

THE BIBLE VS. EVOLUTION

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LESSON 9. AGE OF THE UNIVERSE.

KEY SCRIPTURE: “The heavens declare the glory of God; And the firmament shows His handiwork.” Psalms 19:1 (NKJV)

Preparing to Teach the Lesson:

This lesson and the next one deal with the age of the universe and earth. If you're worried that people might think you're crazy for believing in Biblical creation, wait until you tell them you believe it happened just a few thousand years ago. They may laugh at you, or they may call you a fanatic, a superstitious idiot, or worse.

Does the Bible really teach recent creation? Yes. If not, it would be foolish for us to risk persecution because of it. But what about the thousands of scientists who believe the earth is billions of years old? It turns out that the scientific community is not unanimous in accepting a great age of the earth. More and more scientists are publishing research that points toward a much younger age. Since most technical journals refuse to publish anything that points to special creation, we must look to sources such as the Institute for Creation Research (I.C.R.), Answers in Genesis, and similar organizations for these materials. You can find books from these and many other creationist organizations in Christian bookstores and on the Internet.

Most of the research referred to in this lesson is fairly straightforward. However, in order to deal with the question of how light could get here from distant stars in only a few thousand years, it is necessary to delve at least a little bit into physics. If your class trusts you, you can just summarize the answers and skip the hard parts. Or if you are interested in more background information than is available here, you should get Dr. Russell Humphreys' book *Starlight and Time*, available from the above sources.

Today's Aim:

In this lesson and the next the students will learn that:

- The Bible points unmistakably to recent creation.
- Belief that the universe and earth are billions of years old is based on philosophy, not science.
- There is no compelling scientific evidence that the earth has to be more than a few thousand years old.
- There is no way to scientifically prove the age of the earth, whether thousands or billions of years old. Whichever we believe, we have to take a step of faith.

Introducing the Lesson:

Most people think you have to commit intellectual suicide to believe creation took place just a few thousand years ago. We are going to see that the opposite is true: those who reject the possibility of recent creation are the ones who are committing intellectual suicide.

Many people who claim to be Bible-believing Christians see no problem with believing the earth and universe are billions of years old. They don't realize that recent creation is an important Biblical doctrine, nor do they realize that there is no way to scientifically prove that the earth is either old or young. While there are interesting arguments for great age, there are answers to every one. On the other hand, there are equally strong arguments for young age. Many of these remain unanswered by evolutionists.

Before we get into technical details, let's consider why it matters how old everything is.

1. BIBLICAL ARGUMENTS FOR A YOUNG UNIVERSE AND EARTH:

- a. The Hebrew word for day is “yom.” It occurs with a specific number over **350** times throughout the Old Testament. Every time, it refers to a literal 24-hour day. This is the same way it is used in Chapter One of Genesis.

Though some may not like it or may not agree, the author of Genesis obviously intended to describe literal 24-hour days.

- b. Exodus 20:11, written by God's own finger, confirms the creation timetable of Genesis One. It says that in **six days** the LORD made the heavens, the earth, the sea, and all that is in them.

- c. If the “days” were millions of years long, **plants** would have become extinct. God created them on day 3, the sun on day 4, and insects on either day 5 or 6 (Gen. 1:11-25). Plants can only live without sunlight for a short time, and need insects to reproduce.

- d. The genealogies in Genesis imply that man came into existence a few **thousand** years ago. Genesis says that he was created during the earth's first week. Creation must have been relatively recent.

Even if there are gaps in the genealogies, they would amount to only hundreds or thousands of years - not millions or billions.

- e. At the end of the creation week everything was “very **good**” (Gen. 1:31). God could not have said this if Satan had already destroyed the world and every living thing in it, and was lurking around waiting to cause more mischief.

Ezekiel 28:11-19 gives a description of the devil's beauty before he sinned. Right in the middle of the passage, verse 13 says that he was in Eden, the garden of God, then continues to describe his former beauty. He was still beautiful when he first went into Eden. He must have rebelled later, after the Creation week was over.

