ARTICLES

CAN SCIENCE AND RELIGION WORK TOGETHER?

Leonard R. Brand
Professor of Biology
Loma Linda University

WHAT THIS ARTICLE IS ABOUT

The most important characteristics of a good scientific theory or hypothesis are that it can be experimentally tested and stimulates scientific progress by suggesting useful experiments to be done. Both creation and evolution contain testable as well as untestable hypotheses. Hypotheses about ultimate causes, or whether God has or has not involved himself in earth history cannot be tested by any experiment. However, hypotheses about the existence of fossil evolutionary intermediates or about the sedimentary environment in which fossil-bearing rocks were deposited can be tested. In other words whether or not a supernatural event (divinely initiated creation or worldwide flood) occurred is not scientifically testable, but if such an event occurred, it would likely have left behind physical evidence. Hypotheses about this physical evidence can be devised and tested.

In attempting to study geologic history, one important limitation affects both flood geologists and conventional geologists alike. The interpretation of geologic history is accomplished mainly by comparison of geologic deposits with modern analogues — modern processes of erosion and deposition. Since the rapid, large-scale geologic processes that would occur in a worldwide flood cannot be observed today, this introduces a heavy bias against the recognition of evidence for a geologic mega-catastrophe.

The finding of evidence to confirm the reality of a global geologic catastrophe would not prove that God caused a flood, but it would indicate that it is not unreasonable to believe the flood story if our confidence in Scripture leads us to do so.

The study of earth history involves research on the nature of events that we have not observed. Because of the uncertainties that this introduces, acceptance of any theory of origins involves a definite element of faith.

A method of dealing with conflicts between Scripture and current scientific interpretations is proposed. In this method, both science and Scripture are taken seriously. New scientific theories challenge us to more careful study of the Bible, to determine if it really says what we thought it says, or if we are reading something between the lines. We then decide if there really is no conflict between the two, or if the Bible is indeed saying that something is wrong with our data interpretation, and more research is needed.

To many people the term "Scientific Creationism" seems to be a contradiction. How can creation, which by definition involves supernatural phenomena, be scientific? This seeming contradiction disappears if we approach the study of origins with an adequate understanding of how science operates; what science can do and what it cannot do.

Let us begin by defining the role of a theory in science. A good scientific theory or hypothesis will have the following characteristics:

1. It explains and organizes previously unrelated facts.
2. It suggests useful experiments to be done, thus stimulating scientific progress.
3. It is testable — experiments can be performed that have the potential to support it if it is true, or to falsify (or disprove) it if it is wrong. These experiments must be repeatable, which means that other scientists should be able to do the same experiments and get the same results.
4. It predicts the outcome of untried experiments. If a theory can predict the outcome of an experiment, our confidence in the theory will be increased.

Does a good scientific theory have to be true? We certainly hope it is true, and a scientist would not waste time on a theory that he thought to be false. But the truth of the theory is what we are trying to determine with our experiments, and we do not know for sure which of our theories will continue to be supported and which ones will turn out to be false. The history of science has shown many times that a false theory can have the characteristics of a good theory and can effectively guide scientific advance for a long time (even hundreds of years) before the accumulating evidence leads some creative individuals to decide that a new theory is needed (Kuhn 1957, 1970). Theories are tools to organize our thinking and to direct our research in a profitable direction. They are valuable practical tools, but that does not necessarily mean that they are absolute truth. They may be only stepping stones in our search for truth.

WHERE DOES A THEORY COME FROM?

It is often implied that because creation originates from religion, it is *therefore* unscientific. Does the source of a theory affect its validity? Philosophers of science have struggled with this question and have concluded that we objectively define the source of a scientific idea (Popper 1959). If a scientist watches a witch-doctor at work (a very unscientific source of ideas) and develops the theory that some of the "doctor's" herbs have medicinal value, is that an unscientific theory? Not if it can be experimentally tested.

A theory is not scientific or unscientific because of its origin; it is scientifically useful if it can be tested; and if it cannot be tested, it is outside the realm of science (even though it may be true).

TESTABLE AND UNTESTABLE THEORIES

Some would conclude that the above definition has already eliminated creation from the realm of science, but perhaps it is not that simple. We can define certain testable aspects and other, untestable, features of both creation and evolution.

Nontestable Hypotheses	Testable Hypotheses
♦ God created life.	♦ All living and fossil organisms fall into discrete groups, without series of evolutionary intermediates between major groups.
♦ God did not create life.	♦ Series of intermediate forms between major groups of organisms have existed in the past.
♦ Vertebrates originated by evolution from the echinoderms. ♦ Echinoderms and vertebrates were both created by God.	♦ The simplest vertebrate animals have more anatomical, physiological, and embryological similarities to some echinoderms than to any other group of invertebrates.
♦ God caused a worldwide flood.	♦ Much of the geologic column was formed quite rapidly and catastrophically
♦ God did not cause a worldwide flood.	♦ The geologic column has formed very slowly over hundreds of millions of years. ♦ The Navajo Sandstone was deposited under water. ♦ The Navajo Sandstone was deposited in a desert.

