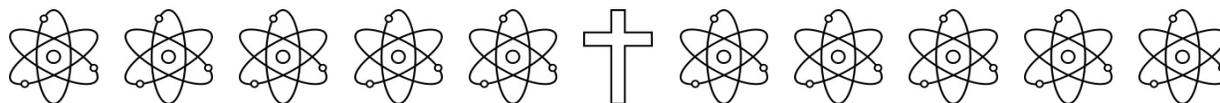


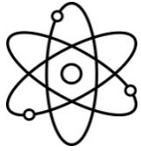


TALKING ABOUT SCIENCE AND GOD, CREATOR OF HEAVEN AND EARTH

A THREE-SESSION CONFIRMATION MODULE

A project of the Lutheran Alliance on Faith, Science and Technology
Written by Pastor George L. Murphy with assistance from Mr. Jeff Fitzkappes





LEADER'S GUIDE

Session One: Creation Today

Basic Ideas

In this session we want to help learners to see God as the creator today, always at work in the world. We also want them to understand that there is no conflict between that belief and scientific explanations of how things happen in the world.

The Bible starts with the creation stories in Genesis, but that's not where the faith of the people of Israel began. Their basic belief was that the Lord had chosen their ancestors, brought them out of slavery in Egypt into the Canaan and provided for their needs there. The ancient "creed" in Deuteronomy 26:1-11 - verses 5-11 of that passage - is a confession of that faith. As Israel reflected on their experience in light of this faith, they came to see that the Lord was not just the one who had brought Israel into being but the creator of all things. (See, e.g., Isaiah 40:21-28.)

The idea that God acts in the world by working with creatures as a human does with tools is an old one. God *co-operates* – literally "works with" – creatures in their actions. Scientists study the "tools" that God uses, not God. (So Luther calls creatures "masks of God" which hide God from our direct observation.) This is not the only way of thinking about God's action in the world but is a simple and effective analogy.

Here and in the next two sessions some discussion questions and activities will be suggested. Leaders can choose the ones that seem the most helpful for their groups. Some activities may be best for the whole groups and others for individuals.

Questions to start discussion and encourage thinking

A pair of questions:

- If we go to a doctor when we're sick, why pray for healing?
- If we pray for healing when we're sick, why go to a doctor?

What are some of the tools you use from day to day?

What would the world be like if there were no "laws of nature"?

Why do we need to talk about God if science explains how things happen?¹

Can you think of yourself as an instrument that God uses to do things in the world?

Possible activities

- Help the group bake cookies – or pizza, if you're feeling ambitious – from scratch. Assign each group member to bring an ingredient. Make the dough at the beginning of class and let the

¹ We'll explore the relationship between faith in God and science in our next session.

cookies bake during the discussion. While cooking, engage the students in a discussion about the ingredients and how they came into being. Each student could be in charge of leading discussion on their "assigned" ingredient. If time allows, discuss the cooking tools as well – bowls, whisks, mixers – and encourage the students to talk about their own impact on the cookie-making (or pizza-making) process.

- Sing "We plow the fields and scatter," found in Lutheran Book of Worship, #362, or Evangelical Lutheran Worship, #680 or #681.
- Have some common tools (e.g., scissors, electric drill, calculator) available. For each, ask learners what the tool does and what the person working with it does. For a twist, bring an uncommon or old tool (such as an abacus or the brace of a brace and bit set) and encourage students to guess what its function is.



CREATION TODAY

Where do things come from?

Creation – that's a word that can start an argument. Did God create the universe or did it just happen? Did God create human beings or did we evolve from creatures like today's apes? Or could it be that both answers are correct?

Those are big and important questions, so we shouldn't hurry to answer them right away. Instead, let's start with something simpler - like pizza. Where does it come from?

Well, you can make it yourself if you know how and have the ingredients. Mom or Dad could make it, or perhaps you could just heat up a frozen pizza. You could go to a pizza place and buy one, or you could have it delivered. We have lots of choices.

But that doesn't completely answer the question, "Where does pizza come from?" We'd have to think about where we get the flour and tomatoes and cheese and toppings, and that would take us back to farms. Even on farms, plants and animals depend on soil, weather, the sun's energy and each other to grow. These things are all part of the story of where pizza comes from.

