

Effects of the Scopes Trial

Was it a victory for evolutionists?

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In 1925, John Thomas Scopes was tried for violating Tennessee's law against teaching the theory of evolution in the public schools. The trial, held at Dayton, Tennessee, created a national sensation. Scopes was prosecuted by William Jennings Bryan, the "Great Commoner," thrice-defeated candidate for the Presidency, and leading spokesman for fundamentalist Protestantism. Scopes' defense attorneys included the great trial lawyer Clarence Darrow. The trial became a focus for major civil liberties issues, and also a major battleground in the war between science and fundamentalist Christianity. Scopes was found guilty, but the verdict was later reversed on a technicality. Nevertheless, regardless of the verdict, it is usually held that the proevolution forces were victorious in the forum of public opinion (1-4a).

Some recent events, however, have cast doubt on the completeness of that victory. In 1964, the State Textbook Commission of the state of Texas, holding hearings on adopting the new biology textbooks prepared by the Biological Sciences Curriculum Study, met a concerted campaign against the new books on the grounds that they contained discussions of evolution. In 1972, the State Board of Education in California, under pressure from the Creation Research Society, agreed to present both the evolutionary and creationist theories in the elementary school social science curriculum (5). In Tennessee itself, the legislature recently required state-adopted textbooks used for teaching evolution to provide equal time for other accounts, "including, but not limited to, the Genesis account in the Bible" (6).

If the fundamentalists were so discredited in 1925, how could the same issue be revived in the 1960's and 1970's? In fact, the victory of the evolutionists was not really complete—nor could it have been. The forces behind the antievolution movement were broader and more long-lasting than the particular brand of fundamentalism espoused by William Jennings Bryan in 1925. Nor is this all. Believing that they had won in the forum of public opinion, the evolutionists of the 1920's in fact lost on their original battleground—the teaching of high school biology.

The scientific community in the 1920's responded forcefully to the overt attack in the Scopes case. But it failed to follow through. As a result, the teaching of evolution in the high schools—as judged by the content of the average high school biology textbooks—declined after the Scopes trial. Not until 1960, when the new Biological Sciences Curriculum Study texts came out, was the treatment of evolution in the most widely used high school texts substantially improved over that found before the Scopes trial.

To demonstrate this, we shall compare the leading high school biology textbooks published before the Scopes trial with those published afterward. We shall also comment, as thoroughly as we can, on the usage and sales of different books. We have chosen the books for discussion on the basis of four types of information: letters obtained from publishers; usage information obtained by writing to those states with statewide textbook adoption policies; bibliographies of high school biology texts; and the subject listings of the Library of Congress, the Harvard College Library, and the Biology Library of the University of California, Berkeley. Our estimates of usage and sales are based on three types of infor-

mation: on statewide adoption information obtained in letters from the states of California, Florida, Kentucky, Mississippi, New Mexico, North Carolina, Oklahoma, Oregon, Tennessee, Texas, Utah, and Virginia in response to inquiries made by one of us; on letters from science editors at Rand McNally; Holt, Rinehart & Winston; Ginn; and Harcourt, Brace & World [though the precise quantitative data that would settle the usage question thoroughly is, according to some publishers, confidential (7)]; and on the printing history of books, gleaned from *The National Union Catalog* of the Library of Congress. These three independent sources—the states, the publishers' remarks, *The National Union Catalog*—provided information that correlated well, and we therefore believe that our generalizations about usage are justified.

High School Biology Textbooks before the Scopes Trial

We shall begin our discussion by looking at the book from which Scopes himself taught biology, George William Hunter's *A Civic Biology* (American Book, New York, 1914) (8). As the title implies, the book was oriented toward public health and hygiene, not theoretical biology. Still, as the prosecutors at the Scopes trial noted, Hunter's book did treat evolution, albeit briefly. There is a paragraph entitled "The Doctrine of Evolution," a diagram captioned "The Evolutionary Tree," and a paragraph on the "Evolution of Man" (8, pp. 194-196). Besides the three-page section on evolution, the book contained a brief discussion of the idea of natural selection (8, p. 253). Hunter did not hide his view that evolution had actually occurred; he used the word "evolution," and credited the theory of evolution to Darwin. These apparently minor virtues, as we shall see, are not to be taken for granted. How much evolutionary biology even the best of students could have learned from Hunter's book is not clear, but the student would at least have been introduced to the existence—and the respectability—of the theory.