I propose that scientifically useful (testable) theories like some of those listed above can originate from religious concepts. We cannot directly test whether God involved Himself in earth history, but if He did involve Himself in ways described in the Bible (creation and worldwide flood), those events should have left some evidence in the natural world (no evolutionary intermediates; evidence for catastrophic geologic action). The possible existence of such evidence can be investigated scientifically.

CAN FLOOD GEOLOGY THEORIES BE TESTED?

Many creationists and evolutionists would agree that the question "Did God cause a worldwide flood?" cannot be answered by science, but their reasons for believing so could be quite different. It is impossible to devise an experiment to test whether God caused a flood, but in addition to that, most scientists make the *a priori* assumption that there has never been any supernatural intervention in earth history. In fact, that assumption has been built into the very definition of science for nearly a century. Presently, to believe in supernatural events is to be, *by definition*, unscientific. However, that assumption is really just an untested hypothesis, not a fact that has been demonstrated, or even can be demonstrated by scientific data. Not only can science never prove God *has* influenced our geologic history, but it is equally impossible for science to prove that He *has not* influenced our geologic history.

These are philosophical questions of ultimate causation that we cannot test by any conceivable experiment. Rather than denying that our universe could ever have been influenced by any Being more powerful and intelligent than ourselves, it would seem a bit more open-minded to simply recognize that if there have been supernatural events, science could not study them unless those events have left sufficient detectable evidence to allow us to test hypotheses about the physical results of the supernatural event.

For example, the approach of the flood geologist is to propose that at some time in the past there was a disturbance in the earth's crust that temporarily disrupted the normal relationships between land and water bodies, initiating a period of rapid geologic activity on a worldwide scale, and this period of rapid erosion and sedimentation produced a significant portion of the geologic column. According to this hypothesis, the geologic and geophysical processes occurring during that event produced the characteristics of the rock formations formed at that time, including the distribution of fossils and the arrangement of the levels of radioactivity in those minerals used in radiometric dating.

Where this theory came from is beside the point. A flood theory expressed in this form is a simple descriptive statement and says nothing about the untestable question of whether God was involved in initiating this geologic event. It does not attempt to explain any process or event that may have operated outside the *known* laws of chemistry or physics. This descriptive theory can be used as a basis for defining specific hypotheses concerning the sedimentary processes and the amount of time involved in depositing individual formations, or the processes that produced various other geologic features. These hypotheses can be tested in the same way that any geologist tests his hypotheses.

Two geologists could be doing research on the same rock formation, perhaps one of the Paleozoic formations in the Grand Canyon. One geologist believes that the formation (like other geologic formations) must have had a long time — thousands or millions of years — in which to be deposited. The other geologist believes that the formation must have been deposited far more quickly than that. They both look for the same general type of data as they study the rocks. Each one must analyze the data that he finds, as well as other published data, and interpret their meaning. When they disagree, each geologist will analyze the other's work, and his own work, and try to determine what additional data are needed to clarify the issue. If each is doing good work, he will then publish his findings in a scientific journal so that other scientists will benefit from his work. In time, as more data accumulate, it is hoped that the conflicts will be resolved, and the total body of data will clearly favor one explanation — it will point to either rapid deposition or very slow deposition of the formation.

Both flood geologists and other geologists believe that if we are completely fair with the data, *eventually* the data will tell us which theory is true (*unless* we are not able to collect the types of data that can provide such information, without being able to go back in time and directly observe what happened in the past). Both types of geologists will also use the same observational and experimental procedures in their research. There is only one real difference in the research approach of flood geologists and other geologists: the flood geologist believes that when the data are all in, or at least a significant portion of the data, they will indicate that much of the geologic column was deposited in a short time. A conventional geologist approaches his research with the conscious or unconscious belief that when the data are all in, or mostly in, the data will indicate that all of the geologic column was deposited very slowly, or in rapid spurts with long periods of time in between. The flood geologist notes with interest the definite trend toward catastrophism that is evident in geology in recent years, but judging from the history of other fields of science, it could take many decades, or hundreds of years, before there are adequate data to fully resolve the issue.

Many would say that the data are already conclusive and have already disproved the flood theory. Why have the data not demonstrated the reality of the flood? Discrepancies between a theory and the available data can arise in at least two different ways — either the theory is wrong, or there is an important discovery waiting for the diligent researcher who uses the theory to guide his research. Creationists and flood geologists recognize that if their theory is true, there must be some significant phenomena yet to be discovered. Does creation stifle research, as some have suggested? Some approaches to creation may stifle research, but if it is understood correctly and if its predictions of new phenomena waiting to be discovered are taken seriously, it could be a stimulus for vigorous new approaches to research. The scientist who uses the Bible as a source of ideas for developing hypotheses should be able to operate as a successful researcher and, I believe, should even have an advantage in generating successful hypotheses.

