Welcome to the third session of **Big History – A Closer Look!** Thank you for coming back. If this is your first time, then thank you for taking a chance. **Let's Pray!**

Tonight we will consider Big History-Threshold 4, "Earth and the Solar System".

On the Big History website there is a page on Origin Stories, which says,

"Where did everything come from?

Every culture has its own origin story. They may be very short anecdotes. Or they might be elaborate narratives that help explain the mysteries of our existence.

Big History is an origin story like many others. But, instead of being rooted in a specific culture or geography, Big History aims to account for everything we know and that which we have yet to discover. Contributors include philosophers, scientists, scholars, adventurers, and curious learners of all stripes who weave a story of enormous scale.

And like all origin stories below, the Big History story has developed over time, and will continue to evolve."

The website then references six origin "stories". The first five stories include Chinese mythology, Greek mythology, Iroquois legends, Genesis, and Mayan legends. The sixth origin story is titled "Modern Scientific". The obvious inference is that the Genesis story is myth like the other four.

So now, let's watch Big History-Threshold 4: Earth & the Solar System. (Play video)

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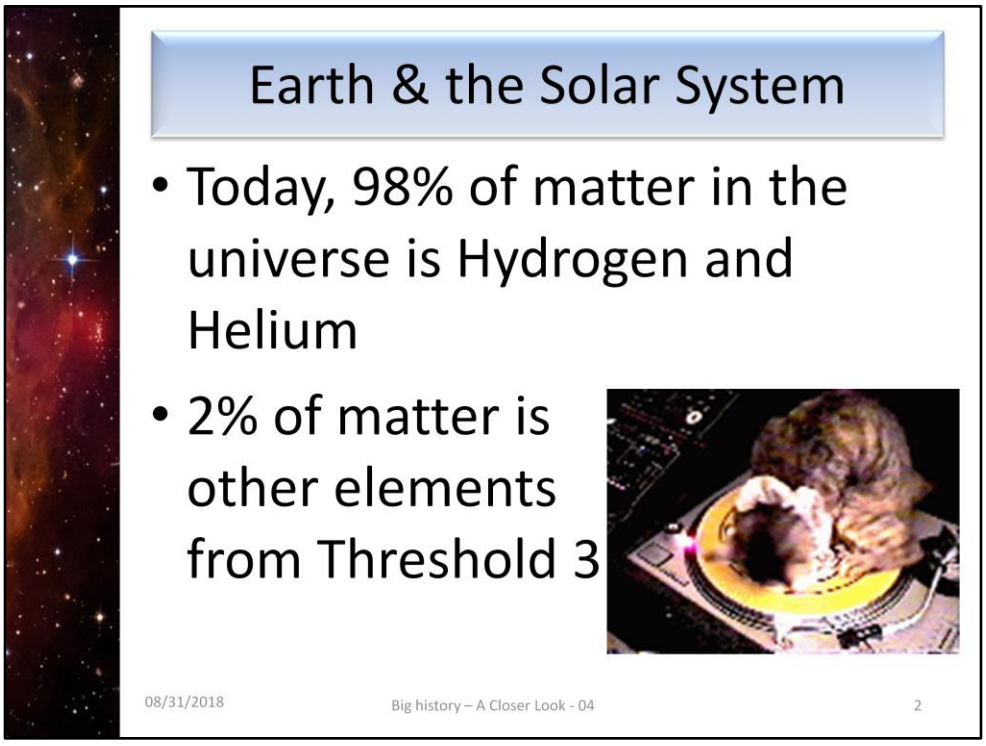

The video tells us that in the universe today, 98% of atomic matter consists of Hydrogen and Helium.

The other 2% of atomic matter is made up of the other elements in the periodic table that were supposedly created according to the processes we discussed last week in Threshold 3.

Once again, we will see that Big History plays very fast and loose with the facts. Big History ignores any inconvenient issues that contradict their narrative. They also like to "jump in" at some starting point with all the "just right" ingredients and conditions without saying how they got to that point, or how long it took.

