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## Heavens Declare the Glory of God: Questions and Answers Concerning God's Vast Universe Part 1

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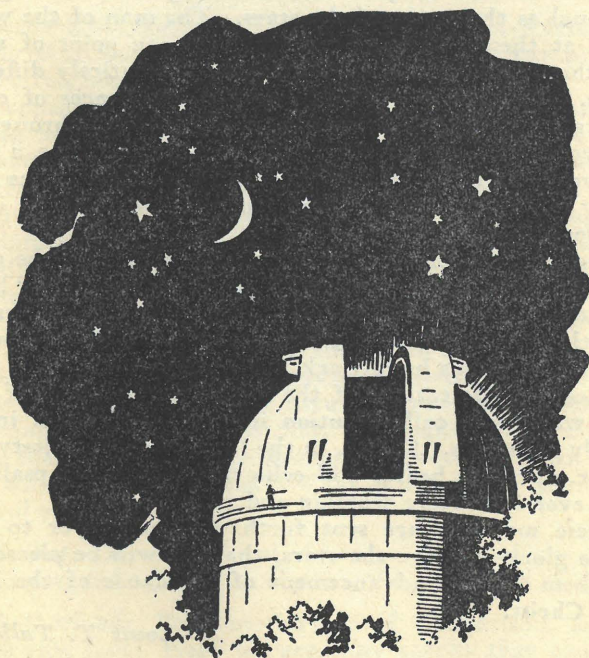
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# *The* HEAVENS DECLARE *the* GLORY of GOD

Questions and Answers Concerning God's Vast Universe

BOOKLET NUMBER ONE



*The Bible Institute on the Air*

Radio Voice of

THE BIBLE INSTITUTE OF LOS ANGELES



## FOREWORD

For several months it was my privilege to broadcast the messages contained herein in question and answer form with Dr. S. H. Sutherland, Dean of the Bible Institute of Los Angeles, over a chain of thirty Pacific Coast radio stations.

There are few subjects as fascinating to the average individual as the study of the stars. The man of the world looks at these glories of nature from one point of view, but the Christian beholds them from an entirely different angle. As we rise above the petty annoyances of every day, as we forget the unrest now prevalent throughout the world, letting our eyes scan the starry heavens, a sense of awe overwhelms us. Indeed, the world itself seems relatively small and unimportant when it is considered in its relation to God's vast universe.

The psalmist tells us that "the heavens declare the glory of God; and the firmament sheweth his handiwork." Surely the glory of God has been revealed in the heavens so that the wayfaring man, though a fool, can not escape the evidence of God's handiwork in all creation. It is to some of these manifestations of the wisdom and power of God that we would call attention in these broadcasts immediately before us. Surely, in the light of such majesty and power, our own hearts will echo the song of the psalmist, with ever-increasing worship and praise.

These messages are sent forth with a prayer to God whose glory is above the stars, that He will be pleased to use them for the advancement of the cause of the Lord Jesus Christ.

*Louis T. Talbot*

*Dr. Talbot:* Dr. Sutherland, as I look out at the skies on a clear night, I am amazed at the bigness of God's creation and at the insignificance of my own self. The thought that comes to me is expressed by the psalmist,

"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?" (Psalm 8:3, 4).

Have you ever felt that way as you have looked at the stars at night?

*Dr. Sutherland:* Yes, Dr. Talbot, I certainly have felt just exactly that way. When we view things in their proper perspective, we do not seem very important, do we? Man then appears as a rather small, insignificant organism, moving around on this microscopic speck which we call the earth; and it is lost in the vastness of God's creation. But the thing that is wonderful about man is that God has given him an intellect whereby he can contemplate the bigness of God and comprehend in some measure the vast difference between the infiniteness of God and the littleness of man. When we look at the heavens, we do not seem very important in our own estimation. It is only when we look at the minute things of life through the microscope that we begin to get an exalted opinion of our own importance. But if we turn that microscope around, re-arrange the lenses somewhat, and make it into a telescope, then we realize the proper perspective. Then it is that we ask the question, "What is man that thou art mindful of him?"

*Dr. Talbot:* Dr. Sutherland, what are some of the comparisons regarding the size of man, the earth, and the sun?

*Dr. Sutherland:* For the purpose of comparison, let us realize this fact: Here we are, tiny specks that can not be felt in the least by a ball as large as our earth. But our earth itself is only a tiny speck. It would take one million, two hundred thousand such specks or balls the size of our earth to fill a ball the size of the sun. And yet, as we discover from a study of astronomy, the sun itself is



a comparatively small object, probably smaller than the average suns which are in the sky.

May I say just this as a basic fact? All of the stars that we see with the naked eye; or indeed, with the telescope for that matter, are suns; and most of them are larger than our own sun. Strictly speaking, of course, the planets are not stars. They are objects like our own earth. And the only reason we can see them is because of the reflected light from the sun, whereas the true stars in the heavens are all suns themselves. When we consider the fact that there are millions upon millions of such suns in the sky, then we realize that we are relatively quite unimportant in respect to size.

*Dr. Talbot:* Tell us a little about this planet on which we live.

*Dr. Sutherland:* I have often been impressed with the relative size of man and the earth. No wonder the ancients used to think that the earth was the center of the universe; because, as we look out upon it from a high mountain peak, or as we view the vast expanse of the ocean, we are impressed with the bigness of this planet on which we live. I realize, of course, that the earth is approximately 8,000 miles in diameter and 25,000 miles in circumference; but I was reading not long ago this striking fact: If the earth were viewed from a distance so that one could see it as we might observe a smooth-skinned orange held at arm's length, the great mountain ranges that seem so formidable to us and the great depths of the ocean which scientists have discovered would disappear almost entirely. In other words, Dr. Talbot, if the earth were a ball that could be shrunk to the size of a smooth-skinned orange, the surface of the earth would be as smooth as the skin of the orange. Compared, then, with the size of the earth, these mountain ranges do not seem so high, do they?

*Dr. Talbot:* No, Dr. Sutherland, they certainly do not. It is only when we, small, insignificant creatures, begin to hike up those mountain ranges that they take on such tre-

mendous proportions. They seem big compared with us. Compared with the world, they are not so high.