- f. The Bible tells us (Rom. 5:12 ff) that death entered the world only after **Adam** sinned, not the devil.

If people and animals were dying before then, the first Adam did not bring sin and death into the world. Jesus, the “last Adam,” died for a myth! How do we know we can trust Him with our eternal destiny?

- g. Since fossils are the preserved remains of dead things, animal and human fossils must have formed after Adam's sin. They must be only a few thousand years old. Most probably formed in or after the **Flood**.

Regardless what the Bible says, most people don't care that it implies recent creation because they don't believe it anyway. Let's see what arguments they use to

justify their belief that the universe and the earth are billions of years old. We'll come back to the answers shortly.

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2. REASONS PEOPLE BELIEVE THE UNIVERSE IS OLD:

- a. If the universe is only a few thousand years old, what was God doing all that time before He created it?
- b. Starting from a **big bang**, it would have taken billions of years for the universe to reach its present size.

The “big bang” is supposed to have occurred billions of years ago when all the matter in the universe was compressed into a single point perhaps the size of an atom, which exploded and evolved into the present universe. We will look at the flaws in the big bang concept in a later lesson.

Finally,

- c. How could light from **stars** billions of light years away reach us in only a few thousand years?

A light year is the distance light travels in a year, estimated at about six trillion miles.

When we turn our attention from outer space to the earth, we find that there are two reasons people believe it has to be extremely old.

3. ARGUMENTS FOR AN OLD EARTH:

- a. Most people think that **radioactive** dating proves the earth is billions of years old.
- b. Geologic features such as the **Grand Canyon** are supposed to have taken millions of years to form.

We'll consider the age of the earth in the next lesson. For now we will focus on arguments about the rest of the universe, starting at its far reaches and working our way in toward the sun.

4. RESPONSE TO OLD-UNIVERSE ARGUMENTS:

- a. God was not doing anything before He created the universe because “before” requires the passage of **time**. Time is a measurement of change in a physical system. Until the physical universe began there was no time, because nothing changed.

Anyway, it wouldn't matter if creation took place ten thousand or twenty billion years ago. Compared to eternity, the age of the universe is a blink of an eye.

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- b. The size of the universe at the beginning is **unknown**. God did not need a big bang; He could have created it close to its present size.

We are not even sure how big the universe is now. No one has ever stretched a tape measure across it. Astronomers calculate its size using a series of assumptions. If any one of the assumptions is wrong, the universe may be much smaller

than they think - perhaps a few million light years across rather than billions.

Even so, we are still left with a tough question: how could light from distant stars have gotten here in just a few thousand years?

c. It did not necessarily take billions of years for light to get here.

Following are several factors that may have reduced the time light needed to get here. While we can't prove any of them, evolutionists can't disprove them either. Either way, we have to take a step of faith.

i. God could have created **light paths** in place.

That is, maybe He created light already on its way to earth when He created the stars. However, astronomers have seen many supernovae that they say happened millions of years ago. If the light path explanation is correct, God had to put illusions of these events that never happened in the stream of light. Many find this idea unsatisfactory on philosophical grounds - who wants to believe in a God who deliberately deceived us? - and look for other answers. Though some are rather technical, you should at least let your students know that they exist.

Curved Space.

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Einstein's theory of relativity predicted that gravity should bend light. Thus, we should see at least a few duplicate images of distant stars whose light had to pass massive objects on their way to us. After studying such binary stars, MIT's Parry Moon and Domina Spencer proposed in 1953 that light traveling in deep space does not follow the straight lines of Euclidean geometry, but that space is somehow curved because of gravity. (The curvature is toward a mysterious fourth dimension required by relativity and allowed by non-Euclidean geometry.)

According to this model, the enormous mass of the universe would cause a tremendous "gravity well." Light would not have to go to the bottom of the well to get from point A to point B; instead, it would go around it on the shortest path. If their calculations are correct, light would take no more than 15.71 years to get to us from the farthest reaches of the universe. It doesn't matter whether there was a big bang or not, nor does it matter how old or young the universe is. The 15.71 year value follows from the curvature of space produced by the enormous quantity of matter in the universe.