Therefore, we find ourselves at Threshold 4, where the explosions of stars in supernovas has populated the universe with elements that the video says could combine to create things like planets that are much more complex than stars.

That is of course a startling statement. Remember that Hydrogen and Helium don't combine chemically. Apparently, we are supposed to believe that the other 2% of elements born in supernovas have spread out across the universe to permit the creation of planets, moons, meteors, etc.

So, let's investigate just how the video claims this process formed planets such as the Earth.

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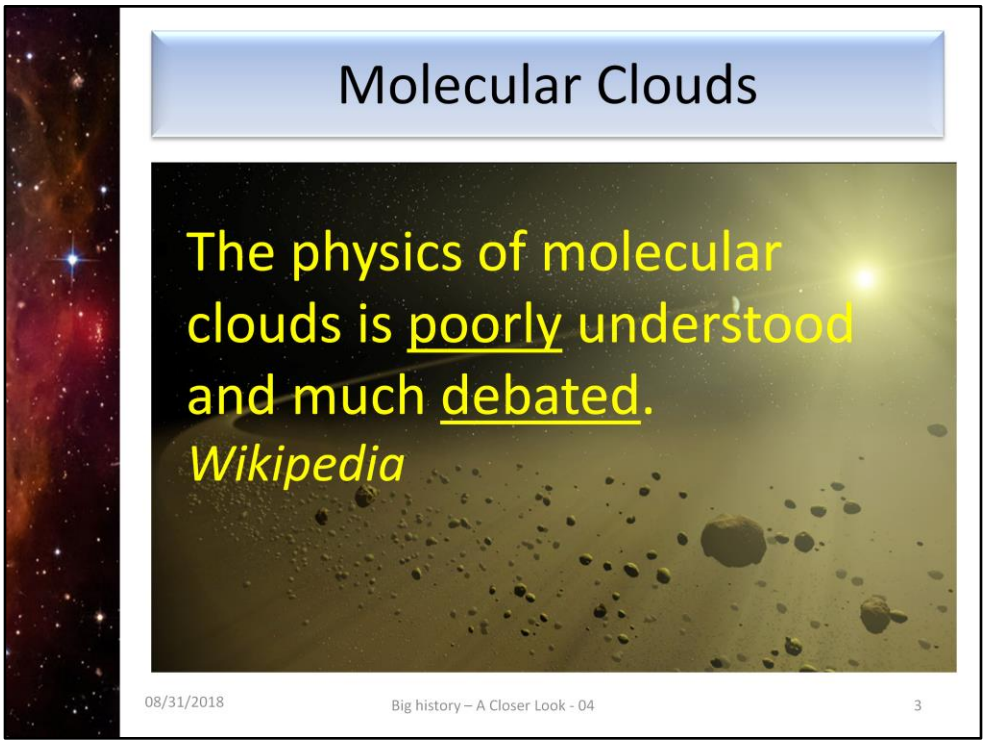

The video tells us that "when new stars are formed they are surrounded by huge clouds of chemically rich matter". The clouds, we are told, spin around the newly forming star in different orbits. This environment, the video says, produces the Goldilocks conditions that are "just right for elements to combine". But is this true?

The video is describing what is known as a "molecular cloud" or more specifically the video is referring to a "circumstellar disk". A number of stars have been observed to be enveloped in dust. But not all stars have this cloud of dust as the video seems to infer. If the cloud begins to rotate, then it forms a "circumstellar disk", which is a flattened disk with the star at the center. Supposedly, planets form in this disk area.

In our Solar System, all the planets orbit the Sun in a single plane, which is called the ecliptic. This is cited as evidence for the theory promoted in Big History. We will discuss more about our Solar System shortly. Big History doesn't really discuss this except to sneak in Jupiter and Saturn without explaining the big difficulties that arise over their formation.

The video states that some of the elements in the clouds combine chemically. That is, the elements interact in a chemical reaction to form molecules.

The video then says that atoms and molecules "clump" together to form bigger and bigger "lumps of matter". This process is called accretion. The only problem is that it is not true.