Another book that was much used before the Scopes trial was Benjamin Gruenberg's *Elementary Biology* (Ginn, New York, 1919, 1924) (9-11). Gruenberg's book is quite outspokenly evolutionist. The word "evo-

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lution" appears extensively, and several chapters are devoted to the subject; fossil evidence is discussed at length; and classification is discussed from an evolutionary standpoint. A genealogical tree of animal life may be found on p. 483 of the 1924 edition. The frontispiece is entitled "Experiments in Evolution."

The last of the widely used evolutionist books was Truman Moon's *Biology for Beginners* (Holt, New York, 1921) (9, 12). Not only did Moon have several chapters on evolution, but the frontispiece of his book was a picture of Darwin. In his preface, Moon stated that evolution was the fundamental unifying idea of biology (12, p. v). The thorough treatment of evolution in the text ranged from the fossil evidence to the clear statement that "both man and the apes are descended from a common ancestor from which both lines have developed" (12, p. 316).

Even before the Scopes trial, however, textbooks like these did not meet with universal approval. Fundamentalists were already active in trying to prevent the teaching of evolution in the early 1920's (13). Among the results of this activity were antievolution laws passed in Florida and Oklahoma in 1923. The governor of North Carolina publicly opposed the teaching of evolution in 1924. Perhaps as a response to these events, a number of new textbooks were published in 1924. Many of these treated evolution very cautiously.

For instance, the widely used (14, 15) W. M. Smallwood, I. L. Reveley, and G. A. Bailey, *New Biology* (Allyn & Bacon, Boston, 1924) (15) devoted about two pages to evolution and did not discuss the origin of man at all. Arthur Clement's *Living Things* (Iroquois, Syracuse, 1924, 1925) (17) almost ignored evolution save for a brief mention. Benjamin Gruenberg wrote another text, *Biology and Human Life* (Ginn, New York, 1925) (18) which paid substantially less attention to evolution than his *Elementary Biology* (11). And James Peabody and Arthur Hunt, *Biology and Human Welfare* (Macmillan, New York, 1924) (16), explicitly excluded evolution, citing in their preface a report by the College Entrance Examination Board claiming that a thorough treatment of evolution might be too difficult for high school students. This omission did not make their book the least popular text of the period (14).

Is there any way to explain the appearance of books in 1924 and 1925 which play down evolution, without taking into account the fundamentalist attacks? One might want to explain it as being simply a response by the textbook publishers to the larger number of non-college-preparatory students enrolling in high school biology courses, as Peabody and Hunt invoked the authority of the College Board to claim, and as Gruenberg implied in the preface to his *Biology and Human Life*. But the presumed "difficulty" of evolution seems to have been more than conceptual. The publication of such books at precisely the time when some legislatures had passed, and others were considering, antievolution laws was no coincidence. Events following the Scopes trial clearly show that the changes in the textbooks were responses to the antievolution movement and the fears it generated.

The best that can be said for most of the high school biology texts available in 1925 is that the term "evolution" can usually be found in the index, however minimal the treatment of the subject itself might be. But none of these books even approximates the level of a good college text. Forgetting entirely about evolution, one might expect a science book to stress principles and explanations instead of individual, dogmatically presented facts; these books seldom do.

One reason for the lack of quality of these books is that, with one exception, none of the authors was a professional biologist (19). The idea of having working scientists write high school textbooks had apparently occurred to almost nobody in the 1920's. The authors of such books before the Scopes trial were usually high school biology teachers (Hunter, Gruenberg, Moon, Peabody, Hunt) or, when they were college professors, they were professors of education or science education (Reveley, Bailey, Clement). Though Smallwood was a biologist, the text he wrote with Reveley and Bailey does not reflect his training in any recognizable way. One more detail about the authors is worth noting: all were from New York State, apparently because this is where the publishing industry was centered. All these facts suggest that the biological community at large paid little attention to the quality of high school science instruction. This situation made it more likely that publishers would be moved by nonbiologists' views on what textbooks should contain.

