

Statements by Scientists in the California Textbook Dispute

Editor's Introductory Note

On July 26–28, in San Francisco, the Curriculum Development and Supplemental Materials Commission of the California State Department of Education met to consider recommendations of its Science Education Subcommittee on the adoption of textbooks in the California public schools. The meeting was, in part, a confrontation between biologists and special-creationists on two intertwined issues: (i) the creationists' efforts to have the Bible account of animal origins admitted into full standing as a scientific theory, along with the Darwinian theory of evolution, in the science classrooms of California; and (ii) separation of church and state. (For an excellent summary of the dispute see "Science and the Citizen," *Scientific American*, August 1972, p. 43–44.) The first of these issues had been decided, at least administratively, in favor of the creationists with the official adoption of the commission's report *Science Framework for California Schools . . .* (1970: California State Department of Education, Sacramento), containing a notorious passage (p. 106) that was explicitly repudiated by the department's own State Advisory Committee on Science Education. The passage reads as follows:

All scientific evidence to date concerning the origin of life implies at least a dualism or the necessity to use several theories to fully explain relationships between established data points. This dualism is not unique to this study but is also appropriate in other scientific disciplines, such as the physics of light.

While the Bible and other philosophic treatises also mention creation, science has independently postulated the various theories of creation. Therefore,

creation in scientific terms is not a religious or philosophic belief. Also note that creation and evolutionary theories are not necessarily mutual exclusives. Some of the scientific data (e.g., the regular absence of transitional forms) may be best explained by a creation theory, while other data (e.g., transmutation of species) substantiate a process of evolution.

Guided by this passage, the California textbook-selection authorities would be compelled to choose biology books akin to those predating the Scopes trial. It was the intention of the scientists (chiefly biologists), in their testimony, to urge the commission not to turn back the clock or to permit a particular religious point of view to traduce the evidential nature of science itself. Meanwhile, NABT has established a Fund for Freedom in Science-Teaching—see the association newsletter—and is cooperating with other teachers' organizations to oppose the undermining of science education in California and elsewhere.

Among the scientists who testified in San Francisco were (in alphabetic order) William V. Mayer, professor of biology, University of Colorado; Richard J. Merrill, consultant in secondary curriculum to the Mt. Diablo Unified School District, Concord, Calif., and a member of the executive board of the California Science Teachers Association; David H. Ost, associate professor of education, California State College, Bakersfield; G. Ledyard Stebbins, professor of genetics, University of California, Davis; and Claude A. Welch, professor of biology, Macalester College, and president, National Association of Biology Teachers. Their statements are presented here without abridgment or substantive change.

WILLIAM V. MAYER

A decade or so ago it would have been unthinkable that the Curriculum Development and Supplemental Materials Commission of the state of California would be gathered to consider seriously the proposition that fundamentalist religion is a biologic subject. A hundred years ago the Huxley–Wilberforce debates had apparently settled this issue for all time. The fact that we are gathered here to consider whether or not the fundamentalist position is a scientific one is an indication of a much greater and more serious problem that the curriculum commission might consider; and that is, our failure to communicate the dimensions, limitations, and requirements of science. In short, we apparently do not teach science, only details thereof. In five minutes it's impossible to rectify the omissions of the past, but it is sufficient to say that science is a way of know-

ing things that is pragmatic, empiric, observational, experimental, and capable of being confirmed and reconfirmed.

I will not take your time recapitulating scientific methodology with its hypotheses, controlled experimental designs, applicability, and the analyses that ultimately lead to theories and laws. I would parenthetically state, however, that loose language, including terms such as theory, experiment, and yes, even science itself, contribute to the confusion we are experiencing here today. The basic fact is that the theory of evolution—I am using the term theory in a scientific sense, in which it is not being used by others—is not a religious doctrine. It has no more to do with theology than does gravity or the atomic theory—each of which, by the way, could be attacked as has evolution if one were to challenge their compatibility with biblical accounts. The fundamentalist position that the theory of evolution is a theologic

statement is untenable; and, to add to the confusion, they have attempted to do the impossible—namely, to put forth their theologic position as a scientific one. The Bible is no more a scientific treatise than biology textbooks are theologic ones.