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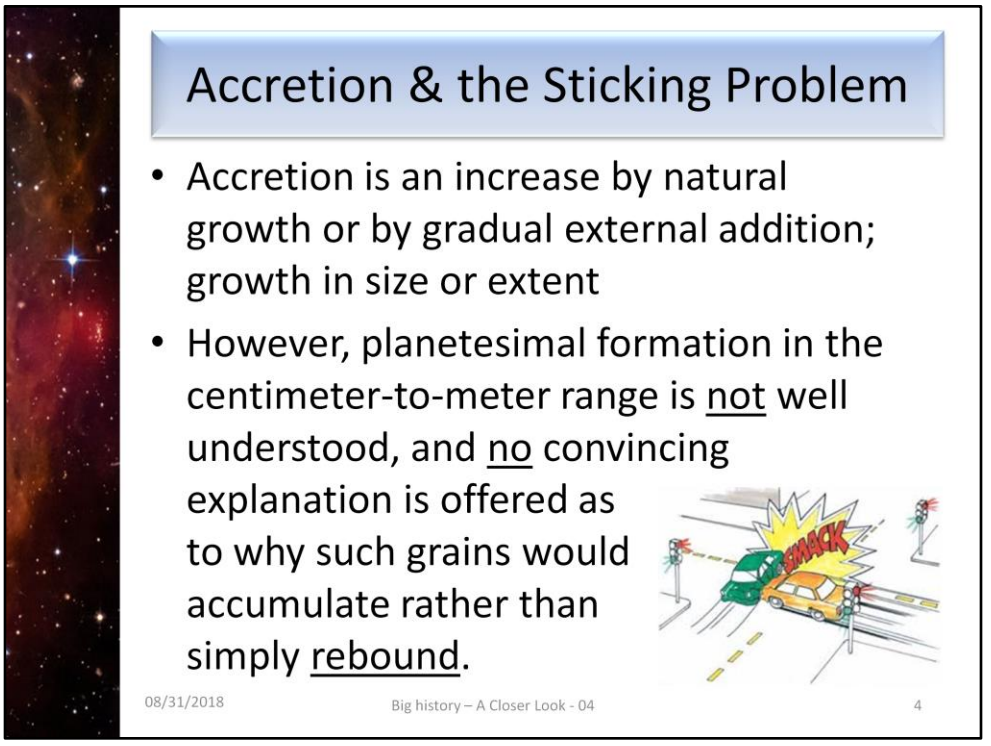

You can see from the slide the definition for accretion, the clumping process the video describes. The video states as a simple matter of fact that the lumps of matter will grow until they become planets. However, this is a theory . And the theory has real problems.

These so-called lumps of matter that are swirling around in these clouds are more likely to bounce off each other or shatter each other than they are to stick to each other.

When you have even larger chunks, they really will smash each other rather then weld together to form a large mass.

We see disks of chunks in planets like Saturn. However, the chunks in Saturn's rings are not clumping together to form larger masses. The speed of the debris relative to one another is very slight, and so they just orbit together and occasionally bump and bounce off.

This is the "sticking problem", but there are many other problems that are not mentioned or that are cleverly passed over. This leaves the viewer with the impression that these processes are "automatic" and they are seen all the time. However, this is simply not true.

Some proponents of the "cold accretion" process say that meteors are an examples of this process. However, meteors do not look like lumps that have grown by accretion. Meteorites are mostly solid rock or solid iron. In fact meteors appear more like pieces of a broken planet than like ingredients for making a planet.

But there are still other issues Big History ignores as well.

