 to 20,000 light-years thick, and yet of the 50,000,000,000 stars which it contains, only 6000 may be seen with the unaided eye.

The whole galaxy is turning like a giant pinwheel, so big that it requires almost 200,000,000 years to complete one turn. So the sun does move. Besides this motion, it is going at least 12 miles a second with respect to the other stars in our local cluster. The whole cluster is moving 170 miles a second due to the rotation of the galaxy. This might be likened to a swarm of bees, but don't worry about our crashing into the star toward which we seem to be moving. It is so far away that it takes its light 46 years to reach us, and

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even traveling at the enormous speed mentioned above, we will not reach its neighborhood for at least 1,800,000 years-and beside all that, it is moving too.

This fact of the sun's motion was not believed by astronomers until a little over a hundred years ago. According to them, the sun did not move. By some the Bible was considered to be an unscientific book, but after great labor and the invention of better instruments it was discovered that the old Book was right after all-the sun does move.

Now for our sixth fact: The Bible says that the stars also are in motion. Isaiah 40:26: "Lift up your eyes on high, and behold who bath created these things, that brings out their host by number." That is, they move; they are brought out. And it is done by number; it is a mathematical affair. To study astronomy, men must use mathematics. We are told that the average motion of the stars is 10 miles a second, and that's speed. A person traveling at that rate could go from New York to Chicago in a little more than a minute; from New York to San Francisco in five minutes. Arcturus, the runaway of the heavens, travels 15,420 miles a minute.

Since the invention of the telescope in 1608, it has been more and more evident that the stars are all in motion. The whole universe is in constant, universal, and harmonious motion. The stars move. And surely, friends, the Hand that bears creation up, can guide His children still."

We come now to our seventh fact: The Bible declares that the stars are innumerable. This could not have been determined by visual observation in Bible times, for only about 3,000 stars are visible at any one time. If one could see the entire celestial sphere, rather than that just overhead, he perhaps could count 6,000. There were no telescopes in the days of Abraham as far as we know, nor were there any when Moses wrote the book of Genesis about 1,500 years before Christ's day, yet God speaks as though the task of numbering the stars were not impossible. "And he brought him forth abroad [speaking of Abraham], and said, Look now toward heaven, and tell the stars [that is, number the stars], if thou be able to number them: ... So shall thy seed be." Genesis 15:5.

This great truth revealed in the Bible is only now beginning to be appreciated by modern astronomy. Herschel, who was one of the greatest astronomers of the last century, informs us that with his best glasses he counted 588 stars in a single spot without moving his telescope. Once, while he kept his telescope steadily fixed to one point, there passed over his field of vision 116,000 stars; and another time, in 41 minutes, not less than 258,000. While examining a section of the Milky Way not more than one yard in breadth and six in length, he discovered 50,000 stars large enough to be counted, and he suspected many more. And now it is said that in the Hercules cluster alone, which is 100 light-years in diameter, there are at least 1,000,000 stars. We are told by the astronomers that our own star home, the Milky Way island universe in which we live, is composed of from 40 to 50,000,000,000 blazing suns or stars.

The spectroscope has come to our aid in the counting of the stars and tells us that the extra-galactic nebulae give spectroscopic lines like those of stars. This proves that they are not clouds of atoms, but stars. Think of it-millions and millions and hundreds of millions of stars!

The only one of these island universes that we can see with the naked eye is the Great Nebula of Andromeda, thought first to be merely a fuzzy star, then a great nebula of gaseous material, but now known to be a spiral galaxy of billions of suns. And remember this: just outside its borders are over a hundred other globular clusters, and still beyond there are hundreds of thousands of others within easy reach of our great photographic instruments. With hundreds of thousands of exterior galaxies within photographic reach, we are led to say, "End is there naught to the universe of God." In the power of the great 100-inch telescope on Mount Wilson which reaches out 500,000,000 light-years, there are more than 100,000,000 galaxies of stars, and we have no idea of how many millions or billions of stars or suns there are in each galaxy.

What can we say, then, to these things? They are beyond human comprehension. We begin to learn a little of the greatness of the universe and, through that, just a word of the greatness of our God. All that we now know may be only a corner of the universe. Night after night the great eyepieces are turned heavenward, looking for more truth, searching out the hiding places of God's glory. And the truth begins to dawn upon the startled intelligence of man-the stars of the heavens are innumerable. God formed the heavens. He scattered the depths of space with the glories of uncounted suns and the wonders of attendant planets and satellites. They are beyond the comprehension of man, but God can count them. "He tells the number of the stars; he calls them all by their names." Psalm 147:4.

Yes, billions of stars, yet there is no lack of room in the unfathomed universe, for astronomers have found that, apart from the sun, there is no star within 25,000,000,000,000 miles of us. Each of the stars is a sun, perhaps the center of a magnificent solar system with planets which we cannot see.

Are those other planets inhabited? Are they the "many abiding places" of celestial races untouched

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by heartaches and where tears are unknown? Are these the ninety and nine who never left the fold of the great Creator? Are these those “worlds afar-worlds that thrilled with sorrow at the spectacle of human woe, and rang with songs of gladness at the tidings of a ransomed soul; . . . worlds that share the treasures of knowledge and understanding gained through ages upon ages in contemplation of God’s handiwork”? Someday, “with undimmed vision, we shall gaze upon the glory of creation suns and stars and systems, all in their appointed order, circling the throne of deity.” - The Great Controversy, p. 677.

Does not God declare through the prophet Isaiah that He “stretches out the heavens as a curtain, and spreads them out as a tent to dwell in.” Isaiah 40:22.

Yes, the heavens are telling. What are they telling? They are telling of the glory of God, the power of God, the wisdom of God, the mercy of God. The stars are speaking, the constellations flash signals to our earth, and to those who listen comes this message: “In the beginning was the Word.... and the Word was God. All things were made by him; and without him was not any thing made that was made.” John 1:1, 3. “Who is the image of the invisible God, the firstborn of every creature: For by him were all things created. And he is before all things, and by him all things consist. For it pleased the Father that in him should all fullness dwell.” Colossians 1:15-19.

“A million torches lighted by Thy hand
Wander unwearied through the blue abyss;
They own Thy power, accomplish Thy command,
All gay with life, all eloquent with bliss.
What shall we call them? Piles of crystal light,
A glorious company of golden streams,
Lamps of celestial ether burning bright,
Suns lighting systems with their joyful beams?
But Thou to these art as the noon to night.

“Yes! as a drop of water in the sea,
All this magnificence in Thee is lost.
What are ten thousand worlds compared to Thee?
And what am I then? Heaven’s unnumbered host,
Though multiplied by millions and arrayed
In all the glory of most sublime thought,
Is but an atom in the balance weighed Against
Thy greatness is a cipher brought
Against infinity! What am I then? Naught!

“Naught! But the effluence of Thy light divine,
Pervading worlds, hath reached my bosom, too;
Yes, in my spirit does Thy spirit shine,
As shines the sunbeam in a drop of dew.
Naught! But I live and on hope’s pinions fly
Eager toward Thy presence; for Thee
I live, and breathe, and dwell; aspiring high
Even to the throne of Thy divinity.
I am, O God! And surely Thou must be!”
-Derzhavin

2. Astronomy Reveals God

O worship the King, all glorious above, And gratefully sing His wonderful love; Our shield and defender,
the Ancient of days, Pavilioned in splendor, and girded with praise.

O tell of His might, O sing of His grace, Whose robe is the light; whose canopy space; His chariots of wrath
the deep thunder clouds form, And dark is His path on the wings of the storm.

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The earth, with its store of wonders untold, Almighty, Thy power has founded of old, Hath established it fast by a changeless decree, And round it hath cast, like a mantle, the sea.

Thy bountiful care what tongue can recite? It breathes in the air, it shines in the light; It streams from the hills, it descends to the plain, And sweetly distills in the dew and the rain.

Frail children of dust, and feeble as frail, In Thee do we trust, nor find Thee to fail;
Thy mercies how tender, how firm to the end; Our Maker, Defender, Redeemer, and Friend!

O measureless Might! ineffable Love! While angels delight to hymn Thee above, The humbler creation, though feeble their lays, With true adoration shall lisp to Thy praise.

Robert Grant

As science reveals more and more of the greatness of the universe, so it reveals more and more of the greatness of God, the Creator. The Creator is greater than His creation. The more we learn of the starry universe, the more understandingly can we exclaim, ‘The heavens declare the glory of God; and the firmament shows his hand work.’ Psalm 19:1.

So nearly changeless are the stars that they appear to us almost exactly as they appeared to David as he watched his flocks at night. They look practically the same to us as they did to the Greek philosophers, Hipparchus and Aristotle, to Galileo and to Newton. For the past two thousand years, the stars have been an important factor in the development of science as well as philosophy and religion. The very foundation of science is the orderliness of the universe which was discovered by ancient men as they observed the regularity of the celestial motions.

As we look at the awesome sky, we realize that every new discovery of astronomy extends its incomprehensible vastness. Every time science makes a new discovery, it raises new questions. Every extension of the known has increased the boundary which separates it from the unknown. As the power of modern telescopes increases, we look out into immensity, we view through immeasurable distances incomprehensible spheres in incalculable numbers moving with inimitable precision through illimitable space.

“The world’s greatest debt to astronomy,” says Prof. Simon Newcomb, “is that it has taught us what a great thing creation is, and what an insignificant part of the Creator’s universe is this earth upon which we dwell.”

No wonder the inspired psalmist declared, “His greatness is unsearchable.” Psalm 145:3. The greatness and majesty of the Creator are revealed in the greatness and majesty of His creation. ‘Come and see the works of God,’ is the invitation of Psalm 66:5. This is the invitation of astronomy. “Lift up your eyes on high, and behold who hath created these things, that brings out their host by number: he calls them all by names by the greatness of his might, for that he is strong in power; not one fails.” Isaiah 40:26.

Astronomers have sustained the teaching of the Scripture that the universe is one of universal order. A universe of law leads us to the Lawgiver. While from the very beginning the Holy Scriptures have upheld the truth of the vastness of the universe and its revelation of the power and majesty of God, men have not always known this.

Some ancient philosophers thought that the earth was flat like a great level plain, and that it rested on the back of an elephant which stood on the back of a great tortoise. What that rested on, they did not venture to suggest. Later on some Greek philosophers taught that Atlas, one of the giants who was at war with Zeus, was condemned to support the earth and he is represented as bearing the world on his head, neck, and shoulders. Others believed that the heavens were a vast hollow globe, and that the heavenly bodies were like jewels fastened to it on the inside. Scholars later believed that there were several hollow crystal spheres, one inside the other like the layers of an onion, each carrying heavenly bodies.

Many in ancient times believed that the stars were distant torches. Some thought there were openings of different sizes through these crystal spheres, permitting light to come from the glorious land beyond. Ptolemy, one of the greatest astronomers of ancient times, believed that the earth was the center of a series of concentric spheres which upheld the sun, moon, stars, and planets. This view was held until the Middle Ages. About AD 1500 Copernicus discovered the annual revolution of the earth around the sun. It was not until 1666 that Sir Isaac Newton, at the age of twenty-three, discovered the law of gravitation. In 1683, at 40 years of age, he proved the truth of his calculations and thus founded the basis of modern

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astronomy.

The first telescope was built by Galileo in 1609. It was very small instrument and magnified only about seven diameters, but with it, he discovered the mountains on the moon, the moons of Jupiter, and the spots on the sun. The people of that time could not believe that such things existed, so instead of hailing this invention they persecuted Galileo. They were afraid he would destroy religion, but the fact is that he was upholding it and just discovering some things that had been revealed in the Bible centuries before.

Galileo was opposed not only by theological authorities, but by philosophers and astronomers of that day. Many of them would not look through his telescope as they thought it was the invention of the devil. As a sample of the arguments used against this great pioneer in astronomy, we quote from a dissertation written by Sizzi, one of his enemies: "There are seven windows given to animals in the domicile of the head, through which the air is admitted to the tabernacle of the body to enlighten, to warm, and to nourish it. Which windows are the principal parts of the microcosm, or little world—two nostrils, two ears, two eyes, and one mouth. So in the heavens, as in a macrocosm, or great world, there are two favorable stars, Jupiter and Venus; two luminaries, the Sun and the Moon; two unpropitious, Mars and Saturn; and Mercury alone, an undecided and indifferent. From these, and from many other phenomena of nature, we gather that the number of planets is necessarily seven. Moreover, the satellites are invisible to the naked eye, and therefore can exercise no influence on the earth, and therefore would be useless; and therefore do not exist. Besides, as well, the ancient Jews and the other nations as modern Europeans, have adopted the division of the week into seven days, and have named them from the seven planets. Now, if we increase the number of planets, this whole system falls to the ground." How strange such a statement seems to us today!

Not only did Galileo see the satellites of other planets aside from that of the earth, but we see them today and have counted them. The satellites, or moons, of the various planets of our system that have been discovered up to the present are thirty-two.

And here is a strange statement from Huyghens, an astronomer of three hundred years ago. He said: "The solar system is now completed. It consists of six planets and six moons, and from this equality, and from the fact that they together constitute the perfect number twelve, we infer that no more satellites will be discovered."

We know that the number of satellites is more than twelve, and the number of stars has been discovered to be almost infinite. We are told that a professor in a well-known seminary stated a few years ago that with the stronger telescopes some 50,000,000 stars may be discovered in the whole heavens. Well, since he made that statement, with the aid of stellar photography, at least 300,000,000 stars, or suns, may be seen in the immensity of space. One astronomer who has made a special study of the number of the stars places it at 850,000,000.

The Milky Way system, or galaxy, contains not less than 50,000,000,000 suns, and, according to one writer on astronomy, G. H. Tyndall, it is estimated that the famous island universe of Andromeda contains a billion or so suns, and that in the 30,000,000 to 70,000,000 of such nebulae called "island universes," there are hundreds of millions of suns in each one. He also tells us that some of them are so far away that, if they were blotted out of existence, we on this earth would not know it for at least a billion years. Such statements may be incomprehensible but they still may be true. Such ideas approach infinity so far as our minds are concerned. We are utterly unable to comprehend them. However, they not only give us some idea of the vastness of the universe, but they also give us a faint conception of the greatness of God.

"He made the stars also." we read in Genesis 1:16. Not only did God make the stars, but He can number them, as we read in Psalm 147:4: "He tells the number of the stars; He calls them all by their names." And again, in Isaiah 40:26, we read "For that he is strong in power; not one fails."

As we look out into the midnight heavens through a mighty modern telescope, we are gazing into the immensity of immensities. There, marching by as armies doing honor to their Creator, are millions upon millions of the magnificent array, mighty luminaries running their designated courses through unnumbered years, and proclaiming in their bright millions, "The hand that made us is divine."

When we place the spectroscope to the eyepiece of a great telescope, we stretch out the eye of discovery farther and farther into the boundless voids and behold remote constellations in the regions of immensity and are overcome with the extent and grandeur of God's illimitable universe. Millions upon millions of magnificent stars, glowing nebulae, far star cities on the edges of the unknown, cry out to us, "Great is our Lord, and of great power." Psalm 147:5. His understanding is infinite. "His greatness is unsearchable." Psalm 145:3. "Who is a strong Lord like unto thee? ... Who in the heaven can be compared unto the Lord? who among the sons of the mighty can be likened unto the Lord?" Psalm 89:8, 6.