But you spoke a moment ago of the great depths of the ocean. Have you any more information on that subject for us?

*Dr. Sutherland:* Yes, Dr. Talbot, I have. I am sure you have stopped to realize something of the significance of God's infinite care in creating this world of ours exactly as we find it. I have stood down by the seashore and watched the waves rolling in. It is an impressive sight. Sometimes those waves are small when the sea is smooth. Sometimes they are mighty billows that rip and tear the shore-line and any objects which are in their way. Then it is that we are amazed at the tremendous power revealed there. We should be very thankful that we are kept at such an even keel so far as our earth is concerned, for God has dealt with us most graciously in this regard. By way of comparison, suppose you were to take a saucer six inches in diameter and fill it to the brim with water; then hold it in your hand at arm's length and try to walk across your living room at home. Inevitably you would spill some of that water over the edge of the saucer; for, in spite of your effort to hold it as steadily as possible, you would create little waves, about one-eighth inch from the crest of the trough; and that would be sufficient for the water to splash over. Suppose God's hand trembled just as much as your hand trembled as you held that saucer. Do you realize that if that were the case, waves would be created which would have to be measured, not in terms of feet or yards, but in terms of many miles? They would be approximately one hundred and fifteen miles high. Surely we should be very thoughtful about thanking God for holding us at such an even keel!

*Dr. Talbot:* Yes, we certainly should be thankful for all the way the Lord guides, for all His protecting care, and for His provision for our every need. But, fascinating though it is to study the physiological conditions that exist here upon this earth, we must move out into other parts and discover there what is going on. What is there about



the force called gravity that attracts your attention, Dr. Sutherland?

*Dr. Sutherland:* I was impressed not long ago with the tremendous power of gravity as I observed the tides here along our Pacific Coast line. I can see the tides come in and go out, but have been somewhat baffled to know where the water goes when the tide is out. Does that mean that it is "in" on the other side of the ocean? And then I began to think about the tremendous pulling power of the moon that could actually move a vast body of water, drawing it toward itself as it revolves around this earth. How great God is in being able to do that by the utterly mysterious power, of which we understand absolutely nothing, but which we call gravity!

You know, the subject of the moon has always fascinated me. When I look at the surface of the moon with the naked eye, and see there those strange lines and dark areas, I imagine I see one thing; but when I view it through a telescope, which makes it look as though it were only a hundred miles away, I am amazed at the moon's surface. Someday, when I get my resurrection body, I am going to take a little trip of exploration and view from close range some of the wonders that surely must be found there upon the moon.

*Dr. Talbot:* It will surely be a wonderful experience to get a close-up view of the moon when we get our resurrection bodies. But tell us some more about the moon and its features.

*Dr. Sutherland:* Yes, Dr. Talbot, that is going to be a great experience. As a matter of fact, I should rather wait until we get our resurrection bodies to make that trip than to depend upon some sort of rocket projectile that might send us to the moon. There would be many unsolved problems connected with such a projected tour.

In the first place, if we could get safely inside a projectile of that sort and steer ourselves out of our atmosphere, it would be somewhat of a problem to know how to steer ourselves toward the moon because it is traveling at a

terrific rate of speed around the earth. Besides, we need our atmosphere in order to steer a ship. We could hardly dare hope to get into the gravitational pull of the moon and get to our destination, because the gravitational pull of the moon is practically nil upon any object as small as a projectile would be.

And then, you know, astronomers tell us that on the surface of the moon there is doubtless a great layer of pumice-like powder formed by the breaking down of the granite surfaces as a result of the excessive cold and intense heat. If one were able to steer his rocket ship onto the surface of the moon, he would have to go down into that powdery layer for no one knows how many feet, before striking anything solid enough to stop his progress. Of course, this powdery substance is not blown away because there is no atmosphere on the surface of the moon. It is too small a body to hold an atmosphere. Hence, there is no water on the moon either; and it naturally follows that there is no vegetation whatever on the surface of that great satellite of ours.

If an individual were able to walk around on the surface of the moon, he would find himself in a rather embarrassing situation; for, if he got into the sunlight, the temperature would be far above the boiling point; and if he got away from the sunlight, he would be in pitch darkness far below the freezing point. He would need to have a ready change of garments to adapt himself to those conditions. Bear in mind that there are no shadows on the moon. There is either intense sunlight or deep blackness. Our dawns and twilights are caused by the atmospheric condition which surrounds the earth. There is no such condition on the moon. It is a lifeless body; and I verily believe that it was placed there for the enjoyment of God's people. It is there, in order that we might understand something of God's care for us in providing beautiful things for our consideration; for there is certainly something beautiful about the moon which has touched the hearts of lovers, poets, and songsters alike. If we can see back of it all the hand of a loving God, we can doubly enjoy its beauty and receive blessing therefrom.



*Dr. Talbot:* But as interesting as the moon is, we must move on out to the other objects of the sky. What is there about the sun that first attracts your attention?

*Dr. Sutherland:* I think the sun is without doubt the most important astronomical subject which can engage our attention. We ought to discuss it at some length, in order to present a rather comprehensive view of this magnificent star which provides light, heat, and comfort for our planet. Our Lord said,

"I am the light of the world: he that followeth me shall not walk in darkness, but shall have the light of life" (John 8:12).

There are numerous comparisons found in Scripture between our sun that gives us light and the living Son of God, the One who is the true Light of the world. This comparison is not by mere accident. I verily believe the Lord put it in His Word, in order that, in the course of time, we might be able to comprehend more fully His wonderful love as we understand more and more of the beneficent effects of the sun.

*Dr. Talbot:* It is a wonderful thought to realize that, as the sun gives light to our physical bodies and helps to sustain life, so the Son of God gives light and life to our spiritual natures. But what else is there of interest about the sun?

*Dr. Sutherland:* Of course, every school child knows that the sun is approximately 93 million miles from the earth; and that, because of this distance, it looks only a little larger than the full moon. But as a matter of fact the sun is 864,000 miles in diameter and it is enveloped in flames, the tongues of which often reach up from one hundred and eighty to two hundred thousand miles from the surface of the sun. These are called prominences. It is almost impossible for us to comprehend the immensity of the sun. As we said a little while ago, it would take a million, two hundred thousand balls the size of the earth to fit into a ball the size of the sun. Even then there would be plenty of room for thousands upon thousands of balls the size of the moon.