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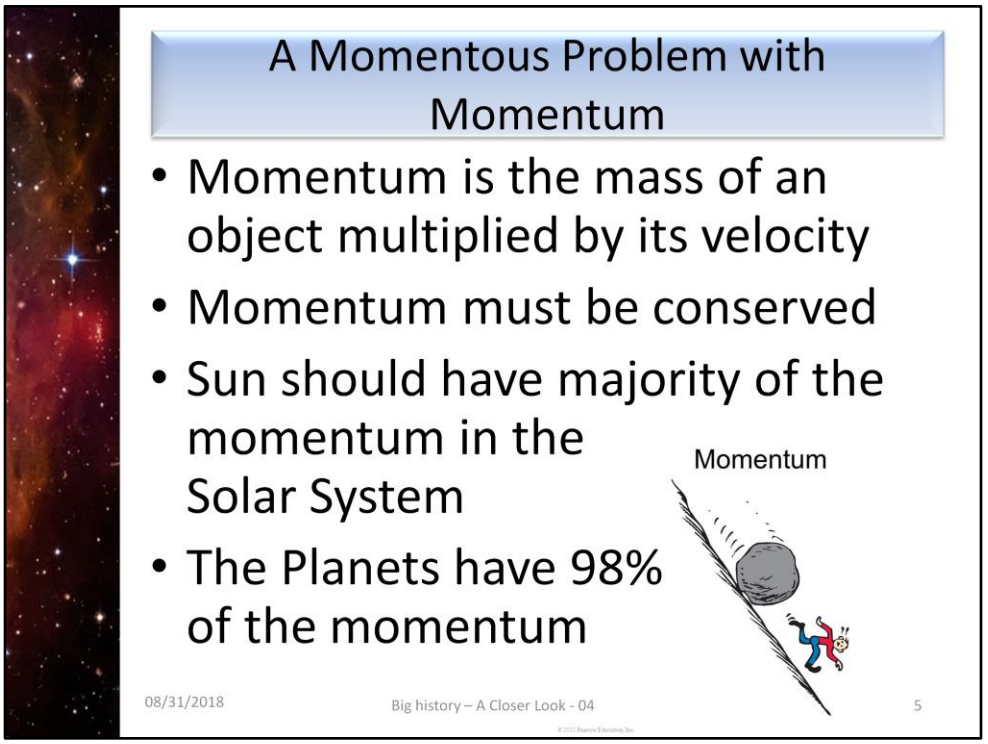

The Big History video does not mention anything about momentum. Momentum is the mass of an object multiplied by its velocity.

In all physical interactions momentum has to be conserved. This means that the Sun, which has the majority of the mass in the Solar System, should have carried the momentum of the particles that made it. Therefore, the Sun should be spinning very rapidly. But, the Sun actually spins quite slowly (24.47 days at the equator to 38 days at the poles). Approximately 98% of the momentum in the Solar System is in the planets.

Scientists have no explanation for this. And if Big History has an explanation, they did not feel compelled to give it.

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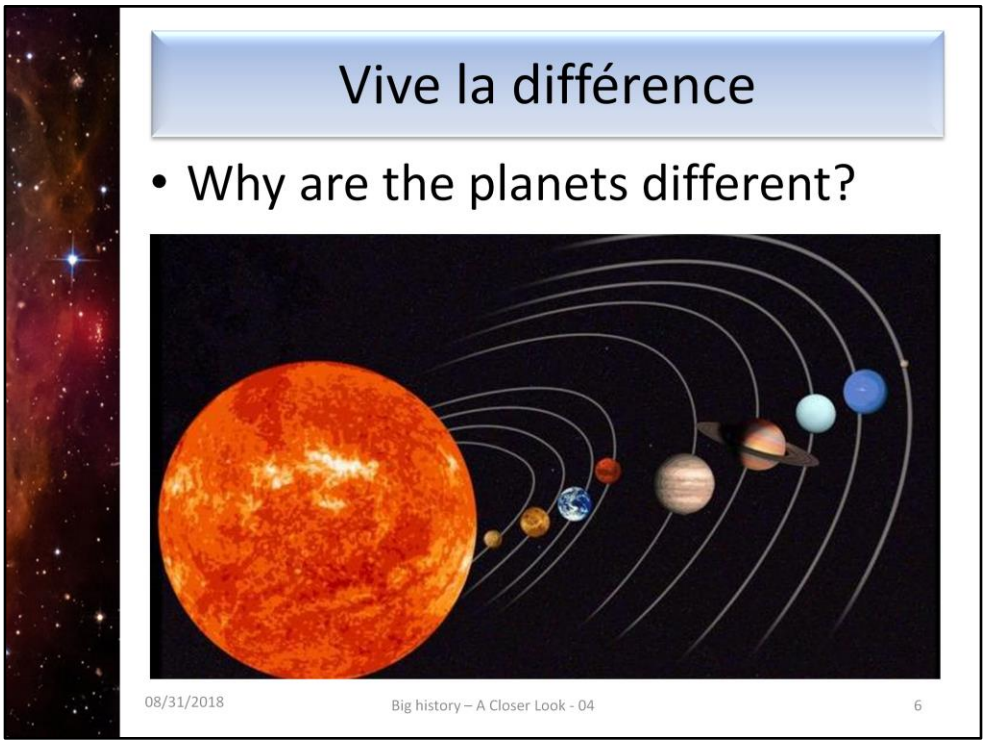