Critics say that if Moon and Spencer are correct, we should see the effects of curved space on more than just a few binary star systems. Nevertheless, though there is no way known to experimentally verify their calculations, the mathematics are sound.

ii. Light may somehow travel in curved space. If this is correct, MIT astronomers Moon and Spencer calculate that it would take no more than **15.71** years for light to cross the universe.

Slowing Down of Light.

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iii. Some believe light may have traveled much **faster** in the past.

While almost all physicists believe the speed of light never changes, it may have slowed down without our noticing. In a report entitled *The Atomic Constants, Light,*

and Time (available from I.C.R.), Australians Barry Setterfield and Trevor Norman tabulated the results of speed-of-light experiments over the last several centuries. They found that the experiments point toward an exponential decrease in the speed of light. The farther we go back in time, the faster light would have been traveling. Some time in the past, its speed would have approached infinity. No matter how far away the source, the light would have reached earth quickly.

Because the speed of light is supposed to be one of the most fundamental constants in physics, Setterfield and Norman have encountered a great deal of opposition. Critics point out that little data is available from before the 1840's, and that the amount of decrease reported over the last 300 or so years is less than one percent. This is not enough to convince many scientists. However, no one has proved Setterfield and Norman wrong either.

Speed of Light in Deep Space.

No one knows exactly how light moves through space. Since it has many characteristics of a wave, we would expect to find that it needs a medium on which to travel, much as a wave of energy in the ocean rides on water. However, the ability of light to move through seemingly empty space is characteristic of a particle rather than a wave. (Physicists call this the *wave-particle duality*.)

Scientists may be overlooking possible media that extend throughout space, such as gravitational and electromagnetic fields or even the fabric of space itself. We know from observation that light travels slower in a denser medium such as water and faster in a less dense one such as air. We also know that it slows down and/or bends in a strong gravitational field. If gravitational fields are the medium on which light propagates, it may travel much faster in deep space where the fields are extremely weak.

iv. Since light slows down in the presence of strong gravity, it may travel much faster in interstellar space where gravity is **weak**.

Gravitational Time Dilation.

This is the most technical part of this lesson, involving black holes and relativity. If your class is willing to take your word on it, you might want to skip to the box at the top of page 57 summarizing it. Or, if you want to know the technical details, here they are. (From Dr. Russell Humphreys' book *Starlight and Time*.)

Humphreys is a theoretical physicist. He believes that God used relativity to allow the far reaches of the universe to age millions or billions of years (from their perspective) while the earth aged only a few days (from our perspective) during the creation week. He believes that at the beginning of the week the universe was very different than it is now, but by the end it was close to its present condition. The key points of his model are:

1. The universe expanded rapidly at some time in the past but is not doing so now. He bases this on at least 17 Old Testament passages that say God "stretched out" or "spread out" the heavens. (This is very different from the "big bang," which we will study in a later lesson.)
2. The "deep" of Gen. 1:2 consisted of ordinary water (H₂O). Hydrogen and oxygen were the raw materials God later used to manufacture the rest of the elements. (The Bible hints at such a conclusion in 2 Peter 3:5, which says that the earth was "standing" or possibly "formed" out of water.)

3. The deep was a large enough sphere of water at ordinary density to later be used as raw material for the rest of the universe. It could have been more than two light years in diameter.
4. Expansion began on day two when God separated the waters above the “firmament,” or expanse, from the waters below. (Ps. 148:4 refers to waters that are still above the heavens.) The expansion was finished by the end of the week, possibly as early as day four. He believes the expanse was interstellar space.
5. There is a definite center and edge to the universe. At the beginning the earth was at the center. It may have moved, but it should still be fairly close.
6. There was so much mass in a relatively small area that the universe began as a black hole. God changed it to a “white hole” (a black hole running in reverse) on day two when He began the expansion.
7. The expanding waters furnished the raw material for the heavenly bodies.

