SCIENCE: PHILOSOPHY & OBJECTIVES BASED ON SCRIPTURE

Presented to the

School Visitors' Workshop

August 1-3, 1978

DMLC

New Ulm, Minnesota

by

Prof. Paul R. Boehlke

SCIENCE: PHILOSOPHY & OBJECTIVES BASED ON SCRIPTURE

The Christian's view of the nature of science will imply a great deal about how he will treat the subject in the classroom. We have all been exposed to an image of the scientist as a collector of the bare and objective facts. Is the scientist not able to reject all prejudice and bias by his method? Is there not at least a true science which is evidence of this?

Shortly after Creation God brought all the animals to Adam and he named them. This was a very scientific thing to do. Later we also read in the Bible that men were making cutting instruments of copper and iron. Musical devices are also mentioned. Jacob used the genetics of his day while watching the flocks of Laban (Gen. 30:31-43). It seems to be in the nature of man to make a study of the world for its own sake (pure or basic science), and also to apply the knowledge gained for the betterment of his condition (technology or applied science). Christ acknowledges scientific behavior and skill when He says, "In the evening you say, 'The weather will be fine, because the sky is red.' and in the morning: 'There will be a storm today, because the sky is red and gloomy.' You know how to judge the appearance of the sky correctly but can't judge the signs of the times (Matt. 16:2,3, Beck)."

It is generally accepted that science has made greater progress in the Western world because of the acceptance of the idea that God put order into Creation. In the East gods were not viewed as consistent. With Isaac Newton the order idea was pushed to the extreme, imagining the universe to be a giant machine set in motion by the Creator and bound by the laws He established. It was here that a fatal philosophical step was taken. Newton did not need God in science as a preserver of Creation. Today, as we well know, most scientists do not need Him as a Creator. Only the idea of natural order remains imbedded as a presupposition in science.

We tend to think of science as a body of knowledge that man has discovered about God's Creation. Science is much more than that. "Science is built up with facts as a house is with stones. But a collection of facts is no more a science than a heap of stones is a house" (J.H. Poincare, 1885). Science is what scientists do: observing, classifying, using numbers, measuring, using space-time relationships, communicating, predicting, inferring, defining operationally, formulating hypotheses, interpreting data, controlling variables and experimenting. (This was an example of an operational definition, by the way.) Redfield calls science "an attempt to make the diversity of our sense-experience correspond to a logically uniform system of thought. In this system a single experience must be correlated with the theoretic structure in such a way that the result is unique and convincing." "Science is above all," states Medawar, "an imaginative and exploratory activity. Having ideas is the scientist's highest accomplishment; the working out of ideas is important and exacting but yet a lesser occupation. Pure science requires no justification outside itself and its usefulness has no bearing on its evaluation."

Science does not attack all subject areas. The acceptable subject matter of science includes that about which one can come to "universal agreement." Norman Campbell holds that universal agreement is determined by the scientific process. It is a matter of sharing the same experience.

If several scientists study the relationship between the parsnips plant and an insect, the parsnips webworm, that infests it; the overlap or area of agreement in their observations becomes subject matter for science. When a scientist at the University of Illinois reports that isolated parsnips plants are more heavily infested than those in high density patches, his peers in the same area of study review his article to see if it agrees with the general body of knowledge and what they may have been working on. Should he report that the largest parsnips plants are on the edge of a population, and this does not agree with observations made by scientists at the University of Iowa, an effort will be made to either establish some kind of agreement or that particular statement will not become part of the subject matter of science (cf. figure 1).

It is important that science educators realize that here is where science's strongest claim for "truth" or objectivity lies. Science develops laws by this process. If several botanists reported that flying saucers are blasting holes in the stems of the parsnips plant and not the larva of the webworm, the editors and the larger scientific community would react. Universal agreement about flying saucers has not occurred. For this and other reasons they would be rejected as subject matter for science.

There are presuppositions that are held in common by communities of scientists. These presuppositions are imbedded in the meanings of observational and theoretical terms, affect the choice of problems and influence the acceptance or rejection of solutions. Scientific process, as it is actually carried out, loses its commonly believed character of a logically straightforward process once this is realized.