In our Solar System the inner planets are dense and rocky. The middle planets are gas giants and the outer planets are ice balls. How does the Big History scenario account for this?

The video does not mention this directly. Instead, it states another theory without evidence. The video only briefly skims by this by saying that lighter elements like hydrogen and helium are more plentiful and so more planets are made up of hydrogen and helium, like Jupiter and Saturn. We will discuss gas giants on the next slide.

The video tells us that lighter elements can be blasted away by radiation, meaning solar bursts or winds from the star (in this case the Sun). This supposedly leaves heavier elements which merge through accretion to form planets such as the Earth. For evidence the video says that the crust of the Earth is made up of oxygen, silicon, aluminum, and iron. There is no attempt to explain why we have a molten core or an atmosphere which was not blown away by radiation.

We have already seen that accretion does not clump these elements together, but the video just states that they do.

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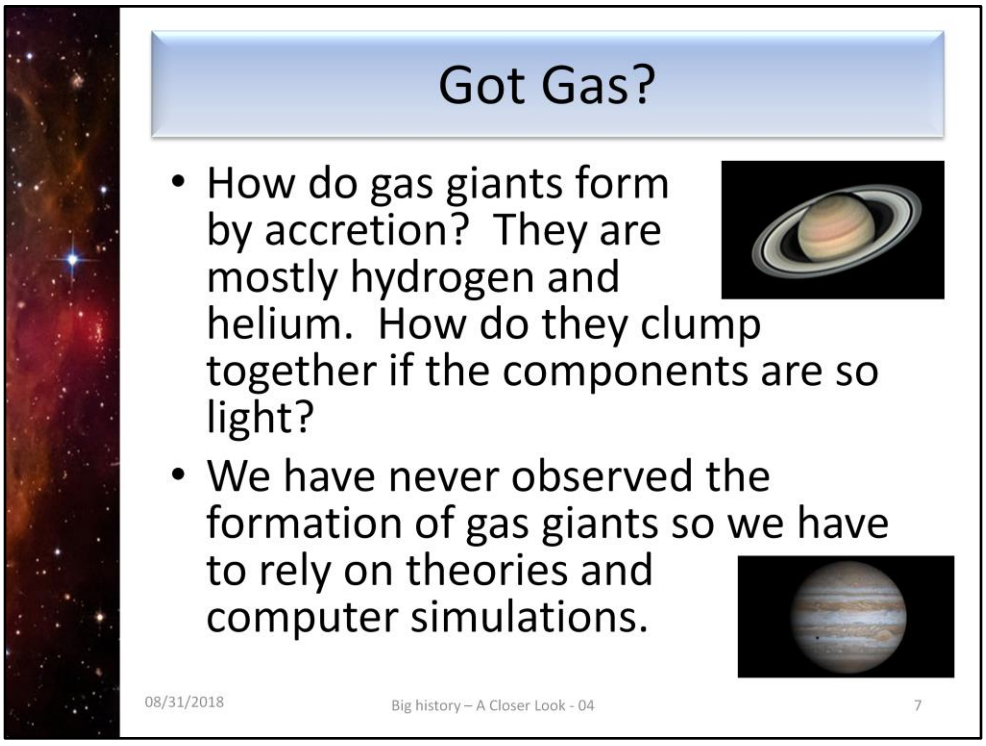

More perplexing yet is the formation of "gas giants" like Jupiter and Saturn. As we mentioned before gas giants are primarily composed of Hydrogen and Helium. These are light elements that do not combine readily.