Fundamentalists use the term "creation theory," but they are using the term theory in an entirely different sense than one does in science. We should have a clear statement in writing as to what this creation theory constitutes. What are its hypotheses? What are its data sources? What are the experiments that tend to confirm it? In short, let us subject this so-called "creation theory" to the tests demanded of all scientific theories. The fact that this has not been done and is not available for examination indicates that we are not dealing with any creation theory at all but rather a belief system of a religious sect that is attempting to foist its views off as scientific ones.

Creation theory, if it exists, is too peculiar ever to be considered seriously as scientific. There is not a reputable biologist alive who would not jettison the evolution theory were a better *scientific* theory postulated concerning evolution. The creationist position, however, is the exact antithesis of science. While the evolution theory was derived from a vast mass of data and hypotheses consistently analyzed, creationist theory, as they use the term, is God-given and unquestioned. Now that they have postulated a theory of creation (whatever that is), they are eagerly searching for facts to buttress it. In discussions with them I find that there can be no modification of the creationist position, regardless of evidence, for they have self-declared themselves to be in possession of the sole truth.

To include this type of position in text materials supposedly devoted to science is to debase both religion and science and will so confuse children that future generations will understand even less about the nature of science than does our current one. Religion has no place legally in our classrooms. This attempt to create a "science" of religion and smuggle it into the classrooms under the guise of fair play or equal time necessitates stretching logic and imagination too far.

Evolution is not a theologic doctrine; theology is not science. Data from both are not necessarily incompatible, but they are different ways of knowing things; and to insist that the data from one have been derived the same way as the data from the other is to deny the facts available to us. If the state of California is concerned with the theologic instruction of grade-school pupils, this problem should be faced openly for what it is and the curriculum commission should propose mandatory courses in comparative religion. Then the fundamentalist position can be analyzed along with similar and comparable positions from other Protestant denominations, as well as those from the Catholic church and from the Jewish faith. To be truly comparative it should deal with the beliefs of such divergent groups as American Indians, Hindus, Buddhists, and Moslems, among others. To

accept one view of theology as scientific and the others as not is to lead to a consistent stream of future complaints and demands for equal theologic access to the classroom at the expense of science.

If theology is to be introduced into our classrooms, let it come under its proper designation and under its proper label. Let us not smuggle a minority religious belief into classrooms under the mistaken notion we are dealing with a scientific position.

RICHARD J. MERRILL

Thank you for giving me this opportunity to speak to you about my concerns and those of the California Science Teachers Association, which I represent today.

I shall address two major concerns. The first has to do with the kinds of nonbook materials that are needed for teaching science.

The California State Board of Education in 1969 adopted a *Science Framework* that is truly outstanding. In 1970 the Board adopted a similarly excellent set of criteria, derived from the framework, for consideration of textbooks and reusable materials in science. The goals, objectives, and teaching strategies set forth in the framework—especially those relating to attitudes, rational thinking processes, and skills—clearly require that students be given access frequently and intensively to the phenomena of nature, upon which all of science is ultimately based. The criteria for textbooks and reusable materials faithfully reflect this need. This point of view is also clearly expressed in the National Science Teachers Association position paper *School Science Education for the 70's*.

Many teachers are ready and eager, given the necessary materials, to teach science in this way. Many more, some of whom now teach little or no science (though they may assign science from time to time) can be helped to teach in this way, given appropriate in-service training opportunities. Speaking as an individual whose prime responsibility is the provision of in-service training opportunities for teachers, I can say from experience that the nontextbook programs you are considering can serve as excellent bases for such efforts.

The California Science Teachers Association recognizes that systems now available for science-teaching were not foreseen by those who wrote the legislation now in effect. CSTA also appreciates and supports the efforts of this commission in seeking to obtain and implement the broadest possible interpretation of present laws and in seeking new legislation more clearly consistent with the needs of teachers and students.

I shall now turn to the other problem with which CSTA and many other groups and persons are concerned. This is the matter of evolution, creation, and theories about origins.