Harold K. Schilling has made a list of such presuppositions affecting the process of doing science today. Typical ones follow.

1. I exist, and have existed prior to the present.
2. Science results from natural urges to observe, reason, symbolize, conceptualize, generalize, to count, measure, experiment, etc.
3. These tendencies of man are valid and good, and lead to reliable knowledge.
4. Nature exhibits orderliness and regularity.
5. Nature is intelligible.
6. When we measure something, we know it.
7. Nature does not change basically in time, i.e. natural laws are independent of time.
8. The second law of thermodynamics applies to the universe regarded as a closed system.
9. The future is determined by the present.
10. The universe exhibits the dynamic tendency of evolution.
11. There is no reality outside of the physical.
12. There can be no action at a distance, i.e. without a physical connection such as a field.

For scientists these presuppositions are tacitly involved in all scientific judgments, and an indicative point is that many times scientists are not able to render these tacit elements explicit. One wonders how they are learned in the first place, but Thomas Kuhn points out that the close personal association of the graduate science student with an established scientist assures this. The presuppositions of science are acquired in the manner of an apprentice, not by reading textbooks (which serves to establish the subject matter of science for the novice).

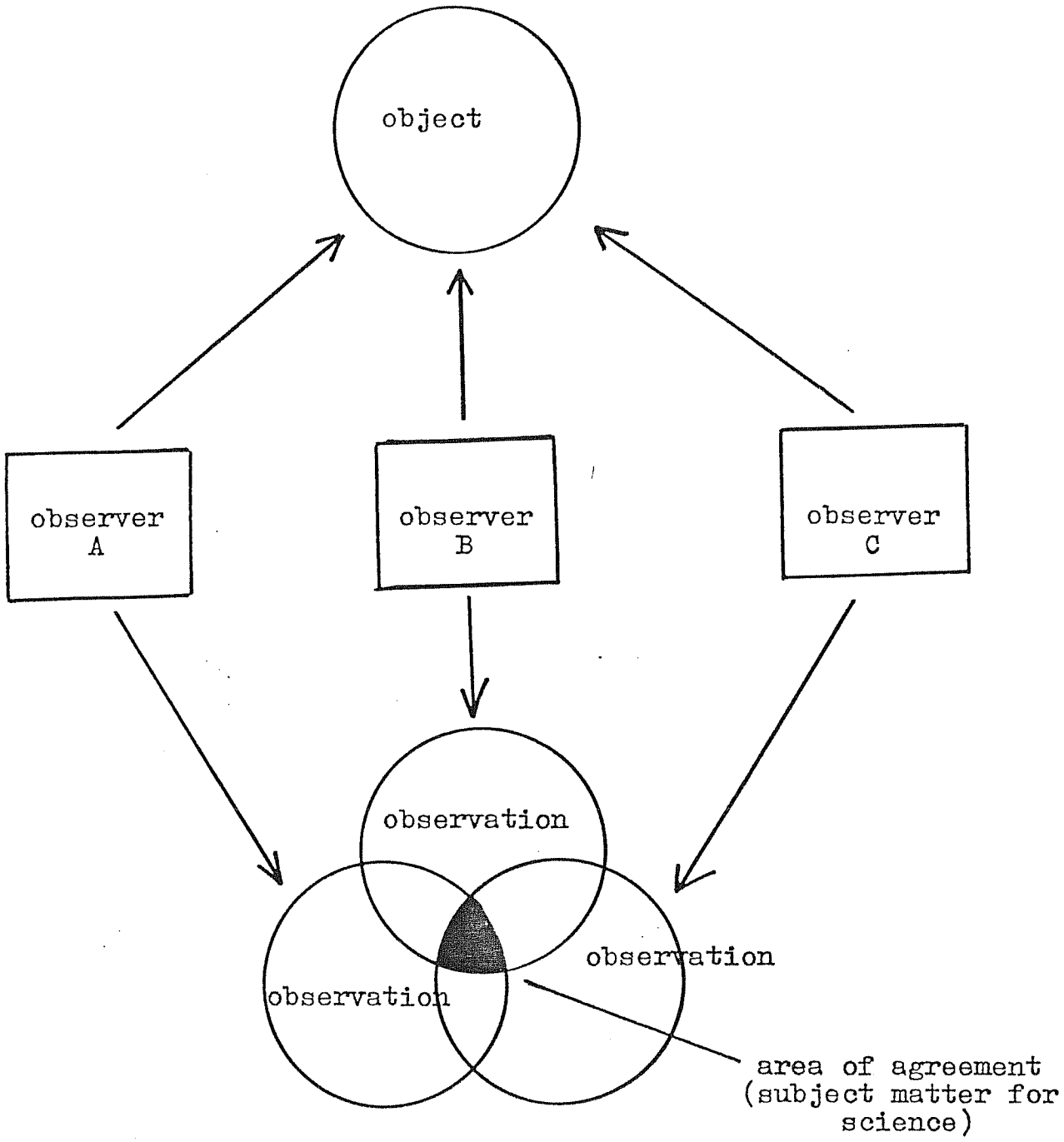

Figure 1: The area of overlap in the reported observations is the basis for science's claim for truth.

A scientist is going to feel strongly compelled to reject the Flood as told in the Bible because he does not see this as agreeing with presuppositions 4, 7, and 11.

Presuppositions are only part of the disciplinary matrix (paradigm) that mediates the scientist's perception of his experience: how the subject matter of science is interpreted and how the process of discovery and verification is carried out. Explanation of laws is involved and is an extension of the same process we have been describing. Explanation is the function of theories.

According to Campbell a theory must 1) allow deduction of the laws which it explains; 2) explain those laws in the sense of introducing ideas which are more familiar or, in some way more acceptable than those of the laws alone; and 3) predict new laws which must turn out to be true. The theory itself is never proven true. "It is, of course, when the theory seems to them (scientists) to explain the laws, when the ideas introduced by it appear to them acceptable and satisfactory, that nature conforms to their desires, and permits to be established by experiment the laws which are the direct consequence of those ideas" (Campbell, p. 90).

