

A DELICATE BALANCE:
TEACHING BIOLOGICAL EVOLUTION AT BYU-IDAHO

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“Nothing in biology makes sense except in the light of evolution.” This statement was made in 1973 by Theodosius Dobzhansky, a prominent evolutionary geneticist, in an article written for the *American Biology Teacher*. Perhaps no statement has been quoted more in the discussions which arise in the war that rages over the teaching of evolution in America’s schools. I can think of no better way to emphasize the importance of teaching evolution in all biology classes, at all educational levels, than to point out its central role in biology. Evolution theory ties all of the fields of biology together into a unified whole. It explains not only why there is so much diversity of life on earth but also why all of these diverse forms of life are so *similar* on a molecular basis and in the attributes which define life itself.

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There is also another important reason for studying evolution. Understanding evolution helps scientists solve problems that influence the quality of our lives. For example, understanding how pathogenic organisms evolve facilitates the treatment of diseases. The DNA of some bacteria contains mutations which allow them to survive and continue to reproduce even in the presence of antibiotics that would normally kill them. A resistant bacterium is able to pass on these resistance genes not only to its own offspring and other bacteria of the same type but also to other types of bacteria. A multitude of antibiotic resistant strains of bacteria that threaten human health can arise very quickly. Understanding how these resistant bacteria evolve and why they evolve has led to new treatments and to the current educational programs that make people aware of what can be done to help prevent their spread. Another example involves the HIV virus. HIV infection has been so difficult to treat because the virus can rapidly mutate and avoid scientists’ attempts to eliminate either the virus itself or its ability to cause disease. Understanding the evolutionary basis of what is happening has made it possible for medical scientists to find multiple ways to attack the virus and thus minimize the effects of its ability to adapt so readily.

Another example of the need to understand evolution comes from agriculture. Understanding how organisms are related is a very important consideration in any crop management system. For instance, understanding the evolution of resistance to pesticides by insects allows us to develop more effective use of pesticides. The study of evolution, then, is not just a matter of curiosity about where we might have come from but can

provide information that is critical in solving biological problems that influence our quality of life.

All of the faculty members in the biology department have stories to tell about encounters with parents, students, and/or colleagues who just cannot understand why or how we can teach organic evolution on the BYU-Idaho campus. I suspect that our universal response would be: “How can we *not* teach evolution in our biology classes?” To leave out the topic of evolution would be a disservice to our students. Our students will not be literate in biology unless they understand how evolution adds critical understanding to our investigations of life in virtually all fields of biology. Failure to teach evolution would result in an incomplete biological education.

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In the BYU-Idaho Biology Department, we require that all biology majors complete a course called Biological Evolution. The entire biology faculty is also encouraged to incorporate the appropriate evolutionary principles into their other biology courses. This includes all of the general education classes that are taught in biology. None of the biology faculty takes this responsibility or its implications lightly. Teaching the subject of biological evolution at this institution requires an awareness of and sensitivity to the potential conflicts that may arise in the minds and in the hearts of our students.

The intent of this paper is to discuss how the “controversy” between biological evolution and religious beliefs is handled in my biology classes. In order to address that issue, I first need to explore the nature of the conflict between religion and biological evolution.

DIFFERENT WAYS OF KNOWING

On my way into a Family History Conference one rainy Saturday morning, I was talking with an elderly lady who was also attending the conference. I commented to her that the weather had taken me by surprise since the weather report had not mentioned rain. She acknowledged that she had heard the same forecast I had heard and commented that the weatherman was very often wrong. She then extrapolated her feelings to include all scientific endeavors when she said: “It makes me wonder if any of those scientists ever know what they are talking about. I don’t trust any of them.” Those words stung and they have come back to my mind over and over again.

In the field of Science Education, one of the most pressing concerns is the general lack of scientific literacy in this country. The newly developed National Standards for Science Education state the correction of this problem as an important goal for science education. So what does it mean to be scientifically literate? The following statement from a report by the

National Research Council (1996, 22) on the development of the current National Science Education Standards describes scientific literacy:

Scientific literacy means that a person can ask, or determine answers to questions derived from curiosity about everyday experiences. It means that a person has the ability to describe, explain, and predict natural phenomena. Scientific literacy entails being able to read with understanding articles about science in the popular press and to engage in social conversations about the validity of the conclusions. Scientific literacy implies that a person can identify scientific issues underlying national and local decisions and express positions that are scientifically and technologically informed. A scientifically literate citizen should be able to evaluate the quality of scientific information on the basis of its sources and the methods used to generate it. Scientific literacy also implies the capacity to pose and evaluate arguments based on evidence and to apply conclusions from such arguments appropriately.