The criteria for evaluating science textbooks and materials approved by the California State Board of

Education on 13 March 1970 and published on 1 March 1971 mentioned these subjects at only one point. Criterion #4 for the selection of *teacher materials* states that the materials shall "Recognize the relationship of science to other disciplines, particularly when considering unresolved theories, such as origins, evolution, creation, and so forth." Nowhere else in the criteria are these subjects mentioned. In fact, specific content is dealt with hardly at all in the criteria.

At a general meeting of its membership on 19 November 1971 CSTA adopted a resolution urging that the California State Board of Education adhere to the adopted criteria that have just been referred to.

In contrast with the adopted criteria is a widely publicized statement to the California Department of Education at its 8 July 1971 meeting by one of its members, Dr. John R. Ford. This statement reads in part: "One of the most important requirements established by the California State Board of Education in the science framework is that more than one theory for the origin of the universe—matter, life and man—must be presented in the textbooks. . . . No textbook should be considered for adoption by the State Board that has not clearly discussed at least the two major contrasting theories for origins—chance or the general level of [*sic*] theory of evolution, and design or the general theory of creation."

Speaking for myself, now, it would appear to me that Dr. Ford attempted in this statement to read into both the text-adoption criteria and the framework upon which the criteria are based a requirement that has no real basis in either. This was done a full 16 months after the adoption of the criteria and over two and one-half years after the adoption of the framework. I have searched both the framework and the criteria in vain for any statement or implication that suggests that evolution or creationism or any other specific piece of subject matter is mandated for inclusion within the textbooks. On the contrary, the whole tone of both documents is such as to deny that such mandates were intended. Dr. Ford's statement seems to me to be an untimely, unfortunate, and totally unwarranted extrapolation of the framework, and seems to have no relationship at all to the criteria.

(For lack of time, oral presentation of this statement ended here.)

The framework and criteria say to me that we should take care to distinguish between theories that are useful to scientists and beliefs that have their origin outside of science. As for competing theories within science: the framework reminds us that theories are never proved—only supported or refuted. It also points out that some theories are vastly more useful than others in correlating data and in suggesting observations and experiments that test the theory and lead to its eventual modification. The case for the usefulness of such theories as creationism or "the

general theory of creation" needs to be made in the arena of science before it is introduced into the elementary curriculum. That such a case has been adequately made seems doubtful, to say the least.

DAVID H. OST

Through time, attempts to legislate belief systems by controlling printed materials in the public schools have frequently been a part of fascism. Even today there are apparently some in this great democracy who have learned little of the needs or values of a free people. It has been shown time and again that an important step to the production of a controlled populace is the usurping of academic responsibility and the denial of academic freedom. Such steps are initially taken by honorable people believing in sincere causes. An example of such an honorable effort might be the taking of framework documents, which have been prepared by persons judged to be authorities and leaders in the fields of study, and the modification of these frameworks by less competent people to emphasize an area irrelevant to the subject matter but which strengthens a particular belief system of that group. It follows, then, that the use of such prostituted documents as criteria for the selection of educational materials must be viewed with a critical eye.

The argument regarding the incommensurability of evolutionary theory and special creation has been with us many years. Even the most ignorant would agree that three lines of type in a state framework cannot modify a theologic statement into a scientific theory. However, I leave this problem to more learned persons than I, for through history honorable citizens have frequently attempted to arbitrarily legislate what constitutes a discipline of study, science, or theory. This is done in the same manner and for reasons similar to the convening of conventions to answer such theologic questions as what number of angels can sit on the head of a pin. Sometimes even the most honorable men do strange things in the name of sincerity.

If a leading poet such as Robert Frost had written a statement as to what constitutes poetry, few people would accept, with any degree of integrity, criticisms made by a hack novelist who makes big money as a technician of the English language or reactions by a general publisher concerned with technology. Such criticisms might be interesting; but the artist, in this case the poet, is the only authority. Why, then, are comments relating to science made by high-priced technicians, such as medical doctors, and by persons in the related field of technology more readily accepted as statements of science than those made by the scientists themselves?

No one would claim that Robert Frost's poem "Stopping by Woods on a Snowy Evening" would be any less beautiful or less meaningful because it is not taught in the science class; nor would the teaching of "Stopping by Woods on a Snowy Evening" in the

science class likely increase the probability that students would accept the beauty or determine any meaning in the poem. On the contrary: the teaching of subject matter by a teacher who lacks enthusiasm and excitement because he judges the legislated material irrelevant to the discipline or even exhibits sarcasm and personal disdain for the incorporated material can do a great deal of damage to student attitudes previously developed.

