
Pro Rege

Volume 1 | Number 3

Article 4

March 1973

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Russell W. Maatman

Dordt College

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Recommended Citation

Maatman, Russell W. (1973) "Unifying Principle in Natural Science," *Pro Rege*: Vol. 1: No. 3, 15 - 20.

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THE UNIFYING PRINCIPLE IN NATURAL SCIENCE.

by Russell Maatman
Professor of Chemistry



Dr. Russell Maatman received his Ph.D. in Chemistry from Michigan State University. Prior to joining the Dordt faculty in 1963, Dr. Maatman taught at the University of Mississippi. He also taught at De Pauw University and has been a research chemist for the Mobil Oil Company. He is the author of a book and several technical and non-technical articles.

For a long time it has been claimed that a Christian understanding of nature should be developed. Assuming that there is such a need, what is the next step? This article is an attempt to take that next step as the unifying principle in natural science is investigated.

Before the thesis of this article is stated, certain clarifications are necessary. First, "nature" and "natural" as applied to aspects of creation refer here only to physical and chemical aspects. "Natural law" and examples of natural law are used, except where noted, to denote human correlations of observed natural phenomena. Such laws are limited, and they can be erroneous; but to the extent that they are correct, they can point to some part of an absolute law of God. "Natural science," here, means the study of the physical and chemical aspects of both the living and nonliving parts of nature. The question of the nature of life is not entered into.

Second, a Christian understanding of nature should have implications for the teaching of natural science. Without such an understanding, a Christian teacher or a Christian school might be satisfied that education in natural science is Christian if it solicits cer-

tain wholesome attitudes. There might be satisfaction if the student of natural science is taught, for example, to have ecological concern, admiration for what God has created, and an understanding of the errors of evolutionary teaching. But there is more. It will be seen that a list of items such as these does not constitute an adequate description of Christian education in natural science.

What is involved in a Christian understanding of nature? The heart of the answer to this question is the thesis of this article: As man develops natural science in his investigation of nature, the truth of a principle which has always been a part of the Christian position becomes increasingly evident to him. This is the principle that a single power is the cause of the various phenomena of natural science.¹

1. What does this thesis mean? Before the era of modern science, men understood very little of natural phenomena. They could not, for example, understand the relation between the ocean's tides, the tendency of dense objects to fall, and the tendency for the climate on the leeward slopes of mountain ranges (as in eastern Washington, Idaho, Montana, etc.) to be dry. These are seemingly isolated phenomena, but in the modern scientific era

they have been shown to be related. It is not that one of these phenomena causes another to occur. Rather, there are common factors in the explanation of the three phenomena. One such common factor is the Law of Gravitation, one of the laws formulated to explain these phenomena.

But the Law of Gravitation also explains many other phenomena. Thus, diverse phenomena are "brought under one logical roof." Other laws are formulated to explain other phenomena. What happens next in this process of explanation is extremely interesting: Laws such as the Law of Gravitation can also be considered diverse phenomena, and these laws can be brought together when more inclusive laws are formulated. The history of natural science is fundamentally the history of man's attempts to bring more and more seemingly isolated phenomena under one logical roof. Man wants better and more inclusive explanations.

What is happening before our eyes is amazing. We observe that the rich diversity in nature can be explained largely by a small number of simple but profound laws formulated by men. Natural phenomena are like leaves on a tree. Some leaves may be on the same twig, where the twig is like a law or a set of laws. The twig is not a leaf, but it shows the relationship between the leaves. Similarly, twigs are related if they are on the same branch, where a branch is like a more inclusive set of laws. At a still higher level, branches can be related to each other, etc. It is no surprise that scientists talk of reducing the number of fundamental laws. "Is there but one law?" they ask. The general trend in the history of natural science points in that direction.

Consider what this means. A humanly formulated law might be valid and might correctly describe creation. Creation could conceivably be described by a perfect law, an absolute law which only God could formulate. Such a law would be a description of God's power. Thus, such a humanly formulated law would, to some extent, describe God's power.

It has always been inherent in the Christian position that God is the source of all power. Furthermore, any expression of His

power is harmonious: He does not contradict Himself. Accepting the Christian position, we expect that the natural-scientific enterprise would reveal harmony in creation. The existence of this harmony, which is both profound and beautiful, is precisely what developments in natural science point towards. In no way do these developments prove the existence of God. But these developments do suggest that there is a basic unity in creation. There is no ultimate contradiction. The Christian who considers these things expects that man, if God so leads him, will find connections between many phenomena which still seem to be unrelated. At the same time, the Christian knows that the will of God is not comprehensible and that a single, valid law encompassing all phenomena will not be found. Yet the Christian does not doubt the existence of such an absolute, ultimate law or power. It is only a question of how much that man, in the providence of God, will be permitted to learn.