There are other ways of comparing the size of the sun with the earth. Suppose we were to put the earth in the center of the sun. Of course, the orbit of the moon, 238,000 miles from the earth, would be completely within the sun; and in order to get to the surface of the sun, we should have to travel 194,000 miles farther. This is only one-half of the sun's diameter.

When we contemplate the gravitational pull of the sun, we realize anew something of that power which holds our solar system in order and enables us to study these celestial objects at our leisure.

*Dr. Talbot:* Dr. Sutherland, you have made us seem very small, indeed. And did you say the sun is one of the smaller stars in the sky? If that is the case, we are surely lost in the bigness of the universe. I am glad this force called gravity holds us in place.

*Dr. Sutherland:* So am I, Dr. Talbot. That gravitational pull is a most fascinating subject. Nobody knows what it is, but I am exceedingly thankful we can feel it; for were it not affecting us, we should be thrown off the surface of the earth in short order; this earth of ours would certainly get out of its orbit and go wandering around in stellar space; and if we got very much farther from the sun, we should be very cold. Indeed, it must get far below zero out there where there is practically no effect of the sun's warming rays.

This gravitational pull, of course, holds our planets within their orbits. It holds Mercury, that tiny planet which is in a continually hot spot because of its close proximity to the sun. It is tearing around the sun at a merry clip, making its complete revolution in about three months. Then there is Venus which takes a little longer time to revolve around the sun because its orbit is much longer than that of Mercury. Venus requires  $7\frac{1}{2}$  months to make its year complete. Our earth swings around in its orbit of 186,000,000 miles in diameter and requires about  $365\frac{1}{4}$  days to make a complete trip. Then follows Mars with its wider orbit and correspondingly longer year; and out be-



yond Mars are Jupiter, and then Saturn, Uranus, Neptune and, finally, that new discovery, the planet Pluto.

*Dr. Talbot:* Do they move at a constant rate of speed, or do they move rather carelessly through space?

*Dr. Sutherland:* The remarkable part of it is that these planets are keeping perfect time. We know, to the second, exactly how long it is going to take for us to make our journey around the sun. We can gauge our distance and our rate of speed perfectly by comparing our position with the stars of the heavens.

This fact leads me to present a proposition especially to young people who may be listening in. It is this: If God did not create these things, who did? There are those who tell us that the creation of our world and the worlds about us was by mere chance. They say there is no Supreme Being.

I hold in my hand a watch. The watch is a twenty-one jewel Hamilton, one of the best watches that can be obtained. It keeps extremely accurate time; that is, when I wind it and do not tamper with it. When I see a watch like this, I come to the conclusion that, because it keeps accurate time and because it is so expertly put together, there must be a master-mind back of it all—one who designed the watch, one who directed the making of the parts so that I can enjoy the finished product. I can gauge my day and know exactly what time it is by consulting this watch. Now it would be sheer nonsense for me to suppose that this watch just happened to come into existence, would it not? I could take the component parts of this watch, mix them all up, and put them in the bottom of a wash tub. And I could shake that wash tub until doomsday, regardless of how distant that occasion might be; yet I could never produce a watch like this, a mechanism that keeps accurate time. No, somebody made it; somebody designed it; somebody put it together. It is the product of a mind.

*Dr. Talbot:* All of this is very interesting; but tell me, what does your watch have to do with the stars?

*Dr. Sutherland:* First let me ask you a question. With what does this watch keep time? How is it gauged? The answer is obvious. It keeps time with the stars, because the stars are perfect in their running order. I submit to you, Dr. Talbot, that it is just as reasonable to suppose that there is a master-mind back of this universe, which keeps such perfect time that we could never improve upon it, as to suppose that there is a mind back of this watch. The only thing that we can do with our best minds is to create instruments that will approximate the accuracy of the stars which we see about us. Of course, this is known as the teleological argument for believing in the existence of God. No skeptic has ever been able to answer it. It proves beyond all doubt to the reasonable, thinking individual that God is, and that God is absolutely perfect and accurate in all that He does.

*Dr. Talbot:* You mean to say that our watches all keep time with the stars; that is, if our watches are accurate? And in view of the fact that God has started these stars, we can be sure of keeping the correct time by clocking with them?

*Dr. Sutherland:* Yes, we can. And He has given us a little of the beauty of His creation for us to behold as we look at the members of the sun's family through the telescopes which are available to us. I have never ceased to marvel at the beauty of the planet Saturn, with its mighty rings that encircle it. Again, I am thrilled anew as I look at Jupiter and have the astronomers point out to me the satellites that revolve around that beautiful star in our night sky. Sometimes I wonder if there is life on those planets. Certainly there cannot be life as we know it; but is there some form of life that has been created in the image of God? Or are those planets and the stars in the heavens merely for our enjoyment?

"The living God . . . giveth us richly all things to enjoy" (I Tim. 6:17).

And we who are members of His family through faith in the Lord Jesus Christ acknowledge His goodness to us in providing these wonders for our pleasure. Some day we



shall know the answer to these questions; and what a glorious experience that will be!

*Dr. Talbot:* I suppose you mean when we get our resurrection bodies, Dr. Sutherland. It will be wonderful to view God's universe when these bodies are "fashioned like unto his glorious body." Then we shall really see the beauty of His creation. But tell me, how did these planets come into existence anyway?

*Dr. Sutherland:* There are several views as to how these planets came into existence, particularly as to how our world came into being; and, of course, we are primarily concerned about this particular planet which we call our world. There are those who believe in what is called the "nebular hypothesis;" that is, that there was once a great cloud of fire rotating in the heavens similar to the great galactic system in the constellation of Andromeda. We shall talk about that some time. Gradually, through countless ages, according to this theory, this great cloud of fire cooled off; and with the cooling, it became more and more condensed until the particles finally were joined together by this mysterious thing called "gravitational pull." As it condensed, rings were thrown off; and ultimately these rings became planets which revolve around the sun.