An implementation of the currently prostituted framework as a criterion for the selection of textbooks in the state of California is a threat to the basis of religions that are founded upon personal belief systems of intensities that supersede any and all legislative attempts to instill it. The spirit of the framework will force the classroom teacher to water-down aspects of religious beliefs—which will place Christianity and other contemporary religions in the same category as the Egyptians' belief in the god Nun or the Hittites' belief in El. (For evidence of this, please refer to the sixth-grade edition of *Science, Environment, and Man* published by Leswing and Stone.) It is not infrequent that honorable men inadvertently do great harm to the thing they prize most as they move forward in their sincere conscientious endeavors. Even Brutus was an honorable man.

The rise of science in a contemporary society, whatever else it is, is the result of an effort to achieve a rational understanding of reality or the experienced world and is an established part of culture. Tampering with science education by insisting on the priority of feeling over reason, of spontaneity over discipline, or irrationality over objectivity, the honorable man wrecks his own ideals. By attempting to redefine science for his own purposes the honorable man finds himself in the company of the young hippie radical, representing the counterculture, who indiscriminately is throwing out a life of reason based on objectivity and thus gives himself license to live carelessly and dogmatically. Such action suggests that science has not become a part of the shared mentality and that such persons are not aware of the distinction between a life of reason and illegitimate rationality. Such honorable men have acquired very little of the spirit, methods, or basic concepts of science. It is all the more reason that science must remain free of irrationality if it is to continue as one of the greatest liberating, liberalizing forces in human thought. The objective methods of science constitute the most powerful means devised by man for extending his limited senses. It is indispensable in the education of modern man, who so desperately seeks adjustment through rational processes to his civilized environment.

Furthermore, being of the Christian faith, I resent attempts by honorable men to regulate the belief systems of my children and the members of the Sunday school in which I teach. I believe these honorable men do an injustice to religious beliefs by relegating them to mysticism and forms of mythology. This is grossly unfair (perhaps there is a pun there) to those

of us who are convinced that our beliefs do not have to be justified or supported by education in the public schools. The sincerity and conscientiousness with which honorable men developed the framework statement has backfired, in that now the belief systems of children will be eroded by public education. The influence of the family unit will be significantly decreased.

I strongly urge that the Curriculum Development and Supplemental Materials Commission disregard page 106 of the *Science Framework for California Public Schools* in establishing criteria for the selection of educational materials in this great state.

G. LEDYARD STEBBINS

Every scientist can agree with the statement made in the excellent booklet *Science Framework for California Public Schools* . . . (p. 26), "that what a scientist mainly does is to build and test hypotheses." Consequently, any hypothesis that must be accepted on faith and cannot be questioned or tested by means of observations or experiments designed to acquire new facts about it cannot be a part of scientific knowledge. It has no place in a scientific curriculum. The only faith that a scientist may have about scientific matters is the confidence that he and other scientists can obtain more facts upon which to strengthen or reject the hypotheses that he holds. The belief in the special creation of living organisms is an untestable hypothesis. Those who advocate its inclusion in the science curricula of our public schools do not permit scientists to criticize or examine it. They simply assume that if, to their satisfaction, insufficient facts can be obtained to support the theory of evolution, creation must be accepted on faith and without examining or questioning the way in which a Supreme Being could have created life. For this reason discussion of the faith in special creation is religion, not science, and is out of place in a scientific curriculum.