And those are all things that scientists understand pretty well. People who study plants or weather or the sun or the way farms work and get their products to market can explain them. Science doesn't tell us everything about the world but it tells us a lot.

So in one way we know the answer to the question about where does pizza comes from. And at the same time, as Christians, we pray as Jesus taught us, "Give us this day our daily bread." When we say that, we're asking God to provide us with food. (The Jewish people in Jesus' time didn't have pizza, but "daily bread" really includes all food and other things we need for life.)

What does God have to do with it?

Why do we do this? Why do we ask God for food if science can explain where it comes from? It's not because scientists are wrong and God is an explanation for our pizza *instead of* those other things we listed. Nobody imagines that God will drop a pizza onto the table out of nowhere! So what does God have to do with it?

We might say that sometime in the past God must have created the kind of world in which people could live and get food. That's part of an answer, but asking for *daily* bread suggests that God didn't just do something a long time ago. It sounds as though God is at work today, in what is going on in our world now. That's the idea we get from the way the Bible talks about God:

The eyes of all look to you, and you give them their food in due season. You open your hand, satisfying the desire of every living thing.

Psalm 146:15-16

God works and creatures work

God is at work all the time in the world. But things in the world – atoms and rocks, bacteria, plants and people, water and light and planets and stars – are doing things all the time too. Sunlight, soil, the cells in wheat plants, farmers and other things all have to work in order to bring us pizza. And God, we say, is the reason we have it. It's not one or the other.

Perhaps God could make our food appear out of nowhere but God doesn't seem to work that way. Somehow God acts together with things in the world to do what God wants to do. How does that happen? One way of thinking about it is to picture God using the things in the world as tools or instruments, the way we use a screwdriver, a hair dryer, pulleys or some complicated machine to do a job.

When we say this we're not suggesting that God has to be added to the ideas that scientists use to explain how things happen. Some scientists don't even believe in God and do their work quite well. We speak about God doing these things because we trust that God who sent his Son to save us will provide what we need. St. Paul said it very well in his Letter to the Romans (8:32): "He who did not withhold his own Son, but gave him up for all of us, will he not with him also give us everything else?" We'll talk more about the relationship between faith and science in our next session.

Creation means that God takes care of the world

So at the beginning of the Apostles' Creed we say "I believe in God, the Father almighty, creator of heaven and earth." We look to the Father of our Lord Jesus Christ, who invites us to call him father as well, to provide for us.

Martin Luther went on to explain what the creed means by creation:

I believe that God has created me together with all that exists. God has given me and still preserves my body and soul; eyes, ears, and all limbs and senses; reason and all mental faculties. In addition, God daily and abundantly provides shoes and clothing, food and drink, house and farm, spouse and children, fields, livestock, and all property - along with all the necessities and nourishment for this body and life. God protects me against all danger and shields and preserves me from all evil. And all this is done out of pure, fatherly, and divine goodness and mercy, without any merit or worthiness of mine at all! For all of this I owe it to God to thank and praise, serve and obey him. This is most certainly true.

This explanation concentrates on what God does now, not what happened in the past. But the past and the origin of the world and life are important. We'll talk about those things in our third session.





Discussion Questions for Session One: Creation Today

A pair of questions:

If we go to a doctor when we're sick, why pray for healing?

If we pray for healing when we're sick, why go to a doctor?

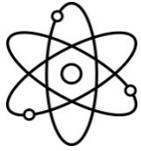
What are some of the tools you use from day to day?

What would the world be like if there were no "laws of nature"?

Why do we need to talk about God if science explains how things happen?

Can you think of yourself as an instrument that God uses to do things in the world?





LEADER'S GUIDE

Session Two: Belief and Brains

Basic ideas

In this session we talk about the relationship between faith, with trust being its key aspect, and reason. Faith is not simply a matter of thinking certain things are true, but a person with a mature faith will have thought about what he or she believes and tried to see how it makes sense.

Since Christians believe that God is the creator of our world, thinking about our faith means that we need to take into account what science tells us about that world. That means that we may have to change some of the ways we think about what we believe when new discoveries are made. That can be a challenge.