Scientists tend to mix the terms "law" and "theory" to the frustration of philosophers. A philosopher can show that gravity is not a law (unless one only wants to state that apples always fall toward the center of the earth - no big deal), but that it is a theory explaining a universal property of masses. The idea introduced is "gravity" itself. For what is gravity? I have never seen any! It is an idealization used to explain. Of course, there must be gravitational fields because there can be no action at a distance. Gravity waves would be nice to find too.

The mixing of the terms "law" and "theory" by scientists is indicative of the processes involved being very closely related. It becomes difficult to say which comes first. Both theories and laws derive their ultimate value from their concordance with the whole paradigm. Laws are not any less the product of imaginative thought than are theories.

We should realize that evolution is internally logical in view of the presuppositions built into the current scientific paradigm. It is man's best effort at a natural explanation of how we have come to be here. The reason of man and his experiments are continuing to be applied in order to articulate this paradigm. Scientists are hardly satisfied with Darwin but are likely to do a pretty good job on your students if you tell them that evolution is only foolishness. If nothing else they will show pity for your student.

We believe in Creation by faith. Let's not resort to trying to out-science the scientist. It is better to realize that science is a human activity that does not assure truth.

We can help children see the human nature of science as they learn their science. When our children sprinkle iron filings around a magnet, do we say, "Look, there is the magnetic field?" Should we not say, "The filings line up along the lines of force of the field. We cannot see the field. In fact the field was invented as an idea by scientists because they felt that when magnets exert force on each other, they must be connected by something. The field is not foolishness; it allows explanations and predictions. When we get to heaven,

however, we may find out that there never was any such thing as a magnetic field in Creation. (or atoms, molecules, photons of light, black holes, gravity, electrons, lock and key molecules, genes, and many more)

Don't take me wrong. I do not wish to say that I believe science is not worth anything. God has seen fit to bless us through science. God blessed Jacob too, even though part of his genetics would not be considered today as a useful way to increase wages.