LIMITATIONS IN STUDYING THE PAST

As we attempt to study the history of the earth and of life on earth, one limitation of the scientific method must be clearly understood. Interpretation of geologic history is accomplished primarily by comparison of rock formations with modern analogues. If a geologist is studying a sandstone layer, he would like to know under what conditions it was deposited. He cannot go back in a time-machine to observe its origin, so he will find modern processes (rivers, wind, ocean waves, etc.) that produce sand deposits, and compare these modern analogues with the sandstone formation. He will try to determine which modern analogue produces a deposit with characteristics most similar to the ancient

sandstone. If the sandstone matches most closely the deposits formed by underwater sand dune fields that are sometimes found offshore in shallow ocean water, it will be concluded that the ancient sandstone was also produced by a similar offshore dune field. It is like taking a multiple choice quiz:

This sandstone deposit was formed under which of the following circumstances:

A. River deposit
B. Desert sand dunes
C. Beach sand deposit
D. Marine offshore dunes
E. Turbidity currents

If the sandstone was indeed formed by one of the processes A-E, the research method described above should be an effective way to find the answer to our question. But what if the sandstone was not deposited by any of the processes A-E? What if it was deposited in an environment not observable on the earth today? What if it was deposited by a rapid, large-scale flow of water during a global geologic catastrophe? Such a deposit would likely be quite similar in many respects to sand deposits in one or more of our modern analogues.

Our real choices would then be A through E as listed above plus:

F. Rapid underwater sand deposit during a worldwide flood.

Of course, the problem is that alternative F does not have any modern analogue that we can study; so most geologists would choose one of the modern analogues as the correct answer. In doing so they would have reached a wrong choice, and the logic of our research approach would have become, as Charles F. Kettering has stated, "an organized way of going wrong with confidence." A geologist who believes in a worldwide flood did not observe that flood, and he also has access only to modern analogues of A-E. However, the flood geologist will at least be more aware of the possibility that our modern analogues may not be adequate to explain all of the geologic data. "Inasmuch as geologists are forced to interpret ancient sediments chiefly by analogies with modern phenomena, interpretations are severely biased if all possible analogues are not known..." (Stanley et al. 1971). Since no one has witnessed geologic activity on a scale even approaching that expected in a worldwide flood, there will naturally be a heavy bias in favor of geologic processes and rates that are within the range of what man has witnessed. Some data may force a recognition of greater forces and rates, but only a scientist who takes seriously the Noachian flood account is likely to be adequately prepared to recognize evidence for rapid, worldwide geologic activity on a grand scale.

Now, let us change direction and look at the other side of the coin. Even if the flood geologist uses his theory effectively and makes discoveries that

others have overlooked, there will be limits on the scientific conclusions that he can draw from his data. Science cannot demonstrate whether God was or was not involved in influencing our geologic history. Even if research eventually demonstrates that the best explanation for the geologic column is rapid sedimentation of most of the column in one short spurt of geologic activity, that would not prove that God caused a flood. But it would demonstrate that it is reasonable to believe the flood story if our confidence in Scripture leads us to do so. God never promised us proof; He only promised us reasonable evidence on which to base our faith.

This principle can be further illustrated by consideration of a specific formation — the Navajo Sandstone — and by trying to decide what kind of evidence would tell us if it was a flood deposit. It is often helpful to begin by trying to think of all possible models, or theories, that could perhaps explain a particular phenomenon. Here are several possible models for the Navajo Sandstone:

Wind 1. Deposited by wind over hundreds or thousands of years in a normal desert environment.

Wind 2. Deposited rapidly by wind during a period of unusually persistent high winds, but otherwise not in a catastrophic setting.

Wind 3. Much of the geologic column was deposited rapidly and catastrophically, and the Navajo Sandstone was one formation that was deposited rapidly by wind. However, God was not necessarily involved, and this rapid deposition had nothing to do with Noah's flood.

Wind 4. Deposited very rapidly by wind, during the latter part of the Noachian flood, during a period of lowered water level and persistent high winds.

Water 1. Deposited over hundreds or thousands of years by water, as the water slowly or periodically carried sand into the area.

Water 2. Deposited rapidly in an area with persistent relatively rapid water currents and a plentiful sand supply. Otherwise not in a geologic setting that was especially catastrophic.

Water 3. Much of the geologic column was deposited rapidly and catastrophically and the Navajo Sandstone was one formation that was deposited rapidly by water. However, God was not necessarily involved, and this rapid deposition has nothing to do with Noah's flood.

Water 4. Deposited rapidly underwater, by the persistent water currents during the Noachian flood. The sand-sized particles were not necessarily produced during the flood, but came

from extensive beds of sand that were part of the preflood world, and were transported into their new location during the flood.