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Let us look at some of these stars a little more closely. Aside from the planets which circle around our sun, all the stars are vast and glorious suns. To study the heavens and to identify individual stars and constellations, we must know the directions—we must know which way is north. Fortunately for us, we have the North Star conspicuous in the Northern Hemisphere, and the Southern Cross in the Southern Hemisphere. The apparent position of the North Star does not change on account of the rotation of the earth. It is nearly at the point at which the axis of the earth points in the northern sky.

The North Star, or Polaris, is easy to find because it is in line with the two stars known as the pointers, which form part of the bowl of the Big Dipper. It is always above the horizon in northern latitudes and revolves around the pole counterclockwise. The star at the bend of the handle of the Big Dipper is called Mizar and near it is a very faint star, Alcor, which means the test. It is regarded as being very difficult to find, and anyone who could see it had good eyes. With field glasses, it is quite conspicuous.

With the naked eye, Alcor appears to be very near to Mizar' but they are so far apart that through a telescope only one can be seen at a time. The distance between them is 15,000 times the distance from the earth to the sun. Through a good telescope Mizar is seen to be a double star and it was the first such star to be discovered. This took place in 1650, but nearly 250 years later, in 1899, it was discovered that one of these two was itself a double star. Then in 1907, by the use of the spectroscope, it was discovered that the other component of this telescopic pair was also a spectroscopic double. No telescope alone was able to discover this without the aid of the spectroscope. And now it has been discovered that Alcor, the little star, is also a double. So these two stars are really six huge suns, several of them far greater than our own sun in mass and brightness.

Astronomers tell us that these four stars of Mizar and the two of Alcor, and nearly all the-stars of the Big Dipper, are one enormous system of suns which move in parallel lines through the heavens at a speed of 60 miles a second. They are so far from the earth, approximately 450,000,000,000,000 miles, that they apparently stand fixed in the sky.

Another constellation well known and loved is the Pleiades. According to the ancient Greeks, Atlas and Pleione had seven daughters who were transferred into the stars, or seven Pleiades. The ancient Babylonians, called them Many Little Ones. In central Europe they are known as the Hen and Chickens, and by the natives of the South Sea Islands, as the Little Eyes. They are also known as the Spirits of the Slain Brothers of a great Pawnee Indian chief.

But, instead of being the spirits of seven sisters or Indian warriors translated to the sky, the Pleiades are mighty suns from ten to one hundred times brighter than our sun. Instead of being just a little way beyond the clouds, they are over 200 light-years from this earth. Light travels at the rate of more than 186,000 miles a second, and a light-year is the distance that light travels in a year at this terrific speed, or nearly 6,000,000,000,000 miles. So you see that in round numbers the distance of the Pleiades from the earth is 1,300,000,000,000,000 miles. Even the distance across the Pleiades is 10 light-years, or about 600,000 times the distance of the sun from the earth.

Far from the Pleiades is the bright star Aldebaran, which is about 55 light-years from the earth. This glorious star is a mighty sun 60,000 times the volume of our sun and more than 75,000,000,000 times the volume of the earth. It radiates so much heat that if our earth were as near to it as it is to the sun, the temperature on the earth's surface would be above the boiling point of water.

Not far from Aldebaran lies the great constellation of Orion, one of the finest in the whole sky. There are many legends about this beautiful constellation. It was considered to be a mighty hunter with a club in his right hand. There are in Orion two of the most brilliant stars: Rigel, which is white, and ruddy Betelgeuse. It has long been known that these two stars are very remote from the earth, but Betelgeuse is nearer than Rigel, being about 200 light-years away. It is one of the largest stars, 27,000,000 times the volume of our sun with a brightness 1,000 times as great. Rigel is about 500 light-years from us. It is an exceedingly hot white star about 15,000 times as bright as our sun.

Southeast of Orion, almost in line with the three stars in the belt of Orion, is Sirius, the brightest star in the sky. It is very near to us, only a little over 8 light-years away, or about 50,000,000,000,000 miles from our solar system. Its brightness is due to its nearness to us. While Sirius radiates 27 times as much light as the sun, it is less brilliant than Rigel and many other stars.

There is something very interesting about Sirius: More than 200 years ago the great English astronomer, Halley, found that instead of being stationary this star has a slow motion with respect to other stars. A century later, a German astronomer, Bessel, found that Sirius moves in a slightly wavy path, which he was sure was caused by some unknown companion. He was sure that Sirius and this unknown star were revolving around a common center of gravity which moves in it straight line with uniform speed. In 1862

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Clark, a celebrated American telescope maker, discovered this faint companion while he was testing a new telescope. It was found that the distance between the pair was about 700,000,000 miles, or about eight times the distance of the earth from the sun. This companion to Sirius is so small that it can hardly be seen. It is very hot and very heavy, probably 800 times as dense as any substance known on earth—at least, that is the belief of astronomers.

We must not close this chapter without speaking of another star which is especially noticeable in the summer skies. This is Vega, which will be found near the zenith about ten o'clock on midsummer nights. Vega is slowly moving toward the north pole of the heavens and, if time should continue for 12,000 years, would take the place of the pole star.

It is interesting for us to know that our whole solar system, the sun with its planets including the earth, is moving nearly in the direction of Vega at the rate of about 400,000,000 miles it year. But so incomprehensibly remote are the stars that we need not worry about running into Vega, for it is 1,600,000 times as far from our solar system as the earth is from the sun.

The brightest star that we can see in all the sky is our own sun, and what a mystery it is! In spite of all the study that has been given it, it is still a profound mystery. It has been said that the sun sheds enough heat on the earth every day to melt a layer of ice 424 feet thick, and that every day the Sahara Desert receives three times as much energy from the sun as is contained in all the coal that is burned in the whole world in a year.

The sun is about 98,000,000 miles from the earth. An aviator in an airplane traveling at 600 miles an hour without stopping for fuel or sleep, rest or repairs, would take over 17 years to reach the sun. We must remember that the light and heat falling on any body diminishes inversely as the square of the distance from its source. If the sun were only a mile away, its heat would bum everything on the earth as quickly as feathers are consumed in a red-hot furnace. Even the sea would be instantly dried up and all the rocks and minerals melted, and the earth itself transformed into gas.

Authorities disagree on the temperature of the sun. It is believed that the surface temperature is from 10,000 to 12,000 degrees Fahrenheit, which is greater than is necessary to melt any known substance. The heat of the sun's interior may go up to at least 10,000,000 degrees, and probably much higher. This, of course, is only theoretical. If the earth should suddenly fall into the sun, it would last no longer than a snowflake falling from the sky on a hot summer day. Someone claims that a small piece of iron no bigger than a twenty-five cent piece, or a shilling, heated at New York to the estimated temperature of the sun's interior would radiate enough heat to destroy all life as far, away as Chicago, or within a radius of 1,000 miles.

Some scientists declare that the sun is losing by radiation 4,000,000 tons of its own substance every second. One great astronomer states that the sun is pouring out light and heat so fast that it is radiating away its mass at the rate of 133,000,000,000,000 tons a day. At this rate it would take 50,000,000 years for the sun to radiate as much of itself as the mass of the earth. And even at that rate, it would not lose 1 per cent of its own stupendous mass until the lapse of about 150,000,000,000 years. So you see we don't need to worry much about it. In fact, science knows very little about the exact cause of the Sun's heat. We only know that it is a part, of God's tremendous universe. One astronomer says: It is quite likely that things not yet conceived of are taking place two or three hundred thousand miles below the surface of the sun, where the pressures are hundreds of thousands of tons per square inch and where the temperatures are millions of degrees."

For many years the contraction theory of the sun's heat was held by scientists. Now the mass energy theory based on Einstein's views holds the stage. The sun is radiating what amounts to 77,000 horsepower per square yard of its surface. This energy would be enough to melt in one hour a layer of ice 3,300 feet thick over the entire surface of the sun. The earth, on the average, receives energy from the sun at the rate of 643,000 horsepower per square mile, or 127,000,000,000,000 horsepower for its entire surface. Since the population of the earth is not more than 2,000,000,000, it receives energy from the sun at the rate of about 63,000 horsepower for every person living on the earth.

Think of the fiery storms on the surface of the sun, from which the light and heat come to this earth to give us vegetation and sunny days. When the astronomer turns his telescope toward the sun, he sees titanic forces at war. Great fire clouds shoot up from its surface in masses sometimes 1,000 times as great as the whole earth. In one of his beautiful poems, Alfred Noyes personifies the sun as speaking to his attending planets and referring to the fiery storms from which light and life flow out to them. We quote it here:

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“Light, on the far faint planets that attend me!
Light! But for me-the fury and the fire.
My white-hot maelstroms, the red storms that rend me
Can yield them still the harvest they desire.

“I kiss with light, their sun ward-lifted faces.
With dew-drenched flowers I crown their dusky brows.
They praise me, lightly, from their pleasant places.
Their birds applaud me, lightly, from their boughs,

“And men, on lute and lyre, have breathed their Pleasure,
They have watched Apollo’s golden chariot roll;
Hymned his bright wheels, but never mine that measure
A million leagues of flame from Pole to Pole.

“Like harbor-lights the stars grow wide before me,
I draw my worlds ten thousand leagues a day.
Their far blue seas like April eyes adore me.
They follow, dreaming, on my soundless way.

And so the sun goes flaming on through the sky, drawing with him his family of planets, dragging his great load of rolling spheres, asteroids, and meteors along his journey toward the star Vega as if he were hauling a heavily loaded trailer over 4,000,000,000 miles long. Yet Dr. C. H. Tyndall tells us that he is sweeping through the sky with this majestic procession over 18 times as fast as a rifle bullet goes.

And just think of it, back in the days of Galileo all the great scholars, scientists, and theologians declared that the sun was not moving. However, the Holy Scriptures reveal that the sun does move. That fact was there for them to read, but for some reason they ignored it. We find it here in the nineteenth psalm. “The heavens declare the glory of God; and the firmament shows his handy work. Day unto day utters speech, and night unto night shows knowledge. There is no speech nor language, where their voice is not heard. Their line is gone out through all the Earth, and their words to the end of the world. In them bath he set a tabernacle for the sun, which is as a bridegroom coming out of his chamber, and rejoices as a strong man to run a race. His going forth is from the end of the heaven, and his circuit unto the ends of it: and there is nothing hid from the heat thereof.” Verses 1-6.

This is a plain statement that the sun is running a race and that it follows a great circle or orbit. The earth itself is swinging us from west to east, at over a thousand miles an hour, yet traveling at this great speed, we feel no jar and have no sense of speed. The speed of the earth is exceeded by the speed of the sun rushing over his great orbit, the extent of which is said to be 9,000,000,000 miles in diameter. What holds the sun with his family of planets in this great orbit? All other heavenly bodies also are sweeping through the sky at terrific speeds. Why do they not fly out in all directions?

A mysterious force called gravitation reaches out about 93,000,000 miles from the sun like a mysterious and gigantic arm and holds the earth steady in its orbit. Its pull on the earth is equal to four quintillion tons and is as powerful as if each square foot of the Earth’s surface were covered and held by a steel cable 11 inches in diameter.

As great as this force is which holds the earth and all the worlds of our solar system as they sweep by in their orbits, how much greater must be the force which holds the sun on its vast incomprehensible journey through the heavens at such inconceivable speed! And how immeasurably greater still is that power which holds in its silent and invisible grasp all the millions of millions of suns of the entire universe of God! All we can say is that behind and above them all is the Creator, the Mighty One who says, “Thus far and no farther.”

Science has not yet declared a knowledge of gravitation. It is still a matter of discussion and of mystery. Modern astronomy simply tells us that the stars “are bound to one another by the invisible bonds of gravitation, the nature of which is quite unknown. Although it cannot be seen, its existence can be established even more readily and certainly than the existence of light, for at least some of its effects accumulate indefinitely.”

It is the power by which “all things consist,” or hold together. This power as revealed in the Holy Word of God is the power of God in Christ as Creator, “who is the image of the invisible God, the firstborn

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of every creature. For by him were all things created, that are in heaven, and that are in earth, visible and invisible, whether they be thrones, or dominions, or principalities, or powers: all things were created by him, and for him: and he is before all things, and by Him all things consist.” Colossians 1: 15-17.

The Unknown Power

“This unknown power we may not touch or see This thing impossible yet known to be, This master of the atoms and the sun, This servant of Thyself, this hand of Thee.

Shall we deny because to us unknown The mystery of the universe alone, Mere candles flickering in the night of time, Deny to Thee the power that is Your own?

It is Your, O God, to hold the worlds in thrall, Nor may the stars in their bright mansions fall. Your hand sustains them still; about Thy throne The constellations circle one and all.”

-H. M. S. R.

3. Consider the Heavens

WHEN I consider thy heavens, the work of thy fingers, the moon and the stars, which thou has ordained; what is man, that thou art mindful of him? and the son of man, that thou visits him?” Psalm 8:3,4.

So, let us consider the heavens. Many who live in great cities have never really seen the stars. There the lights of heaven are obscured by the artificial lights and smog of earth. One who has never had the soul-enlarging experience of solitude beneath the sparkling stars of a cloudless sky has missed one of the most sublime experiences of life. If the stars were visible only one night in every hundred years, think how people would watch for it, long for it, plan for it, and how millions would be gazing at God’s handiwork on that one night!

Many philosophers, scientists, and great thinkers aside from religious teachers have expressed the thought found in the Holy Scriptures: “The heavens declare the glory of God; and the firmament shows his handy work. Day unto day utters speech, and night unto night shows knowledge.” Psalm 19:1, 2.

One of the great truths which impress us most as we consider the heavens is the orderliness of the universe. And this is the very foundation of all science. For instance, the North Star, Polaris, for ages has been the universal beacon in the sky, guiding mariners over the trackless sea as they have explored into unknown regions. Its apparent position does not change much during the year because it is very remote. Polaris is found nearly at the point at which the axis of the earth, if prolonged, would intersect the northern sky. The Big Dipper, or Great Bear, circles it like the hands of a huge clock. In regard to its fixity, Shakespeare makes Caesar say:

“But I am constant as the northern star, Of whose true-fix’d and resting quality There is no fellow in the firmament. The skies are painted with unnumbered sparks; They are all fire and every one does shine, But there’s but one in all does hold his place.”

As we consider the heavens, we look next at the Pleiades, often called the “Seven Sisters.” A good telescope will show not seven, but 100 stars, all mighty suns from 10 to 100 times as bright as our sun. The Pleiades are so far away that it takes 220 years for their light to reach us, traveling over 186,000 miles a second.

Now, friends, notice these amazing astronomical questions asked in Job 38:31-33: “Can thou bind the sweet influences [or as the American Revised Version says, “the cluster”] of Pleiades, or loose the bands of Orion? Can thou bring forth Mazzaroth in his season? or can thou guide Areturus with his sons? Know thou the ordinances of heaven? can thou set the dominion thereof in the earth?”

Three thousand years ago or more God asked Job if he could do what God was doing every day, or if he knew what God was doing to “bind the sweet influences of Pleiades,” or “the cluster of the Pleiades.” thus holding them together as a unit. This was an astronomical fact which no one on earth could know at that time, unless it was revealed to him by God.