Man's relation to the idea of unification is discussed further after a few illustrations.

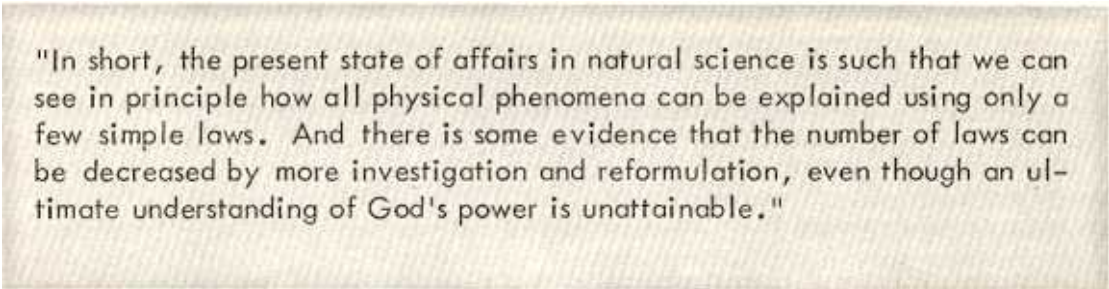
2. What are some examples of this thesis? Some questions about the explanation of facts in that part of physics called "classical mechanics," the science used to explain the behavior of objects much larger than single atoms or molecules, are the following: How is it that a rocket engine can cause a space ship to move, even if the ship is in outer space where there is no air? How does a highway engineer calculate the angle at which a curve must be banked? How is it that a person can easily lift a car without the aid of a motor if he uses a hydraulic jack? What determines which objects float on water? Why are two boats which are close to each other and traveling in the same direction drawn even closer together? Why does a baseball or a golf ball curve? How can the wings of an airplane give it "lift"? These questions and thousands of others about many seemingly unrelated phenomena can be explained by using approximately three very simple physical laws. The exact number depends upon how they are formulated. These laws are called simple because they are easy to understand; they are laws like the Law of Gravitation and the law

which states that energy can be neither created nor destroyed. In the application of these natural laws to the questions which have been listed, mathematics, and therefore the laws of mathematics, must be used.

Here are some typical questions concerning explanations of chemical phenomena: How does a water softener function? How does a battery produce electricity? Why are certain chlorine-containing compounds bleaching agents? Why does iron rust have color? Why are only a few metals, such as gold, found as free metals in their natural state? Why are the great majority of elements metals? How is it that a very large branch of chemistry can be based on one element, carbon, although the same cannot be said for any other element? What is the chemistry involved when a living thing changes food into heat and energy of motion? These phenomena and a seemingly endless number of other chemical phenomena

chaotic is not chaotic at all. But this means that "order" is related to, though not dependent upon, our ability to perceive and reason. The Christian, however, does not need to rely on such perceptive and reasoning powers to know that God is sovereign and that He is, among other things, the single ultimate Causer of natural phenomena. Moreover, the Creation is perfectly ordered regardless of how much we see.

Natural science, however, would not exist if man could not perceive order in the universe. Man can perceive order, that is, man can formulate laws, only because God made man so that he can observe and appreciate order. Man thus has some knowledge about what God has created. Such knowledge is possible only because man was created in the image of God. Both the Christian and the non-Christian bear the image of God, and, therefore, both are capable of doing work in



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can be explained by a very small number of humanly formulated simple laws. (Including the laws used in classical mechanics, approximately five laws are needed here.)

In short, the present state of affairs in natural science is such that we can see in principle how all physical phenomena can be explained using only a few simple laws. And there is some evidence that the number of laws can be decreased by more investigation and reformulation, even though an ultimate understanding of God's power is unattainable.

3. Why is this thesis true? The idea that diverse phenomena can be explained by a few simple laws is often said by natural scientists and others to be evidence of "order" in the universe. What is meant by "order"? Whoever says that he sees order means that he is able to discern a pattern: what at first seems

the natural sciences. No doubt sin has affected the quality of the work that man is capable of, and the differing presuppositions of the Christian and the non-Christian also inevitably affect their work. But it cannot be said that sinful men, even non-Christians, are not capable of worthwhile work in natural science. This thesis of this article is true because man, created in the image of God, has been led by God to see something of His power as it is expressed in the phenomena which are the subject of investigation in natural science.