Parts of relativity cannot be tested. However, one part that can involves the slowing down of time. We know from direct observation that atomic clocks slow down slightly in the presence of strong gravity. Thus *gravitational time dilation*, which is the key to Humphreys’ model, has at least some observational support. (Of course, we can’t rule out the possibility that there is some unknown explanation instead.)

Time would run slowest inside a *black hole*, a theoretical object so massive that not even light could escape its gravity. (Several objects in space are suspected of being black holes, but they are so far away that we can’t be absolutely sure.) Since the force of gravity drops off by the square of the distance between two objects, there is a certain distance called the *event horizon* at which light passing a black hole at a glancing angle will not be drawn in. Current theory says that time inside the event horizon slows down greatly compared to time at an ideal place far enough away to be unaffected by gravity. The difference between ideal time and “proper” time measured by an observer in a gravitational field depends on the strength of the field.

Since gravity would be so strong inside a black hole, relativity says that time inside it could virtually stop compared to the rest of the universe. An astronaut getting pulled in would see his proper time passing at its normal rate as he crossed the event horizon, but a distant astronomer on ideal time watching him through a telescope would see his time of crossing approach infinity. He would seem to slow down more and more. The astronomer would never see him cross the horizon because his image would become redder and redder until it passed out of visible range. From the astronaut’s point of view, however, his watch would keep ticking at its normal rate. If he looked back at the astronomer through a telescope he would see him moving faster and faster until he became a blur of motion.

According to relativity, both observers are right. And this, says Humphreys, is the key to how light could have gotten here from distant stars in just a few earth days.

The effects of gravity on time are described by a complex set of mathematical equations. It turns out that the same gravitational equations apply to a black hole and a “white hole,” a black hole running in reverse. According to these equations, proper time deep within the event horizon of either a black or white hole would be at a virtual standstill as compared to ideal time. Humphreys believes the universe began as a black hole, because a sphere of water of sufficient mass to produce all the matter in the known universe would have had more than enough gravity. It would

not have been a tiny speck; it would have been at least two light years in diameter, with an event horizon perhaps 450,000,000 light years from the center.

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As long as the sphere of matter was well inside the horizon, proper time would have been about the same throughout it. Then, on Day Two, God began to spread out the heavens, supernaturally changing the black hole into a white hole. As the outer edge of the expanding waters passed the horizon, the horizon began to collapse inward because of the lessening amount of mass within. Proper time began to pass much faster outside. As more and more matter passed the horizon, it shrank until it vanished. Since the parts closest to the center stayed inside it longest, their proper time passed much more slowly than that of the parts that left earlier. After the horizon shrank away, proper time once again began to pass at a fairly even rate throughout the universe (except near black holes).

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Visual
#9-14

From the perspective of the center, the outer parts of the universe would have been aging at tremendous speed until the event horizon shrank away to nothing. Humphreys believes that millions of years of proper time could have elapsed in galaxies far away from the center while only a few days of proper time passed here on earth. Since Genesis is written from an earthly perspective, there would have been plenty time for those objects to age and for light from them to reach us even though only six of our days elapsed.

This is just a brief summary of Humphreys' model. Those interested in the technical details can obtain his book *Starlight and Time* through I.C.R. or a number of other sources such as <http://www.christiananswers.net>.) He is the first to admit that the model is very preliminary and in need of a great deal of fleshing out. Nevertheless, it may help answer the difficult question of how light from distant stars could have gotten here in a short time. In summary:

v. Some believe that during the creation week God used **relativity** to let the far reaches of the universe age a great deal while only six literal days passed on the earth.

Finally, the most likely thing of all is that

vi. There may be other factors we just don't **know** about.

POSITIVE ARGUMENTS FOR A YOUNG UNIVERSE.

Responding to evolutionary claims for great age is an important part of young-earth creationism, but there is more. There are also positive arguments that point toward the conclusion that the universe is young.

In order for us to know how old anything is, we need some sort of clock. We can use any process that changes through time, provided it meets certain conditions.

Visual
#9-15

5. In order for any clock to be reliable, we must know:

- a. **Initial** conditions. What time did the clock say when it was wound up?
- b. Rate of **change** the entire time. It need not have been constant, but if it varied we must know when and by how much.
- c. It must not have been **reset** or tampered with at any time.

