

BY STUDY AND BY FAITH

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Truth by Reason and by Revelation. By Frank B. Salisbury, Salt Lake City: Deseret Book Co., 1965. x plus 362 pp. \$4.50. Joseph Murphy is Associate Professor of Zoology at Brigham Young University and has published articles in the fields of Ecology and Ornithology; he and his wife are superintendent and president of their ward Mutual Improvement Association, the L.D.S. youth auxiliary.

A survey of Latter-day Saint literature dealing with science and religion will reveal that, with few exceptions, biologists are poorly represented. All manner of other scientists and technologists, including chemists, physicists, geologists, agriculturalists, sociologists, medical practitioners, and even non-scientists have attempted to define the place of science and scientific philosophy in L.D.S. theology. The lack of expression from professional biologists is the more regrettable because many of the topics dealt with are those of vital concern to modern biology (e.g., organic evolution, man's physical nature, human nutrition and metabolism, extraterrestrial life, etc.).

It is significant, then, that a devout Latter-day Saint who has earned a solid reputation in biological research and teaching has recently produced a book dealing with many facets of science which appear to present interpretive difficulties for adherents to the restored Gospel. This commendable effort is the work of Dr. Frank B. Salisbury, Professor of Plant Physiology at Colorado State University, who has made important investigations into the physiology of flowering and other phases of physiological plant ecology, and has also studied and published in the fascinating field of exobiology. It would appear that Dr. Salisbury is well qualified to undertake a work of the nature of his *Truth by Reason and by Revelation*.

According to the author's preface, the book was written with two rather disparate groups of people in mind: the troubled student who may experience some erosion of his religious foundations as he encounters "the theories and philosophies of the world," and the author's fellow scientists, at least the atheists and agnostics among them, for whom he would like to provide a rational basis for his own faith in God and the Gospel of Christ. Dr. Salisbury feels that he can find common ground for both groups by describing the development of faith, "beginning with the assumption of no faith at all." Although the author states that no effort was made to outline the principles of the gospel, I believe that most readers will agree that the book contains a fairly complete treatment of the major tenets of the restored Church.

The opening section of the book, subtitled "Searching for Truth," begins with a statement of the alleged areas of conflict between science and religion and is followed by chapters which contrast the approach to truth through the two methods, concluding with a chapter on the mechanics of gaining a testimony of the gospel.

In section II, "Problems of Science and Religion," the author devotes five chapters to the general subject of the creation of life and organic evolution. There are additional chapters on miracles, nature of the spirit, the Word of Wisdom, extraterrestrial life, and Satan.

The final section of the book consists of two chapters dealing with the nature of man, contrasting the viewpoints of science and of revealed truth.

Any attempt to define or explore a concept as subjective and often as abstract as truth is apt to prove difficult, particularly when the intent is to compare truth as a part of religious experience with the tentative "truths" of science. The author contends that there are absolute truths towards which scientific inquiry and religious revelation are both leading; nevertheless, the inherently different methods and limitations of the two systems suggest that less than complete correlation can be achieved. Dr. Salisbury tacitly acknowledges this in his discussion of the two methods of truth seeking (Chapters 2 and 3) wherein he concludes that the scientist is limited to those conclusions which will stand the test of the formal processes of logic, while the method of revelation has no such limits. I do not mean to imply that there are no absolutes discernible by science, but the scientist's major contribution is made on the frontiers of expanding knowledge, where he is apt to be more concerned with evidence than with final proof or absolutes.¹

Turning from generalities to some of the specific problems discussed in the text, I will restrict the majority of my comments to the "problem" of organic evolution, and the related question of the origin of life. Judging from the amount of space devoted to these concepts, the author considered them of crucial importance in developing the theme of his book.

Although the author makes some concessions to evolutionary processes and allows natural selection limited operation, I believe it is fair to say that his position is, with some important qualifications, essentially anti-evolutionary. He is particularly unwilling to recognize the process of natural selection as fundamental in the creation of new species. In developing his argument, he first states the case for evolution (Chapter 7) by reviewing the various lines of evidence generally found in introductory biology texts (e.g., the fossil record, anatomy and embryology, biogeography, evidence from genetics, etc.). Owing in part to the necessity for brevity and in part to questionable interpretations and errors in fact on the part of the author, this is not in my opinion a particularly strong or satisfactory chapter.

For instance, in his discussion of fossils Dr. Salisbury argues that there are few if any known intermediate forms which might serve as transitional types between major animal groups. As a matter of fact, paleontological museums and monographs are replete with fossil forms so intermediate and so transitional in character that appellations such as "reptile-like amphibian" and "mammal-like reptile" are widely applied. In the one instance which the author does cite as a possible example of this kind of transition, "the giant flying lizards which might be thought of as intermediate between the lizards and the birds," he adopts a hypothesis, namely derivation of birds from the ancient pterodactyls and pteranodons, which has been discredited for many decades; but he unfortunately fails to mention the well-studied fossils of *Archaeopteryx* which provide a nearly ideal transition between reptiles and birds.