Aftermath of the Scopes Trial

The impact of the Scopes trial on high school biology textbooks was enormous. It is easy to identify a text published in the decade following 1925. Merely look up the word "evolution" in the index or the glossary; you almost certainly will not find it. About its place in the text itself, it is harder to make generalizations.

In 1926, a new edition (20) of the book Scopes had taught from—Hunter's *Civic Biology* (8)—was published. And it had been changed. Hunter himself was concerned that the Scopes trial publicity would drive his book out of the classroom, so he was willing to make changes (21). The title of the new edition, apparently to distinguish it carefully from its predecessor, was *New Civic Biology*. In it, the paragraph on "The Doctrine of Evolution" and the evolutionary tree are gone (20, pp. 250–251). The word "evolution" no longer appears in the index. Darwin's influence on the study of the "development" of species is no longer stressed; some of the credit is now given to Hugo de Vries (20, p. 385). The word "evolution" has disappeared from the paragraph in the first edition called "Charles Darwin and Natural Selection"; the paragraph is now titled "Natural Selection" (20, p. 383). The paragraph (20, pp. 250–251) on "Evolution of Man" has now become "Development of Man." Should there be any doubt as to why these changes were made, the treatment of man's place in nature should indicate why; it begins with the newly added sentence (20, p. 250), "Man is the only creature that has moral and religious instincts." These changes are relatively minor, and presumably were made at the last minute. But they indicate the attitudes of the textbook publishers and authors of the time (22).

The year 1926 also saw a new edition of Moon's *Biology for Beginners* (Holt, New York, 1926) (23). The most striking evidence for the influence of fundamentalist pressures on Moon's book is to be found in the frontispiece. The 1921 edition had as its frontispiece a portrait of Charles Darwin. In the 1926 edition, this was banished in favor of something less controversial—a cartoon cutaway diagram of the digestive system. The preface in 1921 had stated that biology was "based on the fundamental idea of evolution"; in 1926, this became the "fundamental idea of development." Otherwise, however,

Moon's book retained its substantial treatment of evolution, and even retained the word "evolution" in the index (though the word had disappeared from the index in the 1933 edition). But some religious quotations were added to the chapters on evolution (23, p. 368). In a way, such material was an attempt to meet the critics of evolution on their own ground; only after the 1926 edition did Moon and his publishers begin to emasculate their treatment of evolution. The author and publisher of *Biology for Beginners* had reason to believe that adding religiously oriented quotations would increase the acceptability of a textbook. A few such statements had appeared in the 1921 edition, and had been cited by the California State Board of Education in 1924 in judging Moon's book worthy of adoption because it presented evolution "as a theory, and not as an established fact" (10). It is therefore not surprising that the 1926 edition of Moon gave more such statements and featured them more prominently.

The really new book of 1926 was the first book to be entirely the work of a professional biologist. Its author was one who was not afraid, then or later, to defy conventions. Drawing on his own work in biology, Alfred C. Kinsey, associate professor of zoology at Indiana University, presented most of the topics in his *Introduction to Biology* (Lippincott, New York, 1926) (24) in an evolutionary framework. Furthermore, Kinsey included an attack on the opponents of evolution—an attack based on extensive evidence, ending with these words (24, pp. 196–197):

The scientific word for change is *evolution*, and there are some people who think they don't believe in evolution. The man who says so may own a new breed of dog; he wears clothing made of new kinds of cotton, or wool from an improved variety of sheep; . . . he may smoke a cigar made of a very recently improved tobacco. When he says he doesn't believe in evolution, I wonder what he means!

Yet, even Kinsey's book shows some traces of fundamentalist pressure. For instance, a later printing of the 1926 edition has the polemical sentence, "When he says he doesn't believe in evolution, I wonder what he means!" replaced by (25, p. 197), "Whether we consider these species or varieties, they are certainly new kinds of plants and animals that differ from their ancestors. Within the average

man's experience, we may discover an endless number of such new kinds of organisms." More significant—and more typical—is the fact that, in the index to *all* the printings of the 1926 edition which we have seen, we do not find either the word "evolution" or the name "Darwin."