In discussing this matter, the *Science Framework* makes an error of statement that is commonly made by those who advocate so-called creation theory. It refers (p. 106) to "the regular absence of transitional forms" between major groups of organisms. It is important to note that, as indicated in the footnote to page 106, this error was introduced into the *Framework* by nonscientists over the objections of the California State Advisory Committee on Science Education. The fact that such things can happen in California should be of the utmost concern to scientists throughout the state, no matter what may be their position with respect to evolution. Paleontologists now have evidence that transitional forms between amphibians and reptiles were widespread during the Carboniferous Period; that animals transitional between reptiles and mammals existed for 100 million years, during the Permian and Triassic Periods, when they dominated the world's fauna; that *Archaeopteryx*, in spite of statements to the contrary by some creationists, was in nearly every characteristic inter-

mediate between reptiles and birds; and that some of the australopithecines, particularly the creature sometimes called *Homo habilis*, were in every observable characteristic intermediate between apelike animals and man. Furthermore, the discoveries and experiments of the past 30 years have fully justified the confidence of evolutionary biologists, that man's scientific ability and progress will eventually fill in the gaps in our knowledge. For all who desire to listen and learn, new discoveries will confirm the confidence of nearly all biologists in the validity of evolution as an explanation for the origin of the diverse kinds of organisms on the earth.

Consequently, teachers of science in California schools should not be hampered by a requirement to give equal time to the stories of creation while teaching evolution as the scientifically accepted explanation for the origin of kinds of organisms. At the same time, teachers should be discouraged from speaking against the religious beliefs of any pupils, whatever faith they may have. They should be encouraged to ask these pupils to discuss matters of faith and religion with their own religious leaders.

CLAUDE A. WELCH

A theory holds a very special place in science. A theory is not just any old or new hunch that strikes the fancy. All theories, first of all, contain a series of assumptions, known as postulates, which attempt to explain known observations and predict new ones. A theory is often called an hypothesis when it is first formulated; the term theory is generally reserved for those sets of assumptions that have stood the test of time through their capacity to explain and predict.

Competition among theories in science is as old as science itself. The well known Ptolemaic-Copernican and spontaneous generation-biogenesis controversies are good examples. The assumptions of each theory were clearly stated and their explanatory power carefully argued. This process has been repeated many times in the history of science, and science is the stronger for the debates.

The biologic theory of evolution is now being challenged in California, not by another scientific theory but by a religious doctrine. "Creationism" has never, to my knowledge, been expressed as a scientific theory. Never have the assumptions been specifically stated so that their consequences could be checked by observation. Scientists need a clear answer to questions like the following if, as stated in the California science framework, "science has independently postulated the various theories of creation":

1. What are the assumptions or postulates that make up the "theory" of creationism—if, indeed, such a theory exists?

2. Should we assume that creationism is the same as chapter 1 of *Genesis* in the Old Testament?

3. Or is creationism the same as chapter 2 of *Genesis* in the Old Testament?

4. Approximately how old is the earth and its organisms, according to creationism?

If creationism is a religious doctrine, then it has no place in any science textbook used in our public schools.

If creationism is, indeed, a scientific theory, then its assumptions must be stated explicitly so that scientists can examine the testable consequences of these assumptions.

The scientific community is in no way attempting to limit competition among scientific theories, because it is through competition and debate that new avenues to truth are often found. What the scientific community is *not*, repeat *not*, interested in is another round of fruitless debate between scientific theory and religious doctrine. The forced imposition of religious doctrine, disguised as science, into the science textbooks is a discredit to religion and a threat to our educational system.

"Science Folio" Reissued

Questions and Problems in Science—the "Science Folio" produced in 1956 by Educational Testing Service—has been reissued by ERIC/TM: full-size copy (850 pages) \$29.61, microfiche 65¢. The work consists of thousands of test items in the biologic and physical sciences, grouped by subject and tagged with *Taxonomy of Educational Objectives* subcategory numbers. High-school and college teachers might use the questions in constructing tests. The "Folio" is available from ERIC Clearinghouse, Educational Testing Service, Princeton, N.J. 08540.

How Many Will Get Cancer?

More than 52 million Americans now living will eventually have cancer—one in four persons, at present rates. Cancer will strike over the years in approximately two of three families. In the 1970s there will be an estimated 3.5 million cancer deaths, 6.5 million new cancer cases, and 10.0 million persons under medical care for cancer.

American Cancer Society

Cruelty Statutes Publicized

The Animal Welfare Institute has had more than 1,100 requests from police officials across the country for its pamphlet *Animals and Their Legal Rights*. Cruelty to animals is a criminal offense in every state, but the laws are "not as well known as they should be to all enforcement agencies," AWI points out.