This is but one example; similar exceptions could be taken to many of the author's conclusions relative to the other evidences for evolution which are discussed in this chapter, wherein he appears to be arguing against the evidence for evolution rather than presenting the case for it. In fact, he

¹ For a good discussion along these lines, see Paul B. Weisz, *The Science of Zoology* (New York: McGraw-Hill, 1966), pp. 10-15.

reaches the remarkable but poorly supported conclusion that these traditional evidences for organic evolution argue equally well or better for the hypothesis of special creation.

I am tempted to devote considerable discussion to Chapter 8, entitled "Natural Selection," for it is here that the author considers evidence primarily from the fields of genetics and cytology and believes that he detects "fatal weaknesses" in evolutionary theory. Genetics is not my speciality, however, and I will restrict myself to one or two observations on his conclusions in this key area.

Dr. Salisbury believes that natural selection does occur in a limited sense, but feels that its effects are quantitatively too small to account for the broader patterns of evolution. On page 155 he asserts that "the source of variability, gene mutation, cannot provide enough good mutations or combinations of mutations to supply the selection process with stock for evolution." By way



of contrast, G. L. Stebbins, a competent student of speciation processes, has recently argued that "only one in a million of the useful mutations or one in a billion of all mutations which occur needs to be established in a species population in order to provide the genetic basis of observed rates of evolution."² Stebbins also points out that there is no relationship between the rate of mutation and rate of evolution.³

Continuing this same line of argument, Dr. Salisbury asserts that we cannot account for the observed complexity in nature on the basis of the selection process, since essential intermediate stages in the development of organs or behavior patterns would seem to have negative survival value. This "classic" argument, as he terms it, would hold true only if we asserted that the environment remained constant over long periods of time, whereas there is ample evidence to indicate that past environments were notably unstable. A con-

² G. L. Stebbins, *Processes of Organic Evolution* (Englewood Cliffs, N. J.: Prentice-Hall, 1966), p. 30.

³ *Ibid.*, p. 31: "Natural selection directs evolution not by accepting or rejecting mutations as they occur, but by sorting new adaptive combinations out of a gene pool of variability which has been built up through the combined action of mutation, gene recombination, and selection over many generations Consequently, the rate of mutation rarely if ever has an influence on the rate of evolution."

dition which from our present point of view may seem to have been non-adaptive might have been eminently adaptive under the environmental complex prevailing at the time. The recent careful studies on industrial melanism in British moths have provided an excellent example of the manner in which a changed environment can convert a "harmful" mutation (in this case the dark or melanistic phase of the moth) into an "advantageous" mutation.⁴

In the above paragraphs I have deliberately attempted to demonstrate the vulnerability of many of Dr. Salisbury's conclusions relative to the evolutionary principle. By so doing it is not my intent to defend the position of the atheistic or agnostic evolutionists. On the contrary, I prefer to ally myself with that group within the Church who feel that a reasonable and harmonious synthesis can be forged between the principle of organic evolution and the revealed truths bearing upon these subjects. This general attitude has been expressed in a recent article by B. F. Harrison which appeared in *The Instructor*.⁵ I find a daily source of inspiration in the knowledge that within a few steps from my office in the biology building on the B.Y.U. Campus are located the offices of several bishops, high councilmen, and at least one general board member, who espouse views similar to my own. That these views are at variance with many of Dr. Salisbury's ideas certainly implies no lack of respect for his professional competence. I am fearful, however, that his book will be used as an anti-evolutionary tract by certain fundamentalist elements. (Judging from comments and questions about the book already brought to me by students, my fears are well grounded.) This would be most unfair to Dr. Salisbury, for while he by no means warmly embraces the evolutionary concept, he avoids the trite and unwarranted "either — or" approach (i.e., either you are a good Latter-day Saint *or* an evolutionist, etc.) so frequently offered inquiring students by those who have been unable to come to terms with various scientific philosophies. In fact the author suggests a number of alternatives to account for the creation of life and its present diversity (pp. 186-193). He points out that several of these are in essential harmony with revealed truth and admits that he finds himself vacillating from one point of view to another as he continues to study the problem. I also appreciated Dr. Salisbury's interpretation of some of the scriptural passages, ancient as well as modern, often cited by fundamentalists as adequate to "put down" scientific principles and philosophies which seem to be at odds with their own understanding of these concepts. The author has demonstrated that such scriptures need not present the insurmountable obstacles which some have suggested.

In reference to general literary style, the author writes lucidly enough but incorporates certain characteristics of expression which I frequently found irritating. I suppose it is impossible in a book of this type to suppress one's personal biases and prejudices without appearing to equivocate, but Dr. Salisbury often seems to get carried away. For example, he seems to have the notion that most scientists accept ideas such as organic evolution and pre-Adamic man blindly, dogmatically, and "without thinking." Whatever may have been Dr. Salisbury's experiences with his scientific colleagues along this line, I have certainly not found this to be generally true of my own non-L.D.S.

⁴For a discussion of this fascinating example of natural selection in action, see J. M. Savage, *Evolution* (N. Y.: Holt, Rinehart & Winston, 1963), pp. 54-55.

⁵B. F. Harrison, "The Relatedness of Living Things," *The Instructor*, V. 100, No. 7 (July, 1965), pp. 272-276.