

TRENT DEE STEPHENS, PH.D.

SCIENCE

and

**THE OLD
TESTAMENT**

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Contents

[Introduction](#)

[Chapter 1 What Can Parents Teach the Youth of the Church about the Relationship between Science and Scripture?](#)

[Chapter 2 God Existed Before the Creation of the Universe](#)

[Chapter 3 We Are Created in the Image of God](#)

[Chapter 4 How Did the Fall Affect Adam and Eve?](#)

[Chapter 5 The Lord Called His People Zion](#)

[Chapter 6 The Flood of Noah: Global or Local?](#)

[Chapter 7 The Abrahamic Covenant: How Many Stars?](#)

[Chapter 8 Where Is Heaven?](#)

[Chapter 9 Fire and Brimstone Rained on Sodom and Gomorrah](#)

[Chapter 10 Wells, Camels, and Pitchers of Water: Rebekah's Story](#)

[Chapter 11 Jacob and the Piebald Sheep](#)

[Chapter 12 Egypt at the Time of Joseph](#)

[Chapter 13 The Israelites in Egypt](#)

[Chapter 14 Moses and the Burning Bush](#)

[Chapter 15 The Plagues of Egypt](#)

[Chapter 16 The Immortal Messiah](#)

[Chapter 17 Parting the Red Sea](#)

[Chapter 18 Where on Earth Is Mount Sinai?](#)

[Chapter 19 Israel's Footprint on the Arabian Peninsula](#)

[Chapter 20 The Tabernacle](#)

[Chapter 21 The Brass Serpent](#)

[Chapter 22 Moses's Assumption and the Archangel Michael](#)

[Chapter 23 What Happened at Jericho?](#)

[Chapter 24 The Great Trial of Science versus Religion](#)

[Chapter 25 Samson's Hair and Strength](#)

[Chapter 26 Samuel Hearing Voices](#)

[Chapter 27 Camelot, David, and Goliath](#)

[Chapter 28 The Wisdom of Solomon](#)

[Chapter 29 Elijah's Miracles at Zarephath](#)

[Chapter 30 Elisha, Naaman, and Leprosy](#)

[Chapter 31 An Angel Smites the Assyrians](#)

[Chapter 32 The Scriptures Are Read to Israel](#)

[Chapter 33 Who Was Ahasuerus?](#)

[Chapter 34 The Sons of God Shouted for Joy](#)

[Chapter 35 Who Wrote the Psalms?](#)

[Chapter 36 A Clean Heart](#)

[Chapter 37 Though the Heaven and Earth Perish](#)

[Chapter 38 Wisdom Is the Principal Thing](#)

[Chapter 39 One Lota](#)

[Chapter 40 I Will Make Dry Land Springs of Water](#)

[Chapter 41 Seeing and Knowing](#)

[Chapter 42 A Cockatrice by Any Other Name](#)

[Chapter 43 I Knew Thee Before](#)
[Chapter 44 The World of Jeremiah](#)
[Chapter 45 The Vision of Ezekiel](#)
[Chapter 46 Daniel and the Hypnotized Lions](#)
[Chapter 47 Amos and the Earthquake](#)
[Chapter 48 Jonah and the Whale](#)
[Chapter 49 What Happened at Nineveh?](#)
[Chapter 50 The Numerical World of Zechariah](#)
[Chapter 51 Malachi's Dragons](#)
[Chapter 52 The Star of Bethlehem](#)
[About the Author](#)

Chapter 1

What Can Parents Teach the Youth of the Church about the Relationship between Science and Scripture?

To paraphrase Albert Einstein, “Without science there is no brain, without religion there is no heart.” Both unite to create a complete, functioning, healthy being. Sharing the knowledge we have gained jointly through science and the scriptures, especially during the past two hundred years, is vital to a future of well-balanced Church members and Church leaders.