We learned from the video that the solar winds had blown away the gas from the clouds that should have been around the dense inner planets. That is why the video said they were not composed of hydrogen or helium.

Okay, so why didn't the solar winds blow away the hydrogen and helium from Jupiter and Saturn? We are not told, but the theorists say that Jupiter and Saturn must have managed to pick up enough gas before the solar winds blew it away. Computer simulations are used to try and explain gas giant formation, because nobody has ever seen it occur.

What we know from these simulations is that gas giants will not form, unless you make them form via our old friend gravity. But gas giants have far too little mass to cause a collapse. Remember it took theoretical gravity fluctuations acting on a large gas cloud to make a star. Jupiter is approximately a thousand times smaller in mass that the Sun.

The problem is even worse with ice planets like Neptune. The ice planets are so far from the Sun that everything freezes. There is less material farther out and it would take much longer to gather up the mass needed to form a planet.

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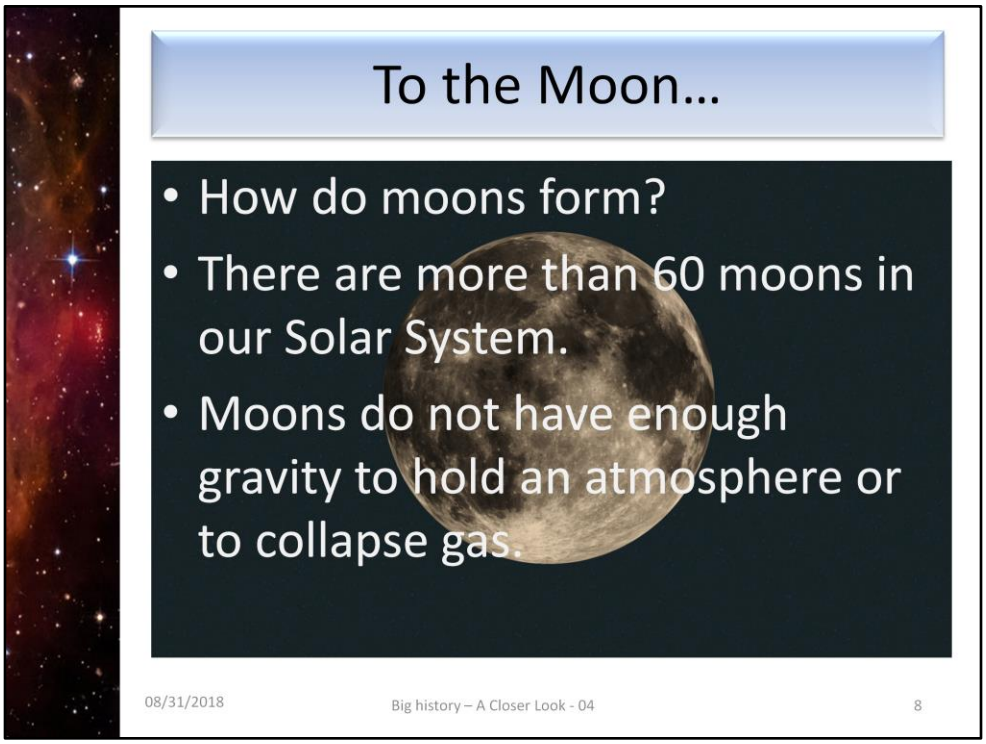

If gas giants and ice planets defy explanation, then moons are even worse. There is simply no good explanation for how they form using the methods described in the video.

The video just says that accretion causes planets to form. And so, by inference we are to assume that that is how moons form.

There are more than 60 moons in our Solar System, but scientists can't explain how they got there.