Kinsey's book can serve us as a test case. It was unusual both in its frank espousal of evolution and the high biological level of its material. Could such a book succeed commercially in the 1920's? Apparently only partly. Though by no means the least popular textbook in print, it was never really widely used, either in the 1926 edition (24, 25) or the 1933 and the 1938 (26) versions (27). The most extensively used books in the 1920's and 1930's were not those from which a great deal could be learned about evolution.

The most widely used text in the years following the Scopes trial appears to have been Smallwood, Reveley, and Bailey's *New General Biology* (Allyn & Bacon, New York, 1929) (14, 33) which was a revised version of their *New Biology* (15). The brief treatment of evolution in the *New Biology* was further shortened in *New General Biology*, and the word "evolution" was removed from the index; there was no hint that man had evolved. One reason for this text's popularity is found in the remarks of an educational official in Texas in 1926. Though Moon's book had to be altered because of its treatment of evolution (34, 35), the Smallwood book was already "tactfully written" (35, p. 296).

More of the Same: The Early 1930's

The most widely used text in the 1930's (36, 37) was Arthur O. Baker and Lewis H. Mills' *Dynamic Biology* (Rand McNally, New York, 1933) (31). Evolution is discussed in the last chapter of this book, though the term "evolution" is carefully avoided; nor does the word appear in the index or the glossary. (The chapter's title, "Changing Forms of Living Things," is typical of the many euphemisms that textbooks used for "evolution.") The treatment of evolution is unusual, to say the least. Fossil evidence for changes having occurred in animal forms over time is treated at some length, and two paragraphs are given to the "Theory of Natural Selection" attributed to Charles Darwin. But the

discussion ends with an attack on Darwin (31, p. 681): "Darwin's theory, however, *like that of Lamarck*, is no longer generally accepted" (italics ours). Having disposed of Darwin, Baker and Mills state that "in the theory of *mutation*, advanced by Hugo de Vries, we have the best explanation of how living forms change and produce new species" (italics theirs). Should a textbook commission still hesitate in assessing the authors' attitudes, the chapter on "Changing Forms of Living Things" closes with a religiously oriented couplet by the poet Bliss Carman (31, p. 682):

Seeing it good as when God first saw
And gave it the weight of His
will for law.

The success of this book indicates the general situation in the 1930's.

Most of the popular books published in the early 1930's, whether new (30, 38) or new versions of the old (28, 29, 39), continued to downplay evolution and Darwin's role in discovering it. The relatively thorough treatment of evolution still present in Moon's 1926 *Biology for Beginners* (23) began to be de-emphasized—and the word removed from the index—in the 1933 edition (39). Even the relatively favorable, though brief, treatment of evolution in a new book, Charles Pieper, Wilbur Beauchamp, and Orlin Frank's *Everyday Problems in Biology* (Scott, Foresman, Chicago, 1932, 1936) (32), found it necessary to speak (pp. 441–442) of evolution as "the theory of development," to explain (p. 287) Darwin's contribution to biology simply by calling him "the greatest English naturalist of the nineteenth century," and, of course, to omit the word "evolution" from the index. On the basis of an interview with a colleague of Beauchamp's at the University of Chicago, one scholar concluded that Beauchamp and Pieper knew evolution's biological importance, and avoided full and direct discussion of evolution for political reasons (35, p. 297).

We do not wish to maintain that the omission of the word "evolution" from the index of a book automatically invalidates the book's treatment of the subject. However, widely used biology textbooks of the 1930's did not treat evolution very well in the text either. The religious quotations which appear in some of these books, together with the near-disappearance of the theory

of evolution and of Darwin's role in establishing it, demonstrate the impact of fundamentalist pressure in general, and the Scopes trial in particular, on the textbook industry.