Much of this chapter will address how we think about issues—in this case, science and the Word of God—and how they relate to the scriptures and our paradigms. The word *paradigm* is the English version of the Latin word *paradigma*, which means “to show side by side,” as in “to compare.” *Paradigma* is derived from the Greek words *para*, meaning “beside,” and *deiknynai*, meaning “to show.” Given this definition, we may think of a paradigm as our point of view, our perspective, in comparison to some other perspective—such as a liberal versus a conservative paradigm. Historically, however, the problem has always been that there are seldom two views to compare side by side. The world point of view, at any given time in history, is usually unilateral, and the concept of a paradigm is literally non-existent. Indeed, the biggest problem with paradigms is that no one realizes that their point of view is *a paradigm* because they don’t realize there is even *another point of view*.

In their book *The Grand Design*, in a chapter entitled “What is Reality?,” Stephen Hawking and Leonard Mlodinow tell a very pertinent, enlightening, and, to me, very entertaining story about goldfish bowls: “A few years ago the city council of Monza, Italy, barred pet owners from keeping goldfish in curved goldfish bowls. The measure’s sponsor explained the measure in part by saying that it is cruel to keep a fish in a bowl with curved sides because, gazing out, the fish would have a distorted view of reality.”¹

Reality compared to what? The Monza city council must assume we who are outside the bowl have a better perspective of “reality.” How many goldfish live in a reality where they can see out of their pond and see *anything* of the outside world? How could a goldfish have *any* view of reality when looking out of *any* container, curved or not?

As someone who has taught neurobiology and written anatomy and physiology textbooks for more than thirty years, I perceive that our perspective of reality isn’t actually very “real” at all. To begin with, we all have a “blind spot” in each eye where nerves and blood vessels leave and enter the eye. Because there are no rods and cones there (the cells in the back of the eye that allow us to “see”), if an image is projected into only one eye, there is a blank spot in the image. The problem is that our brain has a mind of its own and doesn’t like blank spots, so it simply collects information from around the blank spot and fills it in. We seldom realize there is a

problem because we usually use both eyes and rapidly scan objects in our field of view. But if we see something occurring very quickly, such as an automobile accident, our eyes may not move quickly enough to see everything, and our brain simply fills in the blanks without our even knowing it.

Here is a simple experiment that you can perform to demonstrate your blind spot. On a three-by-five lined index card, draw a small cross about one inch from the right side of the card. Now draw a small red dot about one inch from the left side. Then cover your right eye with your hand and hold the file card in front of your left eye. Look at the cross and slowly move the card forward and back. There should be a point where the red dot disappears. You should also notice that there is not a white spot where the dot was; the lines continue straight through uninterrupted. You can rotate the card (reversing the locations of the cross and dot) and test your right eye.

As light rays enter our eyes, they are bent by the cornea and lens to focus *upside down* on the retina at the back of the eye. But your brain doesn't like to see the world upside down, so it simply rotates the image so that the world is "right side up," as the brain perceives it *should* be. In the middle of the twentieth century, Swiss-Austrian philosopher and psychologist Theodor Erismann at the University of Innsbruck devised an ingenious experiment to test this quirk of the brain. He created a pair of glasses fitted with mirrors that inverted the image entering his test subject's eyes. His test subject was his student assistant, Ivo Kohler. The image projecting onto Kohler's retina was right side up with the world while he was wearing the glasses, but Kohler's now-confused brain inverted the image anyway.

At first, Kohler reached out wildly when trying to grasp an object and stumbled when walking around furniture or down stairs. In fencing with sticks, Kohler raised his stick to check a low thrust and lowered his stick to check a stab from above. When holding a cup out to be filled, he turned it upside down to catch the water he apparently perceived was flowing upward. But Kohler's brain gradually adjusted over the space of a week as he constantly wore the glasses. After ten days, Kohler's brain had adjusted so much that he was able to negotiate the world quite well—even riding a bicycle. When Kohler removed the glasses at the end of the experiment, his brain gradually readjusted to its original function of rotating the upside-down image of the retina.² In 1950 and 1954, Erismann and Kohler produced documentary movies of their experiment.³

Probably my favorite visual demonstration, however, is a video made by Daniel Simons and Christopher Chabris in 1999.⁴ So as not to spoil your experience with the investigation, READ NO FARTHER until you have watched the YouTube video. Conduct a google search on "count the bouncing ball." When you are finished watching the 1:22-minute YouTube video, continue reading.