The evolution of living things can be a special challenge. We won't try to answer all the questions in these sessions but in this one we make one basic point. Since we said in Session 1 that God normally works in the world by cooperating with creatures in their actions, we can think of God's creative work taking place through the processes of evolution. This is like the way in which we can understand scientifically how each person develops in a mother's womb *and* believe that God is the creator of each person.

Science enables us not only to understand the world but to control some of its forces. Technology, used in responsible ways, can be a way to "love your neighbor as yourself." Both these aspects of science can be used to encourage young people who are interested in science to pursue it as a vocation.

Questions to start discussion and encourage thinking

Are we allowed to ask questions about the things the Apostles' Creed says we believe?

If you knew that a person was a licensed medical doctor but didn't trust that person, would you let that doctor perform a difficult surgical operation on you?

Why do some people think that science and religion always have to be fighting one another?

Jesus said that we should love God and our neighbor. What are some ways in which science can help us to do that?

Possible activities

- Assign the group to research the possibility of collecting and recycling aluminum cans. Discuss why this project would be important and possible recipients of the funds that come from said cans. Help the group start a collection and recycling effort in the congregation.¹
- Have each learner research one of the people in the following list and give a brief report on that person’s religious beliefs and scientific work to the group.

Hildegarde of Bingen	Galileo Galilei	Johannes Kepler	Blaise Pascal
Leonhard Euler	Michael Faraday	James Clerk Maxwell	Mary Anning
Gregor Mendel	Henrietta Leavitt	Arthur Compton	Charles Townes
Pierre Teilhard de Chardin			

- The basic laws of planetary motion were found by Johannes Kepler around 1600. The average distances from the sun of the planets he knew about and the time it takes each to go around the sun (its orbital period) are listed below. (The unit of distance is the average distance from the sun to the earth, the “astronomical unit,” and the times are in earth years.) Can you see a pattern? There’s an easy answer and a more difficult one.

Planet	Distance <i>Unit: distance from earth to sun</i>	Period <i>Unit: earth year</i>
Mercury	.387	.241
Venus	.723	.615
Earth	1.00	1.00
Mars	1.52	1.88
Jupiter	5.20	11.9
Saturn	9.54	29.5

(Answer: The period obviously increases as the distance does. And it does that according to a definite rule – the square of the period equals the cube of the distance. This is Kepler’s third law, which he discovered in 1619. This law brings out the fact that there is indeed order – quantitative order, in fact – in creation. It holds true for all planetary bodies, including the satellites of Jupiter that Galileo was studying around the same time. About fifty years later, Isaac Newton explained Kepler’s work in terms of the laws of gravitation and motion.)

¹ The primary reason for recycling aluminum (and cans in particular) is to reduce electric power usage (and thus the use of fossil fuels and greenhouse gases). While aluminum is the third most abundant element in the earth’s crust, the metal is obtained from its ore by electrolysis of the molten oxide from the ore. Recycling a can requires about 5% of the electrical energy that would be needed to get the same amount of aluminum from the earth’s crust. In other words, the energy used to get one can’s worth of aluminum from the earth’s crust can generate 20 cans from recycling.



BELIEF AND BRAINS

Trust God and use the brains God gave you!

In the First Commandment God says "You are to have no other gods." The Catechism explains this by saying "We are to fear, love and trust God above all things." That word "trust" is what faith is all about. We are to rely on God in every need, not just have certain ideas about God.

"Love" is important too. Jesus tells us what that means in Mark 12:30: "You shall love the Lord your God with all your heart, and with all your soul, and with all your mind, and with all your strength."

We are to love God with our *minds*. God has made us able to reason, to think clearly and deeply about things. We have brains so that we can try to understand the world God creates. We are able to trust in God as intelligent people who think about what our faith means. That thinking can be a way we express our love of God and give thanks for creating a world that we *can* understand.

Faith in God is the heart of religion and using our minds to understand the world is what science is all about. Faith and reason, religion and science, go together pretty well. The Scottish physicist James Clerk Maxwell was one of the greatest scientists of the 1800s. He wrote down the basic laws of electricity and magnetism, helped to explain the rings of Saturn and the behavior of molecules in gases, and prepared the way for Einstein's relativity theory. And he said, "Men of science as well as other men need to learn from Christ."