Late 1930's to the Biological Sciences Curriculum Study

In 1933, Lippincott allowed the word "evolution" to appear in the index of Kinsey's *Introduction to Biology* (26). This change seems a harbinger of a general improvement in the treatment of evolution in high school biology texts in the later 1930's. The first steps are tentative, but they are measurable. In 1934, for instance, the revised edition of Peabody and Hunt's *Biology and Human Welfare* (40) included for the first time a brief treatment of evolution (though carefully sidestepping the term), a portrait of Darwin, and the statement (40, pp. 289-290) that man, too, had "ancestors that were far more primitive in their structure and in the way in which they lived. . . . Man, too, has had a long history." Smallwood, Reveley, and Bailey also expanded their discussion of evolution somewhat in their 1934 edition of *New Biology* (33).

The year 1938 marked even more decisive steps toward the teaching of evolution. A new book—Ella Smith's *Exploring Biology* (Harcourt, Brace, New York, 1938) (41)—used the term "evolution" and had a substantial discussion of the evidence for evolution having occurred. And Elsbeth Kroeber and W. Wolff, *Adventures with Living Things* (Heath, Boston and New York, 1938) (42) had an 80-page treatment of evolution and a discussion of the origin of life. Neither of these books became popular at this time. Still, the trend in the late 1930's might suggest that the effects of the Scopes trial on the teaching of high school biology were diminishing. However, this was not entirely the case. There were now three evolution-oriented books to choose from: Kinsey (26), Kroeber and Wolff (42), and Smith (41). But these were not the most popular textbooks. Nor did the slight improvement in the treatment of evolution in Smallwood, Reveley, and Bailey (33) reward their publisher with a larger share of the market. Baker and Mills' *Dynamic Biology* remained the leading textbook in the field (31, 36).

The books most often used in the period 1945 to 1960 were almost all revisions of books first published before the war. Without question, the most widely used book in this period was Truman Moon and Paul Mann's *Biology: A Revision of Biology for Beginners* (Holt, New York, 1941, 1946) [(43); see also (39)] and later, Moon, Mann, and Otto's *Modern Biology* (Holt, New York, 1947, 1951, 1956, 1958) (44-46). But these books were much different from the evolutionist text Moon had published in 1921 (12). In the 1947 edition, for instance, the word "evolution" still does not appear in the index, nor can it readily be found in the text. The treatment of evolution is relegated to pages 618 to 636 of a 664-page book; probably many classes never even reached the topic. The immediate and long-continuing popularity of *Modern Biology* (44) makes clear that downgrading evolution did not adversely affect sales (46).

Brief, superficial treatments of evolution are all that are to be found in the revised and comparatively widely used editions of most of the prewar books (47). One new book—the 1000-page John W. Ritchie, *Biology and Human Affairs* (World, Yonkers, 1941; revised and shortened to 800 pages, 1946) (48) did have an extensive treatment of evolution. But another new book, B. B. Vance and D. F. Miller, *Biology for You* (Lippincott, Philadelphia and Chicago, 1946, 1950, 1954, 1958) (49) resembled the prewar books rather than its Lippincott predecessor, Kinsey (26). Save for Smith's *Exploring Biology* (41), the most widely used standard high school texts in the 1940's and 1950's are not characterized by extensive treatments of evolution. The Smith book, it should be noted, was the second most popular textbook in the 1950's (46) after Moon, Mann, and Otto's *Modern Biology*. Its sales indicate a potential market not yet thoroughly explored by other publishers. But, otherwise, the books with more extensive treatments of evolution did not sell very well. And Smith notwithstanding, *Modern Biology* dominated the market.

The Market and the Publishers

Let us make it explicit that we are not speaking of special expurgated southern editions. The textbooks we

have examined are all from northern college and public libraries (50). Nor are we here concerned with teachers who were overtly prevented from teaching evolution, though this sort of thing did sometimes happen (35, chap. 10; 51). Our subject is not outright censorship and repression, and the locale of our study is not the south alone. We are concerned with the self-censorship exercised by the New York-based publishing industry, a self-censorship that shaped the content of high school biology courses for the 35 years following the Scopes trial.