I am saying that science should be done with humility. Should Creation-scientists claim that the dates must always be wrong in the various radioactive-dating methods? What if the world was created as an ongoing process: with apparent and necessary age? Can we be open-minded enough to also allow for this possibility? Scientists do not tolerate more than one paradigm during a period of normal science, but what has that to do with us. We hear little of this from Bible-Science groups because Calvinism has historically viewed the Creation as an open book (Barber). God would not deceive us, they say. (a presupposition?) That's not the issue. God just doesn't tell us everything. We do not know where Moses was buried (Deut. 34:6). The issue is rather one of humility where the punishment is to be made fools. Consider God's answer to Job and his friends who thought they knew what God was up to. Note how many of the examples are scientific in Job 38-41.

How can we avoid the words of our Lord in chapter 38: "Where were you when I laid the foundation of the earth? Tell me if you understand.... On what were the sockets of its pillars placed; who laid its cornerstone.... What is the way to the source of light... Do you know the laws of the sky; did you set up laws of nature on earth? Who is wise enought to count the clouds...."

Consider the great German Lutheran scientist Johann Kepler. He believed in Creation and proceeded to study the solar system. He believed in perfect order in Creation. He presupposed that mathematics was the perfect language. Therefore it followed that mathematics was the language of God and would be spoken in His Creation. There are five so-called perfect mathematical solids and there were five known planets at the time. How could Kepler resist? He spent his whole life fitting the solids inside each other in order to discover God's design. Along the way he came up with his three laws of planetary motion, for which he is remembered. He, however, did not regard these laws as very important. The result of his work is shown in figure 2. Of course, the discovery of more planets didn't do much for the model. The lesson is that Creation-scientists could be considered lucky to accomplish as much as Kepler. Believing in Creation is not going to guarantee the production of truth.

What science gives us oftentimes is <u>useful knowledge</u> and not truth. Our laws and theories are not apart from ourselves. There are things beyond us that we cannot know. Certainly we should try to know our world. What is being suggested is that humility and understanding of the pitfalls inherent in all science be cherished.

Jacob Bronowski, mathematician, scientist and philosopher, states, "I do not think that there is a God's eye view of nature (for the scientist), that there is a truth, an accessible truth of this kind. ...we cannot extricate ourselves from our own finiteness. And therefore, we do this decoding by a highly imaginative, creative piece of guesswork. But we finish with something which is only a gigantic metaphor for that part of the universe which we are decoding."

