

## A CRITIQUE OF THE BSCS BIOLOGY BOOKS

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### Introduction

In January 1959 The American Institute of Biological Sciences set up a committee called the Biological Sciences Curriculum Study. Supported by the National Science Foundation, the committee, commonly called the BSCS, undertook a study of biological teaching from kindergarten to college. It was decided to provide an entirely new type of curriculum starting with the key level, high school.

When study was started under the direction of a steering committee, it soon became evident that ideas of suitable approaches varied so widely it would be impossible to prepare a single text that would please all. Accordingly it was decided to prepare three texts with different methods of approach. To prevent ranking the texts it was decided to call the texts by colors, so they came to be called the *Green Version*, the *Yellow Version*, and the *Blue Version*. The *Yellow Version*, given the title *Biological Science: An Inquiry Into Life*, was published by Harcourt, Brace and World, Inc. Rand McNally and Company published the *Green Version* which was given the title, *High School Biology*. The *Blue Version*, *Biological Science: Molecules to Man*, was published by Houghton Mifflin and Company.

### The Themes of the Books

All the texts and the accompanying laboratory work are built around nine themes which are proposed as unifying themes. They are as follows

1. Change of living things through time: evolution
2. Diversity of type and unity of pattern in living things
3. The genetic continuity of life
4. The complementarity of organism and environment
5. The biological roots of behavior
6. The complementarity of structure and function
7. Regulation and homeostasis: preservation of life in the face of change
8. Science as an enquiry
9. The history of biological conceptions"<sup>1</sup>

According to Schwab the first five of these themes are concerned with content, the sixth and seventh are intermediate, and the last two

are concerned with the structure of the BSCS materials. Let us note what this author has to say about evolution in the first five themes or the content of the courses:

Theme 1: "It is no longer possible to give a complete or even a coherent account of all living things without the story of evolution."<sup>2</sup>

Theme 2: "As we have indicated before this theme is, in part, a special aspect of the theme of evolution."<sup>3</sup>

Theme 3: "This theme, too, is part of the theme of evolution"<sup>4</sup>

Theme 4: "This theme, too, is part of the theme of evolution especially where it concerns the environment of the whole organism."<sup>5</sup>

Theme 5: "In brief, the BSCS texts emphasize behavior as arising not only from the experience of the individual but also from the 'experience' of its forebears, the stored experience arising from variation and selection in evolution."<sup>6</sup>

The slant of the content of the texts is unmistakable. Theme 6 is equally evolutionary in its approach. Again we quote:

"Long before the mechanism of evolution was understood, the well-organized character of life units was recognized and the functions of their parts investigated. With the development of the theory of evolution, the conception of function underwent important changes. We no longer thought of the organism as a *perfect* organization but instead recognized the possibility of the vestigial, the novel, and the incompletely relevant part. This did not mean, however, that the conception of function became obsolete. On the contrary, within the limits required by our knowledge of evolutionary processes, we still sought evidence through which to understand each part in terms of its contribution to the whole."<sup>7</sup>

The theory of evolution is not explicitly mentioned in the discussion of the seventh theme. The last two themes are concerned with the ways in which the content of the courses is presented to the student. Theme 8 suggests that science is an enquiry. The authors oppose the use of authoritative statements:

"We have remarked that teaching science merely as authoritative facts and dogma has had an extremely bad effect on American attitudes toward science and scientists."<sup>8</sup>



In that process of verification, it is mistakenly supposed that materials go through three stages or degrees of certainty: a first stage, of complete doubt, called hypothesis; a second stage, of uncertainty, called a theory; a third stage, or certainty, called a fact or principle. This sense of 'theory' no longer holds in science, if it ever did. Modern science is not merely a process of verification of isolated items but a process of organization as well. In this twofold process, 'theory' refers, not to the uncertain, the unverified, but rather to the coherent and organized . . . Evolution is a theory in this sense, yes—a body of *interrelated* facts. As new facts about evolution are discovered, the organization may be changed in order to include them, but this would *not* mean that the present organization of facts now known is unsound.”<sup>16</sup>

It would seem that the laws of some states prohibiting the teaching of evolution as a fact but permitting its being presented as a theory are rather pointless when that interpretation of “theory” is used.