And science itself requires a kind of faith, a trust that the world can be understood by careful observation and clear thinking, and that understanding the world is worth the effort. Without that faith, who would devote a life to scientific work?

But as you've probably heard, there have been some quarrels between science and religion. You can start an argument just by mentioning "creation and evolution" to some Christians. Why would that be true if faith and science can go together?

Thinking about what we believe

Unfortunately Christians haven't always been willing to consider new ideas. Really thinking about our faith requires more than memorizing what people have always said was true.

For a long time almost everyone believed that the earth stood still and the sun, moon and stars moved around it. That's how things look to us as we stand here on "solid ground." The writers of the Bible spoke that way, with the sun rising and setting, and Christians got the idea that that was part of what God wanted to teach us. When the Polish astronomer Copernicus wrote in 1543 that the earth and other planets went around the sun, it caused a lot of debate. In the next century the great Italian scientist Galileo got in trouble with the church for teaching this idea. It sometimes takes Christians awhile to get used to new ways of thinking.

The most heated arguments have been the ones about how life has come about on earth. In 1858 Charles Darwin and Alfred Wallace presented an idea about the way living things had gradually evolved over long periods of time. Their theory of evolution has helped us to understand a lot about the relationships between different kinds of plants and animals. Almost all scientists today who study living things accept the basic idea of this theory.

But people sometimes get confused when they try to understand evolution together with God. If living things evolved, does that mean that God didn't create them?

Of course not! The Catechism's explanation of creation that we talked about in our last session says that God is the creator of each one of us. That's true even though we know that each of us developed from a single fertilized egg inside our mothers. Science can tell us a lot about that development, and God has been at work in those processes that science studies. In a similar way, God has been at work through all the millions of years of evolution, bringing living things to the forms we see today.

This doesn't mean that we understand everything about evolution and creation. But it is "evolution *and* creation," not "evolution *or* creation," as if we had to make a choice. Next week we'll look at the way the Bible speaks about God's creation of life.

Science as a way to serve God

So there have been debates about religion and science and there probably will be in the future. Some scientists are not Christians or don't believe in God at all. But many Christians make important scientific contributions. We've already mentioned James Clerk Maxwell and could also think of Pierre Teilhard de Chardin, a Roman Catholic priest who studied and wrote about evolution. Henrietta Leavitt, who discovered a property of some stars that made it possible to measure the distances to other galaxies, is another example. Working in science is one way a person can serve God.

Christian biologists or geologists or chemists do the same kind of work as others in their scientific fields but they have a special reason for doing it. As they learn to understand the universe in more and better ways, they make it possible for us to see more and more clearly how amazing God's work of creation is. Just the fact that God has made a world that makes sense, so that we can discover how things work, is a reason to praise God as the creator.

Jesus said that after loving God, loving our neighbor is the second most important commandment (Mark 12:31). God does not just tell us to do that but gives us the ability to understand what needs to be done and to figure out how to do it. Developing better medical treatments, finding new sources of energy, and working to protect the environment are all ways of expressing our love of neighbors, and all require scientific knowledge.

When people hear the word "creation" they usually think of what happened "in the beginning." We haven't said much about that yet but will do so next week.





Discussion Questions for Session Two: Belief and Brains

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LEADER'S GUIDE

Session Three: Pictures of the Beginning

Basic ideas

This final session addresses the fact that the way scientists today speak about the origin of the earth and living things is different from the way (or really, ways) that the Bible pictures them. There should be no attempt to force the scientific picture into the mold of the biblical accounts. On the other hand, there need be no apologies for the differences. The biblical writers and today's scientists are interested in different issues - the first in who is the creator, the cause, of the world and the place of humans in the world, and the second in the details of "what really happened." And when the biblical writers talked about features of the world, like the sky, they naturally used assumed the knowledge of their contemporary culture.

The material in this session gives a very brief picture of what scientists know today about origins and, because of space limitations, nothing has been said about the origin of the whole universe. Leaders who want to go into more detail might look at the appropriate parts of the books by Miller and Murphy listed under Resources.