What does science say today? While most of the constellations are gradually drifting through space in different directions, and even changing their shape because of motions of which we know little, this is not true of the Pleiades. Photographs now reveal 250 blazing suns in this cluster, all traveling together in a common direction, “all sharing in a common motion and drifting through space in the same

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direction,” according to Isabel Lewis of the United States Naval Observatory. In another place this same writer speaks of them as journeying onward together through the immensity of space.”

Dr. Robert J. Trumple of Lick Observatory has made the statement that on the basis of over 25,000 individual measurements of the Pleiades, which cost millions of dollars in equipment and the time of the astronomers in computing the distances and speeds, it is now clear that the Pleiades “May be compared to a swarm of birds, flying together to a distant goal. This leaves no doubt that the Pleiades are not a temporary or accidental agglomeration of stars, but a system in which the stars are bound together by a close kinship.”

So, when you look up at the Pleiades tonight, just remember that they are preaching a mighty sermon. They are pointing to the Creator of the universe, who is able to “bind the sweet influences of Pleiades” and keep them together through unimaginable ages, moving toward one common goal, or around one great center.

Notice another question in Job 38:32: “Can thou guide Arcturus with his sons?” This is very significant. Did you know that Arcturus is the runaway star of the universe? It is rushing through the most densely populated part of the Milky Way system at the speed of 257 miles a second, or almost 1,000,000 miles an hour. In his book, *Curiosities of the Skies*, Carrett P. Serviss states: “Arcturus, one of the greatest suns in the universe, is a runaway whose speed of flight is 257 miles a second. Arcturus, we have every reason to believe, possesses thousands of times the mass of our sun.” Think of it! Our sun is traveling only 12 miles a second, while Arcturus is traveling 257 miles a second. Serviss says further: “Think then of the prodigious momentum this motion implies!” A bullet from a great 16-inch cannon travels 25 miles a minute, but Arcturus travels 15,420 miles a minute.

Charles Burckhalter of the Chabot Observatory says that Arcturus must be an outside visitor, a star from outside our galaxy, a real runaway. He adds that Isaac Newton gives the velocity of a star under control as not more than 25 miles a second, but Arcturus is going 257 miles a second.

When you go out under the open heavens tonight, look for Arcturus. The two stars at the end of the handle of the Big Dipper point almost directly at this runaway, the only bright star in that part of the heavens. The distance from Arcturus to the end of the handle is about the same as the distance from that point to the North Star.

By the way, do you remember that in 1933 the lights of the Chicago Century of Progress Exposition were turned on by a ray of light that had left Arcturus when the gates of Chicago’s previous world’s fair were locked in 1893? That ray of light had traveled for 40 years and arrived at Yerkes Observatory just in time to go into the barrel of the great 40 inch telescope and pass on through the photoelectric cells and set energy in motion that pulled the switch and floodlighted the 1933 world’s fair. When you look at Arcturus, remember that it is one of God’s creatures. “Can thou guide Arcturus with his sons?”

We can get some idea of the size of Arcturus when we realize that the moon makes a circle about the earth at a distance of 240,000 miles. If it were possible to place the earth in the center of the sun, with the moon at the same distance from the earth as now, both the earth and the moon would be hidden entirely within the ball of the sun. And, great as our sun is, it is only a pigmy compared with Arcturus, because we would have to multiply its size 1,000 times to make a ball big enough to match Arcturus.

So we respond to the challenge of the Almighty, “No, we cannot guide Arcturus and his sons.” It is not within the power of any of us to guide the stars in their majestic march through the heavens, but the Lord can and does guide them. “For that he is strong in power, not one is lacking!” Isaiah 40:26 (A. R. V.) And remember this: “The hand that bears creation up. Can guide His children still.”

There is another question asked by God in Job 38:81: “Can thou . . . loose the bands of Orion?”

In his book, *Other Worlds Than Ours*, Richard A. Proctor’ astronomer and author, says: “The middle star in the belt of Orion is involved in a nebula. [Something that looks like a vast cloud.] ... As a mighty band this nebulous region seems to gather the stars here into close association, showing us, in a way there is no misinterpreting, that these stars and the nebula form one system.”

And in Howe’s *Descriptive Astronomy* (page 237) we read that “the stars in Orion, with the notable exception of Betelgeuse, have a special variety of spectrum scarcely found outside of that constellation. This indicates that these stars have a similar structure; probably they are chips off the same block.”

In his book, *The Starry Realms* (page 265), Sir Robert S. Ball says: “Orion, the finest constellation in the heavens, is not a mere fortuitous concourse of stars, but a system possessing indications of a common origin!”

No man could group together such a community of stars as the Pleiades, neither could he tear

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asunder such a cluster as Orion. What could he do against even one of these rolling suns, burning through the midnight sky? Can we not trust God? Can we not believe in Him? Can we not trust the Holy Word of this eternal God “which makes, Arcturus, Orion, and Pleiades, and the chambers of the south; which does great things past finding out; yea, and wonders without number?” Job 9:9, 10.

And there are other things about Orion which are very interesting to Bible students. There are the two mighty stars, white Rigel and ruddy Betelgeuse, the latter being one of the largest stars. Its volume is 27,000,000 times that of the sun, and it is 1,000 times brighter. About half way between them is a row of three stars, about as bright as the North Star, forming the Belt of Orion. Hanging down from this belt is a line of three fainter stars known as the Sword of Orion. On close examination the middle star of these three appears to be a little fuzzy, as though it were seen through a mist. When we view it through a large telescope, we discover the great Orion nebula. Our imagination can give no hint of its reality, for its diameter is 600,000 times the distance from the earth to the sun. Of this misty star, which we know to be a mighty nebula, Tennyson wrote: “A single mystery star, which is the second in a line of stars that seem a sword beneath a belt of three. I never gazed upon it but I dreamt of some vast charm concluded in that star to make fame nothing.”

And now a photographic study of the Orion nebula has shown that this great flaming cloud of stars and cloudy mystery in the Sword of Orion seems to contain the mouth of a cavern, a deep opening, receding into mighty distances beyond. Astronomers tell us that the opening of this shining cave is at least 15 minutes wide. What does this astronomical language mean in miles? Since one minute of this inconceivable distance is 1,116,000,000,000 miles, multiplied by 15 (the opening in Orion being 15 minutes of an arc wide), it would equal 16,740,000,000,000 miles. This is the enormous width of the colossal cavern. Some say it is 19,000,000,000,000 miles wide and 51,000,000,000,000 miles deep. Ninety thousand little rings of the dimension of the Earth’s orbit, placed side by side, would be engulfed in it. This is the famous open space in Orion.

Some have thought that this jeweled immensity, this mammoth cave of supernal splendor, might be the opening to a more glorious region. Even Huyghens, the discoverer of this awesome glory, was already of the opinion that in viewing it he saw, as it were, through an opening into a region of light. Sime, the author of William Herschel and His Work, speaks of this magnificent pageantry of the skies. He says that God, the Creator, “the Maker, Governor, and Upholder of all these worlds and universes is one and the same. Who He is, what is His central seat of power, no telescope, no glass prism, can reveal, Amid the wonders of infinite space and time, our standards of measurement and knowledge may be said to be our five senses. And if one of these, sight, were taken from us, our sphere of knowledge would be immeasurably reduced in extent. On the other hand, in addition to the senses we have, a quickening of the inner light might reveal this Builder of worlds, His palace, His living armies, with a distinctness, a fullness, hitherto unknown. Hersehel evidently thought this when, he stood in wondering awe before the hole in the heavens.”

Through this vast cavern of crystal light, of glittering splendor, beyond those glowing Herculean walls of ivory and pearl, studded with millions upon millions of diamond points, shining stars, burning suns-yes, beyond-could it not be that there is indeed some vast mystery concealed in that part of the heavens to make fame nothing? Could it not be that that Holy City of God, that “city never built with hands, nor hoary with the years of time,” that city of life eternal, is just beyond?

Ah, friends, let us consider the heavens, for when we do so, we are looking at God’s signature. Across the starry expanse of the midnight sky is written in fadeless glory the one word, GOD.

“The spacious firmament on high,
With all the blue, ethereal sky,
And spangled heavens, a shining frame,
Their great Original proclaim.”
Joseph Addison

The heavens are telling the one supreme fact, God is. Surely the constellation of Orion is one of the mightiest of Cod’s pulpits in the universe, night after night saying to every thinking mind: “Seek him that makes the seven stars and Orion, and turns the shadow of death into the morning, and makes the day dark with night. That calls for the waters of the sea, and pours them out upon the face of the earth. The Lord is his name.” Amos 5: 8.

4. The Earth Is Speaking

IN THE BEGINNING God created the heaven and the earth. Genesis 1:1. These are the first words in the Bible, the world's Wonder Book. No one can go back of the beginning -no one except God. In the beginning God made the heaven and the earth.

Some men deny the words of Holy Scripture. They seem to want to believe that the world made itself. But this is con" to all that we know of science. Every effect must have an adequate cause, so of this we read, In the beginning God." God is both Creator and Revealer as we read in Isaiah 45:18, 19: "Thus said the Lord that created the heavens; God himself that formed the earth and made it; ... I the Lord speak righteousness, I declare things that are right."

God creates, and God speaks. Thus His creation and nature reveal Him; and His speech, the Bible, is His Word. So we have God's two books, nature and the Bible; and they agree because they have the same author. There can be no antagonism between true science and the Scripture. The Bible is astronomically correct when it speaks of God's creation of the earth and of the heavens.

Many ancient astronomers and scientists had strange ideas about the earth. Some taught that the earth was the shape of a table. It is said that Leucippus thought it was like a drum; Pindar, that it stood on pillars. Others said it rested on the head of a giant called Atlas, while still others believed it was upheld by a huge elephant which, in turn, stood upon an enormous tortoise.

For more than a thousand years the popular scientists taught that the earth was flat and that it was the center of the universe. This was called the Ptolemaic system, after Ptolemy, the ancient Greek scientist, and this theory was taught by all the great scholars and professors of the colleges and universities of the day. It is hard to believe, but we are told that as late as 180 or 190 years ago, this system of astronomy was taught in the universities. So, for more than a thousand years the so-called science of the best thinkers was wrong, and the Bible was right all the time.

It was the general idea at that time that the earth was the center of everything and that the sun and all the planets moved around it. However, several hundred years before Christ, Plato, one of the great Greek philosophers, had dared to say out loud that the earth moves. But his greatest pupil, Aristotle, went back to the old idea, and it wasn't until the year AD 1500 that Copernicus discovered the annual revolution of the earth around the sun.

It seems that there have always been a few at least who realized that the earth is round, but the millions did not believe it. Now we know that the earth is not only round, but a sphere, and we know also that it is turning rapidly upon its axis and flying swiftly through the endless heavens as it describes an elliptical orbit about the sun.

But hundreds, yes thousands, of years ago the Holy Scriptures declared this same truth. Isaiah 40:22 speaks of God "that sits upon the circle of the earth," or, as another translation puts it, It is he that sits upon the globe of the earth." "He sits upon the sphere of the earth." Or, as the American Revised Version puts it, "above the circle of the earth," or above the sphere of the earth. So we see that the Scriptures declare that God sits above the circle, sphere, or globe of the earth.

It is true that men might have considered the earth as a globe, but they could not conceive of its having no visible, physical support. This idea was beyond their comprehension. Knowing nothing about the power of gravitation, they thought that the earth must have some solid foundation-pillars, rocks, a turtle, an elephant-something to rest upon. Just put yourself in the place of the men of those days and think of what a revolutionary idea it must have been when it was suddenly discovered that the earth is rotating on its axis at the rate of 1,000 miles an hour and shooting onward at the far more rapid, almost frightful speed of over 1,100 miles a minute, with nothing above it, around it, or under it to support it.

Here is what the Scriptures said about three thousand years ago: "He stretches out the north over the empty place, and hangs the earth upon nothing." Job 26:7. That is all the earth could hang upon-no thing.

And now the astronomers of the Carnegie Institute at Mount Wilson Observatory, in California, tell us that the earth spins in five motions through space, whirling along at a speed of 18 miles a second, playing hide-and-peek with the stars. Not only does it turn on its axis and race around its giant orbit of hundreds of millions of miles, but it also has a motion as an attendant of the sun, as that great star moves among the other stars at 12 miles a second. Other motions are on a grander scale, for the sun and its

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neighbors move in colossal orbits about the center of our galaxy, or the Milky Way star system, at the speed of about 200 miles a second.

So you see we humans are moving through space by a complication of motions, consisting of those about the earth's axis and orbit, with the sun among the stars, with the sun about the galaxy, to say nothing of what may be the movement of the galaxy as a whole. We do not need to worry about getting around this great circle of the Milky Way too soon, for the scientists estimate that the sun, with our earth as a member of its system, requires 240,000,000 years, even traveling at the high rate of about 200 miles a second, to complete its circular journey about the vast center.

What holds the earth on its orbit? What mighty power keeps it on its unseen highway amid the stars? We have the answer in Hebrews 1:1-3, where we read that God appointed Christ as "heir of all things, by whom also he made the worlds; who being the brightness of his glory, and the express image of his person, and upholding all things by the word of his power." There is the secret. All things are upheld by the word of His power. Scientists call this power "gravitation," but no man on earth knows what gravitation is. Sir Isaac Newton, a devout believer in the Bible and one of the worlds greatest pioneer scientists, discovered the power of gravitation in 1666, and in 1683 proved the truth of his former calculations. It is said that he was overcome by emotion as he beheld the mighty unfolding of this law of the universe of God. Alexander Pope wrote of him:

"Nature and nature's law Lay hid in night:
God said, Let Newton bet And all was light."

Announced by Newton, the law of gravitation is that "every particle of matter in the universe attracts every other particle of matter with a force directly proportional to its mass and inversely proportional to the square of the distance." The law of gravitation is merely a description of how this mysterious power works.

Dr. Josiah Parsons Cooke, Erving professor of chemistry and mineralogy in Harvard University, says: In regard to the law of gravitation we know a great deal; but in regard to the force of gravitation-whatever we may think or believe about it-we know absolutely nothing, and the same is true of every other force."

The speed of light, which is more than 186,000 miles a second, is so great that it makes all other velocities seem as nothing when compared with it. But it has been taught by some men of science that the rapidity with which gravity acts makes light seem motionless when compared with it. Surely it is not unscientific to believe that the perfect speed of the heavenly bodies, and gravitation itself, reveal the fact that the Creator of all things "hath measured the waters in the hollow of his hand, and meted out heaven with the span, and comprehended the dust of the earth in a measure, and weighed the mountains in scales, and the hills in a balance." Isaiah 40:12.

This mighty power which holds the universe together and in action is revealed in Colossians 1: 16, 17: "By Him [Christ] were all things created, . . . And he is before all things, and by him all things consist [or hang together]." Science can go no further than that today.

And here is another text in the book of Job which reveals the knowledge of some scientific effects of light unknown by the world in general at the time it was written. Listen to these words: It is turned as clay to the seal; and they stand as a garment." Job 38:14. What a picture this is of the earth turning around to receive the light of the sun! The writer reversed the usual order here, for usually the seal is turned on the clay. But notice that the Scripture says, "It [the earth] is turned [or rolled] as clay to the seal." We know that the sun does act upon the earth much as the seal acts upon the clay. Where the sunlight rests, the earth responds to its touch.