No matter what we use as a clock for the age of the universe or the earth, there is no way we can be sure about any of these three things because we haven't been

watching since the beginning. All we can do is make assumptions. Since there is no perfect clock, we should use many different clocks and see if there tends to be significant agreement between them. If so, they may be able to point us toward a maximum possible age for the universe. The true age may be anything less.

6. Out of all the dating methods we could use to estimate the age of the universe, less than **ten** percent point toward a maximum age measured in billions of years. The rest point toward millions or even thousands.

Here are a few of the indications from space that point to a much younger age than evolution requires. We'll look at some evidence about the earth in the next lesson.

7. POSITIVE ARGUMENTS FROM SPACE FOR A YOUNG UNIVERSE:

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Spiral Galaxies.

A galaxy contains millions or billions of stars. Many galaxies, such as our Milky Way, are in the shape of a spiral with outstretched arms. Since galaxies do not rotate as rigid bodies, the center moves faster than the arms. Within just a few rotations - 200 million to 500 million years - the spiral arms would be wound up tightly toward the center. Yet many galaxies throughout the universe have clearly defined arms. Since the arms have not wound in toward the center, these galaxies must be considerably less than a billion years old.

a. The **arms** of spiral galaxies would have wound in to the center in a few hundred million years.

This sounds like a long time until we remember that the youngest evolutionary estimate for the age of the universe is about 7.5 billion years. And remember, the actual age could be anything less.

Supernova Remnants. (From Keith Davies, "Distribution of Supernova Remnants in the Galaxy," *Proceedings of the Third International Conference on Creationism*, 1994)

Every so often a star explodes in a supernova. The expanding cloud of debris left over is known as a supernova remnant, or SNR for short. A SNR should theoretically go through three stages, detectable either by optical or radio telescopes.

Visual
#9-17

- Stage one, rapid expansion accompanied by a great deal of visible light, results from the initial blast.
- Stage two begins 60 to 600 years later (with an average estimated at 317 years), when the SNR begins to radiate much less visible light and heat. It radiates mainly in the radio or X-ray frequency ranges.
- Stage three theoretically begins at about 120,000 years when the SNR radiates mainly heat energy until it reaches thermal equilibrium with its surroundings. It should be detectable for up to about a million years, until it loses enough energy to be indistinguishable from the background material of its galaxy.

Astronomical scans of the entire observable universe have shown that supernovae occur at the rate of about one every twenty-five years in galaxies similar to our Milky Way. Some are blocked from our view by interstellar dust and intervening bodies such as stars. Because of these blockages, instrument limitations, and other unknown factors, astronomers estimate that we can detect about 19% of the Stage

One SNR's in the galaxy, 47% of Stage Two, and 14.3% of Stage Three. (Only they know how they arrived at these exact numbers.) We can use these figures to make predictions about how many SNR's of each stage we should find in an old Milky Way versus a young one.

If you refer to the visual, you will see that there are far fewer Stage 2 SNR's than evolutionists expected, and not a single Stage 3. This fact is inexplicable if the galaxy is even one million years old, let alone billions. Over 7,000 Stage 2 and Stage 3 SNR's are missing! Yet the observed numbers of SNR's of all three stages match closely with what we expect if our galaxy is less than 7,000 years old.

b. The number of **supernova** remnants (SNR's) in the Milky Way is about what it should be if the galaxy is no more than 7,000 years old.

Short-Period Comets.

Visual
#9-18

Comets are grouped into two classes: short- period, which orbit the sun in less than 200 years, and long-period. (Halley's Comet, with a 76-year period, belongs to the former group.) Every time a comet comes close to the sun it loses a considerable amount of mass. It has been calculated that a short-period comet will completely disintegrate in less than 10,000 years. The fact that many short-period comets still exist indicates that the solar system is thousands of years old, not billions.