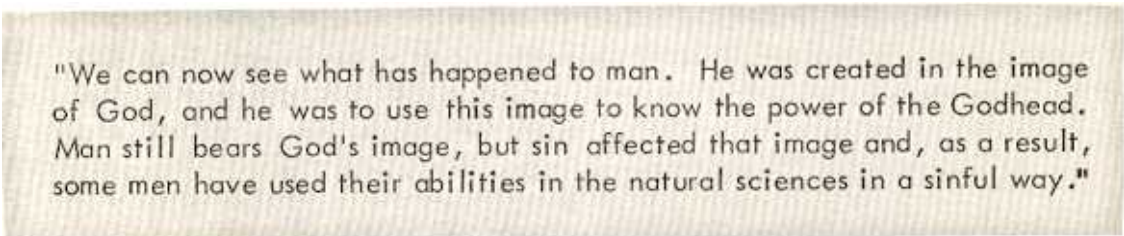
A further suggestion that work in the natural sciences can be carried out by all men is the Scriptural statement that all men see "the invisible things of Him from the creation of the world... even His eternal power and Godhead" (Rom. 1:20). We are taught in this passage that all men know of God, even

though some of them have distorted ideas concerning Him. Therefore, it is concluded that part of the image of God in man is some knowledge of the integrating "power" that is the reason for order and which, therefore, makes natural science possible. The ultimate power referred to in this passage is just that power which is pointed to by our humanly formulated natural laws. It is not claimed that all men are conscious of this knowledge. But this passage states that they have always had this knowledge. Consequently, men act upon this knowledge, and there is a universal urge to relate the forest of seemingly unrelated phenomena to the simpler and more general laws which point to that ultimate power.

But the non-Christian has no desire to unite phenomena in order that they will point to a god who is sovereign. Rather, he perverts unification so that unification will point away from God. How does he do this? Let us observe what has happened in recent years.

some men have used their abilities in the natural sciences in a sinful way. That is, some men have denied the power of the Godhead in the ultimate sense. They claim there was no creation. According to the Christian position, there was creation and there is providence. Thus, for the Christian, the existence of God the Creator and Provider explains why an understanding of natural phenomena points ultimately to a single power. For the non-Christian, however, the relation between the phenomena and a single power is "explained" by assuming the exact opposite, non-creation.

4. How can it be demonstrated that this thesis is true? It is possible to start out with the laws which explain the phenomena and then "prove" the existence of those phenomena. It is precisely this that can be done in many instances, and the examples in classical mechanics which have been given can be treated this way in a high school course in physics. The equivalent of the necessary



"We can now see what has happened to man. He was created in the image of God, and he was to use this image to know the power of the Godhead. Man still bears God's image, but sin affected that image and, as a result, some men have used their abilities in the natural sciences in a sinful way."

Since the concept of creation in the Biblical sense is incomprehensible to man, many scientists wanted to avoid the idea that God created living things. At the same time they like all scientists, wanted to put all the phenomena of nature under one logical roof. They wanted unification. These twin desires were an important reason that the idea of biological evolution took hold. To avoid creation and still keep unification, the idea of biological evolution was later extended: it was accepted that life evolved from non-life and, finally, among many "advanced" thinkers, the idea took hold that the universe is infinitely old. There never was a time of creation, they said.

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operations is carried out in many natural science courses, but little emphasis is put on the unity in all of natural science which is thereby indicated. The student can be taught to start out with what is "obvious" to him. For example, the high school physics student can be told to assume that energy can be neither created nor destroyed--this is merely a scientific way of saying that one cannot get something for nothing--and, if he assumes a few other ideas equally obvious, he can "prove" that the rocket engine can do what it does, that the ball will curve under certain conditions, etc. And so it goes for all of natural science. The ultimate proof of the thesis is too detailed to be given in this article, and is left to the natural science textbooks and classrooms.

But two additional comments must be made. First, classical mechanics is not a

typical example: it is an instance in which the connection between laws and phenomena is more easily seen than in most other areas of natural science. Second, the "obvious" assumptions which the high-school student can make have by this time been largely replaced with more sophisticated, but nevertheless simple, assumptions which have broader use than in classical mechanics. These more sophisticated assumptions serve to reduce the number of needed simple laws, the trend described in the thesis of this article. Since these assumptions are more sophisticated, their use makes it more difficult to demonstrate the thesis, and the more difficult demonstration is not necessary.

Thus, it is possible to demonstrate to the student that he indeed has the ability to put together ideas that he accepts without question for the purpose of deducing the existence of phenomena which at first seem to be isolated from each other. It is imperative that the student be shown that his ability to make these connections is no accident, but that it is a consequence of his having been created in the image of God. This is discussed further in Section 6.