*Dr. Talbot:* That sounds rather fantastic to me. Is that the best theory men can present as to how the earth came into existence?

*Dr. Sutherland:* Yes, Dr. Talbot, there are many problems connected with this theory which preclude it, so far as most thinkers are concerned, from being a reasonable explanation of the origin of our earth.

*Dr. Talbot:* It certainly seems to me that men do some vain imaginings in trying to explain something of which they know nothing.

*Dr. Sutherland:* You are right. There is another theory known as the "attractional theory." This view suggests that the planets were never a part of the sun, but were attracted to the sun by gravitational force, and that they

came into our solar system from the infinite reaches of space. This, too, is not very widely held.

The third theory is known as the "meteoric theory." That is, meteors, they say, were attracted to each other by gravitational pull; and, in the course of combination, they built themselves up into solid worlds and then were drawn into the gravitational pull of the sun. There is no evidence, however, that this is the situation.

Yet another view is the "collisional theory." This one holds that two stars, either one of which or both of which might have been dead—that is, they were not burning suns, but merely dead objects—in their wanderings through space crashed in a head-on collision, causing the release of tremendous heat. This heat became our sun, and the shattered parts of matter which were thrown off became our planets. That, too, is a very interesting view; but again there is no evidence to support it.

*Dr. Talbot:* When men get beyond that which is self-evident, they are inclined to become rather foolish in their thinking, are they not? But are there yet other man-made ideas on this subject?

*Dr. Sutherland:* There is still another view known as the "planetesimal theory," which is a little more widely held than some of the others. This theory supposes that the sun, in the midst of some great excitement caused either by a passing star or by activity from within, exploded, shooting out into space great chunks of itself. These parts, being comparatively small, cooled and condensed through the ages and became planets revolving around the parent star.

The sixth view held by some is known as the "tidal theory." That is, a star equal to or greater than our sun, passed relatively close to this star of ours; and the gravitational attraction pulled out of the sides of either one, or possibly both stars, great streams of flaming substances. Most of this substance fell back into the respective stars, but some of it did not fall back; and in the course of the ages became the planets which revolve around the sun.



*Dr. Talbot:* But, Dr. Sutherland, these theories do not solve the problem at all. They actually raise more questions than they answer, do they not?

*Dr. Sutherland:* That is right. You will notice, Dr. Talbot, that all of these are purely speculative. There is no evidence whatever for believing any of them. They are simply figments of man's imagination, in an effort to explain how these things came to be.

*Dr. Talbot:* I am certainly glad that I do not need to depend on man-made speculation to answer my original question as to how this earth came into existence. Let us hear what God has to say about it.

*Dr. Sutherland:* There is another explanation which has the stamp of divine authority upon it. It is, therefore, the most sensible, the most reasonable, and the true explanation. We can find this view explained very briefly in the first chapter of Genesis, and in the very first verse. "In the beginning God created the heaven and the earth." There is the grand view of the origin of things. It puts mind above matter. It puts God in His proper place and creation in its proper place. It recognizes the existence of God, the reality of matter, and the facts of the case as they may be observed. This is the sensible explanation.

*Dr. Talbot:* Dr. Sutherland, a few moments ago you mentioned the light and heat which radiate from the sun. Tell us a little more about this interesting fact.

*Dr. Sutherland:* Dr. Talbot, we can best illustrate the action of the sun by comparing it with an electric light in our room. The light shines steadily; that is, so far as our eyes are concerned, because the filament in the light is red hot as the result of the electrical energy. The sun gives forth a steady light because it, too, is red hot, although the temperature is much higher than that which we associate with "red hot." Just as the lamp filament, in order to remain hot and therefore bright, must receive electrical energy over the wire from the power house, so the sun receives energy and heat from its interior; and thus the outer layer is kept at a terrific heat and lights up the earth 93 million miles away. Indeed, it lights up the

planets which are far more distant from the sun than is the earth.

*Dr. Talbot:* We have here a very practical lesson, have we not? If we would remain on fire for the Lord, we, too, must receive power from within, even from the Holy Spirit who dwells within each believer.

*Dr. Sutherland:* Some statistician has figured out that every second the earth receives a hundred billion dollars worth of light and heat from the sun. Figure that up, if you care to, and see how much value we get from the sun in a month. It has also been estimated that the earth receives less than one two-billionth part of the sun's total output of light and heat. Practically all of the rest of the sun's light and heat moves out past the realm of our solar system and is lost in the abysmal depths of interstellar space. I tell you, Dr. Talbot, when God does things, He does them in a big way. You know, if we had this business to perform, we should beam the sun's light and heat to the earth and conserve the rest of its heat and energy. But God does not do it in that way. He spreads His blessing near and far. We see this in all of nature. Desert flowers bloom whether men are there to see them or not. The snow falls upon the surface of the earth and makes the landscape beautiful whether a man is present to see it or not. God is completely unselfish in the distribution of His blessings and benefits to mankind.

*Dr. Talbot:* That gives us a wonderful spiritual lesson, doesn't it, Dr. Sutherland? It makes us realize that God's blessing is shed abroad so that, wherever we go, we can find there His blessing and His benediction awaiting us, if we but incline our hearts toward Him. We do not need to go into a certain place or assume a certain form in order to be ready to receive this blessing from the Lord; but, if our hearts are right, we can have His benediction resting upon us wherever we are and wherever our duty may lie. But tell us more about the sun and some of the interesting features connected with it.

*Dr. Sutherland:* One of the most interesting facts is that the sun is constantly giving itself away, literally burning



itself up, in order that we might have its light and enjoy its heat. Scientists have figured out that it will take several billion years for the sun to burn up, but it is expending its energy at a terrific rate. What will happen when it actually burns itself out is a mystery; but we shall not be here to worry about that anyway. Therefore, we can go on enjoying the sun's beneficent rays as long as we live.