#### Confusion of Terms

Not only is the use of the term “theory” confused in general, but there is failure to delineate between *limited change*, which is easily observed or demonstrated in the laboratory, and *total evolution* which is nothing but hypothesis. Schwab states the two phases this way:

“Evolution, then, forms the warp and woof of modern biology in two different ways. First, evolution appears as the *history* of organisms, the sequence of unique events in past time from which the biological present has had its origin. . . . This history may well be the key to understanding the biological future . . . Second, evolution appears in organisms as a *present* phenomenon. We have not only inferred the course of evolution in the past from such evidences as *all* historians use, but we have also seen it occur in the living present.”<sup>17</sup> (Italics added)

On examining the texts it can be seen that the writers use “present evolution” (limited change) as evidence to support “historical evolution” (molecules to man). The Green Version, for example uses Darwin’s finches, various breeds of chickens, the peppered moth, the two color phases of screech owls and of foxes, various kinds of Cucurbita, and the colors of hares and rabbits as examples of limited change or “present evolution” to illustrate the presumed basis of “historical evolution” (molecules to man). There is no suggestion that the gaps between orders, classes, and phyla are not crossed either in the fossil record or in nature today.<sup>18, 19, 20, 21</sup>

But that is the very place an objective text should point out those qualifying limitations.

Although some weaknesses in the theory are mentioned, many other weaknesses are not pointed out. Perhaps the following quotation gives the reason:

“Every law has its exceptions or its uncertainties, and every theory is subject to question. Sometimes these exceptions and uncertainties must be *minimized*, else the student might become *disconcerted*, *confused* and *hindered* in achieving an understanding of what we know as science. Later these limitations should be examined as the student’s understanding progresses.” (Italics added)

#### The Use of Genetics to Support Evolution

The BSCS texts place great emphasis on genetics as providing the explanation of how evolution supposedly takes place. Mutation is considered the source of change with selection providing direction. Again the authors fail to point out some pertinent facts. Note what Dr. Walter E. Lammerts (professional geneticist) has to say about these omissions in the Yellow Version:

“I am amazed that they use the Hardy-Weinberg principle as part of their proof of evolution. This expression of *stability* of a breeding population is used very cleverly to prepare the student for the idea of change. Then change is equated with evolution and the mind is all prepared to accept almost any proposition no matter how impossible such as the conversion of fins into legs. What amazes me is that they fail to say that since most mutations are harmful under natural conditions, the Hardy-Weinberg stability principle is accentuated by selection *against* the accumulation of mutations! But since this selection can only operate against the homozygous mutant, the feed back into the next generation by the heterozygote continues. Since obviously mutations are in the great minority to start with they are soon eliminated! They fail to state that no population studies have yet demonstrated a take over by the mutant gene.” (Personal communication)

#### Materialistic Philosophy

One does not find any statement that there is no God in the BSCS books, but the material is so handled that the student easily concludes that God is not necessary. At that point atheism is the next step.

In the Yellow Version, chapter 4 (29 pp.) is devoted to a study of vitalism versus mechanism as a means of explaining life phenomena. The two terms are defined as follows:

“There have been two main philosophies to account for the relation of life and matter. One is *vitalism*, a philosophy that assumes that life is made possible by some force that is neither

chemical nor physical. The other is *mechanism*, a philosophy that assumes that life can be explained entirely in chemical and physical terms.”<sup>23</sup>

Following discussion of Aristotle and Descartes, and the work of Priestley and Wohler, the student is lead to this conclusion:

“This is not to say that scientists proved there is no vital force, They showed that it was *unnecessary* to invoke a vital force to explain the data of the physiology of cells and organisms. Vitalism was not discarded: it became unnecessary in explaining biological activities.”<sup>24</sup> (Italics added)

The purely mechanistic philosophy is very ingenuously taught without saying so in definite terms. In the teachers’ manual we find these statements regarding this material:

“The basic idea of this chapter is the firm establishment of the fact that biological function is explicable in terms of the laws of chemistry and physics—the same laws, essentially, that apply to nonliving materials of the earth. . . . While not disproving the theory of vitalism, the conclusion is inescapable that physiological problems are approachable by the methods of chemistry and physics—that, in fact, they cannot be understood without resort to chemistry and physics.”<sup>25</sup>

By means of suggestive questions the student is lead to believe that the mechanistic philosophy is *the* logical one and leaves the false impression that the mechanistic approach can be verified by experimental means. According to the BSCS writers the mechanistic method is all-sufficient. There is no compromise—no recognition that both factors can be involved in explaining vital functions.