Notice the last part of this verse, "And they stand as a garment." The American Revised Version puts it, "And all things stand forth as a garment." What a wonderful meaning that gives! The earth is lightened every morning. Vegetation comes forth as the result of the sunshine, and stands forth as a garment over the earth. Should the sun's rays be cut off for one month, everything on the earth would die, all life on its surface would cease, civilization would be solidified in universal frost. The power that streams to the earth from the sun is another manifestation of God's providence.

Yes, the earth is turned toward the light. Not merely does it turn, but it is turned. By what power is it turned? Rather, by whose power is it turned? In the words of another, we may say: "It is not by inherent power that year by year the earth yields its bounties, and continues its march around the sun. The hand of the Infinite One is perpetually at work guiding this planet. It is God's power continually exercised that

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keeps the earth in position in its rotations.”-The Ministry of Healing, p. 416.

For ever, O Lord, thy word is settled in heaven. Thy faithfulness is unto all generations. Thou has established the earth, and it abides. They continue this day according to your ordinances. For all are thy servants.” Psalm 119:89-91.

“O give thanks unto the Lord; ... to him that stretched out the earth above the waters: for his mercy endures for ever.” Psalm 148:3, 6.

“Praise you him, sun and moon. Praise him, all you stars of light. Praise him, you heavens of heavens.... Let them praise the name of the Lord for he commanded, and they were created. He hath also established them for ever and ever: he hath made a decree which shall not pass.” Psalm 148:3-6.

The earth is filled with marvels, from the tiniest atom to its vast globe. No wonder we read in the Holy Scripture, “Speak to the earth, and it shall teach thee.” Job 12:8. If we listen, we shall indeed hear the wonderful teaching of this wonderful floating world of ours, floating in space by the power of God, as it flies through space at about 18.50 miles a second, over 1,100 miles a minute, around its great oval shaped orbit of about 590,000,000 miles.

The Bible says that there is a universal power holding up all things, and holding together all things in the universe, for in Hebrews 1:3 we read that God is “upholding all things by the word of his power.”

And now come the revelations of nuclear science, the laws not only of light and gravity, but of electromagnetic energy. The mysteries of the atom, of the electron, proton, and neutron seem to indicate that matter itself is a form of energy. Then we read the words of Hebrews 11:3: “Through faith we understand that the worlds were framed by the word of God, so that things which are seen were not made of things which do appear.” In Romans 1:20, the apostle Paul wrote: “For the invisible things of him from the creation of the world are clearly seen, being understood by the things that are made, even his eternal power and Godhead.” God started with nothing but His power, His purpose, and His plan. And by His word He still sustains the universe.

There is a very remarkable statement made in an article entitled “Remarks on the Evolution of the Expanding Universe” and published in the April 1, 1949, issue of the Physical Review. The authors are Ralph A. Alpher and Robert C. Herman of the Applied Physics Laboratory of Johns Hopkins University at Silver Spring, Maryland. This article is highly technical and mathematical, but within the text there is presented an hypothesis, backed up by their calculations, that all the original atoms of material in the original creation came into being in the amazingly short period of time of approximately 10,000 seconds. That’s just a little less than three hours. This statement by modern science approximates the statement of the Scripture that “in the beginning God created the heaven and the earth.”

The prophet Isaiah describes the mighty power of God in these words: “Who hath measured the waters in the hollow of his hand, and meted out heaven with the span, and comprehended the dust of the earth in a measure, and weighed the mountains in scales, and the hills in a balance.” Isaiah 40:12. All this, of course, is not merely with particular thought of actual weights and measurements, but to assure us that God is able to save the sinner and bear the burdens of those who trust in Him.

But now, after careful computation, the United States Bureau of Standards in Washington, DC, announces the actual weight of the earth as 6,592,000,000,000,000,000 tons. In other words, they tell us that the earth weighs 6,592 million, million, million tons. The earth is about as heavy as if it were made of solid steel, yet it floats around the sun as lightly as thistle down, and is always on time. This is possible only by the infinite power of God. Human thought cannot conceive of such power, but we know that it is there, for we see it working all about us.

Surely the God who holds up the earth can take care of us. “He gives power to the faint; and to them that have no might he increases strength. They that wait upon the Lord shall renew their strength; they shall mount up with wings as eagles; they shall run, and not be weary; and they shall walk, and not faint!” Isaiah 40:29,31.

Now let us come a little nearer home, to the surface of the earth itself. Think of the terrific centrifugal force of the earth, which whirls around its axis at 1,000 miles an hour, and yet the things on its surface do not fly off into space. The mysterious power of gravitation holds everything to the Earth’s surface. Even the atmosphere is held to the earth by gravitation. That means that the atmosphere has weight.

In Genesis 1:7, the atmosphere, or air, is called the “firmament,” the word meaning expansion. This is a perfect name for the atmosphere, the expansion and contraction of which bring us our various forms of weather and produce many other effects upon the earth itself.

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During the Middle Ages scholars occasionally, discussed the possibility that the air might have weight, but always decided in the negative. All experience and sensation seemed opposed to the idea that the air could have weight, yet men everywhere were using their crude devices for raising water in pumps without any idea of what they were doing. They did not realize that it was the weight of the atmosphere upon the surface of the water in the well that forced the water up behind the pump plunger to the height of 32 feet and no more. They tried to explain it by the strange statement that “nature abhors a vacuum,” but Galileo reminded them that it was strange that nature did not abhor a vacuum above 32 feet

An experiment was made of weighing a bladder when empty and also when distended with air, and noting the difference. The fallacy of this experiment was not evident to the men who made it. They seemed to forget the fact that the bladder was immersed in the same fluid with which it was filled, and that we are living at the bottom of a great sea of air. This experiment would be the same as trying to weigh a vessel under water both empty and filled with water. Both Copernicus who discovered that the sun is the center of our solar system, and Galileo who proclaimed that the earth itself is moving, died without knowledge on this subject.

An attempt was made to raise water from a deep well in Florence, Italy, but it was found that no suction pump would raise it higher than 32 feet. Galileo noticed this and recommended that the subject be investigated further by his pupil and successor, Torricelli. The young scientist thought long on this subject and finally decided that the atmosphere must have weight, and that it must be by its pressure that the water was caused to rise in the pump barrel. He decided to use mercury in his experiment, this substance being over thirteen times heavier than water. If atmospheric pressure existed, it would cause the mercury to rise about 30 inches in a glass tube.

We can just imagine the feelings of this philosopher as he made his experiment, which is remarkable for its simplicity and also for its importance. We can see him filling a glass tube about four feet long with mercury, sealing it at one end placing his finger over the open end, inverting the tube, plunging it into a vessel half filled with mercury, and then removing his finger. What were his emotions when he saw the column of mercury fall and, after completing oscillations caused by momentum, stand at a height between 29 and 30 inches!

This was one of the world’s great discoveries. It was a radical discovery, and from it has sprung an endless series of discoveries and inventions. And yet, if men had only believed the Bible in the first place, they would have known that the air has weight. Here is what we read in Job 28:23-25, a statement written over 1,500 years before Christ: “God understands the way thereof, and he knows the place thereof. For he looks to the ends of the earth, and sees under the whole heaven; to make the weight for the winds; and he weighs the waters by measure.” The winds do have weight -over 5,000 millions of millions of tons, in round numbers; or more exactly, as one authority puts it, 5,517,823,961,408,000 tons.

The winds not only have weight but, because of the rotation of the earth and for other reasons, follow vast circuits around the earth. Notice these words in Ecclesiastes 1:6, written nearly a thousand years before Christ: “The wind goes toward the south, and turns about unto the north; it whirls about continually, and the wind returns again according to his circuits.”

Because of the heat in the equatorial regions, the air continues to rise and flow northward. It descends to the earth as it is cooled and then flows southward again. But the rotation of the earth causes this continual flow of air to be deflected toward the east or the west, depending upon whether the phenomenon takes place in the Northern or Southern Hemisphere, and upon various other factors. And so these great circular air movements form and move around the earth from west to east, bringing continually changing weather.

Notice also the scientific fact regarding the circulation of water over the earth. In Ecclesiastes 1:7 we read: “All the rivers run into the sea; yet the sea is not full; unto the place from whence the rivers come, thither they return again.” This is a clear statement that the water of the ocean returns to the land and flows again from the rivers into the sea. This circulation of water makes life possible on the earth.

Why should we not have faith and confidence in the God who has arranged all these things for the benefit of mankind and has revealed them, not only in the book of nature, but in His Book of divine revelation?

And here is something interesting about the windows of light. In Psalm 65:8 we read these words referring to God: “Thou makes the outgoing of the morning and evening to rejoice.” The literal translation is to sing. Thus the writer by inspiration declares that light is vocal. The word “outgoing” has been translated radiation. For several years scientists have been talking about the possibility of hearing light. We have seen many statements to the effect that light is musical, and instruments have been invented to

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demonstrate that light vibrations may be transformed into waves that can be heard. Some time ago a certain scientist announced that he had been able to hear the sound of starlight. A newspaper report declares: "The beams of Venus were picked up from the eyepiece of a telescope by a photoelectric cell, amplified into a microphone, and broadcast over a radio network. The sound resembled that of a sustained high note from a violin."

So, in many and marvelous ways, our earth is teaching us. It is speaking to everyone who is willing to listen. Every day, every minute, every second, it declares, "I am the handiwork of God!"

5. Our Home Town

GREAT and marvelous are thy works, Lord God Almighty. Revelation 15:3. We see the great works of God in our own home town-astronomically speaking, our own stellar system. As Milton in his Paradise Lost declared:

"These are Thy glorious works, Parent of good, Almighty,
Your this universal frame, Thus wondrous fair."

Our home town star city is called our galaxy, or Milky Way system. Full agreement is lacking regarding the number of stars in our galaxy, but it is now generally believed that this number is about 50,000,000,000 and also that not more than 1 per cent of the stars in our Milky Way system are within range of our present telescopes. It is believed, too, that 100,000,000 of these stars are equal to our sun in brightness. In the observation of our astronomers, it is concluded that the number of the stars may indeed be infinite when we consider the whole heavens. They occupy infinite space but not uniformly. This is true of our home town in the heavens. The stars are not spaced uniformly nor are they uniform in size and brightness.

Our star city is shaped much like a lens-thick in the middle and thinning out toward the edges. Our sun with his attending planets is in a small cloud of stars, not in the exact center of this lens, but a little to one side. As the lens of stars is shaped much like a great wheel, as we look out toward the edge or rim of the wheel, naturally there are more stars. This is the explanation of the Milky Way which we see sweeping across the heavens on a clear night. We are looking toward the edge of the wheel. The sides of the wheel, not being so thick, do not contain so many stars.

It is believed that the center of our Milky Way system is in the direction of Sagittarius and that the solar system is somewhat north of its central plane. There are many other star clouds in our star galaxy. We are told that the solar system is at present about 300 light-years from the center of our local star cloud. Astronomers have been able to measure the distance from the earth to the moon by determining the difference in its direction from two points on the earth. From this apparent displacement and the known distance between the two observatories, the distance of the moon from the earth can be determined by easy mathematics. But most stars are so far away that astronomers; cannot find positions far enough apart on the earth to make their measurements, so they take an observation from one point on the orbit of the earth, then wait six months and take another observation. Thus their base line, instead of being a few thousand miles long, is one of 100,000,000 miles or more. But even with this long base line, it is impossible to measure with accuracy the distance of more than 200 stars. However, with refined photographic processes and modem methods, the distance of some galaxies still farther away, including the star clouds of our own galaxy and others a thousand times as far away, can be discovered quite accurately.

If a star is within 13 light-years-that is, 76,000,000,000,000 miles-of the sun, its distance can be measured by direct methods with an error not exceeding 10 per cent. With increasing distance the percentage of possible error increases until at a distance of 100 light-years, direct methods are quite uncertain. There are 23 known stars, including our own sun, within 13 light-years of the earth and a few others within this approximate limit.

If this is about the density of the stars in space, and if they are uniformly distributed, which of course we are not sure, then we can know something about the number of the stars in our own galaxy. Assuming that the equatorial diameter of the Milky Way system is 20,000 light-years, its polar diameter 7,000 light-years, and the average distance between its stars is 8 light-years, we find that it contains

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between 43 and 50,000,000,000 stars. Remember, these are all blazing suns, and each one may have accompanying planets.

Our galaxy is shaped similarly to thousands of other known galaxies. It is an irregular and loose assemblage of huge star clouds in lesser swarms. The local star cloud to which our sun belongs is at present 2,000 or 3,000 light-years from the center of the galaxy, and is revolving around its center at the rate of from 200 to 300 miles a second. So we see that the sun does move.

Our galaxy contains all the celestial objects—planets, planetoids, suns, moons, stars, comets, meteors, open star clusters, and nebulae except the globular clusters and the spiral nebulae. We should not confuse our star cluster, our home town, with our universe because we can see outside nebulae, or exterior star cities, which do not belong to our system—for instance, outside our galaxy the two Magellanic Clouds, over 90 globe shaped clusters of stars, and all the spiral nebulae. Our home town in the heavens includes the sun and all the stars that we can see with the naked eye. What lies beyond the Milky Way? What lies beyond our home town? Other home towns, other galaxies, on and on into the endless depths of space.

It is understood that our local star cloud, which includes our sun and the planets following it, probably moves around a great circuit in the galaxy in periods of the order of 50,000 000 years. Of course, no one can understand that. We must remember, too, that the distances of light-years suggested for the size of our galaxy are not definite. Some say that our galaxy is 10,000 light-years thick, others say 7,000. These figures vary so greatly that so far it is impossible to find accurate answers to all our questions about these vast distances.

Solar System Planets

Name	Year	Day	Diameter	Distance - Sun	Area
Mercury	88	58.64	4,880	57,900,000	74,845,257
Venus	225	243.01	12,100	108,200,000	460,145,714
Earth	365	1.00	12,756	149,600,000	511,391,685
Mars	387	1.03	6,788	228,000,000	144,813,213
Jupiter	4,333	0.41	142,800	778,300,000	64,088,640,000
Saturn	10,759	0.42	120,000	1,427,000,000	45,257,142,857
Uranus	30,685	0.71	50,100	2,871,000,000	7,888,602,857
Neptune	60,188	0.74	49,400	4,497,000,000	7,669,702,857
Pluto	90,700	6.39	2,200	5,913,000,000	15,211,429

[Year = Earth days, Day = Earth Days, Diameter, Distance And Area = Kilometers]

Another thing that may seem impossible to us, but which astronomers tell us is true, is that sometimes two or more star clouds pass through each other. This creates no difficulty, however, because the stars are so far apart.

As we think of the inconceivable distances of immensity and the almost paralyzing vastness of the universe, of the unthinkable number of the stars, the multitudes of the shining heavenly hosts, we cry out with the prophet of old: “Behold who hath created these things, that brings out their host by number: . . . for that he is strong in power; not one fails.” Isaiah 40:26.

Many great star clusters, or groups of blazing suns, are found in our own galaxy, or Milky Way system. In fact, astronomers say that between 300 and 400 known galactic star clusters belong to our part of the universe. One of these great clusters is found in the Big Dipper, another in the Pleiades. We know that they are clusters because these great stars, or suns, move in parallel lines. They seem to be bound together by some unseen power. The distances to about 100 of these galactic clusters of stars have been determined, but not one of them is within 100 light-years of our solar system. The nearest is that called the Hyades, at a distance of 130 light years. Only a few of these clusters are within 1,000 light years of the earth.