Evolutionists cannot accept such a short age. In trying to explain the short-period comets, they have invented the "Oort cloud," a hypothetical sphere of about 200 billion comets far beyond the edge of the solar system and thus out of range of observation. Every so often, the story goes, new comets are dislodged by gravitational effects from nearby stars and fall into short-period orbits around the sun. The problem is that nobody has ever seen it. It's a nice story, but it has nothing to do with science. There is no way to test it.

Visual
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The latest hypothetical source for replenishing short-period comets is the "Kuiper Belt," supposed to consist of hundreds of millions of small objects orbiting the sun beginning at Neptune and extending past Pluto. In 1995 astronomers found a few dozen tiny blips mixed in among the static of some extremely faint Hubble Space Telescope images. They think these questionable blips are Kuiper Belt objects ranging in size from a few kilometers to a few hundred kilometers across.

It doesn't solve the problem. If there really is a Kuiper Belt, it is in roughly the same plane as the orbits of the planets. However, the great majority of short period comets orbit at considerable angles to this plane. (This is why the Oort Cloud is supposed to be spherical; comets come in from all different directions.) The Kuiper Belt might be able to account for the small minority of comets that orbit in the plane of the solar system with a period of less than 20 years, but there is no evolutionary explanation for the vast majority of short period comets. Their presence points toward a young age for the solar system.

c. The presence of large numbers of short-period **comets** in the solar system points toward an age of less than 10,000 years.

Volcanic Activity on Io.

Most evolutionists believe the planets and their moons formed about 4.6 billion years ago. Each is supposed to have started as a superheated ball of gas which gradually cooled to a liquid, then a solid. Since very little of the sun's heat reaches

the outer planets and moons, almost all the heat they contain should be left over from the beginning. The smaller bodies should be cold and geologically inactive.

In 1979, the Voyager spacecraft gave astronomers quite a shock as it flew by Jupiter's tiny moon Io, thought to be only a few degrees above absolute zero. The cameras photographed a volcanic eruption more violent than any ever seen on earth, spewing fire and brimstone more than 100 miles into space. Further study revealed at least six active volcanoes on Io.

There is no known mechanism that could keep this tiny moon hot if it is billions of years old.

- (1) NASA flights haven't detected anywhere near the amount of radioactivity that would be needed to maintain such heat.
- (2) If the crust were flexing because of Jupiter's gravity, Io would be heating from the outside in, not the inside out. It would not have a solid surface.
- (3) Jupiter's electric field produces an estimated current between Jupiter and Io of about five billion amps. If this were the source of the heat, Io would have encountered a great deal of resistance to its orbital motion. A charged body moving through an electric or magnetic field encounters an opposing force that slows it down (unless something keeps pushing it). Within a relatively short time, far less than billions of years, Io would have slowed down enough to spiral in and crash into Jupiter's surface.

The obvious implication is that Io is not billions of years old, but thousands.

d. **Volcanic** activity on Jupiter's moon Io indicates an age of a few thousand years.

Space Dust and the Poynting-Robertson Effect. (From Harold Slusher's *The Age of the Cosmos*, available from I.C.R.)

Suppose you were driving down the road on a calm yet rainy day. Even though the rain was falling straight down, it would look to you as if it were falling at an angle to your windshield. Your car's movement across the rain's direction of travel would produce resistance. If not for the energy furnished by the engine, the car would stop.

Dust orbiting the sun likewise encounters resistance as it crosses the path of light from the sun. Even though light has no known mass, it still possesses momentum. This produces a drag effect on small dust particles in space, slowing them down so that they eventually fall into the sun. Physicist Harold Slusher calculates that within about 180,000 years, all dust particles 1/10 mm or smaller would have been "vacuumed up" at least as far as earth's orbit. Yet millions of tons fall on the earth and moon every year. Space probes heading toward Venus, even closer to the sun, have also found a great deal of dust. It should all have disappeared billions of years ago. Its presence implies that the solar system's age should be measured in thousands of years, not billions.

e. The Poynting-Robertson Effect on space **dust** points to an age of the solar system of less than 189,000 years.

This is far less than the solar system's supposed age of about 5 billion years - and of course, it could be any amount younger.