*Dr. Talbot:* Dr. Sutherland, it is a most comforting thought that the sun will be here as long as we desire to use it. I have read somewhere that the sun is called a "dying star;" that is, no less than 360,000 millions tons of matter are consumed every day, in order for the sun to maintain its present degree of radiation. The sun weighs 360,000 million tons less today than it did yesterday. Figured in terms of our concept of weights and measures, it looks like a vast amount; but considered in terms of the total weight of the sun, it amounts to practically nothing. But let us hear a little more about the sun before we move into the vast reaches of the space beyond.

*Dr. Sutherland:* Did you know, Dr. Talbot, that every square yard of the sun emits energy equal to 130,000 horsepower? When you figure that the sun is 864,000 miles in diameter, you get something of the total amount of energy that is being released by this great powerhouse.

*Dr. Talbot:* It is very interesting to talk about the energy used by the sun, but I cannot conceive it. Is there not some other way of comparing the energy and the heat given off by the sun, so that an ordinary person can understand it a little better?

*Dr. Sutherland:* It has been pictured for us in another way: "If the sun were frozen over completely to a depth of 64 feet, the heat from the interior would be sufficient to melt this solid encasement of ice in one minute." Or, it has been pictured for us in this manner: "If an ice bridge could be formed from the earth to the sun,  $2\frac{1}{2}$  miles in width, the concentrated radiation of this huge heating plant would melt that ice bridge in one second of time."

*Dr. Talbot:* Dr. Sutherland, I am glad that I am 93,000,000 miles away from the sun!

*Dr. Sutherland:* The Lord knew what He was doing when He put this earth in its orbit 93,000,000 miles away from the sun. We have just enough heat to make us comfortable, and yet we are not so close that we are uncomfortable. Furthermore, the Lord made this earth just the right size to hold the proper amount of atmosphere, so that it would check the powerful rays of the sun and disseminate them for our health and convenience. If the earth were larger, there would be more atmosphere and its contents would be decidedly changed. Such is the condition, for instance, on the planet Jupiter. Jupiter has such gravitational effect upon the atmosphere because of its great size that the surface of the planet is covered with two gases: ammonia and methane. These gases are both poisonous to human beings; there, life as we know it does not exist upon the planet Jupiter. On the contrary, if the earth were appreciably smaller in size, the oxygen and hydrogen gases would not be held to the surface of the earth, and we should surely die for lack of the air that is so vital to our well-being. It all adds up to the fact that the Lord knew what He was doing when He fashioned the earth and when He placed the various chemical elements here in just the proper proportion so that we might be benefited thereby. This great layer of atmosphere is about 48 or 50 miles thick; and then we get into the hydrogen sphere. Ultimately the atmosphere disappears completely. This great layer of air around us acts as a cushion so that the sun's rays do not strike us with all of their force, but they are mellowed and subdued and we are benefited by them instead of being destroyed by them.

*Dr. Talbot:* Dr. Sutherland, I have been reading about the sun spots that appear from time to time on the surface of the sun. Do astronomers know anything about them?

*Dr. Sutherland:* Yes, Dr. Talbot. The sun spots have been a most interesting study for a long time because they occur in such great number, and apparently they affect the earth vitally; for when the spots are most numerous, certain electrical variations occur here upon the earth. These sun spots appear in the telescope as dark spots on the surface of the sun. For a long time no one knew what those



dark spots were, but photographic investigations have revealed the fact that they are dark only by comparison with the blinding brilliance of the rest of the sun's surface. The blackest parts of these sun spots exceed the brilliance of an immense arc light here upon the earth. There are in reality great holes in the surface of the sun that go down into its heart for thousands of miles. Apparently through these great depressions; or, if you please, they may be likened to vast whirlwinds; great volumes of gas are being ejected from the interior at terrific speed. The gas is highly compressed in the sun; but as it is shot out from the surface of the sun for thousands of miles, it expands and becomes a flame. We see these great tongues of flame shooting out from the sun's surface; astronomers call them prominences. This gives us just a little hint as to the unimaginable pressure that exists within the interior of the sun. I am glad I am not there. It has been estimated that the temperature of the sun is no less than 50,000,000 degrees. This is purely a conjecture because there is no conceivable way of measuring the temperature at such a distance. We have no instruments that would remotely approximate such a procedure. Therefore, a few million degrees more or less, when talking in terms of 50,000,000 degrees, means practically nothing. Suffice it to say, it is very, very hot.

*Dr. Talbot:* Our minds can hardly comprehend these things. I was recently in a place where it was 120 degrees in the shade. That was hot enough for me. But as you have been speaking, Dr. Sutherland, I have been impressed with the fact that our minds become utterly baffled at the very immensity of the things which we see about us. I realize anew that there is no adequate explanation for the origin of such a star as our sun apart from the account given in God's Word, "In the beginning God created the heaven and the earth." He fashioned the stars with His own fingers, and He holds them all as in the hollow of His hand.

*Dr. Sutherland:* Yes, Dr. Talbot, it is a wonderful fact. We cannot comprehend how these things work; nor do we understand why they work; but the glorious thought is

that we can know the One who made them all, for He is none other than our Lord Jesus Christ. We come back to that eternal truth time and time again as we continue in these studies. There is no greater marvel than this to be found in the Word of God: Jesus Christ made the things that we see about us; and we can know Him, the Creator, as our personal Saviour and Friend. Surely God has not created all these things for us to enjoy only during the few years of our earthly life. I verily believe that He has created them for our permanent enjoyment; I believe that they are included in those wonders which He is going to show to us in the ages to come. It will require the ages to come for us to be able to comprehend the majesty of God's creation.

*Dr. Talbot:* But let us move out into the farther reaches of space, Dr. Sutherland. After all, these planets and the sun itself are merely our next-door neighbors. We want to see what is going on out there beyond them.

*Dr. Sutherland:* When I think of the stars in the infinite regions beyond us, I wonder if Job was not a great astronomer himself; for we often read in the book which bears his name of the heavens above and stars in it. Job even named some of the stars for our convenience. One of his friends spoke to Job in these words,

"Stand still and consider the wondrous works of God."

When we consider the distance out there in space, we are reminded of another one of Job's friends who asked the question,

"Is not God in the height of heaven? and behold, the height of the stars, how high they are."