Publishing high school textbooks is a lucrative business. And the authors and publishers of biology textbooks have to pay attention to their market. Textbook adoption practices vary; some states approve texts for the entire state, while others allow local option. Unfortunately for the market prospects of an evolutionary textbook, most of the states which have at various times practiced statewide textbook adoption are in the south, and no eastern states are included: Alabama, Arizona, Arkansas, California, Georgia, Florida, Indiana, Kansas, Kentucky, Louisiana, Mississippi, Nevada, New Mexico, North Carolina, Oklahoma, Oregon, South Carolina, Tennessee, Texas, Utah, and Virginia (46).

The importance of the southern market is further magnified by the fact that a higher percentage of southern high school students study biology than students in other regions of the country (52), presumably because of the south's agricultural orientation. Publishers and authors feared that a good treatment of evolution meant the loss of the southern market—a fear which seems to have been justified. Nor was the southern market the only one which was at stake. In the 1940's and 1950's, the extensive national sales of Moon, Mann, and Otto's *Modern Biology* (44), and the continued popularity of the books by Curtis, Caldwell, and Sherman and Smallwood, Reveley, and Bailey [see (47)]; and by Baker and Mills (31), show that the publishers' decisions, economically if not biologically, were rational ones.

Where was the professional biological community when all this was going on? They did not, apparently, realize what was happening. Save for Kinsey and Smallwood, no professional biologists involved themselves in the writing of high school biology texts; and, save for Kinsey, none was concerned with

presenting a biologically respectable treatment of evolution. (The lack of professional scientific involvement in writing high school texts was not peculiar to biology.) Thus, no group with a deep interest in the content and quality of high school biology textbooks cared enough to exert counter-pressure on the publishers.

Biological Sciences Curriculum Study

The scientific community became interested in improving the state of high school science teaching in the late 1950's. Prodded by the Russian Sputnik, the U.S. government gave financial support to groups of scientists interested in developing new curriculum materials in the sciences. The School Mathematics Study Group and the Physical Sciences Study Committee are perhaps the best known. The corresponding group of biologists, the American Institute of Biological Sciences, produced the texts known as the Biological Sciences Curriculum Study (BSCS) texts; these completely transformed the profile of high school biology texts (53).

The biologists working on the new texts were shocked by the quality of what they were replacing. In 1960 George Gaylord Simpson expressed this shock in the phrase "One hundred years without Darwin are enough" (54). Perhaps the biologists would have been even more dismayed to know that the treatment of evolution and related topics had received a major setback in the 1920's, and that the time span in which to measure the progress of the treatment of evolution in high school books was not the 100 years since Darwin, but the 35 years since the Scopes trial.

As we have seen in the case of Kinsey's book, the mere existence of texts with a strong evolutionary orientation does not ensure their adoption. The BSCS texts were attacked. The most concerted campaign was in Texas; attacks were made in church sermons and in the press as well as in the hearing rooms of the State Textbook Commission. But 1964 was not 1926; this time the texts were adopted, unexpurgated. Scientists participated in the hearings. The prestige, power, and financial support of the federal government were behind the scientists and the new textbooks. In addition, major historical changes had occurred, all mili-

tating in favor of the approval of the BSCS books in Texas: the new public interest in improving high school science teaching; the large body of legal precedents limiting religious influence in the schools; and the increasing urbanization and educational level of the people of the south. These same historical forces resulted in the repeal of the Tennessee antievolution law in 1967 (55).

The Past and the Future

As the present controversy in California (5) shows, attacks on evolution have not ended. And, as we have tried to show in the story of the textbooks, the victory of the views of the scientific community in such cases is neither swift nor inevitable. The textbook industry is subject to popular pressures (56); and there is still much public hostility to the teaching of evolution.

The evolutionists of the 1920's believed they had won a great victory in the Scopes trial. But as far as teaching biology in the high schools was concerned, they had not won; they had lost. Not only did they lose, but they did not even know they had lost. A major reason was that they were unable to understand—sympathetically or otherwise—the strength of the opponents of evolution. It is worth one's while to inquire into what motivates large numbers of people to oppose evolution. Whether one agrees or disagrees with their views, the people and their concerns deserve sympathy and respect. And understanding the opposition to evolution is essential if one is to take any kind of effective action.