Other biblical texts besides the first two chapters of Genesis talk about creation (e.g., Psalm 104), but for simplicity we focus on those chapters. Biblical scholars see two different creation accounts in Genesis, 1:1-2:4a and 2:2:4b-25. If we see them as pictures that bring out different themes rather than blow-by-blow accounts of what happened we will not be disturbed by the fact that they describe some things differently. (E.g., in the first account humans are created at the end while they come at the beginning in the second account. In fact, having these different views deepens our understanding.

Questions to start discussion and deepen understanding

Does it bother you to think of yourself as being closely related to chimpanzees and gorillas? Why or why not? How about rats or mosquitos?

Does the fact that the biblical writers had less understanding of the natural world than we do today cause a problem for belief that scripture was inspired by the Holy Spirit?

Many people in the ancient world worshipped the heavenly bodies as gods and goddesses. What does the fourth day of the first creation story in Genesis say about that?

Genesis 1 says that everything God created was "good." Does this mean that everything was perfect?

Possible activities

- Give each learner a handout with two accounts of the assassination and death of Abraham Lincoln to read: the first from a good historical biography¹ and the second Walt Whitman's

¹ A good option is Benjamin Thomas's *Abraham Lincoln: A Biography*. See "Resources" for more information.

poem "O Captain! My Captain!" Then discuss such questions as: Do they agree about what happened? Which gives a more accurate picture of the historical events? Which expresses best the meaning of Lincoln's death?

- The first creation account can read seen as liturgy. Divide Genesis 1:1-2:4a into roughly equal sized pieces for individuals to read, and have the whole groups read the statements that God saw that what he had created was good (in verses 1:4, 1:10, 1:12, 1:18, 1:21, 1:25 and 1:31) as responses.
- Play a board game or computer game illustrating evolution by natural selection.² Perhaps you know of one, or you can search for "evolution games" on Google. Choose an appropriate one for your group. If you have a sophisticated computer, one good example can be found here: <http://www.nhm.ac.uk/nature-online/evolution/what-is-evolution/natural-selection-game/the-evolution-experience.html>.

² Be sure that such a game really is about biological evolution. There is one called "Natural Selection" which is really a humans versus aliens combat game.



PICTURES OF THE BEGINNING

Scientific views of origins

If you ask a biologist how life on earth began he may say, "It seems to have started about three and a half billion years ago. We still don't know for sure how the first living things got started. Somehow the right molecules came together to make a crude cell that could use chemicals for energy and reproduce. We know that cells and then groups of them did begin to develop because we find traces of them in ancient rocks."

When we look at layers of rock with different ages, we find fossils of different plants and animals. The fact that they *are* different shows that the kinds of living things on earth have been changing. Evolution has happened. There's other evidence for it too – relationships between chemicals in the bodies of different animals, for example. Our blood and DNA are more like the blood and DNA of chimpanzees and gorillas than they are of the blood and DNA of dogs or cats. We're more closely related to those apes, though we didn't "descend" from them. They're more like our "cousins."

You may wonder if the earth is really that old. A geologist will tell you that it formed about four and a half billion years ago. "We can tell that," she explains, "By using the rates of radioactive decay of elements like uranium as clocks. By measuring the amounts of these elements and their decay products in rocks we can determine the ages of those rocks."

Biblical views of origins

What if we ask the Bible how the universe and life began? In the first chapter of Genesis we read that "In the beginning God created the heavens and the earth... God said 'Let there be light,' and there was light." Heaven and earth are formed at God's commands. God says "Let the earth put forth vegetation" and it does. In the same way God calls into being the sun, moon and stars and animals of all kinds. Finally God makes humans, male and female, telling them to be God's representatives in caring for the world.

Everything that has been created is "very good." All this work takes six days, and on the seventh day God rests. This story goes through the first three verses of chapter 2.

That isn't the end. The rest of Chapter 2 is a *different* story of creation. Here God creates a man from the dust and breathes life into him, then makes a garden and puts the man there to care for it. God causes trees to grow, creates other animals from the ground and finally makes a woman from the man's rib. The chapter ends with what is really a wedding between the man and the woman.