Local Cluster Of Galaxies

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Galaxy	Type	Diameter (Ly)	Distance (Ly)	Mass	Volume
Milky Way	Spiral	120,000	0	150,000,000,000	905,120
NGC 147	Dwarf	7,800	2,220,000	1,000,000,000	249
NGC 185	Dwarf	9,500	2,220,000	1,000,000,000	449
NGC 205	Elliptical	14,000	2,220,000	10,000,000,000	1,437
Andromeda	Spiral	170,000	2,220,000	300,000,000,000	2,573,412
M 32	Elliptical	6,800	2,220,000	1,000,000,000	165
SMC	Irregluar	16,000	196,000	2,000,000,000	2,145
Sculptor	Elliptical	7,500	280,000	3,000,000	221
IC 1613	Irregluar	13,000	2,220,000	300,000,000	1,151
Triangulum	Spiral	59,000	2,720,000	10,000,000,000	107,577
Fornax	Elliptical	20,000	612,000	20,000,000	4,190
LMC	Irregluar	26,000	173,000	10,000,000,000	9,206
Leo I	Elliptical	5,800	750,000	3,000,000	102
Leo II	Elliptical	4,200	750,000	1,000,000	39
Ursa Major	Elliptical	7,800	222,000	100,000	249
Draco	Elliptical	3,300	250,000	100,000	19
NGC 6822	Irregluar	5,500	2,150,000	400,000,000	87

[Diameter And Distance = Light Years, Mass = Solar Masses, Volume = Million Cubic Light Years]

Astronomers tell us that our solar system with its local star cluster is circling about the center of our vast Milky Way island universe, and that the period of that rotation at the distance of the sun from its center is about 85,000,000 years. Of course, we can have no conception of this, but it does remind us of the mighty power and incomprehensible greatness of the Creator. These vast distances and ages of time are merely the suggestions of the human mind when it faces the inconceivable and gigantic vastness of the universe.

All the discoveries of modern science and astronomy indicate that the sun as well as the earth is moving. This was all clearly pictured in the Scriptures, especially the nineteenth psalm, long ages before it was discovered by the telescopes and mathematics of modern thinkers.

Now we consider for a moment what the astronomers call exterior clusters of stars, or suns—that is, those outside our own Milky Way system. Those known are nearly 100 in number. They are called “globular clusters” because they all seem to have the appearance of globes, though some photographs show that most of them are slightly oblate. Some have only a few hundred stars, others tens of thousands of stars.

Two of these clusters, Omega Centauri and the great cluster in Hercules, can be seen dimly with the unaided eye, but they are so faint that their spectra cannot be determined as individual stars. However, by obtaining spectroscopic pictures of light in the center of each cluster, a good deal can be learned about them. It is concluded that the brightest stars in these clusters are the super giants and the giants with thousands of times the luminosity of our sun.

These two far-off dwelling places of the heavens were discovered by Edmund Halley, whose name was made famous by the great comet which he also discovered. He believed that Omega Centauri was probably as big as our solar system. No one could deny this for 150 years. Speaking of these two star clusters, Halley said: “They cannot fail to occupy spaces immensely great, and perhaps not less than our whole solar system.” Would he not be surprised if he were alive today and could learn what modern astronomy has discovered? His suggestion regarding the size of these star clusters is like comparing a small pool of water with the Pacific Ocean.

Let us for just a moment consider the Great Cluster in Hercules, now known as Messier 18. It is said to be 33,000 light-years distant from the earth and to have a diameter of 100 light-years, beside which our solar system would be a mere pin point. It is composed of 1,000,000 stars, 100,000 of which are giant suns with plenty of room between them for planets.

What a glorious and wonderful exhibition this is of our Creator’s power, for He created all things! Jesus said: “In my Father’s house are many mansions” (John 14:2), or, as one translation puts it, “many abiding places.” We know that He referred here to heaven, and it is God’s plan to have a home for His

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people, but may He not in this have intended a wider application also?

God's great universe is filled with many abiding places which may be the object of the interest and visitation of God's people throughout the endless ages when they "follow the Lamb whither so ever he goes." Revelation 14:4.

Galaxy Cluster	Diameter	Volume	Distance
CANES VENATICI I	10	3,919	16
CANES VENATICI II	5	672	24
CETUS I	7	1,476	24
CETUS II	8	1,844	38
COMA I	6	894	26
ERIDANUS	13	9,289	27
FORNAX I	7	1,161	39
GRUS	7	1,161	35
MESSIER 101	5	672	9
MESSIER 66	3	84	20
MESSIER 81	6	894	5
MESSIER 96	5	672	21
CENTAURUS	7	1,476	8
PAVO-INDUS	12	8,176	39
SCULPTOR	3	145	3
URSA MAJOR N	7	1,161	43
URSA MAJOR S	8	1,844	41
URSA MAJOR X	5	672	38
URSA MAJOR Y	7	1,476	36
URSA MAJOR Z	6	894	30
VIRGO E	8	2,268	33
VIRGO III	12	7,155	29
VIRGO S	2	18	33
VIRGO V	7	1,476	43
VIRGO W	2	43	50
VIRGO X	9	3,301	39
VIRGO Y	9	3,301	34
VIRGO Z	5	490	43

[Diameter, Volume and Distance = Million Light Years]

These wonderful globes of stars, while outside our own Milky Way stellar system, are comparatively near to us.

Now let us go out farther still. As we look out into the midnight skies with powerful spectroscopic telescopes, we feel as did Byron who, in his contemplation of the marvels of nature, said:

I love not Man the less, but Nature more
From these our interviews from which I steal
From all I may be, or have been before,
To mingle with the Universe and feel
What I can ne'er express, yet cannot all conceal."

Recently Discovered Planets In Other Solar Systems

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Star	Distance - LY	Mass	Orbital Radius	Orbital Period
HD-75289	95	0.42	6.9	3.51
51 Pegasi	50	0.47	7.5	4.23
HD-187123	162	0.52	6.3	3.10
55 Cancri	44	0.84	16.5	14.65
Rho Coronae	54	1.10	34.5	36.65
HD-217107	64	1.30	6.0	7.11
HD-210227	72	1.30	151.5	437.00
16 Cygni B	72	1.50	405.0	804.00
Gliese 876	15	2.10	42.0	60.80
47 Ursae Major	46	2.80	315.0	1,088.00
14 Herculis	55	3.30	570.0	1,533.00
HD-195019	120	3.40	21.0	18.30
Gliese 86	37	3.60	16.5	15.80
Tau Bootis	49	3.90	7.5	3.31
HD-168443	121	5.00	42.0	57.90
70 Virginis	59	6.60	108.0	117.00
HD-114762	91	10.00	60.0	84.00
Upsilon Andromedae	47	0.70	9.0	4.60
Upsilon Andromedae	47	2.10	124.5	241.00
Upsilon Andromedae	47	4.60	525.0	1,267.00

[Distance From Earth = Light Years. Mass = Earth's Mass, Orbital Period = Earth Days]

We expand our horizon to millions and millions of stars and to millions of light-years. What we say now will be of interest to those in the Southern Hemisphere especially, because the nearest of the exterior galaxies are the Magellanic Clouds, seen by those living south of the equator. Up to a few years ago they were considered to be a part of the Milky Way, but now with more powerful instruments the individual stars can be distinguished. Spectroscopic photographs may be taken and, by measuring what is called the period-luminosity law for the Cepheid variables, and from observing more than 1,300 stars of the Cepheid class in the larger of the Magellanic Clouds, it has been quite certainly discovered that its distance from our solar system is 86,000 light-years. Just think of it, light traveling at the rate of over 186,000 miles a second would take 86,000 years to cover the inconceivable space between this glorious Magellanic Cloud and the earth. It is said that we are being separated at the rate of 170 miles a second partly because of the rotation of our galaxy. However, even at that terrific speed, our solar system will not increase its distance from the Magellanic Cloud by more than 1 per cent in a million years. This is because we are dealing with such vast distances.

One of those suns, we are told, is from 20,000 to 100,000 times as bright as our sun. Are there planets in the Magellanic Cloud? Are there inhabitants there in those bright worlds? Think of the things still to discover, still to know, many of which no doubt we shall never learn until, in Gods great house of eternity, we discover the wonders of His power.

Until a few years ago the Magellanic Clouds were considered to be immensely remote, but now just the opposite is known to be true. Astronomers have measured the distance to them and found them to be our near neighbors, for in every other direction around us there is only vacant space for a distance of 700,000 light-years. But pushing on through space for 900,000 light-years, we come to the enormous galaxy, or island universe, known as the Great Nebula in Andromeda. For generations astronomers pointed their telescopes at it with the impression that it was nothing but a great cloud of nebulous gas, perhaps a thousand times larger than our solar system. But now we know that it is a spiral galaxy of billions of blazing suns like our own Milky Way universe.

The Great Nebula in Andromeda is the only one of the exterior galaxies that can be seen with the naked eye. The Arabs listed it in their catalogue of the stars before the invention of the telescope. It was first observed with the telescope by Marius in 1612, and "looked like a candle seen through a horn." The

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Great Nebula in Andromeda seems to be approaching our solar system at the speed of 185 miles a second.

Then the astronomer looks out farther still into the unknown and declares that within 1,000,000 light-years of our solar system there are hundreds of thousands of other solar systems, or island universes, within easy reach of our modern instruments. With the great 100-inch telescope on Mount Wilson it was possible to reach out 500,000,000 light-years, and now with the great 200-inch reflector on Mount Palomar, 1,000,000,000 light-years, to see hundreds of millions of galaxies and super galaxies. End is there not to the universe of God. "Lo, these are but the outskirts of his ways: and how small a whisper do we hear of him!" Job 26:14. (ARV)

How do we know but that our own Milky Way system, the Magellanic Clouds, the Great Spiral Nebula in Andromeda, and all that we may see from this earth are parts of one super galaxy whirling around its mighty center, that this is simply one speck in other galaxies greater and still greater until the mind collapses before the stupendous and seemingly impossible numbers of light-years, distances, and vastness?

"If heaven above can be measured," we read in Jeremiah 31:37, "and the foundations of the earth searched out, I will also cast off all the seed of Israel for all that they have done, said the Lord." The more men measure the heavens, the more they find that they are immeasurable, and the more do we appreciate the wonderful words of Psalm 103:11: "For as the heaven is high above the earth, so great is his mercy toward them that fear him." To the greatest minds on earth, the origin of the universe is an insoluble mystery. All we know is what the Holy Scripture says: "In the beginning God created." Genesis 1: 1. He spoke, and it was done; he commanded, and it stood fast." Psalm 33:9. Our knowledge of the physical universe reveals the proton, the electron, the atom, the molecule, worlds, solar systems, galaxies, super galaxies. Where does it end? Where did it begin?

6. The Life-Filled Universe

IT IS MIDNIGHT. We are standing high up in the Cascade Mountains of Northern California. The sky is absolutely clear. We look upward to the silent pageantry of the skies. There, circling above us, are the unhasting stars. What does the vast panorama mean? Our little son, six years old, stands with us in solemn silence, companions of the imperial night. Then suddenly he says, "Daddy, does anyone live up there?"

How often, down through the ages, this question has been asked. "Does anyone live there? Is there life in the star studded habitations of immensity? Are there dwellers there in that wonder-sky? Are other worlds inhabited?"

Milton thought of this when, in *Paradise Lost*, he said:

"Heaven is for thee too high To know what passes there; be lowly wise: Think only what concerns thee and thy being; Dream not of other worlds, what creatures there Live, in what state, condition, or degree."

But men will question, will wonder. With such thoughts in mind, we read again the words of the Bible: "In the beginning God created the heaven and the earth.... And God saw every thing that he had made, and, behold, it was very good. And the evening and the morning were the sixth day. Thus the heavens and the earth were finished, and all the host of them." Genesis 1:31; 2:1.

For long centuries men had such large ideas about themselves and such small ideas of God that they imagined this earth to be the center of the universe, with all the heavenly bodies encircling it for man's enjoyment alone. But, to thinkers not blinded by the so-called scientific theories of those days, the Holy Bible spoke of other worlds than ours in the vast immensity of the universe. Even today, with our modern instruments of precision, we can see and measure only a small part of God's infinite creation. We need to remember the words of Job: "He stretches out the north over empty space, and hangs the earth upon nothing. . . . By his Spirit the heavens are garnished; his hand hath pierced the swift serpent. Lo, these are but the outskirts of his ways: and how small a whisper do we hear of him! But the thunder of his power who can understand?" Job 26:7, 13, 14. (ARV)

Just think of it, all the bright circuits of the planets, the majestic march of the constellations across the awesome sky, and all the other wonders of the heavens revealed by the mighty telescopes of scientific

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astronomy are but the outskirts of God's ways, the shining fringe on the robe of His glory. "It is he that built his stories [spheres or ascensions, margin] in the heaven, and hath founded his troop [or bundle, margin] in the earth; he that calls for the waters of the sea, and pours them out upon the face of the earth: The Lord is his name." Amos 9:6.

Surely the center of this unimaginable vastness, this shining universe of which we see but the outskirts-the edges, so to speak-is the very throne of the infinite Creator who is not only Maker but Upholder.

O. M. Mitchell has said: "At His bidding, every planet, and satellite, and comet, and the sun himself, fly onward in their appointed courses. His single arm guides the millions of sweeping suns, and around His throne circles the great constellation of unnumbered universes."

Speaking of this world of ours, called Earth, Isaiah the prophet declares: "For thus said the Lord that created the heavens; God himself that formed the earth and made it; he bath established it, he created it not in vain, he formed it to be inhabited!" Isaiah 45:18.

If this is true of our earth, may it not also be true of other worlds than ours? Some of them at least may be the homes of intelligent beings, according to the will of our heavenly Father. This earth is only one of nine planets circling about our sun, which itself is a blazing star 93,000,000 miles away from us. Its light warms the earth and makes life possible. A planet, such as our earth and its sister planets, shines with the reflected, light of the sun. We are told by one of our modern astronomers that "a generation ago astronomers regarded it as unscientific, or perhaps beneath their dignity, to raise the question of the habitability of planets other than the earth." He declares that the change of attitude which we see today undoubtedly was brought about, at least in part; by Percival Lowell's persistent and able attempts to prove the existence of life on Mars.

In *Watchers of the Sky*, Alfred Noyes personifies the earth and has it not only glorying in its own intelligent beings, but inquiring whether there might not be similar intelligences on its sister worlds.

"Was it a dream that, in those bright dominions,
Are other worlds that sing, with lives like mine,
Lives that with beating hearts and broken pinions
Aspire and fall, half-mortal, half-divine?"

"A grain of dust among those glittering legions-
Am I, I only, touched with joy and tears?
O, silver sisters, from your azure regions,
Breathe, once again, your music of the spheres."

We know that conditions on the other planets in our own solar system are much different from those here on earth. Can we say that intelligent beings cannot live there because conditions are different? How do we know but that life may be revealed there in different forms? Can we limit the power of God? Even in this world, life ranges from huge animals and giant trees, weighing tons, to microscopic and ultramicroscopic forms of life, of which we could hold a million in one hand. We think of the life duration of the giant Sequoia trees, covering thousands of winters, to the infinitesimal bacteria whose life cycles are measured in minutes. As there are different forms of life on this earth, may there not also be different forms of intelligent beings-holy, wise, glorious intelligences-on other worlds beyond, all created, by the hand of God in those sinless spheres that have never known pain, sorrow, or death? It is true that life as we know it is not found in the drifting sands of the absolutely waterless desert, nor in the perpetual snows of the Antarctic continent, yet who can say that God could not create a form of life that could live in just such places?