You know, Dr. Talbot, when astronomers begin to deal in terms of distance in the heavens, they cease talking in terms of miles, which are our standard of measurement; they begin to speak of light years. Accordingly, stars in the heavens are so many light years distant from the earth.

*Dr. Talbot:* Now, Dr. Sutherland, you are getting beyond



me. Just what is a light year? How far should I have to go in miles if I were to travel a light year?

*Dr. Sutherland:* That is a very interesting proposition. A light year is the distance that light travels in one year of time, at the rate of approximately 186,000 miles a second. To translate that figure into terms of miles, all you have to do is multiply 186,000 by 60. That gives you the number of miles light travels in a minute. Multiply that figure by sixty again, and that gives you the number of miles light travels in an hour. Multiply that figure by 24, and that gives you the number of miles that light travels in a day. Multiply that figure by 365, and you will have the distance that light travels in a year; that is a light year. It is a long distance in anybody's language. We think that light travels very fast, for it could circle the earth seven times in one second of time.

*Dr. Talbot:* That is fast enough for me. But you say that those distances in space must be measured in terms of light years, rather than in terms of miles because the distances are so great? Is that it?

*Dr. Sutherland:* Yes, Dr. Talbot, that is it. These light years reveal to us something of the infinite reaches of space. There is no other speed which begins to describe adequately the distances out there in the space beyond our solar system.

*Dr. Talbot:* Dr. Sutherland, if I travelled 200 miles an hour by airplane, I should go out into space very fast, don't you think?

*Dr. Sutherland:* Yes, you would. If you should fly continuously at the rate of 200 miles an hour for fifty days, you would be at the moon. As we have said, that is only 238,000 miles away. But if you went whizzing past the moon, and on to the sun in a direct line, it would require 53 years for you to cover that distance at the rate of 200 miles an hour. Imagine sitting in an airplane for 53 years just to get to the sun. Besides, you would be getting warmer all the time; and I shudder to think of what you would look like by the time you got near the sun.

But let us look at it another way. Perhaps you would like to travel by some other means than by airplane. Suppose a projectile, on which you could travel, were fired out of a cannon. Suppose it continued to travel at the same rate of speed directly toward the sun. You would be ten years in getting there.

If that cannon ball could traverse the intervening distance between us and the nearest sun or fixed star of our solar system, it would require 2 million years constant travel to get to that star. So you see, Dr. Talbot, why it was necessary to adopt this much more rapid method of estimating distance in stellar space.

*Dr. Talbot:* Yes, Dr. Sutherland, as you begin to talk in these terms and figures, I realize anew something of the significance of the phrase, "infinite reaches of space." Surely only an infinite God would be able to handle the affairs of the universe! But now that we have established a unit of measurement, just how far is it to the nearest star?

*Dr. Sutherland:* Let us imagine that we are travelling into space, not by airplane or by a cannon ball, but on a beam of light at the rate of 186,000 miles a second. Eight minutes after we started, we should sail past the sun. That would be an experience! Travelling 93 million miles in eight minutes of time! If somehow we could direct this beam of light toward the nearest star, which is called Alpha Centauri, we should travel all day today and all day tomorrow, all this week and all next week, all this month and all next month. Remember, we should be going one hundred and eighty-six thousand miles a second! We should have to travel all this year and all next year at that same rate of speed; and yet, after two years, we should still be less than half-way to the nearest star! It would take four and a quarter years to cover the distance from that sun to our earth. When you remember that light travels approximately six trillion miles in a year, you can understand something of the distance out there in space. Think of all that vast amount of nothingness between our sun and the nearest sun—four and a quarter light years away!



*Dr. Talbot:* God certainly did not over-crowd His universe when He put the suns in their orbits!

*Dr. Sutherland:* No, He did not. Of course, He had all of space in which to place the suns; and in so doing He has wrought a marvelous work, as we shall see later on in these discussions.

*Dr. Talbot:* Tell us something about the pole star. I can look up in the heavens and see that on a clear night, and know where I am.

*Dr. Sutherland:* Yes, Dr. Talbot, the pole star is probably the most familiar star in our sky. It is up there every night of the year, always in exactly the proper place. By it we have been able to orient ourselves on numerous occasions. But, you know, we can not be sure whether that pole star is up there now or not; for the light that we saw from that star last night left there forty-four years ago. It has been travelling 186,000 miles per second ever since. In other words, something could have happened to it anytime within the last forty-four years, destroying it, or blotting it out from our view, and we should still be seeing the light that left the star forty-four years ago.

The Lord has surely been good to us, in providing the stars for our convenience and enjoyment. What a blessing it is for us to realize that out there, moving majestically through space, we find these bits of God's creation doing His bidding, always on time, faithful, dependable, shining out their welcome and their brilliance, so that we may enjoy them. I tell you, Dr. Talbot, it ought to make us pause and thank God every time we look into the heavens and see His handiwork. We ought to thank Him for this manifestation of His wonderful love toward us.

*Dr. Talbot:* When I consider some of these truths about which you have been speaking, Dr. Sutherland, I am reminded of the passage in the Psalms:

"Come and see the works of God."

"O Lord, how great are thy works, and thy thoughts are very deep!"

"O Lord, how manifold are thy works; in wisdom hast thou made them all!"

And in Revelation 15:3 we read,

"Great and marvelous are thy works, Lord God Almighty."

When we understand that God holds all of the stars within the hollow of His hand, it is hard for me to comprehend the vast distances of which you have been speaking.

*Dr. Sutherland:* Yes, it is hard to comprehend such distances. But let us look at them from a little different point of view. Let us take our solar system first. Suppose we could shrink our sun from its actual size down to a ball two feet in diameter, then place this ball in a field—and it would take a very large field. With that ball as the center, we could step off eighty-two feet, and then put down a mustard seed to represent the planet Mercury. A tiny mustard seed would be about the proportionate size. Then after sixty-two feet more, we could place a small shotgun shot to represent Venus. Walking out seventy-eight feet farther, we might put down a small pea to represent our earth. Then one hundred and eight feet more, and we could place a large-sized pin-head on the ground to take the place of Mars. After seven hundred and eighty-eight feet more, we could put down a small orange to represent Jupiter. From there, we could step out nine hundred and thirty-four feet and, for Saturn, put down a golf ball. Two thousand eighty-six feet more, we might put down a common marble to represent the planet Uranus. After that, we should have to walk out two thousand, three hundred and twenty-two more feet to put down a cherry for Neptune. And then we should have to walk on until we were almost two and one-half miles away from that two-foot ball before putting down a grape seed to represent the planet Pluto. In other words, according to that ratio, we have a solar system approximately five miles in diameter. On this same scale, we should have to go six thousand, seven hundred and twenty miles away to put down another two-foot ball to represent our nearest star. Perhaps this gives you a little idea, Dr. Talbot, of the vast-



ness of the universe and of the great empty areas in which nothing is located.