Having different views deepens understanding

The scientific answers about the beginning of the earth and life are modern. They're very brief summaries of the best that scientists know in the early twenty-first century. They concentrate on *how* things have happened, not on *who* might have caused the whole thing or *why*. They say nothing about God. That doesn't mean that God had nothing to do with the beginning of the universe or life, but science just doesn't study God or use the idea of God to explain things.

The writers of the creation stories in Genesis also used the best knowledge about the world that people had in their time. But that was around three thousand years ago, and people back then didn't know as much about the world as we do now. So there's nothing in the Bible about the earth being billions of years old or evolution. In Genesis 1 the sky is pictured as a solid dome over the earth. It looked that way to ancient people but we know now that the sky is not solid.

The purpose of the Bible isn't to tell us about fossils or the physical makeup of the sky. It's to proclaim that God created the world and that God's creation is good. The God we meet in the first chapters of Genesis is the one who chose Abraham and Sarah and their descendants to be a blessing to the world and who rescued their descendants, the people of Israel, from slavery in Egypt. Those things happened centuries before the creation stories in Genesis were written. Those creation stories make the point that God is not just the God of Israel but the one on whom the whole universe depends.

Although the Bible doesn't teach us modern science, it tells us very important things about God's work and God's purpose for the world. God is the one who has made all things by the Word. Everything God made is good. God gives human beings a special place in the world and special responsibility to care for it. God intends for people to live together in peace.

Having two different creation stories can give us deeper understanding of God's work. For example, in the first account God simply says "Let there be ..." and things happen. God is completely in control. In the second account we have a picture of God getting down in the dust to create the first human. It's a much more hands-on account. God cares for the whole universe *and* for every part of it.

And though Genesis doesn't have modern science, it gives some hints that can help us think about that. In Genesis 1:11 God doesn't have plants appear from nowhere but has the earth bring them forth. That suggests that God has made the basic chemicals able to produce living things. This isn't evolution but it shows that scientific theories and the biblical creation stories can go together as we consider the world.





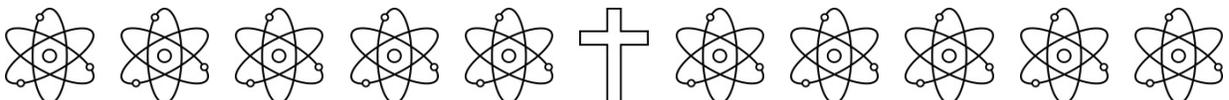
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REFERENCES AND RESOURCES

References

Biblical citations are from the NRSV, but in the third session, one of that version's alternate translations of Genesis 1:1 is quoted. The quotation from the Small Catechism in the first session is from the Kolb-Wengert edition of *The Book of Concord* (Fortress, 2000). The quotation from Maxwell in the second session is from Colin A. Russell, *Cross-Currents: Interactions between science and faith* (Eerdmans, 1985), p.211.

Resources

With the exception of Stannard's book, the resources listed here are intended for leaders – which of course doesn't mean that learners shouldn't be allowed to read them! There simply isn't a lot of good material published for the average confirmation age reader.

Ian G. Barbour, *Religion and Science* (HarperCollins, 1997).

This book is used in many college and seminary courses in religion and science. Chapter 12 discusses several models of God's action in the world.

Keith B. Miller (ed.), *Perspectives on an Evolving Creation* (Eerdmans, 2003).

This book is a collaboration by a number of scientists, theologians and historians of science on issues related to creation.

George L. Murphy, *Toward a Christian View of a Scientific World* (CSS, 2001).

This book is an overview of topics intended for adult classes in congregations.

Russell Stannard, *www.Here-I-Am* (Templeton Foundation Press, 2002).

This is a young adult novel about a boy, Sam, who is exploring the internet and comes across the website of – God? It is written as a first person account by "Sam," but the actual author of the book is a retired British physicist who has been active in religion-science discussions and has written other young adult novels and popularizations of science. This book has a number of questions for discussion on each chapter.

Benjamin Thomas, *Abraham Lincoln: A Biography* (Southern Illinois University, 2008).

This is a good one-volume biography of Lincoln.

Gerhard Von Rad, *Genesis, revised edition* (Westminster, 1972).

This is a commentary by a prominent German Old Testament scholar.