Moons simply don't have the gravitational mass to cause a gas cloud to collapse to form the moon. For example, our Moon is a large moon, and it does not have enough gravity to hold an atmosphere. The Earth has enough gravity to hold an atmosphere, but not enough to cause the atmosphere to collapse.

Professor Harold Urey, the so-called "father of lunar science" is reported to have said, "It is easier to pretend the moon is not in the sky than to explain how it came to be there."

Now, astronomers think the moon was born after a Mars-size body (or a series of such big objects) slammed into the early Earth. Some of the material blasted into space coalesced to form Earth's nearest neighbor, or so the thinking goes. They also say that the Moon is 4.51 billion years old according to their radiometric dating of Moon rocks.

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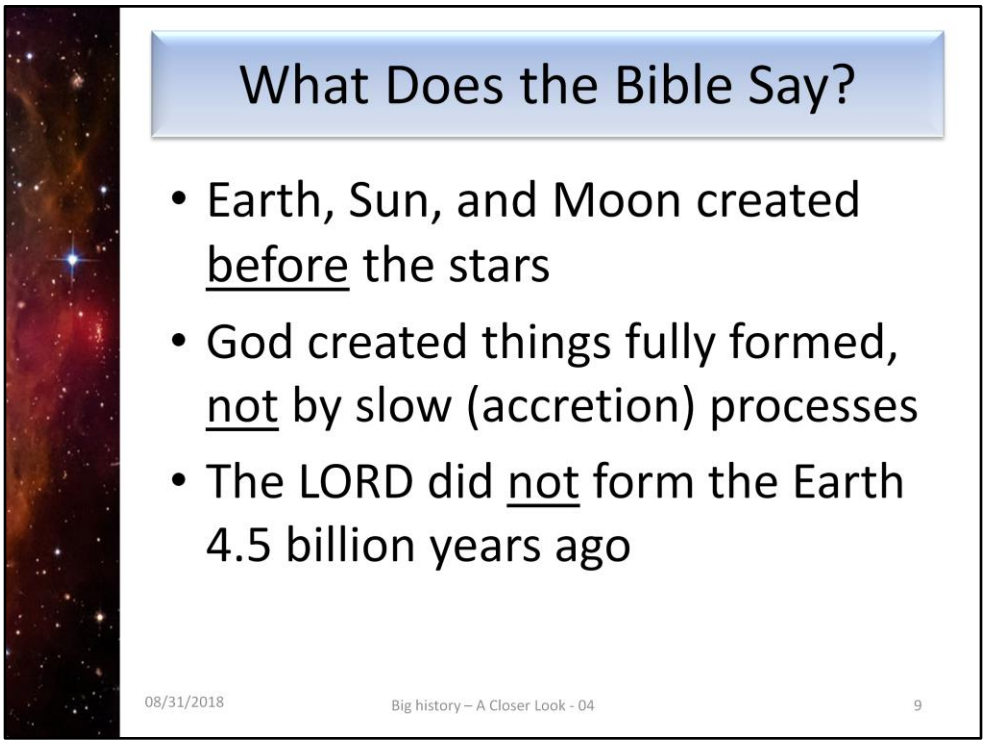

The one theory that scientists in Big History don't consider is the true origin story. This is found in Genesis and is repeated in a number of other places in the Bible.

The Bible says the stars and presumably any other planets were formed after the Earth, Sun, and Moon.

God spoke things fully-formed into existence. He did not cause gas clouds to slowly collapse or particles to clump together over billions of years.

The video tells us that the Earth was formed 4.5 billion years ago. Using the video's numbers, this would mean that the universe was 9.2 billion years old. Current estimates are that there are between 100 billion and 200 billion galaxies in the universe. The nearest galaxy is 25,000 light years away, and a light year is about 5.9 trillion miles. Therefore, all the stars in the 100 to 200 billion galaxies in this mind bogglingly large universe are supposed to have formed a scant 9.2 billion years ago by the processes described in the video. That should disturb you.

Next time, we will address the video's last claim, that the more complex structures could produce life.

Any questions or comments?

Let's pray.