Again, as in so many situations, the discussion is not complete. Much is made of the discovery that enzymes could digest foods in a test tube. No vital force was present, they say, but they

fail to mention that in the living organism living cells produce the enzyme, the enzymes do not digest the protein of the stomach or intestinal wall until death takes place, and also parasites found in the digestive tract are not digested though they are protein. They do not suggest that both chemical and vital factors can be involved.

The theme of mechanism is taken up again in chapter thirty-six dealing with the origin of life. Note what is said about this in the teachers’ manual:

“The basic issue is how science can account mechanistically for the origin of life.”<sup>26</sup>

### Similarity of the Texts

According to BSCS officials about seventy per cent of the material in the three books is the same. That becomes evident on studying the books. The approaches are different. The Green Version stresses ecology, the Blue Version gives more emphasis to molecular biology, while the Yellow Version gives more attention to the cellular level. In the main the same subjects are discussed but where one text devotes an entire chapter or section to one subject another may reduce the quantity to a few pages. For example the Blue Version devotes five chapters to theories of the origin of life and Oparin’s Hypothesis of the origin of life and the evolution of the cell. The Green Version devotes only about two pages to Oparin’s Hypothesis. The Yellow Version emphasizes the historical phase of evolutionary philosophy giving more attention to fossil evidence.

### Conclusion

It seems clear that all three of these books are dedicated to the promulgation of total organic evolution to the exclusion of objectivity in biology, if need be, in order to eliminate any belief in fiat creation.

### References

- <sup>1</sup>Schwab, Joseph J. (Supervisor), *Biology Teacher’s Handbook*, John Wiley and Sons, Inc., New York, 1963, p. 31.
- <sup>2</sup>Ibid., p. 31.
- <sup>3</sup>Ibid., p. 33.
- <sup>4</sup>Ibid., p. 34.
- <sup>5</sup>Ibid., p. 34.
- <sup>6</sup>Ibid., p. 36.
- <sup>7</sup>Ibid., p. 36.
- <sup>8</sup>Ibid., p. 45.
- <sup>9</sup>BSCS, *Biological Science: An Inquiry into Life*, Harcourt Brace and World, Inc., 1963, pp. 638, 639.
- <sup>10</sup>Ibid., p. 641.
- <sup>11</sup>Schwab, op.cit., p. 31.
- <sup>12</sup>Schwab; op. cit.; p. 33.
- <sup>13</sup>BSCS, *High school Biology*, Rand McNally and Company, Chicago, 1963, p. 572, 573.
- <sup>14</sup>Ibid., p. 580.
- <sup>15</sup>BSCS, *Biological Science: An Inquiry into Life*, Harcourt Brace and World, Inc., New York, 1963, p. 589.
- <sup>16</sup>Schwab, op. cit., pp. 32, 33.
- <sup>17</sup>Schwab, op. cit., p. 32.
- <sup>18</sup>Kay, Marshall and Edwin H. Colbert, *Stratigraphy and Life History*, John Wiley and Sons, Inc., New York, 1965, p. 617.
- <sup>19</sup>Andrews, Henry N., Jr., *Studies in Paleobotany*, John Wiley and Sons, Inc., New York, 1961, p. vii.
- <sup>20</sup>Lanham, Url, *The Insects*, Columbia University press, New York, 1964, p. 19.
- <sup>21</sup>Rensch, Bernard, *Evolution Above the Species Level*, Columbia University Press, New York, 1960, p. 267.
- <sup>22</sup>Novak, Joseph D., “Conceptual Schemes and the Process of Science,” NSTA Conference of Scientists, *The Science Teacher*, Oct. 1964, p. 11.
- <sup>23</sup>BSCS, *Biological Science: An Inquiry into Life*, p. 65.
- <sup>24</sup>Ibid., p. 91.
- <sup>25</sup>BSCS, *Biological Science: An Inquiry into Life, Teacher’s Manual*, Harcourt, Brace and World, Inc., New York, 1963, p. 8.
- <sup>26</sup>Ibid., p. 102.