We think first of Mercury, our little brother nearest the sun. It is exceptional in seven ways: it is the smallest planet, has the least mass, is nearest the sun, receives the most light and heat, moves the fastest, has the flattest orbit, and has the greatest inclination to the plane of the Earth's orbit. Its diameter is only 30 per cent that of the earth.

All the planets move about the sun in ellipses, which are merely flattened circles. These ellipses, however, differ a little from circles. This oblateness is noticed more in Mercury than in any other planet, and the sun is quite a bit out of the center of its orbit. Mercury is about 36,000,000 miles from the sun; at times only about 28,000,000 miles. The complete length of its year is only 88 of our days. The rotation period of Mercury seems to be the same as its year. Like the moon, which always keeps the same face to

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the earth, it appears that Mercury always keeps the same face toward the sun. If this is true, it must be very, very hot on the side toward the sun and very cold on the other. It is believed also that Mercury has no atmosphere, and it seems to have no moon.

Next we come to Venus, the brightest and most conspicuous heavenly body, with the exception of the sun and moon, as viewed from this earth. Its year is 225 of our days. It is the nearest of all other worlds to our earth. It is surrounded by a beautiful ring of light, which is due to its atmosphere. Venus has been called the twin sister of the earth, but like Mercury it has no moon, and its surface is always hidden from our sight by its heavy atmosphere.

Mars, the red planet, comes next after the earth away from the sun. It is much smaller than the earth, having a diameter of only 4,200 miles. Its volume is about one seventh of the earth's. If you weigh 150 pounds on the earth, you would weigh only 57 pounds on Mars. The length of its day is almost the same as ours-24 hours, 37 minutes, 22M seconds. Its year is about 687 of our days, so that the seasons on Mars are almost twice as long as they are on the earth., The angle between the equator of Mars and the ecliptic, or plane of the poles, is about 25 degrees. Since we know that the seasons on earth are due to the fact that its equator makes an angle of 23 degrees with the ecliptic, we must conclude that the seasons on Mars are much like ours here, although much longer. The surface of Mars must be divided by nature into five zones, as those on earth. The Frigid Zone must extend 25 degrees from the two poles and the Torrid Zone must be 50 degrees wide. Mars has two white polar caps, which seem to indicate the presence of atmosphere and moisture.

Mars has two moons. These were discovered by Asaph Hall at the United States Naval Observatory in August, 1877, with a new telescope 26 inches in diameter, the largest in the world at that time. The moons of Mars are much closer to the surface of the planet than our moon is to the earth, and they move more rapidly. The outer one, Deimos, is a little over 14,000 miles from the center of Mars, while the inner one, Phobos, is only about 6,000 miles from its center. Phobos goes around Mars faster than the planet rotates on its axis, and if there are inhabitants on Mars they see it rise in the west instead of in the east two or three times a day. In fact, it rises every eleven hours, the only known example of a moon whose orbital velocity exceeds the velocity of the rotation of its world. The other moon, Deimos, moves a little more slowly. It rises in the east and sets in the west. These moons are very small, Phobos being 10 miles in diameter and Deimos 5 miles.

The most interesting markings on the surface of Mars are the so-called canals, discovered by Schiaparelli in 1877. These canals are probably several miles across. Percival Lowell was thoroughly convinced that they are not due to some trick of the eye at the limits of its powers, but correspond to realities on the surface of the planet. He described about 50 of these 400 canals as consisting of double pairs, separated from each other by from 100 to 200 miles. He believed that these canals are not rivers but streaks of vegetation growing along the banks of channels that are annually filled with water from melting snows. Thus, from the earth they appear much as the valley of the Nile would if viewed from Mars. Not many astronomers accept Lowell's theories in full, but almost all agree that there is something interesting there about which we shall know much more in the future.

If there is life on Mars, we have no reason to assume that it is exactly the same as ours here. If there are intelligent beings there, they may know more about us than we know about them. The poet speaks of the inhabitants of Mars as reasoning concerning life on Earth and Venus:

“And now, as dewdrops in the dawn-light glisten,
Remote and cold-see-Earth and Venus roll.
We signalled them-in music! Did they listen?
Could they not hear those whispers of the soul?”

“May not their flesh have sealed that fount of glory,
That pure ninth sense which told us of mankind?
Can some deep sleep bereave them of our story
As darkness hides all colors from the blind?”

Alfred Noyes

Between Mars and Jupiter there is a gap where, according to Bode's famous astronomical law, another planet should be. In this space more than 1,250 small planets or asteroids have been discovered,

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and more are being discovered right along. Ceres, about 485 miles in diameter, seems to be the largest. These planetoids or worldlets are so very small that, if they were all combined into a single planet, it would require more than 3,000 of them to weigh as much as the earth!

We come next to the largest world of our system-Jupiter, the giant planet of the skies. With the exception of Venus, it is the brightest planet. Its diameter is about eleven times that of the earth, and it weighs over 300 times as much as our world. It revolves very fast, however, so that its day is only about 9 hours and 45 minutes in length. Thus a person standing on its equator would move toward the east with a velocity of 28,000 miles an hour, which is 25 times faster than a person standing on our Earth's equator would revolve.

Up to 1935, nine of Jupiter's moons had been discovered, four of which had been found by Galileo as soon as he invented the telescope. One or two more have been reported since. One of Jupiter's moons revolves backwards. Four of them may be on the same side of the planet at a time. At another time they may all be on the other side. If one lived on Jupiter, how would he be able to plant his crops according to the phases of the moon, or rather moons?

Jupiter hides behind an atmosphere of heavy clouds that continually cover it, so that its surface has never been seen. These clouds seem to rotate at different speeds, forming strange colored streaks over the surface of the planet. Sometimes they drift by each other at the enormous rate of 350 miles an hour. Since the angle of Jupiter to the plane of its orbit is only 4 degrees, there can be no seasons like those which we have on the earth.

In 1878 a great red spot 30,000 miles in length and 10,000 miles wide appeared on the surface of Jupiter. This spot has now persisted for more than seventy years, but is gradually fading. It is believed that this red spot is a huge island of frozen ammonia, such as is used in refrigeration plants and which freezes at 37 degrees below zero. If this is true, the temperature of the atmosphere of Jupiter must be very low indeed. The element of oxygen, on which all higher forms of life as we know it on the earth depend, does not seem to be present on Jupiter.

The next planet farther away from the sun is Saturn, the most interesting planet in the sky, surrounded by a system of rings. Nothing ever seen in the heavens is like it. Saturn moves around the sun at the rate of about 6 miles a second, or 21,600 miles an hour. It has so far to go that a year on Saturn is as long as about 30 of our years. It is the least dense of all the planets and we are told that it would float in water if there were a lake big enough to hold it. Different parts of the planet rotate with different periods, and the nearer a spot is to the equator, the more rapid its rotation. The average day is about 10 hours long.

There is a possibility that what our telescopes reveal is not solid surface, but merely a vast envelope of clouds. We are amazed when we see Saturn surrounded by three concentric rings which disappear from time to time and then reappear, since the plane of the rings is inclined to the plane in which the planet is moving. These rings were discovered by Galileo in 1610. The diameter of the outer one is 173,000 miles and it is 10,000 miles wide. The second ring has a width of 16,000 miles. The dark ring is 11,000 miles wide with a space of 7,000 miles between it and the planet. These rings are very thin, being less than 50 miles in thickness. They are supposed to be formed by millions of separate particles, little moonlets they might be called. Saturn also has at least nine moons. Think of what nighttime would be like there with those three great rings arching the heavens and nine moons shedding their strange light everywhere!

Next comes the planet Uranus, which was discovered by Sir William Herschel on March 13, 1781, while trying out a new telescope. It has a year of 68,000 days, and its length is 84 of our years. However, Uranus rotates very rapidly on its axis and its day is only 10 hours and 45 minutes long. It has four moons, all moving backward in their orbits.

Uranus did not seem to travel the orbit that the astronomers expected it to travel and they soon realized that there was some hitherto undiscovered heavenly body attracting its attention by the power of gravitation. Two young mathematicians, Adams in England and Leverrier in France, were convinced that another planet in some other solar system was attracting Uranus. In the year 1845 these two mathematicians both determined to figure a new world into existence. Neither knew that the other was working on the problem. In October, 1845, Adams wrote a letter to the Astronomer Royal of England, in which he announced the approximate position of the new planet. For some reason no attention was paid to the letter.

In June, 1846, Leverrier announced to the world his theoretical position of the planet, which was very close to the place where Adams had said the planet would be found. This communication also was sent to the Astronomer Royal, but still no search was made. Finally Leverrier wrote a letter to Dr. Calle, head of the observatory in Berlin, and told him exactly where to look for the new planet. Calle received this

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letter on September 23, 1846. That night he pointed his telescope to the spot in the heavens specified by Leverrier and within half an hour found the new planet less than a degree from where the mathematician had said it would be.

This was Neptune, never before seen by the eye of man. It has a diameter of 31,000 miles, and its year is 165 of our years. Light which travels from the sun to this earth in 8 minutes must travel about 4 hours before it reaches Neptune. The brightness of the sun as seen from Neptune would be about the same as a 1,200-candle-power light at a distance of 12 feet. Neptune has only one moon. At least, no more have been discovered.

No more planets were discovered until 1930, when at the Lowell Observatory at Flagstaff, Arizona, Pluto was found. Based on the irregularities in the movements of Neptune, the search for it had begun in 1905. Pluto's year is about 250 of ours; its size about the same as the earth. That is about all we know of it.

At least 26 moons circle different worlds in our solar system. We know little of their physical condition, except in the case of our own moon. Is there life on any of these satellites? We are quite certain that our moon is not inhabited, and we might rule out 14 of the other 25 satellites on account of the fact that they are so very small. But we cannot make even a guess as to the probability of life on the others. They seem to be so far away from the sun that they would not receive much heat, but they may have some internal source of heat of their own.

We must remember that the estimated 3,000,000,000 worlds in our part of the universe are only the beginning, the outskirts, the edge, of God's created ways. Jesus said, "In my Father's house are many mansions" (John 14:2), or, as one translation puts it, "Many abiding places." We interpret this, of course, to refer to heaven, the very center of the universe, the place of God's throne, the Holy City. But may it not also refer, in a greater way, to the universe itself? It all belongs to God.

And now the great 200-inch reflector telescope on Mount Palomar has extended the universe, we are told, to 1,000,000,000 light-years. A light-year is the distance that light will travel in a year, going at the rate of 186,324 miles a second. This may add another billion worlds to our edge of the universe. The thought appalls us. Shining homes inhabited with beings in every direction about us! Millions and millions and millions-yes, billions of them-so that one might point his finger toward the sky in any direction and say: "There is life there. There is life here." Truly, we live in a life-filled universe.

And now come news headlines that new outer planets are keeping scientists awake. Glimpsed for the first time, the offspring of the twin tumbling stars, 61 Cygnus, 11 light-years away, and of Ophiuchus, 17 light-years distant, holds much mystery as neighbors in our universe. For the first time earthbound astronomers have actually seen and photographed light from these outer cosmic "other planetary systems," or suns, with the 100-inch telescope on Mount Wilson, California. 61 Cygnus is about 66,000,000,000,000 miles from the earth. Each of these suns has an average of three habitable worlds. It comes as a staggering realization that there may be 3,000,000,000 inhabited worlds in our end of the universe. Whether there are more planets beyond in our solar system we do not know.

Dr. K. A. Strand of Sproul Observatory, Swarthmore College, has been photographing 61 Cygnus for many years and he has known that it was a two-part body with twin stars revolving around each other. At the same time, the twin stars moved through the sky in a definite orbit. The trouble with 61 Cygnus, Dr. Strand discovered, was that its path was not in its expected orbit. The twin stars swung in and out on a wavy, zigzag track. What was the cause of this? The best guess was that some unknown, unrecognized member body was also present as a satellite.

A careful search finally revealed the new planet, 61 Cygnus-Q, shining dimly by reflected light from its two-star parents. For the first time man had found a planet outside his own solar universe. 61 Cygnus-C has a mass 16 times as great as Jupiter's, and Jupiter is the heavyweight planetary champion of our solar system. Yes, this new strange planet, 61 Cygnus-Q is a giant. Its mass is 5,000 times as great as the Earth's and the earth is no midget.

If these figures sound like the war debt, just think of the enormous pull of gravity on this new-found planet. A man weighing 150 pounds here would weigh 325 tons on 61 Cygnus C. Life there certainly would have to be different from life as we know it here on earth. Imagine having two suns and no moon in the sky. It would be all day and no night. There would be two sunrises and two sunsets every day, and there would always be a sun in the sky.

And think of the number of stars or suns in our own Milky Way system or galaxy. According to one authority, there are at least 50,000,000,000 of them. And remember, there are between 300 and 400 other galactic star clusters or island universes. Suppose each is as large as ours, each containing

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50,000,000,000 suns. And suppose each of these suns has nine planets, as has ours, or even one. That will begin to suggest the unimaginable number of the planetary dwelling places in the universe. "Lo, these are but the outskirts of his ways: and how small a whisper do we hear of him! But the thunder of his power who can understand?" Job 26:14. (A. R. V.) Certainly we creatures of a moment on a speck of dust cannot hope to comprehend an infinite universe.

Dr. William W. Campbell, former director of Lick Observatory, once said: "In the latter years of my life I have been gratified to think that there are other representatives of life scattered all through the universe. Probably we could not point a finger in any direction and miss the truth if we said there was some form of life in that direction."

Speaking of man here on earth, Garrett P. Serviss said: "If he is of a devout turn of mind, he thinks, as he gazes into those fathomless depths and among those bewildering hosts, of the multitude of created beings that the Almighty has taken under His care. Thus the natural tendency, in the light of modern progress, is to regard the universe as everywhere filled with life."

What a staggering picture we have just seen of the mighty universe of God, yet what other uncounted universes of universes lie beyond the edge of our vision, no tongue can tell. What forms of life, what wonders, we may someday know when we "follow the Lamb whither so ever he goes." Revelation 14:4.

What does the Holy Scripture reveal about these shining abiding places? Let us turn to Job 38:4-7 and read the questions that God put to Job: "Where was thou when I laid the foundations of the earth? declare, if thou has understanding. Who hath laid the measures thereof, if thou knows? Or who hath stretched the line upon it? Whereupon are the foundations thereof fastened? Or who hath laid the corner stone thereof; when the morning stars sang together, and all the sons of God shouted for joy?"

It must have been a wonderful day when the earth was finished and all the sons of God sang the hymns of creation and shouted for joy at the beauty of a new world fresh from the hand of the Creator. Who were these "sons of God?" Let us turn to Luke 3:38 and read part of the inspired genealogy of Christ as follows: "Which was the son of Enos, which was the son of Seth, which was the son of Adam, which was the son of God."

So Adam was the son of God by creation, the appointed head and king of the newly created earth. His dominion under God was world-wide. He ruled all. "God said, Let us make man in our image, after our likeness: and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creeps upon the earth." Genesis 1:26.