When citizens are scientifically literate they understand how scientific knowledge is obtained—they understand the process of science. A scientifically literate public should understand the processes of peer review and replication of work which do much to assure that our current knowledge base is as thoroughly studied and as accurate as possible given the current state of research techniques and technology. It is also important to recognize that scientific understanding improves as the techniques and technology progress.

Because our current educational system all too often fails to teach students how science is performed and how we have obtained our current body of scientific knowledge, students do not become scientifically literate by simply taking a science class or two. There is a fundamental failure of introductory science education to teach students what science is, how scientific knowledge is pursued, and how science as a way of knowing is different from other ways of knowing. For many citizens, introductory science classes taken in high school or college provide the only opportunity for an exposure to scientific ways of thinking. The failure of our science education programs to effectively teach what science is and how scientific knowledge is obtained has led to a citizenry that is unable to meet the requirements of scientific literacy as stated in the previous quote from the National Research Council (1996, 22).

Of course there are also important ways of knowing that do not involve scientific literacy. These other ways of knowing are also important in helping us to understand the world around us. For example, faith-based knowledge is founded on scriptures, inspiration, and revelation. As faithful church members this way of knowing is sacred to us. We are continually enlightened about divine truths through revelation and inspiration from modern-day prophets, seers, and revelators. As we live worthily we are

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also entitled to individual inspiration and revelation as Heavenly Father sees fit to provide. Faith-based ways of knowing are accessible to all who are willing to follow the prophets, study the Gospel, humble themselves in prayer, and listen to the promptings of the Spirit.

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Both scientific and faith-based ways of knowing can be helpful in obtaining information about the origins of life on this earth. On the one hand, scientific knowledge relies on empirical evidence that can be replicated by many different scientists, all of whom can see for themselves the same results. This type of knowledge is constrained by our ability to test hypotheses, make predictions, and study the physical evidence available to us in this terrestrial world. The field of science encourages testing and re-testing and repeated attempts to find flaws in our current knowledge so that we can move steadily toward a more accurate understanding of how things work.¹ On the other hand, we have faith-based knowledge. Faith-based truths about such matters as the origin and diversity of life on earth are founded on divine revelation given to the Church through the First Presidency in the form of official church doctrine. Official church doctrine is not subject to experimentation or modification by individuals. As members of the Church of Jesus Christ of Latter-day Saints we know and acknowledge that Heavenly Father through his Son, Jesus Christ, created this world and everything in it. However, we do not, through either the scriptures or divine revelation in the form of official church doctrine, have any information on *how* this was achieved.

Elder Packer (1996, 181) in referring to the controversy between science and religion stated: “Each of us must accommodate the mixture of reason and revelation in our lives. The gospel not only permits, but *requires* it. An individual who concentrates on either side solely and alone will lose balance and perspective.” I encourage my students to use both of these ways of knowing as they seek to understand how life first arose and progressed to its current levels of complexity and uniformity.

Another source of difficulty between the scientist and the non-scientist involves confusion over the language used to describe our current level of understanding about biological evolution. What is unfortunate is that many of those who write science textbooks are unclear about how to define the language that describes scientific ways of thinking (Gibbs and Lawson 1992). This leads to a confused public who neither understand nor trust scientists or the current body of scientific knowledge. Because of this confusion, the explanation of a few commonly used but often misunderstood scientific terms is in order.

Many attacks on organic evolution begin by stating that, after all, evolution is “only a theory.” The belief here is that a scientific *theory* is simply a guess or blind stab at what might be happening to life on earth, implying that there is no evidentiary foundation for the “theory”

of evolution. Perhaps those who attack the use of the word *theory* think that evolution would be called a law if it really had a solid foundation based on scientific evidence that was indisputable. However, a closer look at these two terms as used in science tells a different story.