Moon Dust - no longer considered useful as a young-age argument.

Perhaps you are familiar with information published for many years about how the

rate of dust settlement on the moon points toward a young age. Though this seems a very reasonable argument, many creationist scientists now say that the measurements of the rate of dust fall are too uncertain to draw any firm conclusions about how long dust has been accumulating. AnswersInGenesis.org, staffed by highly credentialed scientists, recommends that this argument not be used any more.

Recession of the Moon.

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#9-22

From J. Sarfati, The Moon: The Light that Rules the Night, *Creation* magazine 20 (4): 36-39, Sept. - Nov. 1998. Available at www.answersingenesis.org.

The moon orbits the earth at an average distance of about 384,000 kilometers. The force of gravity it exerts on the earth is strong enough to cause a bulge in the earth and move entire oceans to cause tides. These phenomena are slowing down the earth's rotation at a rate of about 2/1000 of a second every century.

Since the earth-moon system is rotating, it possesses a property known as angular momentum. A law of physics called the Law of Conservation of Angular Momentum says that angular momentum remains constant unless some outside force causes it to change. Since angular momentum is the product of velocity times diameter, any change in the speed at which an object rotates must be offset by an inversely proportional change in its diameter. For example, a figure skater on TV starts spinning slowly with arms outstretched, then pulls in her arms and spins faster and faster due to the conservation of angular momentum. Likewise, as the rotating earth-moon system slows down, it must increase its diameter -- that is, the moon must recede from the earth -- to conserve the system's angular momentum. Centuries of observation have shown that the rate of recession is about 4 cm/year.

The forces exerted by the moon and the earth on each other are inversely proportional to the cube of the distance between their centers. This causes the rate of recession to be inversely proportional to the sixth power of the distance. The closer the moon is to the earth the faster it recedes, and the farther it is the slower it recedes. If the moon had started out rubbing the surface of the earth. Sarfati calculates that it would have taken only about 1.37 billion years to reach its present distance.

This is not to say the earth/moon system is really that old, because the moon could never have been that close. What it does show us is that the system has to be at least 3.2 billion years younger than the 4.6 billion years demanded by evolution. It could be any age less, depending how far away the moon started. Even if it were 1.37 billion years, this is far too short for evolution to occur.

f. The rate at which the moon is **receding** indicates a maximum possible age for the moon and earth of 1.37 billion years -- far less than evolution requires. The actual age could be anything less.

The Solar Temperature Dilemma. (From Paul Ackerman, *It's a Young World After All*)

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#9-23

The sun is believed to obtain its energy by fusion. This implies that it could not have supported life on earth billions of years ago. Since fusion would produce a continual temperature increase, a billion years ago it would have been about 5 percent cooler than at present. While this doesn't sound like much, the earth would have been frozen in a crust of ice! The oldest fossil plants (stromatolites, or blue-green algae) are supposed to be over three billion years old, when the earth would have

had to be colder still. They could not have survived under freezing conditions.

g. Since the sun is gradually heating up because of fusion, it would have been about five percent cooler a billion years ago. The earth would have been covered with ice. It would have been far too cold for the kind of plants we see in the fossil record.

If the sun does not get its energy from fusion it could not be billions of years old. If it does, the earth would have been far too cold for life to begin that long ago. Maybe the earth and sun are not billions of years old after all.

Evidence for a Young Sun.

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#9-24

i. Abundances of Lithium and Beryllium.

The standard evolutionary model for a 4.5 billion year old star the size of the sun says that it should be about 15 million degrees.

Using a technique known as *spectroscopic analysis*, astronomers have determined that the sun has very little of the element lithium. Since lithium breaks down above 3 million degrees, it is reasonable to believe the sun's temperature is at least that high. Beryllium, on the other hand, breaks down at 4 million degrees. The sun has a significant amount of this element. It must not have reached the temperature needed to destroy beryllium. Either the standard model is wrong, or the sun is not as old as it is supposed to be, or both.

h. Since the sun is supposed to be billions of years old, the standard model for a star of its type says it should be about 15 million degrees. However, the presence of large quantities of Beryllium in the sun indicates a temperature of less than four million degrees. This points toward a much younger sun.

ii. Radial Oscillation.