Here's what's amazing: most people seeing the video for the first time are so focused on counting the number of times the team in white passes the basketball that they don't even see the person in the gorilla suit walk through the video, stop in the middle, beat his chest, and continue to walk through.

After these three stories about your visual system, are you still holding on to the old paradigm that "seeing is believing?" Hawking and Mlodinow asked, "how do we know we have the true, undistorted picture of reality? Might not we ourselves also be inside some big goldfish bowl and have our vision distorted by an enormous lens?"⁵

For most of human history, the world around us was only observable with the unaided eye. Then at the end of the sixteenth and early seventeenth centuries, Dutch eyeglass makers became so proficient at lens-making that they began to investigate

new uses for their lenses. In 1595, two lens-makers, Zacharias Jansen and his father, Hans, put lenses into the ends of a tube and invented the microscope. Not long after that, another lens-maker, Hans Lippershey, put two lenses into the ends of a tube in 1608 and invented the telescope. The telescope took off immediately, and by the summer of 1609, every scientist in Europe was making telescopes. Galileo Galilei turned his telescopes toward the moon, Venus, and Jupiter, changing science and humanity forever. The microscope took a bit longer to come into general use. Anton van Leeuwenhoek and Robert Hooke, among others, refined the microscope and by 1665, Hooke was describing the microscopic world, which no one had ever even imagined.⁶

The first “modern element,” phosphorus, was discovered in 1669 by Hennig Brand, inaugurating the era of modern chemistry. A little more than eighty years later, in 1752, Benjamin Franklin demonstrated electrical conductivity, opening the age of electricity. In 1825, William Sturgeon invented the electromagnet, and in 1831, Joseph Henry demonstrated how to use such a magnet to make a telegraph key, inaugurating the communications age. In 1864, James Maxwell demonstrated that electric and magnetic fields travel at the speed of light as waves through space. Then on New Year’s Eve, 1879, Thomas Edison’s light bulbs lighted the world beginning at Christie Street in Menlo Park, New Jersey.

In the meantime, God and His Son, Jesus Christ, appeared to Joseph Smith in 1820. Then on September 21, 1823, Moroni paid a visit to Joseph in his bedroom. Four years later, on September 22, 1827, Joseph Smith retrieved the gold plates from an underground chamber on the Hill Cumorah. The Book of Mormon was published in March 1830, and The Church of Jesus Christ of Latter-day Saints was formally organized on April 6, 1830.

Is there a connection between the scientific advancements of the seventeenth through nineteenth centuries and the Restoration of the gospel in the nineteenth century? Many people think there is. God said, “How long can rolling waters remain impure? What power shall stay the heavens? As well might man stretch forth his puny arm to stop the Missouri river in its decreed course, or to turn it up stream, as to hinder the Almighty from pouring down knowledge from heaven upon the heads of the Latter-day Saints.”⁷

I’m not certain that all that knowledge was poured down onto the heads of the Latter-day Saints directly. Many people have been involved as recipients of that knowledge pouring down from heaven, of which we, the Latter-day Saints, are the beneficiaries. By combining what we have learned through science and from pondering the scriptures, our lives can be much richer and our knowledge much deeper than they would be otherwise.

In a revelation given through the Prophet Joseph Smith to the Church at Kirtland, Ohio, on March 8, 1831, as recorded in Doctrine and Covenants 46, we are told,

Wherefore, beware lest ye are deceived; and that ye may not be deceived seek ye earnestly the best gifts, always remembering for what they are given;

For verily I say unto you, they are given for the benefit of those who love me and keep all my commandments, and him that seeketh so to do; that all may be benefited that seek or that ask of me, that ask and not for a sign that they may consume it upon their lusts.⁸

We are then informed of the importance of what the gifts are: “And again, verily I say unto you, I would that ye should always remember, and always retain in your minds what those gifts are, that are given unto the church. For all have not every gift given unto them; for there are many gifts, and to every man is given a gift by the Spirit of God.”⁹