The Tennessee antievolution law was, of course, in part a product of the state of mind of the south after World War I. There was a theological struggle between fundamentalist and modernist Protestants, with fundamentalism being especially strong in the south. Since evolution contradicted the literal words of the creation story in Genesis, and, furthermore, taught that man was an animal, fundamentalists believed that the teaching of evolution would weaken both religion and morality. A further consequence of the belief in evolution, according to William Jennings Bryan, was a belief in social Darwinism—a philosophy which says that the "survival of the fittest" correctly describes the economic struggle in American society. Southern pop-

ulists and Democrats like Bryan held that a belief in social Darwinism would "weaken the cause of democracy and strengthen . . . the power of wealth" (57).

But there were other forces generating a distrust of science in the 1920's, forces not limited to the south (58). World War I was followed by a wave of isolationism, coupled with a desire to return to what was essentially American: the old, tried and true ways. But the 1920's were not a conservative age. Science and technology seemed to be revolutionizing the way people lived. As technology changed the nature of farming, and as more factories were built, people left the land—and felt that they had left something important behind. Radio then, like television now, brought the world into people's homes, giving them a sense of events beyond their control and passing them by. It is not surprising that, in a relatively conservative region subject to rapid change, people might have wanted a way to vote against the modern world and all its undesirable changes. The antievolution laws gave the American south a chance to do so.

Fundamentalist religion has, of course, motivated the attacks on evolution, but the social changes we have just described greatly reinforced the attacks. Similar social forces exist today. No high school biology textbook can overcome such forces all by itself. Between 1925 and 1960, few textbooks even tried.

Conclusion

Readers may choose their own villain in the story we have told. Like us, some will find the greatest culpability in the scientific community itself, for the large-scale failure to pay attention to the teaching of science in the high schools. Others will blame the textbook authors and publishers for pursuing sales rather than quality. Some will attach blame to the politicians who exploited antievolution sentiment to get into, or remain, in office. Others will blame the conservative Protestant clergy. Some may blame the whole educational system for failing to teach Americans how to evaluate evidence. And many will blame the evolutionists for bringing the matter up in the first place. But whatever the lesson one wishes to draw from the history of biology textbooks since the Scopes trial,

we think the story itself is worth knowing. That the textbooks could have downgraded their treatment of evolution with almost nobody noticing is the greatest tragedy of all.

