Summary

The Loma Linda project largely followed the pattern of the previous work in palynology in the Grand Canyon by Burdick[13], except that the Loma Linda work seemed to produce a slightly larger percentage of angiosperms than the former work. Burdick's work covered the whole series of formations that produced spores from the Permian Supai down to the Precambrian Hakati shale.

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A CHRISTIAN BIOLOGIST'S REFLECTIONS ON THE SCIENTIFIC METHOD

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Science is an activity in which we engage in order to gain a more clearly articulated explanation of the phenomena which we experience all around us in life. The Christian does this in obedience to the cultural mandate which God gave to man, and in which He charged man to subdue the earth and to have dominion over all living creatures on the earth. Our purpose in science, then, is to subdue the earth, to help our fellow man, to enrich our life, but above all to glorify God.

In scientific pursuits the analytic function of man is intensified for the purpose of abstracting a part of the total situation under study so that a clearer understanding of this particular part may then enable us better to understand the total situation. As one of the tools of science the scientific method is *consciously* applied so that by systematization of our work we may sooner get to a clearer understanding of a problem or situation.

The scientific method is a pattern or approach which helps to clarify and explain the phenomena and events which we experience in our everyday lives. This approach is most rigorously applied when we are engaged in specific and detailed abstractions in the laboratory. In the scientific method different stages or steps are often distinguished as follows:

a) recognition of a number of data or observations which seem to be related in some way;

b) formulation of a hypothesis whereby this relationship might be explained;

c) collection of data which may have bearing on this relationship, including designed experiments;

d) evaluation of all the amassed data which may result in 1) clear proof that the hypothesis is contradicted by the total evidence gathered, or 2) corroboration of the initial hypothesis which tends to lend more credibility to the hypothesis and which might now be called a theory, until evidence is adduced which clearly contradicts it.

Initial recognition of a possible relationship between certain data or observations is an activity of the whole person and not necessarily the immediate result of his analytic activity. From his entire rich background of many diverse experiences in life the relationship is discerned by the individual, who has some recognition of the structural order of things and events around him.

The hypothesis by means of which the phenomena and their relationships might be explained is, again, rooted in the total experience of the individual, and is definitely correlated with his basic commitments. Because of such commitments, a person will accept or reject certain possible explanations for eligibility under the circumstances of the situation. For example, when enrolled in my master's degree program I

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was encouraged to determine the relationship of groups of muscles as found in certain different classes of backboned animals, and my major professor suggested that my work be done within the framework of thinking of genetic descent currently held by evolutionists.

But my basic commitments prevented me from accepting this possibility as a legitimate hypothesis. At the same time, however, my suggestion to study these groups of muscles from a creationist viewpoint was immediately and forcefully rejected by the professor as a possible alternative. For both of us our basic commitments limited the type of hypotheses which we could legitimately entertain as possible explanations for the observed and suspected similarities.

Selection of further data, and decisions regarding the design of experiments, too, are determined by the whole person in his rich background of experiences and his commitments. The same is probably still more obvious when we arrive at the point of evaluating the phenomena and the accumulated data, and extrapolating from these to more inclusive concepts. We must decide on which basis we accept or reject the plausibility of a particular hypothesis, and therefore our entire system of values has a bearing on this activity.

These several different activities in which we attempt to arrive at an acceptable explanation of phenomena in our scientific endeavors are, however, not at all unique activities, which would be restricted to use in science. They are refinements, or intensifications, of activities in which we engage during the normal everyday activities usually not included in science.

The housewife, who finds that one of the lids of her newly canned jars of applesauce is not sealed, will quickly seek for an explanation of this undesirable situation. She will contemplate different possible explanations and will test them, if possible. One hypothesis, for example, that the little bit of applesauce left on the rim of the jar might have prevented a perfect seal is confirmed when she repeats the sealing procedure after carefully cleaning both the rim and the lid.

Repeated demonstration that careful removal of all particles of applesauce from rim and lid results in well-sealed jars will soon give the housewife the assurance that her explanation of the situation is correct, and she will show this conviction by carefully wiping all subsequent rims and lids.

Life is an entity, a unity, the many different aspects of which are all necessary to make a coherent whole. On the one hand, we have our naive experience in which we encounter life as citizens and neighbors, for example, in a general non-analytic way. On the other hand, as scientists we have our theoretic and highly analytic experience of those things which we have abstracted from the full context of life. These two kinds of experience, the naive and the theoretic, must not be thought of as being unrelated, or as clearly distinguishable, separate parts of life. Because life is a whole, the theoretic experience is based on, and rooted in, the naive experiences of the individual, while the naive experience is conditioned by his heart commitment. The naive and theoretic experiences are intricately interwoven, so that no sharp distinction line can be drawn between the two; neither, however, do they completely overlap.

The scientific method is a method or tool which we use in our everyday life, as e.g., in the canning of applesauce, but on which we rely much more heavily in scientific endeavors in order to obtain deeper insights and more valid experiences. In scientific work the scientific method naturally takes on a more distinct character because we consciously try to apply this method consistently in all our theoretical abstractions of that part of reality with which we are, at that time, so deeply concerned.

New insights, gained through the scientific method in our scientific endeavor, can indeed enrich the daily experiences of life and can, in turn, be integrated into the total naive experience. Scientific endeavor is part of the scientist's total everyday activity, and in the laboratory he is not merely an analytic machine, but he remains a person with preferences, dislikes, weaknesses, ambitions and values.

When the Christian scientist enters his laboratory he cannot cease to be the whole man who committed his entire life to Christ. The whole man enters, with Christ, but his activities take on a concentration on the theoretical, and he consciously tries to abstract only a part of his subject of study in order to be able to see more clearly a certain aspect. After this he consciously tries to relate his newly abstracted knowledge to his total life experience, in order to determine the true meaning of the newly found data.

This clearly indicates the necessity of his continually feeding on the Word of God so that the latter may be a guide to help him, as a scientist, to determine the right relationship of the scientific data to his full-orbed Christian life, and so that the new data may become truly meaningful in his Christian world-and-life view.