Some of us are given one gift and some another; some have the most important gift of all: “To some it is given by the Holy Ghost to know that Jesus Christ is the Son of God, and that he was crucified for the sins of the world. To others it is given to believe on their words, that they also might have eternal life if they continue faithful.”¹⁰

Then follows a list of the various gifts of the spirit: differences of administration, diversities of operations, the word of wisdom, faith to be healed, faith to heal, the working of miracles, the ability to prophesy, the discerning of spirits, the ability to speak with tongues, and the interpretation of tongues.¹¹ In this list, I skipped over verse 18, which says, “To another is given the word of knowledge, that all may be taught to be wise and to have knowledge.”¹² That knowledge, as with the other gifts of the Spirit, is to be shared with the entire Church, “that all may be benefited.”¹³ “And all these gifts come from God, for the benefit of the children of God.”¹⁴

I paraphrased Albert Einstein at the beginning of this chapter in my own words to set the tone for the chapter. His actual words were, “Science without religion is lame; religion without science is blind.”¹⁵ He also stated:

Don't think about why you question, simply don't stop questioning. Don't worry about what you can't answer, and don't try to explain what you can't know. Curiosity is its own reason. Aren't you in awe when you contemplate the mysteries of eternity, of life, of the marvelous structure behind reality? And this is the miracle of the human mind—to use its constructions, concepts, and formulas as tools to explain what man sees, feels and touches. Try to comprehend a little more each day. Have holy curiosity.¹⁶

I love that quote from Einstein. For me, science is the place where I can exercise my insatiable curiosity. I love the mystery and excitement of the unknown and the thrill of discovery, whether mine or someone else's. I recently gave a lecture in my biochemistry class on the history of the discovery of the DNA structure. I was so excited about that history that, at age seventy-six, I was shaking while giving my lecture.

Parents, encourage your children's curiosity—there are millions of things yet to be discovered in science, and it is a never-ending activity. We scientists will never work ourselves out of a job. Please, don't ever discourage your children by telling them that everything is already known and there is nothing left to discover. Don't make science boring by telling them all the things we know; instead, make it exciting by telling them all the things we don't know. Certainly, don't tell them that the scriptures tell us all we need to know. Encourage them to devour and deeply ponder the scriptures, but also teach them to ask questions and pursue science—the most wonderful and exciting playground on earth.

In his second epistle to Timothy, the Apostle Paul wrote, “This know also, that in the last days perilous times shall come. For men shall be . . . Ever learning, and never able to come to the knowledge of the truth.”¹⁷

This prophetic statement of Paul's defines modern science—and I don't view it as necessarily negative. We, as scientists, know that we can never be absolutely

certain of what we are discovering, but we can move ever closer to the truth. We are close enough to make automobiles, cell phones, and televisions and to launch humans to space stations, the moon, and beyond. We know the structure of DNA and have glimpsed the thrilling world of biology that such knowledge has opened before us. In a *Scientific American* paper, "The Galileo Affair," Owen Gingerich wrote that "what passes for truth in science is only the likely or the probable; truth can never be final and never absolute." Here is where some ultra-conservative Christians pit science, which admits it never has the complete truth, against the scriptures, which they believe are always completely true. One problem with this paradigm is that the scriptures never even mention computers or DNA. I believe that God has left to us the fun and excitement of those discoveries, while the scriptures teach us how to direct our lives and experience our relationship with God.

Gingerich continued:

[T]he poet Robinson Jeffers . . . wrote: "The mathematicians and the physics men have their mythology; they work alongside the truth, never touching it; their equations are false but the things *work*." The mathematicians and the physicists cannot really claim truth, but they have certainly sorted out a lot of things that do not work, and they are building a wondrously coherent picture of the universe. The Copernican system is surely a part of that coherency. A universe billions of years old and evolving is also part of that coherency.