A flood geologist may predict that the correct model is either Wind #4 or Water #4, and Water #4 may seem more likely than Wind #4. (However, we cannot rule out Wind #4 without adequate evidence, since we don't know what was all going on during the flood). When we consider the evidence for model Water #4, it is important to be very careful not to get ourselves into trouble. If we can produce compelling evidence that the Navajo Sandstone was deposited underwater, is that evidence for the flood? Not really, because that evidence could also be explained equally well by models Water #2, 3 or 4. Evidence that can be explained by two or more models cannot properly be used as evidence for any one of these models. If it fits two models equally well, it cannot tell us which model is more likely correct. We need evidence that fits one model and contradicts the other model.

Now, what if we find evidence that indicates that the Navajo was deposited underwater and was deposited *very rapidly*? What does that tell us? That evidence would eliminate models Wind #1-4 and Water #1, but it would still be consistent with models Water #2-4. We still have not shown that it was part of Noah's flood. If we then find convincing evidence that much of the rest of the geologic column was also deposited catastrophically, we have eliminated all except models Water #3 and 4. What scientific evidence would tell us which of these two models is correct? Science can never demonstrate that God *was* or *was not* involved in influencing earth history. The choice between models Water #3 and 4 or between models Wind #3 and 4 will always involve a strong element of faith. The flood geologist cannot expect to prove that God caused a flood, but he can hope to demonstrate that hypotheses based on the biblical flood account can stimulate productive research and produce more adequate explanations for geologic phenomena. As this process achieves success toward demonstrating that much of the geologic column was deposited catastrophically, it will indicate to an open-minded person that it is not at all unreasonable to believe in the Bible.

There is another important aspect of this topic that cannot be experimentally studied but can be dealt with only on a philosophical level. The scientist understands the universe as a complex physical system that functions according to natural laws. Many scientists would insist that for God to cause a worldwide flood would be a miracle, and miracles are some sort of magic, contrary to natural law, and thus unscientific. That would be a reasonable assertion only if we are willing to believe that science has discovered all natural laws; that there could not be any undiscovered laws which God could use to perform His "miracles." To make that claim is hardly even rational! There is

much about the universe that we do not know. Whether God ever does operate outside of the laws that govern the universe is something that we cannot know for sure, although it appears likely that He does so rarely, if ever. The one thing that seems certain is that it is not reasonable to assert that God cannot work outside the natural laws *that are known to us*. There could be many laws which are far beyond our present state of knowledge, which God could use to accomplish His purposes.

Another aspect of this same issue can be best explained with an example. I can hold a book in the air and drop it, and the law of gravity dictates that it will fall to the floor. However, since I am a mobile, reasoning being, I can decide to stick out my hand under the failing book. I have interjected an outside force into the system and changed the course of events, but I have not broken any laws. God could decide to interject an outside force into earth's balanced geologic system and change the course of events to bring on a flood, without breaking any laws of the universe. One has only to be willing to admit that such a powerful and knowledgeable Being could exist in the universe: a Being who understands all natural law, and, in fact, made all natural law.

RESOLVING THE CONFLICT BETWEEN SCIENCE AND RELIGION

In some fields of science, such as physiology and many areas of chemistry and physics, there is no conflict between science and religion. These sciences either complement the Bible or deal with subject matter that is not discussed in the Bible at all. In paleontology, geology, evolutionary biology and other fields, we see severe conflicts between the claims of science and the teachings of the Bible. These conflicts lead us to ask the question — what roles do science and religion each play in our search for truth? Must we accept science and reject the Bible, or vice versa? Or is there a better way?

The scientific process is a good way of discovering truth, both in some areas that the Bible discusses and in areas that the Bible doesn't mention. Science is a slow process, with many human limitations, but still very effective. Science suggests explanations for the things we observe in nature and collects research data to test the validity of those explanations. Usually we do not have enough data to be completely certain that we have the correct explanation, or theory, but the data help to eliminate some of the incorrect theories. For example, there was a time when nutritionists knew that certain general types of food seemed to be beneficial, and some substances were definitely harmful, but not much was known about specific nutritional requirements, or about parasites, some vitamins, cholesterol and other important dietary factors. Thus, within the limits provided by known facts, there was still a broad range for theories about diet.

As continued research has given us more knowledge about physiology and nutrition, this increased knowledge has shown that some of the old theories

were wrong. Thus we see that the more inadequate our data are, the more room there is for uncertainty as to what is correct theory. As more data accumulate, more incorrect theories are shown to be wrong, and our range of uncertainty is reduced. We can illustrate these principles with a diagram (Figure 1).