Gibbs and Lawson (1992, 143) define a *law* as “a general proposition that summarizes a pattern of regularity detected in nature.” This would include explaining the situations and conditions under which the pattern of regularity will occur. The law of gravity is a good example. We all have an understanding of the effects of gravity in our daily lives, but do we understand what gravity really is? An interesting point to note is that laws may or may not provide any explanation for why the pattern occurs. An example of this was presented by Richard N. Williams (2003, 2) in a devotional address given at BYU-Idaho: “Gravity is not an explanation for *why* things fall toward the earth. It is simply a description of the fact that they *do*. Lest you think I’m making all this up, I can assure you that Sir Isaac Newton himself saw this very problem and finally concluded that he did not know what gravity is, but he was confident in his precise description of what it *does*.” In science, however, our ultimate goal is to *explain* how or why these regularities exist. Darwin’s theory of evolution by means of natural selection, far from being a blind guess, is an *explanation* for *how* and *why* organisms have changed and evolved over the course of the earth’s history. Built from a multitude of observations, supporting hypotheses, and laws or principles which deal with many different lines of evidence, scientific theories create a more complete and unifying *explanation* for a set of related phenomena. Scientific theories, therefore, are well documented with a wealth of evidentiary support.

As our knowledge of what constitutes and sustains life has grown and our understanding of how life is perpetuated through generations has increased, overwhelming scientific evidence in support of biological evolution as an explanatory theory has been accumulated. As scientists pursue an understanding of how living things are interrelated, their commonalities and differences, evolution theory provides the best *explanation* for all of the information collected during the 145 years since Charles Darwin published his book, *The Origin of Species by Means of Natural Selection*. With every new discovery made in biology more evidence in support of organic evolution has been added to our scientific knowledge base. Evidence comes from ecology, embryology, anatomy, physiology, genetics, cellular biology, and molecular biology. In addition, there is important supporting evidence from geology and the fossil record. Within the scientific community, evolution is regarded as a fact. However, the mechanisms by which evolution occurs are still being actively debated, with Charles Darwin’s theory of Natural Selection

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still maintaining its place as the major, but not the only, explanation for how and why organisms change over time.

WHAT IS THE SOURCE OF THE EVOLUTION DEBATE AND WHY SO MUCH OPPOSITION?

To a large extent the intense opposition to the teaching of evolution in the schools can be attributed to both a lack of education about the overwhelming scientific evidence that supports evolutionary theory and to a failure of many scientists to respect the faith-based beliefs of those whose faith in God as creator leads them to question the science behind the theory of evolution. The often acerbic stance of many scientists against those who believe in God and his role in creating this earth does nothing but confirm the distrust of a scientifically naïve citizenry. Many scientists, unfortunately some of them very vocal, have taken the evidence for evolution as an indication that there is no need for a god, and they ridicule those who believe in God as being weak-minded and impractical. We have been warned in the scriptures that this type of intellectual blindness will occur in our day (e.g. 2 Nephi 9:28).

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Considering the vocal anti-religion diatribes of some evolutionary scientists, it is possible to understand why many parents and religious educators would rather not see evolution taught to the young people of the Church. However, there are other important considerations to examine as we look at this issue. There are many prominent scientists who have a strong faith in God—this includes the scientists who teach biology, geology, chemistry, and physics at church-owned institutions—but there are many, many others as well. An acceptance of evolutionary theory and a belief in a God who “laid the foundation of the earth, who made the heavens and all the hosts thereof, and by whom all things are made which live, and move, and have a being” (Doctrine and Covenants 45:1) are not mutually exclusive. It is possible for reconciliation between the scientific and faith-based ways of knowing; however, reaching reconciliation is a personal journey of experience, study, and prayer. Reconciliation requires guidance from the Spirit: “For what man knoweth the things of a man, save the spirit of man which is in him? Even so the things of God knoweth no man, but the Spirit of God” (1 Cor 2:11). Elder Packer (1996, 181-182) has stated:

[There is a] constantly recurring contention between the spiritual and the temporal; the never-ending controversy between a narrow sense view of science and religion; the ancient conflict between *reason* and *revelation*.