Galileo had attempted to show that reasoning from the Book of Nature can, at the very least, establish that one world view is far likelier than another. This has been the method of science ever since. Indeed, one might argue (as Alfred North Whitehead did) that since an omnipotent Creator could have made the world in any way he liked, it is all the more incumbent on scientists to discover which way God chose to make it.¹⁸

In spite of its shortcomings, science also has its strengths. It is verifiable, which means it can be confirmed by experiment and by observation. With all their strengths, the scriptures are neither science nor pure history. The best path to knowledge is through a combination of science and the scriptures. For me, at least, the most exciting areas of science, such as biology, are where they interlock with theology like the fingers of two clasped hands—a phenomenon called *interdigitation*. That's where the fireworks explode and the fun intensifies. For heaven's sake, please don't be afraid of those areas, and please don't teach children to fear them. We are told in Doctrine and Covenants 38:30, "I tell you these things because of your prayers; wherefore, treasure up wisdom in your bosoms . . . if ye are prepared ye shall not fear."

Science and scripture are often considered to be residing at opposite ends of the spectrum. To paraphrase Galileo, the scriptures teach us how to go to heaven whereas science teaches us how the heavens go. Stephen Jay Gould called this distinction between science and religion "nonoverlapping magisteria" (NOMA). Gould stated, "Here, I believe, lies the greatest strength and necessity of NOMA, the nonoverlapping magisteria of science and religion. NOMA permits—indeed enjoins—the prospect of respectful discourse, of constant input from both magisteria toward the common goal of wisdom."¹⁹

But Gould also observed:

This resolution might remain all neat and clean if the nonoverlapping

magisteria (NOMA) of science and religion were separated by an extensive no man's land. But, in fact, the two magisteria bump right up against each other, interdigitating in wondrously complex ways along their joint border. Many of our deepest questions call upon aspects of both for different parts of a full answer—and the sorting of legitimate domains can become quite complex and difficult.²⁰

But they are also fun and exciting.

Historically, those areas of interdigitation have been the scenes of greatest conflict, but as Gould has suggested, “Many of our deepest questions call upon aspects of both for different parts of a full answer. . . .” We should not be inclined to repeat the erroneous conflicts of the past—or, worse yet, continue to extend them generation after generation—but rather, we should learn from the past and create a better future where science and revealed religion interdigitate in a loving embrace, as two equal partners holding hands in marriage.

William Henry Bragg was a physicist, chemist, and mathematician who shared the 1915 Nobel Prize with his son Lawrence Bragg. They were recognized “for their services in the analysis of crystal structure by means of X-rays,” which opened the door to our understanding the structure of molecules such as proteins and nucleic acids (such as DNA). William Bragg stated, “From religion comes a man's purpose; from science, his power to achieve it. Sometimes people ask if religion and science are not opposed to one another. They are: in the sense that the thumb and fingers of my hands are opposed to one another. It is an opposition by means of which anything can be grasped.”²¹

People of all ages in our Church should be encouraged to seek truth wherever it arises. As President Brigham Young stated, “‘Mormonism,’ so-called, embraces every principle pertaining to life and salvation, for time and eternity. No matter who has it. If the infidel has got truth it belongs to ‘Mormonism.’”²²

In an 1874 discourse, Brigham Young was referring to the youth of the Church when he stated:

When they are old enough, place within their reach the advantages and benefits of a scientific education. Let them study the formation of the earth, the organization of the human system, and other sciences. . . . form a class in geology, in chemistry or mineralogy; and do not confine their studies to theory only, but let them put in practice what they learn from books, by defining the nature of the soil, the composition or decomposition of a rock, how the earth was formed, its probable age, and so forth. . . . It is the duty of the Latter-day Saints, according to the revelations, to give their children the best education that can be procured, both from the books of the world and the revelations of the Lord.²³

I can think of no greater advice. For some people, scientific education may seem boring (or even frightening)—because in order to understand and practice science, a huge amount of background material needs to be learned. Science is not easy; it is hard work. I was once told by a mentor that if the answers to our questions were easy, some German scientist would have discovered those answers a hundred years ago. Yet as a scientist for some sixty-five years now, I have never worked a day in my life. Every day in science is a play day for me—and I play very hard. Equally, I look forward with great enthusiasm of attending church every Sunday and to working in the temple every Saturday. Reading the scriptures is also a thrill: I learn

something new and exciting whenever I read the scriptures or go to church or attend the temple. By combining my love of biology with my love of theology, my life has been one continuous party.

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