*Dr. Talbot:* Yes, when I think of these things which you have been describing, I exclaim with the Psalmist,

"Great is the Lord, and greatly to be praised. His greatness is unsearchable."

And when I think of the size of some of these creations of God, I ask again,

"What is man, that thou art mindful of him?"

I seem very insignificant, by way of comparison, don't you, Dr. Sutherland?

*Dr. Sutherland:* Yes, Dr. Talbot, I feel most unimportant. There is nothing like a study of the stars to deflate one's ego. As we were talking just a few moments ago about the North Star, I was reminded of a number of outstanding stars in the heavens above us. All of them are a part of our own galaxy.

*Dr. Talbot:* Just a minute, Dr. Sutherland. You have mentioned that word "galaxy" before. Just what do you mean by it? I don't find that word in my vocabulary.

*Dr. Sutherland:* That word refers to a family of stars. Strictly speaking, our earth is a member of the family of the sun, which makes up our solar system. Our sun is a member of the family of suns known as the Milky Way galaxy. There is a vast difference, however, between the number of planets which make up our solar system and the number of suns which make up our galaxy. This galaxy is a well ordered system of suns, each of which is revolving in its own orbit around a common center, going on its way. No one knows where it is going because of the vastness of space about it. But now we shall get into figures that are really large.

*Dr. Talbot:* Dr. Sutherland, I can't think of any larger figures than those that have engaged our attention in connection with the national debt. I am afraid you will lose me completely, as far as my thinking is concerned.

*Dr. Sutherland:* Well, I always think the financiers and the economists of our country must have been astronomers before they got into politics, because we might almost as well be speaking of astronomical figures when we get to thinking about the financial condition of our country. Nevertheless, we are going to talk about the big things in our galaxy and in the universe, because, you know, Dr. Talbot, the bigger we discover the universe to be, the bigger God appears, and the more wonderful He becomes to us.

*Dr. Talbot:* You are right, Dr. Sutherland. We must always keep in mind the fact that, regardless of how big the universe is, our God is greater; for He holds all these things in the hollow of His hand.

*Dr. Sutherland:* Astronomers tell us that there are approximately 40,000 million suns in our galaxy, or in our galactic system. The Milky Way galaxy is also known as one of the Island Universes; that is, it is a great universe all by itself, an island of suns out in the vastness of space. And there are an untold number of island universes like our own away off in the distance, which stagger our wildest imagination. Forty-thousand million of anything is a great number, Dr. Talbot. When we recognize the fact that God has set over forty-thousand million suns in their orbits, swinging around a common center, we realize that He is capable of handling the little affairs of our lives which are so important to us. This is the wonderful truth deducted from all of this study that we are making. We may not know the significance of all these numbers, and we may become lost as we endeavor to comprehend the infinite reaches of space; but we know intimately the One who understands all of these things, the One who calls the stars by name. In Psalm 147:4, 5 we read:

"He telleth the number of the stars; he calleth them all by their names. Great is our Lord, and of great power: his understanding is infinite."

*Dr. Talbot:* Dr. Sutherland, do you mean to tell me that there is a vast galaxy of which we are a part, and that there are forty-thousand million suns in this system? How



is it that they never collide? Are we not in danger of hitting some other sun?

*Dr. Sutherland:* Dr. Talbot, we should be in danger of hitting another sun if we ever got close enough to it. When we remember that, as we were saying a few moments ago, the nearest star to our own sun is four and a quarter light years away, and that the other suns are equally distant from one another, we can understand that there is not much danger of our ever having a collision. These forty-thousand million suns are spread out over an immense territory. This galactic system of ours may be represented by a watch standing on edge; that is, the distance up and down is ten times greater than the distance across.

*Dr. Talbot:* Are you trying to tell me, Dr. Sutherland, that we belong to a vast system of suns, that our own sun has its orbit and is revolving around in space in its proper relation to these other suns of our system?

*Dr. Sutherland:* Yes, Dr. Talbot, that is just exactly the idea. Astronomers tell us that our sun is located, let us say, on this imaginary watch, approximately where the second hand is located on an ordinary watch. We are not in the center of this galactic system at all, but we are down toward the bottom, or up near the top, depending on the way you want to view the situation. That is the reason why, on a clear night as you look overhead, you will see what we call the Milky Way. It is one of the most inspiring sights which may be viewed by amateur astronomers and wondered at by all of us. This great Milky Way—what makes it? What is the cause of that strange streak of light on an otherwise dark sky? If, as I said a moment ago, we are located just about where the second hand is on a watch, then it stands to reason that, as we look up, we are going to be looking up at the greatest possible number of stars in our Milky Way. We see ten times more stars looking in that direction than we do when looking out on either side. As a result we are looking into a much more intensely lighted area.

*Dr. Talbot:* And just how big is this system?

*Dr. Sutherland:* It is exceedingly vast! We are informed that it takes light a hundred thousand years to get from one edge of this great system of ours to the opposite edge; that is, along its greatest plane. It takes light ten thousand years to get through from one edge to the other, traveling horizontally. Remember now, we said that it takes light four and a quarter years to get from the nearest star to our own sun. Think of that in relation to a hundred thousand years that it takes for light to get from one edge of our galactic system to the other. That gives you a vague idea of the immensity of that thing which we call the Milky Way galaxy. This Milky Way galaxy is milling around at a terrific rate of speed. Astronomers even hesitate to suggest how fast we are traveling.