There are two opposing convictions in the university environment. On the one hand, “Seeing is believing”; on the other, “Believing is seeing.” Both are true! Each in its place. The combining of the two individually or institutionally is

the challenge of life. Neither influence will easily surrender to the other. They may function for a time under some sort of a truce, but the subtle discord is ever present. They mix like oil and water mix—only with constant shaking or stirring. When the stirring stops, they separate again. It takes a catalytic process to blend them. This requires the addition of a third ingredient, a catalyst, which remains unchanged in the blending process....

The essential catalyst for the fusion of reason and revelation in both student and faculty is the Spirit of Christ.... The blending medium is the Holy Ghost, which is conferred upon every member of the Church as a gift.

Biologists, in their study of life and its diversity, have developed multiple lines of scientific evidence that undeviatingly point to the process of organic evolution as an explanation for how the current life on earth has arisen. As students study biology or geology they need to know that an acceptance of all the scientific evidence for organic evolution does not preclude being a person of faith and does not mean that they need to abandon their belief that God through his Son created this living earth. If we are not careful, however, in how the subject of evolution is treated on both sides of the issue, we may be leading students into thinking that they need to make a choice between a belief in science, which they can see, study, experiment on, and collect physical evidence for, and the Gospel which is based on “evidence of things not seen” (Hebrews 11:1). The possibility that these young people with immature testimonies may make the wrong choice is all too real.

If we insist on an uncompromising stance on either side of the evolution-versus-religion debate we are endangering young minds and testimonies. Both Henry Eyring and Stephens and Meldrum address this issue from the point of view of LDS science teachers who have taken on the challenge of teaching Mormon youth about challenging aspects of science. First from Henry Eyring (1983, 62):

In my opinion it would be a very sad mistake if a parent or teacher were to belittle scientists as being wicked charlatans or else fools having been duped by half-baked ideas that gloss over inconsistencies. That isn't an accurate assessment of the situation, and our children or students will be able to see that when they begin their scientific studies.

And from Stephens and Meldrum (2001, 30), who teach Biology and Paleontology at Idaho State University:

Often young Mormons enter colleges and universities having been told that evolution is false and, perhaps, evil, and that if they 'believe' in it, they jeopardize their eternal salvation. Then those students take a college biology course where even a small portion of the overwhelming volume of evidence that supports evolution is presented. The student is faced with a difficult dilemma—to

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believe parents or teachers in spite of such evidence or to accept the evidence and disbelieve parents and former teachers. If the student disbelieves what parents and teachers have said about evolution, other teachings might come into question. Must our students be forced to choose between science and God? We think not.

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I believe our approach should be to educate but not indoctrinate students with the information and knowledge available on both sides of the issue. An open-minded, non-threatening, and flexible discussion will help students on their personal journey toward resolution of the issues. It is not my intent as a biology teacher to require students to accept organic evolution as fact, even though I present the material as fact. I am hoping that the evidence will speak for itself and that my students will leave my class well educated in the body of scientific knowledge that supports biological evolution.

THE APPROACH I USE IN DEALING WITH THE CONFLICT WHEN I TEACH EVOLUTION.

Whether I am teaching the topic of evolution to non-majors in my Principles of Biology course or to the majors in my Evolutionary Biology course, I always begin with a lecture titled: “The Church of Jesus Christ of Latter-day Saints and Evolution.” However, the manner in which I prepare the students for the topic of biological evolution in these two courses is somewhat different due to the different science backgrounds of each group.

In my non-majors class before we ever talk about evolution, we thoroughly explore the “ways of knowing” that are used in science. I teach them about what is required for ideas, theories, and hypotheses to be considered scientific. We focus on what makes scientific evidence distinct from non-scientific explanations about life and its origins. I focus on the need to be able to collect evidence that can be experienced through our senses, is testable, reproducible, and explanatory in nature. Alternative explanations for the origin and diversity of life on earth, such as Creationism² and Intelligent Design³ are not scientific because they neither require nor provide objective physical evidence or explanation for how organisms have become so diverse and yet still have so much in common. I emphasize that I am not saying that knowledge gained by faith or other means such as our testimonies of the Gospel are less valid because they are not scientific; I am simply saying that knowledge gained through faith, inspiration, and revelation is different and not able to be studied using the “ways of knowing” employed in science. Stephens and Meldrum (2001, 27) quote Matt Cartmill a prominent Physical Anthropologist on this matter:

Science looks exclusively at the finite facts of nature, and unfortunately, logical reason can't carry you from the facts to values or from the finite to the infinite. . . . But science's necessary silence on these questions doesn't prove that there is no infinite cause—or that right and wrong are arbitrary conventions, or that there is no plan or purpose behind the world. (*Oppressed by Evolution*, 78-83)

As I approach the subject of evolution, I first review the official position of the Church as represented by the 1909 First Presidency statement and other quotes found in the BYU Evolution Packet (see Stephen Ott in this issue). After we discuss these documents, much like Ed Williams (in this issue), I end our treatment of the Church's official position with what I call "givens," which I tell the students they must always keep in mind and never forget. These are:

1. Jesus Christ, along with others, is the Creator of this world.
2. All creatures have spirit counterparts.
3. Man is distinct from the animals in being the only spiritual offspring of our Heavenly Father.
4. Adam was the first man on the earth whose spirit was the literal offspring of Heavenly Father.

At this point, I invite students to share their current views of evolution and any uneasiness they have about the topic so that I can be aware of their concerns. I also hope that through this exercise they will know that I realize the topic may be difficult for them, and I do not have any intention of demanding that they believe in evolution. They do need to understand, however, that I will be presenting the evidence for evolution as a scientific fact. I make it clear that I expect them to become literate in the evidences for and mechanisms of biological evolution, and that they will be required to take an examination on their knowledge of this information. I also invite the students to come and see me privately if they have concerns about studying evolution that they do not feel comfortable discussing in class.

If the idea has not already come up in our previous discussions, I like to end this first day with the question: "Why do you think we have not received specific instruction or doctrine as to the origin of man's or any other creature's physical body?" Students come up with many answers to this question, but what I am looking for is the suggestion that this knowledge is not important to our eternal salvation. At the end of this first day I hope the students are feeling more comfortable about studying biological evolution, but one never knows, as the following story illustrates.

Early in my career at Ricks College, I used an approach very similar to the one outlined above. I scheduled our discussion of evolution as one of the first topics of the semester. The class was large, close to 100 students,

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and I was certain that everyone was okay with how I had handled the topic. Most students seemed very interested and were surprised that there was so much evidence collected in support of evolution. Many students had expressed to me that they had a much better understanding of why it was an important component of the class, and that they felt much more comfortable with the topic as a result of studying it. All was well and I was feeling pretty good about how things had turned out since this was my maiden voyage in teaching the subject of evolution at a church school. However, 12 or 13 weeks later, on the last day of finals, one student came to visit me in my office. I knew this student fairly well; we had had many opportunities to discuss biology (both after class and in my office over the course of the semester) and so what he said shocked me. He said he feared for my eternal salvation and felt he needed to help me see the folly of my ways. He had a stack of articles and talks written by general authorities and others that must have been at least three inches thick. Any one of them, he claimed, could prove to me that I was wrong about evolution; it was not true, and if I continued to “believe” in and teach evolution then I would not be able to receive exaltation. He was concerned about me, and I was concerned about him as I realized that he had been tormented by these feelings for the entire semester. After a few minutes of talking, he became more upset because I was not seeing his point. After a while I convinced him that we were just going to have to agree to disagree on the subject. I assured him that I appreciated his concern for me but that I was not going to reverse my way of thinking.

Nothing like this experience has ever happened again, but I never really know how students feel; many of them can hide their distress well. I try never to assume that a student has been totally mollified by my attempts to assuage their fears by discussing the potential science versus religion conflicts inherent in the study of biological evolution. When the class size is large, as it is in Principles of Biology classes, I pray that what I do or say will not be misunderstood or harmful to any of my students. We have the most wonderful students on the face of the earth, but many of them come from highly protective environments. Many students may not be emotionally ready to confront an issue which they have been taught is fraught with evil and must be avoided at all costs. We must be sensitive to this fact and try to “above all, do no harm.”⁴