Imagine you hit a rubber ball with a bat. If you could measure precisely enough, you would see that the shock wave caused it to compress, expand, compress, expand, etc. until it stabilized again. This is called *radial oscillation*. The period of oscillation depends on the size and density of the ball. A hard rubber ball would oscillate much faster than a ball of Jello, while a ball of Jello with a hard rubber core would have yet a different period.

Since the sun is supposed to have been fusing lighter elements into heavier ones for about 4.5 billion years, the standard model of star evolution says that it should have developed a dense core about 350,000 km in diameter surrounded by a gaseous outer layer. If this is correct, the opposing forces of gravity and heat should cause it to oscillate about once an hour. However, recent observations show that it oscillates every 2 hours and 40 minutes instead. This is incompatible with a dense core, pointing instead to the conclusion that the sun is a fairly uniform ball of gas. Since there is no dense core, it must not have been around long enough to develop one. It must be much younger than evolutionists think.

i. Since the sun is supposed to have been performing nuclear fusion for billions of years, current evolutionary theory says it should have a very dense core surrounded by a gaseous outer layer. However, the frequency at which it expands and contracts (due to the opposing forces of gravity and heat) is

consistent with a uniform ball of gas instead. This too points to a much younger age.

In conclusion,

8. We can't prove the universe is young, but evolutionists can't prove it is old either. Either way, we have to take a step of **faith**.

Young-earth creationists are not the ones closing our minds. We recognize that there are interesting arguments for both old and young age. Upon examination, we believe that those for young age are more persuasive. The ones who close their eyes to the possibility of recent creation are the ones committing intellectual suicide.

How about you? Are you open-minded enough to believe that God could be telling the truth?

LESSON REVIEW:

- I. There is no way to scientifically test the age of the universe. While we can examine arguments for both an old and young universe, there is no way to prove either one.
- II. Though many reject it, the Genesis account is clearly meant to say that creation took six literal days. The Bible clearly intends to show that humans appeared on the earth only a few thousand years ago.
- III. One of the most important Christian doctrines is that Jesus was the "Last Adam" who came to undo what the first Adam did. If animals and humans were dying before Adam sinned, then he did NOT bring death into the world. If there was no first Adam, what do you need a Last Adam for?
- IV. The great majority of animals preserved as fossils probably died and were buried in Noah's Flood.
- V. The main reason people believe that the universe is old is that's what they have been told. They have heard repeatedly that the "Big Bang" is proven scientific fact. It is nothing of the sort.
- VI. The best argument for an old universe is the question of how light could have reached Earth from stars billions of light-years away if the Earth is only six thousand years old.

There are a number of possibilities.

- Most "Big Bang" models say the universe was already a significant portion of its present size by the end of the initial expansion.
- God could have created light paths in place.
- Light may somehow travel in curved space. If so, it could take as little as 15.71 years for light to cross the universe.
- Some believe light may have traveled much faster in the past.
- It is possible that light travels much faster in deep space.
- During the creation week God may have used relativity to let the far reaches of the universe age a great deal while only six literal days passed on the earth.

- There are many things we do not know about the universe.
- VII. Many things we observe in space are much more compatible with a young universe than an old one. Just a few of them:
- Arms of spiral galaxies
 - Missing supernova remnants
 - Large number of short-period comets
 - Volcanic activity on Jupiter's moon Io
 - Poynting-Robertson effect on space dust
 - Moon's rate of recession from earth
 - Earth would have been covered in ice just a billion years ago.
 - Presence of Beryllium in the sun indicates it has not been heating up for billions of years.
 - Lack of a dense core in the sun indicates an age much younger than billions of years.
- VIII. Whatever we believe about the age of the universe is a step of faith.

Other topics for study:

Amount of time needed for galaxy clusters to break up

Instability and age of Saturn's rings

The "Pioneer Anomaly"