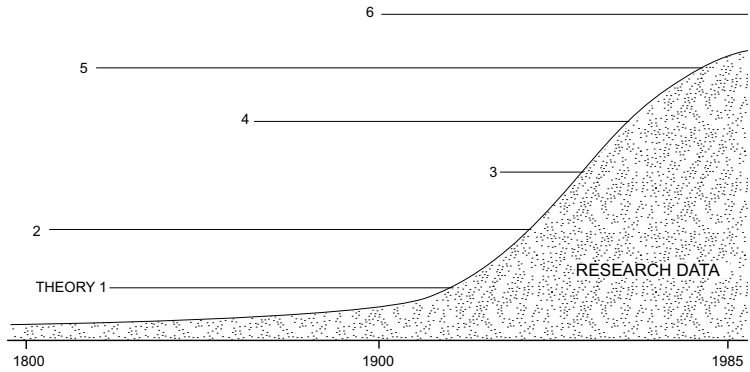
As more data accumulate, the new data not only eliminate false theories, but they also enable scientists to develop new theories that they had not thought of before. These new theories may be stepping stones to even better theories, or they may stand the test of time and turn out to be correct.

Let us now look at another example, in the field of geology. Prior to 1950, sedimentary rocks composed of coarse-grained, graded beds (Figure 2) were believed to have been deposited slowly, in shallow water. For instance, the Pliocene rocks in the Ventura Basin, near Ventura, California, consisted of hundreds of graded beds. The evidence indicated that these layers were deposited in shallow water, and it took several years to deposit each layer (Eaton 1929).

Then in 1950 a paper was published, reporting the discovery of a previously unknown phenomenon — turbidity currents (Kuenen & Migliorini 1950). Turbidity currents are rapid underwater mudflows that can deposit a layer of sand or mud over a large area. The layers produced by turbidity currents are called turbidites, and they are often graded.

Turbidity currents provided an even more satisfactory explanation for the graded beds in the Ventura Basin, and the entire sequence of beds was

FIGURE 1. A diagrammatic representation of the relationship between theories and data. In this diagram and in Figures 3 through 5, the height of the stippled area at any given date represents the amount of data available at that time. Horizontal lines represent the lifespan of various theories. A theory's lifespan ends by "collision" with accumulating evidence that contradicts the theory, or by radical alteration (a scientific revolution, represented by a vertical line) into a new theory which is not contradicted by the available evidence.



reinterpreted as a series of turbidites (Natland & Kuenen 1951). Each graded bed was now understood to have been deposited in minutes rather than years, and in deeper water. This change in theory can be illustrated with another diagram (Figure 3). The change was brought about by the accumulation of new data; the discovery of previously unknown processes.

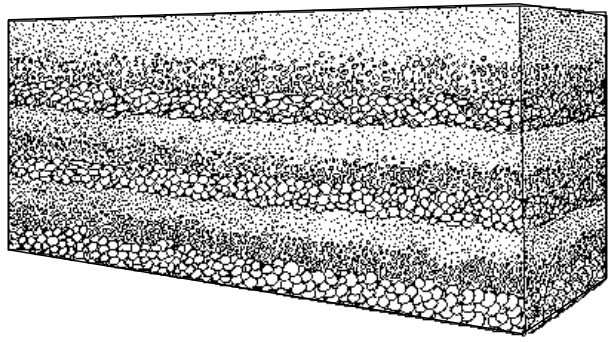
Many such changes have occurred in the history of science and many more will undoubtedly yet occur as new discoveries are made, even discoveries related to phenomena we have not yet dreamed of. Science is always a progress report on the road to truth, not final, absolute truth. In contrast to that, the Bible claims to deal with truth and to have originated with the God who has seen it all — who understands all of earth history and all natural laws. How does a scientist relate the two? Each scientist must decide how much confidence to place in the Bible, and to what extent science can "correct" the Bible.

The many possible approaches to the relationship between science and Bible-oriented religion can be summarized by the following partial list (loosely adapted from Watts 1976).

1	2	3	4	5
science only	science and biblical faith separate	dualist:science and Bible	Bible superior	Bible only

1. Science is the only reliable source of information. This model maintains that the Bible may contain inspirational religious concepts, but these are only relative and allegorical. The Bible is not a source of reliable facts. The person who accepts this view reinterprets or disclaims anything in the Bible that conflicts with current scientific interpretations.

FIGURE 2. A block diagram showing a cross-section through three graded sedimentary beds. In each bed, the larger particles are at the bottom, and the smaller particles at the top.