In my Evolutionary Biology class for biology majors, I approach the issue of the Church and evolution in a somewhat different way. Although all of the aspects covered in my non-majors class are covered here as well, we spend more time discussing possible discrepancies between the Gospel and evolution theory. Because these students are biology majors it is especially important that they come to a personal reconciliation between their faith and evolutionary theory because they are bound to

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be constantly confronted with the issue as they pursue their careers. I can remember the beginnings of my own journey along this path, as a biology student at BYU long, long ago. I recall our entire class trying to get our Organic Evolution professor to share with us his own insights into how the Gospel and evolution could co-exist. He refused to share with us his personal reconciliation, but assured us that he had absolutely no problem and saw no conflict between the Gospel and organic evolution. Looking back I understand the wisdom in his approach; this is not a matter that can be taught or learned from someone else. It involves a lot of searching, and the reconciliation is never complete as new questions come up, on a regular basis, which need to be incorporated into one's own personal integration of Gospel knowledge and evolution theory.

I have found that biology majors, for the most part, come already prepared to accept evolution theory and proclaim that they “have no problem with it.” I do, however, ask them to think more deeply about the issue because I am certain that there will be times when questions arise as they are challenged by new ideas. They are also very likely to be called on to explain their ability to accept biological evolution as a fact and still be faithful in the Gospel. They need to be secure in what they believe and comfortable in their personal unification of the issues. In an attempt to help them explore their understanding and feelings, I make articles available to them that explore the issue in more depth. My hope is that the experience will open their minds to alternative approaches, since no one knows how life really began or exactly how the Gospel story of the creation and the scientific theory of evolution can be combined to show the total picture.

In addition to the BYU Evolution Packet, we read and discuss two articles as a class assignment. J. Lester Allen (1974), while serving as Dean of the BYU College of Biology and Agriculture, wrote a biologist's perspective, and Kenneth Brown (1974) of the Ricks College Religion Department presented a Gospel perspective in an address given jointly to the Natural Science Division and Religion Department. Both articles are open-minded and provide much food for thought. I take the entire first two-hour lab period to discuss these articles as well as the general debate between scientists and the public on the issue of biological evolution. The purpose of the discussion is to encourage open-mindedness and to establish a positive and open classroom in which concerns and testimonies can be freely shared. In these discussions, I have found that it is important to make sure that students do not go overboard and become evolution-minded extremists. I try to instill in the students the value of open-minded discussion and the importance of allowing themselves to entertain both sides of the issue.

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After this introductory discussion, we focus on the *science* of evolution for the remainder of the semester. Then, towards the end of the semester, we revisit the evolution vs. religion debate once more. At this time the focus is on how student perspectives may or may not have changed during the semester. Many times I do this on a one-on-one basis, but sometimes I use group discussion.

In order to help students keep a more balanced perspective throughout the semester while we are studying the science of evolution, I plan to introduce each lecture in the future with individual scriptures or brief thoughts by LDS scientists and general authorities. These thoughts and scriptures will focus on the creation of the earth and of the living creatures which inhabit our planet. I hope this will help keep us from forgetting there is more to life than the physical side we are investigating in our biology class, and also will help us to remember that all life has a spiritual counterpart and is a creation of our Heavenly Father.

HARMONY IS NEEDED IN SEEKING AFTER TRUTH.

The world seeks the truth through both science-based knowledge and application of Gospel principles. As Henry Eyring once said: "...science has rendered a service to religion. The scientific spirit is a spirit of inquiry, a spirit of reaching out for the truth. In the final analysis this spirit is the essence of religion" (Eyring 1983, 39).

Modern scripture tells us, "Truth is knowledge of things as they are, and as they were and as they are to come..." (Doctrine and Covenants 93:24). If we look at the different "ways of knowing" employed in the building of faith-based versus scientifically-based knowledge, we find different methods employed in the pursuit of understanding. Science makes no claim to having absolute truth. Also in the Gospel we are limited in our ability to have the truth by what Heavenly Father sees fit to reveal to us. I believe science has provided us with a very good understanding of life on this earth but that we still have much to learn. I also believe there is much yet to be revealed to us about how Heavenly Father created this earth. When all truth is finally known, I think both approaches will end up at the same point since both ways of knowing are seeking truth—and truth cannot be in conflict with itself.