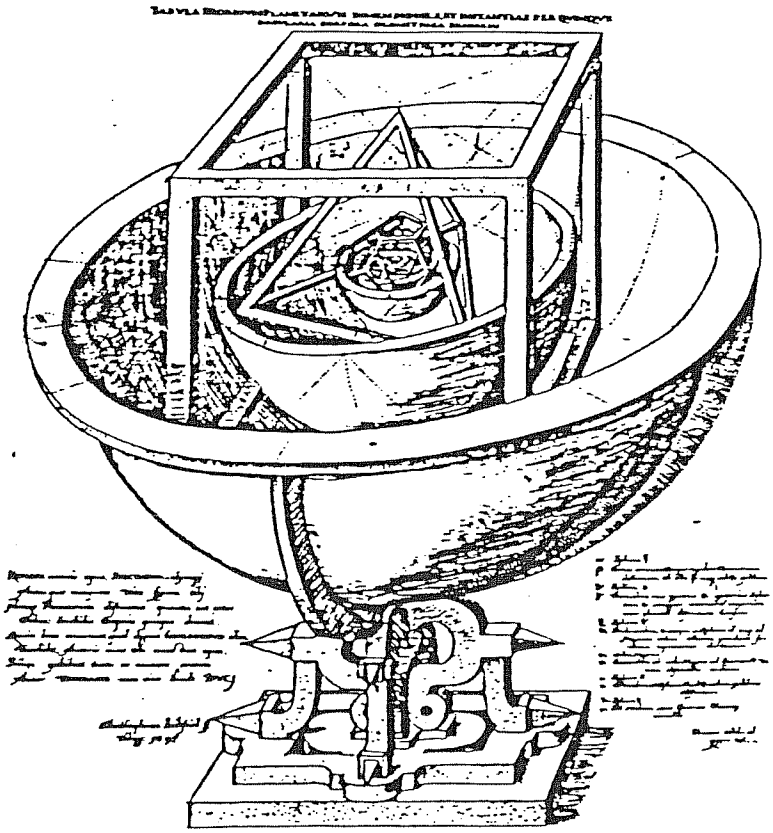

Figure 2: Kepler's model of the solar system: Saturn's orbit, cube, Jupiter, 4-sided regular pyramid, Mars, 12-sided regular body, Earth, 20-sided regular body, Venus, 8-sided regular body, Mercury.

We may think that science presents a picture of smooth progress and continual advancement of the frontiers of knowledge. Thomas Kuhn has pointed out, however, that each age of science worked within its own circles of reason until the recognition of a major anomaly occurred. A summary of Kuhn's model of science is shown in figure 3. The change or revolution is not an easy one, and many a scientist must just die off before a new single ruling paradigm rules. It is impressively difficult to read the old science. Its terminology is strange. We must, however, as Martin Sponholz points out, not make fun of phlogiston, continuous matter or an earth-centered universe. These concepts explained what was required of them in their time. Humility about our own science and knowledge of the history indicates that today's science will also change.

When science is recognized as a framework of evolving concepts and contingent methods, we begin to appreciate its true science. The intricacy, beauty, and size of a universe made by God then truly should impress us and declare the glory of its Maker to us.

Should we teach our children about a vapor canopy covering the earth until the Flood and say that this lengthened the lives of men? Should we teach them that the second law of thermodynamics is the result of sin? Should we claim that the second law of thermodynamics is <u>better</u> science because it seems to argue against evolution? Do we <u>need</u> to find the ark?

If our efforts are to prove Creation to our students, the words of Hebrews 11:3 are being forgotten: "Through faith we understand that the worlds were framed by the word of God, so that things which are seen were not made of things which do appear."

Can Christians do science? Yes, very carefully, recalling that the Lord punishes pride but not counting (2 Samuel 24).

General Objectives in Teaching Science:

1) To stress that doing science is a marvelous gift from God.
2) To acquaint the student with nature as we see it.
3) To stress that the laws of science are not identical to God's laws.
4) To acquaint the student with the theories in the various sciences emphasizing
   a) how theories work
   b) that scientists believe them
   c) evaluation of them in view of Scripture
5) To indicate that the formal steps of the so-called scientific method are useful for public science, <u>i.e.</u> in the write-up of the scientific report but that what goes on in the lab and field work is more complicated and creative than that.
6) To point out some of the presuppositions in science.
7) To expose the child to observable phenomena by demonstration and experiment as much as possible to
   a) increase his understanding and interest
   b) stimulate his own powers of observation
   c) show him where the imagination and artistry of the scientist begins (without ridicule).
8) To avoid teaching science (true science) as dogma.
9) To teach some old science: indicating that science does change.
10) To show the majesty and glory of God in the complexity and vastness of Creation.

Summary of Kuhn's Model of Science

Pre-Paradigm State

Competing schools

§ No agreement on
- major features of research
- methods and instruments
- interpretations

Normal Science

Single ruling paradigm

§ Agreement on
- direction of research
- methods and instruments
- interpretations

§ Emphasis on
- solving puzzles
- increasing precision
- checking predictions
- articulating paradigm
- determining constants
- determining quantitative laws
- refining paradigm alternatives

Scientific Revolution

Recognition of major anomaly

Many lines of research

§ Invention of theory
§ Discovery of fact

} *Extraordinary Science*

One line emerging by consensus as the best guide to research

Normal Science { Single ruling paradigm

Scientific Revolution { Recognition of major anomaly

Normal Science { Single ruling paradigm . . .

Figure 3