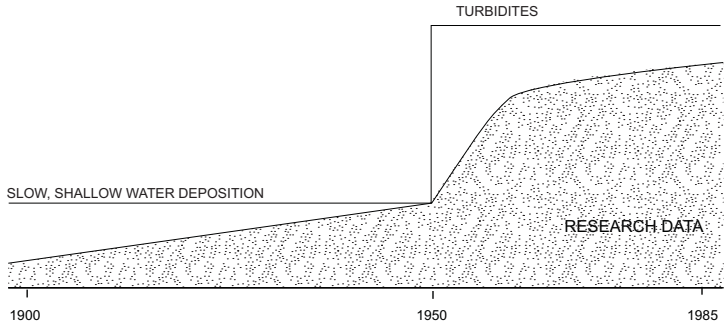


2. The Bible is taken more seriously than in model #1, but science and biblical faith are kept in two separate compartments, and no attempt is made to relate one to the other.
3. The dualist recognizes a type of authority in both the Bible and science, and takes both sources seriously in the search for truth. Conflict between the two arises only because of human limitations in the scientific process and/or in our understanding of the Bible.
4. Science and the Bible are both taken seriously, but the Bible is granted a higher level of authority than science.
5. Only the Bible is accepted as being reliable. This extreme view tends to reject all of science as a tool of the devil, designed by him to destroy faith.

Of the five models described above, #1 and 5 represent the easiest ways to make a decision. They are essentially all-or-nothing approaches, and do not necessarily require much careful thought. I do not believe that either one realistically comes to grips with the problem.

Model #2, keeping science and religious faith separate, is a popular model and superficially seems attractive. It may even work very well for a scientist whose field of inquiry does not require him to think much about the past history of life on earth. However, what does the advocate of this model do when he encounters a Bible statement that contradicts the conclusions of science? When faced with such a contradiction, the Christian scientist can no longer keep the two sources isolated in separate compartments, without putting his mind in neutral. He will then, even though he may not realize it, or may even deny it, move from model #2 to one of the other models. Consequently, Model #2 has failed at the very point where we need a model to help us direct our search for truth. A number of different models can work equally well in areas where

FIGURE 3. A diagrammatic representation of the change from the shallow water theory of graded bed deposition to the turbidite theory. This change occurred through a scientific revolution stimulated by the accumulation of new data.



science and the Bible do not conflict. It is when conflict arises that the relationship between the two sources of information becomes significant. Model #2 merely avoids the issue, or pretends that it doesn't exist, and thus I conclude that this model is not worthy of further discussion.

Model #3 and 4 are similar, except that Model #4 places more confidence in the Bible and man's ability to correctly understand the Bible, than in man's ability to correctly interpret scientific data. This difference is likely to be more pronounced in areas of philosophical conflict, such as theories of origins.

I propose that the most fruitful approach to the study of origins and of earth history is found somewhere between Models #3 and 4. Furthermore, I believe that one of the most crucial features of either of these models will be its definition of the approach to be taken in resolving conflicts that arise between science and religion; between our interpretation of revelation and our interpretation of scientific data. The remainder of this paper proposes an approach to resolving such conflicts.

SCIENCE AND REVELATION: A WORKING RELATIONSHIP

With Christianity there are many different attitudes toward the authority of the Scriptures, but this paper is built on a conviction that there are many lines of evidence indicating that the prophets do indeed speak for a loving and all-knowing God whom we can trust, and whose prophetic messages we can trust. Within that framework, an effective working relationship between science and revelation can result if we proceed through the following steps in our attempts to understand truth:

1. The accumulating data from scientific research suggest new ideas or hypotheses that we might not have thought of if the research had not been done.
2. If the new idea involves a subject that we think the Bible may speak about, we would examine all relevant Bible texts, comparing Scripture with Scripture, and using the Bible as its own interpreter. In doing so, it is important to make use of all the latest information that helps us to research a correct understanding of the original meaning of the words used in the biblical manuscripts. In this way, we attempt to understand exactly what the Bible does or does not say about our new idea. Is the idea compatible with the Bible or not? Do the relevant Bible statements say what we thought they said, or have we been incorrectly reading something between the lines?
3. We then make one of the following decisions, or some appropriate variation of one of these:

a. It is evident that revelation does not speak to this issue at all, and does not help us in our research.

b. We conclude that revelation does address this topic, but does not say anything against the new idea; there is no biblical reason not to accept it as a valid possibility. We then proceed with further scientific research to rigorously test it. This research may give us increased confidence in the idea, or it may lead to even better hypotheses which would also need to be compared with the Scriptures.

c. Our study indicates that revelation clearly contradicts the new idea, thus telling us to go back and do some more research because there is something wrong with our interpretation of the data.

If we follow this process, the Bible is maintained as the standard for religious doctrines, and yet science and the Bible shed light on each other. Science suggests ideas that may help us to recognize that we have been reading some preconceived idea into the Bible that really is not there. In other cases the Bible can help us to recognize incorrect scientific theories, so that we can turn our efforts toward developing more accurate interpretations of the data.

EXAMPLES

The following examples illustrate the application of this approach to some current conflicts between science and religion, and to some past conflicts which I believe could have been avoided if the individuals involved had followed this same approach to the problem.