Harold B. Lee said: "We charge our teachers to give constant stimulation to budding young scientists and scholars in all fields and to urge them to push further and further into the realms of the unknown" (Lee 1974, 117). The scriptures also teach us to seek after all the knowledge we can in this sphere of existence (e.g., Doctrine and Covenants 88:79). We cannot expect knowledge to distill upon us if we are not prepared to receive and understand it. If we live the Gospel as we seek knowledge and understanding of our physical world, we can ultimately come to a

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unification of scientific understanding with ultimate truth. It appears unlikely that such will happen in this lifetime. Still, the Gospel message teaches us that we can know truth through our “spiritual eyes.” We can develop our ability to understand the truth by trusting our God, being obedient and, acting on what we are taught in the Gospel. When we are obedient to all we are taught in the scriptures and by our living prophets, we become eligible for receiving the truth of all things from our Heavenly Father: “He that keepeth his commandments receiveth truth and light, until he is glorified in truth and knoweth all things” (Doctrine and Covenants 93:28).

Our students need to be schooled in both scientific and faith-based ways of knowing. Both are necessary for them to achieve understanding. Students should be encouraged to learn all that we now know about our physical world and the living things which inhabit it. Teaching biological evolution in a way that encourages open-mindedness, while encouraging adherence to Gospel principles, does not detract from Heavenly Father’s powers but adds a greater appreciation for the possibilities of how he may have used those powers to create this world and all of its inhabitants.

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At all costs we must avoid putting students into a position where they feel a need to choose between their faith and science. Inquisitive students should be encouraged to study both biological evolution and the Gospel. Kenneth Brown (1974, 5) pointed out the danger in ignoring the controversy:

...scientists and religionists have advanced theories as to the process [of the creation of man] and students hear about them. We may think we are doing justice to simply say, ‘Well, we don’t know and so let’s reserve judgment and forget about it.’ This might satisfy a great many; however the *inquiring* student may not want to forget about it.... I’m afraid if we don’t give the inquiring student some tentative answers he may look elsewhere, perhaps even outside the faith.

Biology majors in particular need to be encouraged to make their own reconciliation, because the controversy between biological evolution and religious beliefs is not going to go away and they *will* be confronted with questions about what they believe and why they believe it. ☺

NOTES:

1. I need to acknowledge that those who study evolutionary biology often seem to be in a no-win situation. Those who are scientifically illiterate and actively fight against teaching evolution in schools, proclaim to the world that scientists are trying to hide the truth, that they never entertain any negative evidences and manipulate all experiments to show only what they want to show. Those opponents to evolution who *do* have some understanding of how scientific knowledge is obtained claim that since scientists are constantly questioning

their own understanding they must have serious doubts themselves about evolution. Specifically, if scientists are engaged in debate and discussion over possible mechanisms that may be involved in the evolutionary process, they are immediately labeled as dissenters who don't believe evolution really happens. The very aspect of scientific investigation which is most laudable, that of constantly searching for better answers, is portrayed as uncertainty and an attempt to hide the truth.

2. Creationism is used here as the doctrine that God created the earth and each organism in it separately and individually for the exact purpose it fulfills and that species are unchanging. Many creationists take the biblical account of the creation as literal and believe that the earth is only 10,000 years old.
3. Intelligent design ideas have been around for a long time but have just recently resurfaced as a major anti-evolution doctrine. Currently all across the country creationists are using intelligent design as a way to get their point of view taught in the public schools, claiming it would not be religion-based. Intelligent design theory allows for the earth to be very old but believes that organisms are much too complex to have been created through an evolutionary process which is undirected. The intelligent design proponents point to complex processes or structures and claim that there is no way they could have gradually evolved because they can only be functional in their current form and could not have been built gradually by evolutionary processes because the intermediate steps would have had no use and would not have been selected for along the way. Intelligent design theory makes no claim as to how these complexities *did* come about except to say that some intelligent force, which they claim is not necessarily deity, directed their formation.
4. As used by Stephen J. Gould. "Above all, do no harm." *Natural History*: 107(8) October 1998. 25. "I can imagine no nobler rule of morality than this single phrase, which every human being should engrave into heart and mind: *primum non nocere*—above all, do no harm."

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