*Dr. Talbot:* Am I to understand, Dr. Sutherland, that each of these 40 thousand million suns has its own orbit and is whirling around in space in an orderly manner?

*Dr. Sutherland:* Yes, Dr. Talbot, that is exactly what the evidence reveals to be the case. God is a God of order. He does not do things in a haphazard manner. He does everything decently and in order. We see evidence of that in Scripture. We see evidence of that in all of nature about us. And we see evidence of that in connection with the heavens above. Things are done in an orderly manner. Every indication is that our suns, or the members of our galactic system, are continuing in their courses in a perfect and orderly manner. We are told that it will take approximately 250 million years for our Milky Way galaxy to make one complete revolution. In other words, our sun is on a certain spot in its orbit right now. As it moves along the path of its orbit, the other stars are also moving on their appointed paths; and it will take 250 million years for these stars, including our sun, to get back to the point from which they started.

*Dr. Talbot:* That is a long time, Dr. Sutherland! But the glorious part of it is that, after we shall have been up in the heavenlies with our Lord Jesus Christ for 250 million years, it will seem as though we had only arrived. Eternity will then be just beginning. That is a wonderful thought, isn't it?



*Dr. Sutherland:* Yes, Dr. Talbot, it surely is. Another wonderful thought is that we shall be able to enjoy this galactic system with the same degree of intimacy that we enjoy the things which we hold in our hands in this life. The poet speaks of "the music of the spheres." And the Lord said unto Job,

"Where wast thou when I laid the foundations of the earth? . . . When the morning stars sang together, and all the sons of God shouted for joy?" (Job 38:4, 7).

I believe that when our ears are tuned to the heavenly music, we shall be able to hear the stars singing together for joy; and it will be music, the like of which we have never heard here below. It is a glorious prospect that is awaiting the children of God. What a heritage is ours!

*Dr. Talbot:* Dr. Sutherland, you mentioned a few moments ago the fact that our sun is moving at a terrific rate of speed in its orbit and is carrying the planets around with it. That makes us moving in two or three directions at once, doesn't it?

*Dr. Sutherland:* It certainly does. In fact, that may be why we of the human race are just a little peculiar in certain ways. Suppose you were out driving on a rather rough road, Dr. Talbot. In the first place you would be bouncing up and down, wouldn't you? And then, if you were traveling along at a given speed, you would be going forward, as well as up and down. Now our earth is also revolving on its axis; so that it makes one complete revolution every twenty-four hours, or thereabouts. That is the third way that we are moving all at the same time. But the earth is also wobbling just a little bit, so that it does not revolve exactly on its axis; but it may be likened more to a top that is spinning and beginning to run down. There is just a little wobble in it. That is the fourth directional movement that we make. Of course, the earth is moving on its orbit at a rapid rate of speed. That is movement number five. Finally, the sun is carrying us along with it in its grand circuit. That is movement number six.

I was talking one time with a well known astronomer, and asked him if our galactic system is in an orbit of its own, moving around a common center away off in the unimaginable distance of the universe. With a shrug of his shoulder, he said, "Who knows?" Then he went on to say: "That is too big a problem. With our little mind and our limited ability to gaze into the distance, we can not even hazard an answer to that particular question." I suggested to him that I believed there is a common center to our entire universe, and that all of our galactic systems are revolving around it in their ordered course. I do verily believe, Dr. Talbot, that this center is the very throne of God itself, where He sits, the moral Governor of the universe, the Creator of the universe, and, far more than that to those of us who have put our trust in the Lord Jesus Christ, the only begotten Son of our Heavenly Father.

But to return to your question, we have found at least seven ways in which we are moving all at once. No wonder we act a little peculiar every now and then!

*Dr. Talbot:* Dr. Sutherland, have you gotten us out into space so rapidly that we are losing track of ourselves. Let us get back to our own galactic system, and think about it for a while. You said some time ago that all the stars we can see are suns. Are all these members of our own galaxy?

*Dr. Sutherland:* Yes, Dr. Talbot, all of the true stars—and I am excluding, of course, the planets—all of the true stars that we can see in the heaven are suns, members of our own astronomical family, with the exception of two or three objects that may be observed on a dark, clear night. For instance, one of the stars that may be seen in the constellation of Andromeda, of which we shall speak later on, is itself a great galaxy equal in size to ours, if not larger. It has its own 40,000 million suns but it is at such a great distance that we see it only as a tiny dot of light. Indeed, it is the nearest galaxy to our own; but there is a vast amount of space between ours and the Andromeda galaxy. There are one or two other stars; or,



rather, objects which appear as stars, but in reality are either galaxies or great clouds of burning gas, each of which is known as a nebula. Such a nebula appears as a tiny dot of light, or as a star, in the sword of the constellation of Orion. With these and possibly one or two other exceptions, all of the stars that we see are in our own family of suns. Many of the suns, if not most of them, are larger than our own sun.

*Dr. Talbot:* Dr. Sutherland, some time ago we arrived at the conclusion that our sun is 864,000 miles in diameter. Did I understand you to say that there are other suns larger than that?

*Dr. Sutherland:* Oh, yes; there are many of them that are larger than our own sun. There is the star Aldebaran, whose diameter is 39 times the diameter of our sun. Multiply 864,000 by 39, and you will have the diameter of Aldebaran. Then there is the great star, Betelgeuse, which is 296 times the diameter of our sun. There is also Antares, the largest star in the sky that has been accurately measured. It is found right in the center of that beautiful summer constellation known as Scorpio. This star is 428 times the diameter of our sun. Whereas the diameter of our sun is 864,000 miles, the diameter of Antares is practically 400 million miles.

*Dr. Talbot:* These are awe-inspiring truths which you have presented, Dr. Sutherland. We shall be looking forward to a continuation of this study in our next lesson. And the wonder of it all is this—that the God of all creation is our Lord and Saviour, Jesus Christ; that He who put the stars in the heavens loved us enough to die for our sins. I can not understand such love, but I can appropriate it and rejoice in it.

*Dr. Sutherland:* Yes; by His grace we love Him because He first loved us. And by His grace our hearts re-echo the worship and praise of the psalmist who said,

“The heavens declare the glory of God; and the firmament sheweth his handiwork.”