5. What does this thesis NOT claim?

It is not claimed that modern natural science proves that God exists. But if all men know the power of God--and, according to Romans 1:20 they do-- then modern natural science aids in giving a picture of the universe as it is. Men resist their knowledge of God with modern natural science on the scene just as much as they ever have. "Natural" theology is not proper theology.

It is not claimed here that reality is in the eye of the beholder. Even though phenomena can be tied together by laws humanly formulated, there is no reason to deny the objective existence and unity of these phenomena that God created.

Nor is it herein suggested that man's reasoning can be infallible. Many errors have been and will be made. Furthermore, there are inherent limitations on what man can know about nature (i.e., God's creation). These limitations apparently exist because man has limited capabilities, not only because he is prone to err because of sin.

Since man's reasoning power is fallible, we are likely to forget something. We cannot say that our reasoning has told us nothing reliable about the "true" nature of creation. Natural laws formulated by men have been extremely successful in predicting the results of future experiments. In a sense, most successful scientific inventions depend upon the validity of fundamental laws previously formulated. Similarly, when astronauts began the first flight to the moon they assumed that Newton's laws--the fundamental laws of classical mechanics--tell us correctly where the moon will be at a given time. The astronauts went where the moon was supposed to be, and the moon was there.

Nor is it claimed that human reason replaces scientific experiment. It is true that the results of some experiments can now be correctly predicted because we know a small number of fundamental laws and how to apply them. And, we can see in principle how these laws can be used to predict the results of other experiments in natural science. The time when we will be able to use these or other laws to predict the results of most experiments is indefinitely far from us. In short, this thesis does not suggest that the experimental method, the heart of the so-called scientific method, is about to be replaced as the means of finding out what creation is like.

6. Given this thesis, how should the natural sciences be taught? The natural sciences should be taught recognizing that the student bears God's image. As a consequence, the student can comprehend some of the inter-relatedness of natural phenomena. Because he bears the image of God, he too can be led to comprehend that seemingly-isolated phenomena can be unified and understood. Some of the surprising and satisfying things that a high-school student can do have already been referred to.

What, then, is the "Christian" way to teach natural science? Is Christian natural science merely valid natural science, i.e., natural science which is considered correct in the ordinary textbook-classroom context? If so, teaching valid natural science would be teaching in a Christian way. After all, what would be a better way to teach than to

impart to the students an understanding of creation as it actually is? If such teaching is Christian teaching, then much secular education in natural science is already actually Christian education.

Such a view, however, neglects the effect of sin on man. Men do suppress the obvious. They do not of themselves admit that the power of God is the reason that coherence exists in nature. Education is Christian only when it takes into account the whole picture. In presenting the whole picture to the student, the teacher should explain how the power of God unifies what is studied. Error or incompleteness in such an explanation will cause the student to have a distorted view of creation. Christian education in natural science is not merely "ordinary" natural science with an added statement concerning God as Creator; it is education which teaches the student why no phenomenon can exist--can have

meaning for man--without God as Creator.

Thus, in Christian education in natural science it is not enough to teach isolated phenomena. A way of praising God in education in natural science is to recognize that He has led man to study creation and understand it. Even though man is limited, he has been enabled to put together some of the parts of creation and to see that there is a God-ordained whole. If our students are taught these things and learn to believe them, then they are taught for the King.

1. Discussion of this thesis beyond what is given here can be found in R. Maatman and G. Bakker, Contrasting Christian Approaches to Teaching the Sciences, The Calvin Col-Monograph Series, Grand Rapids, 1971, and R. Maatman, The Bible, Natural Science, and Evolution, Reformed Fellowship, Grand Rapids, 1970, Chapters 7 and 12.

FOR THE RECORD, incidentally. . .

by James Koldenhoven

RESPONSE TO ALLOFORMITARIANISM

In the last issue of Pro Rege Professor Gary Parker sought to examine uniformitarianism, a fundamental assumption underlying much of modern geology. It is always good to reexamine fundamental assumptions involving our Biblical faith and the scientific enterprise. I appreciate my friend's thought-provoking effort.

I believe, however, that Professor Parker may have been rather abrupt in his treatment of uniformitarianism. I believe that a caricature

of uniformitarianism has been presented. I fear that the casual reader may be led to conclude that the results of modern geology are mere reflections of unbiblical presuppositions, and that the reader may react by downgrading scientific study as a vain enterprise. There are, of course, unbelieving geologists--unfortunately a large army of them--with unbiblical assumptions whose interpretations must be treated with caution. They live in the same world that we