We read in Job 1:6, 7 that Satan appeared at one time in a conclave of the sons of God and claimed to represent the earth. "Now there was a day when the sons of God came to present themselves before the Lord, and Satan came also among them. And the Lord said unto Satan, Whence comes thou? Then Satan answered the Lord, and said, From going to and fro in the earth, and from walking up and down in it."

Why did Adam not represent the earth? Because he had sinned and Satan had usurped his position. He now claimed to be the rightful representative of this earth when the various sons of God came to present themselves before the Lord. You will remember that later Satan claimed dominion over this earth when he met our Lord on the mountain of temptation, as we read in Luke 4:5, 6: "The devil, taking him up into an high mountain, showed unto him all the kingdoms of the world in a moment of time. And the devil said unto him, All this power will I give thee, and the glory of them: for that is delivered unto me; and to whomsoever I will I give it."

Thus it follows that the sons of God who rejoiced at the creation of this earth were, like Adam, representatives of the other worlds-worlds created before this earth. Christ was with the Father in creation, not only of this world, but of the others, as we read in Hebrews 1:1 2: "God, who at sundry times and in divers manners spoke in times past unto the fathers by the prophets, hath in these last days spoken unto us by his Son, whom he hath appointed heir of all things, by whom also he made the worlds." Notice, the apostle doesn't say "world," but "worlds"-plural. This is in harmony with our view of Job 38:4-7.

Again we read in Hebrews 11:3 "Through faith we understand that the worlds were framed by the word of God, so that things which are seen were not made of things which do appear."

Let us turn now to Isaiah, the fortieth chapter, verses 21 and 22: "Have you not known? have you not heard? Has it not been told you from the beginning? Have you not understood from the foundations of the earth? It is he that sits upon the circle of the earth, and the inhabitants thereof are as grass-hoppers; that stretches out the heavens as a curtain, and spreads them out as a tent to dwell in."

Notice, the heavens above us are spread out "as a tent to dwell in"; not as an endless expanse of awful solitude, but as a place in which to live. Read also verse 15, where we are told that "the nations are as

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a drop of a bucket.” Not merely one drop in an empty bucket, but “a drop of a bucket.” The nations of this earth are only a drop of God’s full bucket, but sometimes they seem to think that they are the sum of all His care.

Christ has been going forth on missions of creative power since the days of eternity. Let us read Micah 5:2: “But thou, Bethlehem Ephratah, though thou be little among the thousands of Judah, yet out of thee shall he come forth unto me that is to be ruler in Israel; whose goings forth have been from of old, from everlasting.”

Not only was Christ associated with the Father in creation, but He is also our Redeemer. When sin first appeared in heaven, its instigator was cast out into this earth. Here he attempted to set up a kingdom in rebellion against the government of God. All the universe has been watching the unfolding drama of sin and redemption. This earth is the theater of the universe. We read in 1 Corinthians 4:9: “For we are made a spectacle unto the world, and to angels, and to men.”

That word “spectacle” is theater in the original. Angels and men are watching the great plan of redemption as it is being worked out on the world stage of this earth. When our Savior died upon the cross as the victim of Satan’s enmity, the holy inhabitants of unfallen worlds saw the true character of the great accuser. Now God carries with Him the sympathy and understanding of the entire universe as the great conflict of the ages draws to its close. These “sons of God” who rejoiced at creation dwell in the heavens and rejoice also in redemption.

. . . The cross becomes “the science and the song,” not only of the redeemed, but also of those who have never fallen as they watch the manifestation of our Savior’s love. This is clear from Revelation 12:10, 12; “I heard a loud voice saying in heaven, Now is come salvation, and strength, and the kingdom of our God, and the power of his Christ: for the accuser of our brethren is cast down, which accused them before our God day and night. . . . Therefore rejoice, you heavens, and you that dwell in them.” Notice, “You that dwell in them.” There are dwellers, then, in the heavens-not heaven, but “heavens” plural. “Woe to the inhabitants of the earth and of the seal for the devil is come down unto you, having great wrath, because he knows that he hath but a short time.” Verse 12.

Like the one lost sheep in the parable that Jesus told, this earth of ours is the only one in all God’s creation that knows tears and pain and the dark shadow of death. It is the lesson book of the universe, and God is turning the last pages. Our flying world, silently speeding around the sun at 1832 miles a second, is a mighty stage where the great drama of sin is about to reach its final curtain. All men act a part, but God’s people play a special part.

When Napoleon Bonaparte led his army at the Battle of the Pyramids in Egypt, it seemed at first that they might be defeated. Suddenly he pointed to those gigantic monuments of the past and cried: “Soldiers, from the summit of yonder pyramids, forty centuries look down upon you.” And they charged on to victory.

We must remember that more than forty centuries look down upon Christians in their battle against evil. God and Christ and all the holy angels and the unfallen intelligences of those shining worlds above look down; they look down with interest and love. (1 Peter 1:12,13.)

We do not know all the mysteries of God’s plans (Deuteronomy 29:29), but we do know that our Lord and Savior came “to seek and to save that which was lost.” Luke 19:10. Notice, “that which was lost” includes not only men, but the earth itself. The first, dominion lost by the first man is redeemed, bought back by “the second man,” the “Lord from heaven.” 1 Corinthians 15:47.

It was God’s original plan that this earth be, inhabited by happy, holy beings, and His plan will finally reach its full fruition. “Blessed are the meek: for they shall inherit the earth,” we read in Matthew 5:5.

The entrance of sin into this world brought thorns and thistles. (Genesis 3:18.) Jesus wore a crown of thorns upon the cross. His redemption includes the redemption of the earth itself, bringing it back to its Edenic condition as the home of redeemed, immortal men. He is the kinsman Redeemer who buys back the lost possession. Not only His people, but all the earthly creation waits for His coming.

“For the earnest expectation of the creature [or creation] waits for the manifestation of the sons of God. For we know that the whole creation groans and travails in pain together until now. And not only they, but ourselves also, which have the first fruits of the Spirit, even we ourselves groan within ourselves, waiting for the adoption, to wit, the redemption of our body!” Romans 8:19, 22, 23.

The cross of Christ forever settled the fact of redemption. “Christ died for our sins according to the scriptures.” 1 Corinthians 15:3. He died “for the sins of the whole world.” 1 John 2:2. His cross certifies the final victory of His people and the redemption of the earth itself as a home for the redeemed. The earth,

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cleansed and made new, will be clothed again in Edenic glory. More than that, it has heavens glory too, for John the apostle says in Revelation 21:24: 1 John saw the holy city, new Jerusalem, coming down from God out of heaven, prepared as a bride adorned for her husband. And I heard a great voice out of heaven saying, Behold, the tabernacle of God is with men, and he will dwell with them, and they shall be his people, and God himself shall be with them, and be their God. And God shall wipe away all tears from their eyes; and there shall be no more death, neither sorrow, nor crying, neither shall there be any more pain: for the former things are passed away.”

There are great things ahead for this little spot in the universe. This flying world of ours is to be the very abode and dwelling place of God. Then one great song of joy and praise will ascend from all created beings, as we read in Revelation 5:13: “And every creature which is in heaven, and on the earth, and under the earth, and such as are in the sea, and all that are in them, heard I saying, Blessing, and honor, and glory, and power, be unto Him that sits upon the throne, and unto the Lamb for ever and ever.”

Then the great controversy will be ended, the universe will be clean. “One pulse of harmony and gladness beats through the vast creation. From Him who created all, flow life and light and gladness, throughout the realms of illimitable space. From the minutest atom to the greatest world, all things, animate and inanimate, in their unshadowed beauty and perfect joy, declare that God is love.” - The Great Controversy, p. 678. So the lost sheep will be brought home, the universe will be clean. It will yet be proved that none of God’s worlds have ever failed, and love will reign throughout God’s life-filled universe.

7. Do the Stars Guide Our Lives?

RIGHT at the start, let us make this clear: Astronomy and astrology are not the same. Astronomy is the science of the stars, while astrology is the pseudo science which professes to show the influence of the stars upon human affairs. Astronomers are universally opposed to astrology.

In an article in the Signs of the Times, written by J. Hugh Pruett, astronomer at the University of Oregon, a statement is quoted from Dr. Daniel Buchanan, astronomer at the University of British Columbia, as follows:

“Many people confuse astrology with astronomy and suppose that there are reputable scientists who believe in it. Actually astrology is an ‘art’ equivalent to crystal gazing or palmistry, and the application of astronomical data to the business of fortune telling is like trying to use the Einstein theory to pick the winner of the sixth race at Santa Anita, California. A fortuneteller could see your future just as clearly by gazing into a \$1.95 crystal ball as by peering into the multi-million dollar 200-inch telescope of the Palomar Mountain observatory.”

Then Dr. Pruett continues: “No present-day professional astronomer who is teaching in a recognized standard college or university, or is working in a large observatory, or is employed in governmental scientific work, believes in astrology or will have anything to do with it.”

And, by the way, he reminds us that this is “true since the days when another Danish astronomer, Tycho Brahe—who in his younger days practiced the pseudo science of astrology to some extent—finally, more than three hundred years ago, denounced it as a fraud. Brahe’s pupil, the great Kepler, expressed the accepted scientific opinion of the next generation when he said of astrology’s relation to astronomy: “A foolish daughter of a wise mother.”

But what does the Bible teach about it? Do the stars guide the lives of Christians, or are they under God’s direct providence? We read, first of all, Job 22,12-21: “Is not God in the height of heaven? and behold the height of the stars, how high they are] And thou says, How does God know? Can he judge through the dark cloud? Thick clouds are a covering to him, that he sees not; and he walks in the circuit of heaven. Has thou marked the old way which wicked men have trodden? Which were cut down out of time, whose foundation was over flown with a flood: which said unto God, Depart from us: and what can the Almighty do for them? Yet he filled their houses with good things: but the counsel of the wicked is far from me. The righteous see it, and are glad: ... but the remnant of them the fire consumes. Acquaint now thyself with him, and be at peace: thereby good shall come unto thee.”

The writer is referring here to the people who lived before the Flood. He tells how they departed from God. They thought He knew nothing about them and could do nothing for them. They were the worlds

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first fatalists and, like all fatalists, they must have confused God with nature and taught that man is a helpless atom in the eternal round of the material universe. They held to the error of the Persian poet who said:

“We are but pieces in the game He plays Upon this checkerboard of nights and days; And one by one, He moves and cheeks and slays; And one by one, back in the closet lays. - Omar Khayyam

The words quoted a moment ago from Job, though written 1,500 years before Christ, are thoroughly scientific. Notice the exclamation: “Behold the height of the stars, how high they are!” Astronomers today have demonstrated the almost infinite distances of the heavens, measured not by mere miles but by the appalling immensity of light-years. We are told that the stars are so far away that light from the very nearest one, Alpha Centauri, traveling at the unimaginable speed of about 6,000,000,000,000 miles a year would take about four and a half years to reach the earth. And the North Star is 47 light-years away.

It takes a ray of light only 8 minutes to come from the sun to the earth, but a ray of light has to travel 330 years to reach the earth from Rigel, that blazing sun so far away. It takes light 370 years to come from Antares. And from some parts of the Milky Way it would take 100,000 light-years for a lonely light ray to reach us here on earth. So we may indeed say, “Behold the stars how high “they are!” This statement is perfectly scientific.

In the verses from Job 22 which we have just considered, we are told that the ancient inhabitants of earth disregarded the will of God. They denied His providence. One result was that His protecting hand was withdrawn from them. Nature ceased to bless them and became their destroyer. They were overflown with the Flood, or, as Jesus put it: “The flood came, and took them all away.” Matthew 24:39. This, too, is a scientific statement. All over the earth today we find clear evidences of some mighty catastrophe caused by water. These evidences are made clear in the geological writings of such men as George McCready Price, Harold W. Clark, Benjamin F. Allen, and Frank L. Marsh.

People before the Flood disregarded the will of God and met disaster. In reviewing their terrible fate, the prophet brings this appeal: “Acquaint now thyself with him, and be at peace: thereby good shall come unto thee!” Job 22:21. This shows that ultimate good depends upon the providence of God rather than upon the impersonal powers of nature, yet there are thousands of people today who disregard God’s power, God’s providence and love, and believe that the stars do control human destiny. They study horoscopes for salvation and trust in the signs of the zodiac for rest and peace. But I wish to assure you in all earnestness that the only way to be happy in this world is to be acquainted with God, to trust in Him, and to believe Romans 8:28: “All things work together for good to them that love God, to them who are the called according to his purpose.”

Remember that all these heavenly bodies were created by God. They obey His will and are subject to His laws. And God has created every man a free moral agent with the privilege of choice. Here is what He says in Deuteronomy 30:19: “I call heaven and earth to record this day against you, that I have set before you life and death, blessing and cursing: therefore choose life.”

Notice, the choice is ours. We are not the helpless victims of some impersonal law or of some far-off burning sun. God’s providence are as fully prepared for man as for the stars. The Scripture declares: “Your eyes did see my substance, yet being imperfect; and in thy book all my members were written, which in continuance were fashioned, when as yet there was none of them.” Psalm 139:16.

The stars in their courses show us the power of God and His infinite wisdom, but it is at the cross of Christ that we finally see revealed His great love that paid for the sinner’s redemption, the price of a human soul.

“At the cross, at the cross, where I first saw the light,
And the burden of my heart rolled away,
It was there by faith I received my sight,
And now I am happy all the day.”
Isaac Watts

The Bible reveals God’s loving watch care over man and the stars, “For that he is strong in power; not one fails.” Isaiah 40:26.

Another important thing to remember is that the vast majority of those who practice astrology do not claim to be Christians at all. Millions of people who do not believe in God or Christ follow this ancient system today. Millions of non-Christian Chinese, millions of Hindus and Arabians who are anti-Christian

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and anti-Bible, are strong for astrology. There should be something significant about this fact to every Christian who is tempted to follow the old pagan cults of the astrologers, and it should cause him to place no credence in them. No force of the universe, no power of blazing star is ever permitted to have any influence for evil over any child of God.

In Romans 8:35, 38, 39 we read. "Who shall separate us from the love of Christ? shall tribulation, or distress, or persecution, or famine, or nakedness, or peril, or sword? ... For I am persuaded, that neither death, nor life, nor angels, nor principalities, nor powers, nor things present, nor things to come, nor height, nor depth, nor any other creature [or creation], shall be able to separate us from the love of God, which is in Christ Jesus our Lord." Therefore the stars cannot separate us from the love of God; they cannot influence the Christian adversely, for he is "in Christ."

In John 13:3 we read that Jesus knew, "that the Father had given all things into his hands." And that's a good place for all things to be-in the hands of Christ. We are safe there, for no one, no thing, no influence, no creature, no part of creation, can ever take us out of His hands. Jesus said: "My sheep hear my voice, and I know them, and they follow me: and I give unto them eternal life; and they shall never perish, neither shall any man pluck them out of my hand." John 10:27,28.

The Holy Bible teaches the effectiveness of prayer-that prayer changes things. We read in Psalm 50:15: "Call upon me in the day of trouble: I will deliver thee, and thou shall glorify me." Notice, the glory belongs to God, not to some planet or star which He has created. Whatever influence any earthly or celestial body might have upon a human being, we must remember that God Himself holds the key to human destiny, and prayer is communion with Him. As one great Bible believer once said: "Prayer is the opening of the heart to God as to a friend. Not that it is necessary, in order to make known to God what we are, but in order to enable us to receive Him. Prayer does not bring God down to us, but brings us up to Him." - Steps to Christ, Page 97.