The Copernican revolution in astronomy. Long before the Middle Ages scientists had developed the theory that the earth is the center of the universe, and all other heavenly bodies rotate around our earth — the geocentric theory. This concept was not merely a bit of fuzzy superstition, but was a carefully developed theory with sophisticated mathematical models describing the movements of stars and planets, supported by volumes of observational data (Kuhn 1957, Ptolemy 150). As the Christian church developed, the geocentric theory eventually became incorporated into church dogma, to the point that a challenge to the geocentric theory was considered to be a challenge to the Scriptures and to the Church itself. Copernicus introduced a new theory — the heliocentric theory. According to his radical new idea, the earth and the other planets rotate around the sun. If the church, instead of persecuting the advocates of the heliocentric theory, had gone to the Bible and studied carefully to see if the Scriptures actually say anything about these theories a serious mistake could have been avoided. They would have found that the Bible does not address itself to the issue of whether the earth rotates around the sun or

vice versa. To attempt to support the geocentric theory from the Bible can only be done if one resorts to arguments akin to saying that 20th-century scientists must believe in the geocentric theory, because they speak of the sun rising and setting. Careful Bible study could have indicated that the heliocentric theory is not unbiblical, and science and Scripture could have worked together in exploring this issue instead of being antagonistic to each other.

The theory of evolution. Previous to the 19th century, scientists and others generally believed that animal and plant species do not change — every species has remained the same since it was created. The Church again incorporated contemporary scientific thought into church dogma, and assumed that the Genesis creation account supported this very static concept of nature — referred to as "fixity of species." Charles Darwin and his contemporaries saw evidence that animals and plants do change, and started another conflict between science and the Church. Because of the complexity of the evolution issue, I will discuss the conflict in two parts: (a) The theory that organisms do change, resulting in variations within created groups, and (b) the theory that the major groups of animals originated by evolution and not by creation.

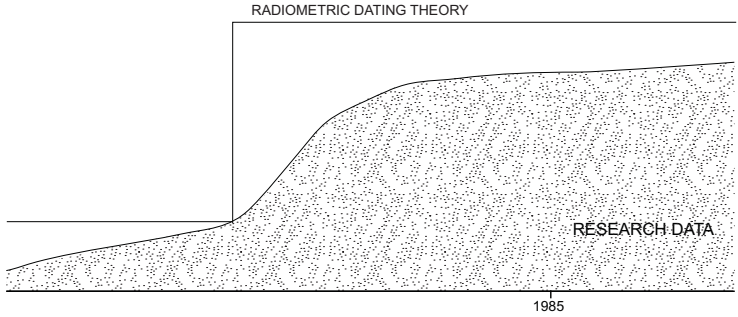
a. Microevolution and speciation. When the theory of evolution was proposed, it was generally believed that the entire concept of evolutionary change was incompatible with the biblical account of creation. But if Darwin and his contemporaries had gone back to their Bibles and studied carefully to see what the Bible says about their theory, they surely would have concluded that the Bible says nothing against the possibility that changes have occurred within the created groups of plants and animals (Coffin 1969, Ch. 3), including the production of new types of organisms to at least the species and generic level. In fact a creationist must believe that some changes have occurred, or else believe that God designed and made even the destructive things that we see in nature. However, Darwin apparently did not go back and reexamine his Bible carefully and he concluded that since his evidence invalidated what he believed to be the biblical creation account, we must explain the origin of *all* living things by some mechanism other than creation. This brings us to the second part of the evolution theory.
b. Evolution of the major groups of organisms. Darwin's theory proposes that even the major groups of living things have arisen by evolution, and thus all life is the result of evolution, not creation. If Charles Darwin had been examining his Bible and comparing it with his theory, he would have found that although the Bible doesn't say anything against microevolution, it does clearly state that the major groups of both plants and animals (including fish, birds,

reptiles, mammals, man, and fruit trees) were created by the end of creation week. This is definitely not compatible with part of the evolution theory. If the approach described in this paper had been followed, it could have led to the development of a theory which included creation of the major groups of living things, with limited evolutionary changes occurring after creation, within the created groups. Such a theory would, I believe, be consistent with Scripture and with the scientific data, and could have been an excellent example of the Bible and science shedding light on each other.

Geology. The church has been in conflict with geologists for over a century, but we will look at this issue from the perspective of the 1980s. As we compare the biblical account of origins, and scientific theories requiring many millions of years for life on earth, how can we best approach truth? I suggest that we follow the same process outlined above. Science has proposed a theory, claiming that the geologic deposits with their fossils have accumulated over hundreds of millions of years. We then go to the inspired writings to find out what they really have to say about this issue. We find that, in contrast to the absence of significant revealed information on astronomy or microevolution, the prophets made statements indicating that life on earth (and thus also the rocks containing fossils) has only been in existence for a few thousand years. We also find that during that time there was a worldwide flood of major geological significance (Brand 1980). From this I conclude that the prophets are telling us that current geological theory is not correct; the data are not being interpreted correctly. Our task is to go back to the research lab and develop a more correct theory, in harmony with both the scientific data and the revealed data.

How does one deal with data such as radiometric dating that seem impossible to harmonize with the biblical view of earth history? I propose that there are new fundamental scientific principles that are yet to be discovered

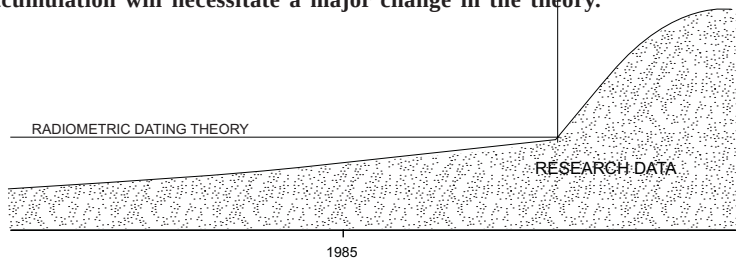
FIGURE 4. Hypothetical history of radiometric dating theory if there are no major changes to occur in the future of this theory.



that will explain these data. In doing so, we have to consider the following two propositions:

A. There are no significant new principles to be discovered in this field; the data are mostly being interpreted correctly (Figure 4).
B. There are new principles to be discovered that will lead to significant reinterpretations of data (Figure 5).

FIGURE 5. Hypothetical history of radiometric dating theory if future data accumulation will necessitate a major change in the theory.



We must now ask whether we have data that will allow us to test between propositions A and B; to determine whether radiometric dating theory is comparable to theories of graded bed deposition *after* the discovery of turbidites, or *before* their discovery. If science could do that we would have the key to answering a lot of difficult questions, but science cannot test between A and B. To do so would require that we go into the past and observe what really happened, or go into the future and see what data will be available then, or talk to someone who has done one of these. The prophets claim to have some of that type of information, but science definitely does not. Consequently, science cannot test between A and B.

Since we cannot prove which is correct, A or B, should we assume that A is correct, if there is no definite evidence for B? Science would normally take that approach, but we must remember that that is only a practical working approach, not a method for determining truth. A scientist must push ahead with the most successful theory available at the time, trusting that the data will eventually tell us if the theory is wrong. That approach may not be satisfactory for a Christian as we compare the Word of God with current scientific theories, and make decisions regarding eternal truth.

The history of science does not support the notion that a well-developed theory must be true if at a given time there is little or no convincing evidence against it. Before the discovery of turbidites there seemed to be good evidence that the then-current theory was correct. Even as some problems with that theory began to appear, scientists did not have the information necessary to

envision a better explanation, until turbidites were discovered. A Christian who is convinced that there is sufficient evidence that God's revelations to us through His prophets are trustworthy will be led to believe that in the field of radiometric dating there must be one or more important discoveries yet to be made, of equal or greater significance than the discovery of turbidites.

I conclude that a decision in favor of the current scientific interpretation of radiometric dating and a decision against that interpretation are both made on faith. A person with more faith in current scientific theories than in revelation will likely conclude that radiometric dates as currently interpreted are accurate. However, a person whose faith in the prophetic writings is stronger than his faith in current scientific theories will be convinced that radiometric dates of fossiliferous deposits are not correct. If he goes a step farther and uses the scientific method to develop and to test new theories to explain radiometric phenomena and other data, scientific progress can result from our search for harmony between science and revelation.

LITERATURE CITED

Brand LR. 1980. Faith and the flood. Ministry, February, p 26-27.

Coffin HG. 1969. Creation: accident or design? Washington DC: Review and Herald Publishing Association.

Eaton JE. 1929. The by-passing and discontinuous deposition of sedimentary materials. American Association of Petroleum Geologists Bulletin 13:713-761.

Kuenen PH, Migliorini CI. 1950. Turbidity currents as a cause of graded bedding. Journal of Geology 58:91-127.

Kuhn TS. 1957. The Copernican revolution. Cambridge, MA: Harvard University Press.

Kuhn TS. 1970. The structure of scientific revolutions. 2nd ed. Chicago: University of Chicago Press.

Natland ML, Kuenen PH. 1951. Sedimentary history of the Ventura Basin, California, and the action of turbidity currents. Society of Economic Paleontologists and Mineralogists Special Publication 2:76-107.

Popper KR. 1959. The logic of scientific discovery. NY: Harper & Row.

Ptolemy C. c. 150. The Almagest. English translation, 1952. Great Books of the Western World 16:1-495. Chicago: Encyclopedia Britannica.

Stanley KO, Jordan WM, Dott RH. 1971. New hypothesis of early Jurassic paleogeography and sediment dispersal for western United States. American Association of Petroleum Geologists Bulletin 55:10-19. (These authors did not make this statement to support the concept of a worldwide flood, but in support of a new hypothesis for the origin of the Navajo Sandstone. However, my logical extension of the statement to a worldwide scale does not change the meaning of their statement.)

Watts WW. 1976. Christ and science. Journal of the American Scientific Affiliation 28(1):9-11.