Charlotte Elliott wrote these beautiful words:

"My God, is any hour so sweet,
From blush of morn to evening star,
As that which calls me to Thy feet;
The hour of prayer?"

"Then is my strength by Thee renewed;
Then are my sins by Thee forgiven;
Then does Thou cheer my solitude
With hopes of heaven."

Strange to say that in this so-called scientific age, astrology, in spite of its dark-age ancestry, numbers its followers by multitudes and its monetary income in nine figures. People are investing heavily in an attempt to pierce the hidden veil of tomorrow. They want to know the future and gaze into that strange land where mysterious silence reigns. Someone may say, "But they have told me many things that have come true." Doubtless, and that for several reasons. But listen to some startling words of God's prophet, Jeremiah: "Thus said the Lord, Learn not the way of the heathen, and be not dismayed at the signs of heaven; for the heathen are dismayed at them." Jeremiah 10:2. The "signs of heaven" mentioned here refer to the signs of the zodiac.

Ours is supposed to be an age of universal enlightenment but speaking of these last days God Himself has said, "Knowledge shall be increased." Daniel 12:4. Isn't it strange that at such a time of scientific light and human advancement, the mind of man should turn back to superstitious beliefs of three thousand years ago and that the ancient Egypt and Babylonian astrology is being revived? One reason is that there is money in it. And here's what the Scripture says about that in Isaiah 2:6: "They be replenished from the east and are soothsayers like the Philistines."

One modern authority tells us that astrology is of Babylonian origin and has come down to us from the noted "wise men" of Babylon. Those men claimed to be able to read destiny from the stars, but they could not read God's hand writing on the wall, as we read in Daniel, the fifth chapter. They were compelled to admit that the future could be made known only by God, "whose dwelling is not with flesh." Daniel 2:11.

Astrology was prevalent in Egypt when God led His people from that land, so He warned them in

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these words: "After the doings of the land of Egypt.... shall you not do: neither shall you walk in their ordinances." Leviticus 18:3.

The apostle Paul found these same astrological ideas among the heathen Galatians, many of whom were converted to Christ. When he went among them, they not only worshiped the sun and other heavenly bodies, but attributed their lucky hours to them. These ideas have entered into the language of our day, being found in such expressions as, "I thank my lucky stars." Such ideas are, of course, out of harmony with the Holy Bible.

Speaking of these people, the apostle Paul said: "Howbeit then, when you knew not God, you did service unto them which by nature are no gods. But now, after that you have known God, or rather are known of God, how turn you again to the weak and beggarly elements, whereunto you desire again to be in bondage?" Galatians 4:8, 9. Let us read also verses 10 and 11: "You observe days, and months, and times, in-d years. I am afraid of you, lest I have bestowed upon you labor in vain." The apostle then pleads with them to leave these heathenish ways, according to which every hour of every day is considered sacred to some particular planet, and urges them to return to the simple gospel of Jesus Christ. There only, my friend, will peace of heart be found.

According to some of the modern teachers of this revived ancient heathen astrology, we are now entering the so-called "Aquarian," or humanitarian age, the age in which every man is his own savior. But, according to the Scriptures, every man is not his own savior. The only Savior of a lost and ruined world is Jesus Christ. We read in Acts 4:12: "There is none other name under heaven given among men, whereby we must be saved." And in John 3:16: "For God so loved the world, that he gave his only begotten Son, that whosoever believes in him should not perish, but have everlasting life."

All the stars and planets were created by God through Christ, and are but the servants of the great God who made them. Our lives are in His hands, who guides the celestial bodies as well as us. In Genesis 1: 14, we read: "God said, Let there be lights in the firmament of the heaven to divide the day from the night; and let them be for signs, and for seasons, and for days, and years." And in Matthew 24 we are told that the darkened sun, the red moon, and the falling stars would be signs of the Second Coming of Christ.

In the study of astronomy, we think God's thoughts after Him, for "the heavens declare the glory of God." Psalm 19:1. In ancient times God's people sometimes made the mistake of slipping from astronomy over into astrology. We read in Amos 5:26, 27: "You have borne the tabernacle of your images, the star of your god, which you made to yourselves. Therefore will I cause you to go into captivity." Also, in Job 31:26-28: "If I beheld the sun when it shined, or the moon walking in brightness. And my heart hath been secretly enticed, or my mouth bath kissed my hand: this also were an iniquity to be punished by the judge: for I should have denied the God that is above."

Astrology is really a hang-over from the worship of the heavenly bodies-sun worship, moon worship, and worship of the stars-which was common in ancient times and is even yet a part of the worship of some non-Christian peoples. Man really worships that to which he attributes the supreme and ruling destiny of his life and of the world, so the Creator commands: "Thou shall have no other gods before me." Exodus 20:3.

Friends, here is good news: Our lives are not crushed in the vice of some imaginary horoscope. To the Christian there is no "fell grip of circumstance," but the tender heart of a loving heavenly Father. The Bible teaches the free will of man. Whosoever will may come. (Revelation 22:17.) According to 2 Corinthians 6:2, today "is the day of salvation," and "now is the accepted time"-not some other day or hour when the planets are propitious. In Job 25:5 we read that "even ... the stars are not pure in his sight." Then why trust them as guides to life?

In olden times the planets were supposed to be the abodes of the spirits of dead heroes, and it was really the worship of those departed Babylonian heroes that was the basis of astrology. God's divine prophecy was a sealed book to the astrologers of ancient Babylon. The so-called "prophecies" of modern astrologers often fail as did the predictions of their ancient predecessors.

The starry orbs themselves will be shaken, as we read in Hebrews 12:26: "I shake not the earth only, but also heaven."

Friends, let us not put our trust in the conjunction of planets nor in the precession of the equinoxes, but in the promises of God. Let us heed the words of the Lord: "Look unto me, and be you saved, all the ends of the earth." Isaiah 45:22.

"In the cross of Christ I glory,
Towering over the wrecks of time;

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All the light of sacred story
Gathers round its head sublime.”

“When the woes of life overtake me,
Hopes deceive, and fears annoy,
Never shall the cross forsake me;
Lo! it glows with peace and joy.”

Sir John Bowring

8. Heaven’s Brightest Star

WE have been speaking here about the bright stars of the sky and their shining testimony to the Creator’s power. There is our sun, itself a star, which sends to this earth alone 63,000 horsepower of solar energy for every person now alive, or 127,000,000,000,000 horsepower for the entire earth. And the earth occupies only one pin point in space which receives the Sun’s blazing energy and light. The brightness of our sun-star is said to arise from energy amounting to 77,000 horsepower for each square yard of its surface, sufficient to melt in one hour a layer of ice 3,300 feet thick over the entire surface of the sun.

Forest R. Moulton says that the sun is pouring out light so fast that it is radiating away its substance at the rate of 133, 000,000,000,000 tons each day, but even at this enormous rate, it will take over 150,000,000,000 years for it to lose 1 per cent of its stupendous mass, even if not replenished. Well, this will give plenty of time for God’s people to begin to enjoy the new earth, and surely the God who could create such a star as the sun and set it for a light in the heavens, can keep it going without being concerned about the passage of time.

Yes, our sun is a bright star, more than a million times as large as the earth. But there are some suns brighter still, and others not so bright. Do not the Holy Scriptures say: “There is one glory of the sun, and another glory of the moon, and another glory of the stars: for one star differs from another star in glory?” 1 Corinthians 15:41.

Think of it! Beautiful white Sirius is 27 times as bright as the sun; the yellow star, Capella, is 200 times as bright as the sun; and the white star Rigel, in the constellation of Orion, is about 14,000 times as bright as our sun. Antares, the red star, one of the largest known-90,000,000 times as large as the sun-also is 14,000 times as bright. It is said that the star S Doradus is the brightest of all, radiating 500,000 times as much as the sun, which is, of course, beyond our comprehension.

Halley, in 1718, was the first to prove that the stars are all in rapid motion. The sun is moving toward the star Vega at about 63,000 feet a second, so that every time the clock ticks the solar system is about 12 miles closer to that great blue star. The red star-sun Betelgeuse is receding from us at 13 miles a second, and the Great Spiral Nebula in Andromeda is approaching us at the rate of 185 miles a second; but it is 900,000 light-years away and we, too, are moving at about 200 miles a second about the great wheel of the Milky Way, so that is nothing to perturb us.

The fastest moving first-magnitude star is orange-colored Arcturus. Its diameter is 27 times that of the sun and it is 100 times as bright. It flies away at a speed of from 200 to 257 miles a second. Think of it-15,000 miles a minute! And what must be the momentum of this great runaway star racing at such inconceivable speed along its predetermined path! When we think of this we begin to see the hidden meaning in the question that the Lord put to Job: “Can thou guide Arcturus with his sons?” Job 38:32. The fact that Arcturus is the fastest star visible in our sky was discovered only recently, but the Creator knew it from the time He made it and sent it racing through space. All the men who ever lived could not exert enough power to turn Arcturus from his course. No, we cannot guide Arcturus and his sons, but God can and does. “That He is strong in power, not one is lacking.” Isaiah 40:26. (A. R. V.)

But for something still more interesting, let us read Job 38:31: “Can thou bind the sweet influences of Pleiades, or loose the bands of Orion?” Here we have a scientific fact revealed in the Scriptures thousands of years before modern astronomers discovered it, and it is this: All the bright stars are moving all the time at an average speed of 10 miles a second, so that all the 90 constellations are gradually changing their shape-all except the Pleiades and Orion! The stars in these two groups seem tied together by

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some invisible force so that these constellations move on, unchanged forever. God was calling the attention of Job to the fact that He could guide these fastest bright star and that He had tied up the Pleiades and Orion so that they would never change with relation to the rest of the heavens. Surely it is true that the more astronomical discoveries we make, the more we agree with the psalmist of old who said: "The heavens declare the glory of God; and the firmament shows his handy work." Psalm 19: 1.

Some astronomers have concluded that Alcyone, the brightest star of the Pleiades, is the actual center around which all the stars in our universe are revolving. The prophet Amos said: "Seek him that makes the seven stars [that is, the Pleiades] and Orion, and turns the shadow of death into the morning, and makes the day dark with night. That calls for the waters of the sea, and pours them out upon the face of the earth: The Lord is his name." Amos 5:8.

The original Chaldaic word translated "Pleiades" is. Chimah and means hinge, or pivot, and, if the seven stars of the Pleiades are actually the pivot upon which our universe swings, there is a wonderful meaning in the words of the inspired prophet Amos. If you have average eyesight, you can see six stars in the Pleiades; eyes a little better than average easily see five more; but the modern telescope reveals 500. Astronomers tell us that the light which you see tonight from this beautiful constellation started on its journey about 350 years ago. The stars making up this family which never separates are immense, brilliant suns-every one of them. They all have identical spectra and are bound by the great band commanded by the Creator. As we look at this and all our vast system of stars, ever moving silently like some vast, complex machinery, yet with an evenness and regularity that can be described as "sweet"-the very word used by engineers to express perfectly smooth working-we begin to see more meaning in that Bible phrase, "the sweet influences of Pleiades."

We could spend a whole lifetime in the study of the stars, and even then we would only begin to learn a little about the infinite hosts of heaven. If these suns and stars and systems are so great, what about the God who made them? As our conception of the universe enlarges, our reverence for the Creator also increases. When we look into the sky we see many stars that are hundreds and even thousands of times as bright as our sun-such stars as Capella, Areturus, Betelgeuse, Deneb, Canopus, Antares, Rigel-the last four blue white super suns, 114,000 times as bright as our sun. We look at them there, the shining witnesses to God, who is "upholding all things by the word of his power." Hebrews 1:3.

But what our poor hearts need to see is another Star, the brightest Star of all. I mean Jesus. With the heavenly Father, He was the Creator of the glorious constellations that we have been talking about; but He Himself is called a Star in the Holy Scriptures. We find this in the unwilling prophecy of Balaam recorded in Numbers 24:17: "There shall come a Star out of Jacob, and a Scepter shall rise out of Israel." This was a prophecy of the Messiah, and was so understood from the earliest times. And in Revelation 22:16 we read these words of Christ: "I Jesus have sent mine angel to testify unto you these things in the churches. I am the root and the offspring of David, and the bright and morning star."

These are the words of our Savior, and they are true. What good will it do us to study the stars unless we know heaven's brightest Star?

Compared with the mighty universe, the life of a man is but a second on the gigantic clock of unimaginable time. "When I consider thy heavens, the work of thy fingers, the moon and the stars, which thou has ordained; what is man, that thou art mindful of him? And the son of man, that thou visits him?" is the question of David in Psalm 8:3, 4. And the more men study the heavens, and the larger the telescopes they point toward the skies, and the farther they push back the curtains of the boundless voids, and the deeper they look into the fathomless depths, and the higher they gaze into the ascensions of unnumbered universes, the more obvious the answer: Man is nothing! But, measured by the cross of Calvary, man is worth everything. Christ, the Son of God, He who was with God in the beginning, from whose creative word rolled suns and stars and systems into being-He came to earth. He "being in the form of God, thought it not robbery to be equal with God: but made himself of no reputation, and took upon him the form of a servant, and was made in the likeness of men: and being found in fashion as a man, he humbled himself, and became obedient unto death, even the death of the cross." Philippians 2:6-8. The cross is the answer to the question, What is man worth?

"For God so loved the world, that he gave his only begotten Son, that whosoever believes in him should not perish, but have everlasting life." John 3:16. If God considers the worth of a soul to be so great, what do you think of your own salvation? What is it worth to you?

Some years ago Prof. Edward Lee Thorndike of Columbia University put a series of questions to a group of unemployed young men and women. First he asked them for how much money, paid in cash, they would be willing to practice cannibalism if the fact were to appear the next day on the front page of all the

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New York papers. The men asked a median price of \$260,000,000, the women \$1,375,000. When he promised them secrecy, the men dropped their price to \$50,000, but the women wanted \$750,000. Next he asked how much they would take for the loss of their left arm. The young women wanted \$1,000,000, the men \$1,000,000,000. The men said they would be willing to go insane during the month of July every year for \$95,000,000. The women wanted only \$4,500,000. The men would get completely intoxicated for \$25, the women for \$98. To spend their lives in a Manhattan apartment, never going outside the door, the men demanded \$10,000,000, the women \$62,500,000. Then, last of all, they were asked what they would take to abandon all hope of life after death, and the answer revealed that something had happened to the faith of these young people. The men wanted \$1,000, the women \$101.

Professor Thorndike suspected that many of his subjects would act contrary to their answers if they were actually confronted with the money, and this may well be true. But friend, just a minute! What would you take, what are you accepting to give up all hope of life after death, that eternal life promised by the Lord to all who believe on Christ? You may think that these young people counted the blessed hope cheaply, but thousands today are giving up all hope of a life beyond for exactly - NOTHING!

O friend of mine, your soul is precious in the sight of God, for you have been redeemed "with the precious blood of Christ (1 Peter 1:19), if you will accept this redemption. The Creator of the heavens is the Redeemer of the cross-your Redeemer, your Savior. Would you come to Him now?