References and Notes

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2. R. Ginger, *Six Days or Forever?* (Signet, New York, 1969), chap. 10, see especially pp. 184-187.
3. F. L. Allen, *Only Yesterday* (Harper, New York, 1931), chap. 8, sect. 4.
4. Witness also the shock with which the scientific community in the 1970's greets the renewed attacks on evolution [see, for example, N. D. Newell, *Nat. Hist.* **83**, 32 (1974)].
- 4a. This impression is also conveyed by both the play and film versions of *Inherit the Wind*.
5. Anonymous, *Sci. Am.* **228** (No. 2), 47 (1973).
6. N. Wade, *Science* **182**, 696 (1973).
7. M. Hopkins (editor-in-chief, School Department, Holt, Rinehart & Winston), personal communication.
8. G. W. Hunter, *Civic Biology* (American Book, New York, 1914).
9. Our usage information for the pretrial period is extremely scanty; only three states, Kentucky, Oklahoma, and Oregon, responded, and only Oregon gave information from before 1924. Information from California is available from *Science* [see (10)]. Both Gruenberg (11) and Moon (12) are cited in bibliographies, were used in California, and were each reprinted, suggesting that a market was anticipated for future editions.
10. W. W. Campbell *et al.*, *Science* **61**, 367 (1925).
11. B. Gruenberg, *Elementary Biology* (Ginn, New York, 1919, 1924).
12. T. Moon, *Biology for Beginners* (Holt, New York, 1921).
13. N. F. Furniss, *The Fundamentalist Controversy, 1918-1931* (Yale Univ. Press, New Haven, Conn., 1954), pp. 83-85.
14. Oklahoma and Oregon adopted Smallwood *et al.* (15) in 1924; Kentucky in 1925; Texas in 1926. For the period 1926 to 1933, we have information from five states: Kentucky and Oregon used Smallwood *et al.* (15) exclusively; Oklahoma and Texas used it in conjunction with other books; thus four-fifths of our sample used it. Only one other book was used in as many as two of our states; Peabody and Hunt (16) was used in Texas and Virginia in the period 1926 to 1933. No other book was used in more than one of our responding states during this period.
15. W. M. Smallwood, I. L. Reveley, G. A. Bailey, *New Biology* (Allyn & Bacon, Boston, 1924).
16. J. Peabody and A. Hunt, *Biology and Human Welfare* (Macmillan, New York, 1924).
17. A. Clement, *Living Things* (Iroquois, Syracuse, N.Y., 1924, 1925).
18. B. Gruenberg, *Biology and Human Life* (Ginn, New York, 1925).
19. Most of this information is gleaned from the title pages of their books. Smallwood was chairman of the Department of Zoology at Syracuse from 1921 to 1943. Hunter (8, 20) obtained a Ph.D. and became a professor of science education after the publication of his *Civic Biology*.
20. G. W. Hunter, *New Civic Biology* (American Book, New York, 1926).
21. A. O. Woodford, personal communication. Professor Woodford was a former colleague of G. W. Hunter at Pomona College.
22. See also an editorial in *Nature* **116**, 70 (1925), which states "one distinguished New York biologist has been requested by his publisher to omit any reference to evolution in any new editions of his text-book, owing to the objections of the Southern and Western States." This may refer to Smallwood.
23. T. Moon, *Biology for Beginners* (Holt, New York, 1926).
24. A. C. Kinsey, *Introduction to Biology* (Lippincott, New York, 1926). The copy that we examined, from the University of California, Berkeley, Biology Library, was presented by Kinsey to W. E. Castle.
25. ———, *ibid.* (Lippincott, New York, 7th impression, 1926). We examined a copy from the Honnold Library, Claremont Colleges.
26. ———, *ibid.* (Lippincott, New York, 1933, 1938).
27. Of the five states responding to our inquiry for the period 1926 to 1933, only one—Texas—reported using Kinsey, along with several other books. For the period 1934 to 1946, of the eight states responding, two report using Kinsey: Texas, along with several other books, and, surprisingly, Mississippi, from 1942 to 1947. Three other books [Curtis *et al.* (28), Hunter (29), and Mank (30)] were mentioned by two separate states, while three books [Baker and Mills (31), Pieper *et al.* (32), Smallwood *et al.* (33)] were mentioned by three or four states.
28. F. D. Curtis, O. Caldwell, N. Sherman, *Biology for Today* (Ginn, New York and Boston, 1924, 1934, 1939).
29. G. W. Hunter, *Problems in Biology* (American Book, New York, 1931).
30. H. Mank, *The Living World* (Sanborn, New York and Chicago, 1933).
31. A. O. Baker and L. H. Mills, *Dynamic Biology* (Rand McNally, New York, 1933).
32. C. Pieper, W. Beauchamp, O. Frank, *Everyday Problems in Biology* (Scott, Foresman, Chicago, 1932).
33. W. M. Smallwood, I. L. Reveley, G. A. Bailey, *New General Biology* (Allyn & Bacon, New York, 1929); *New Biology* (Allyn & Bacon, New York, 1934).
34. *Publishers' Weekly* (31 July 1926), pp. 320-321.
35. H. Beale, *Are American Teachers Free?* (Scribner's, New York, 1936).
36. For the period 1934 to 1946, the eight states responding produced only one case of a book's being used by four states: Baker and Mills' *Dynamic Biology* (31) was used by Kentucky, North Carolina, Oregon, and Texas during this period [Pieper *et al.* (32) and Smallwood *et al.* (33) had three mentions each]. We have reason to believe that our figures for this period are not unrepresentative [see Hill (37)].
37. According to W. L. Hill, executive editor, School Map and Book Department, Rand McNally, "From about 1933 to just before World War II Rand McNally's *Dynamic Biology* was the leading textbook in the field" (personal communication, 1965).
38. W. D. Meier and L. Meier, *Essentials of Biology* (Ginn, New York and Boston, 1931, 1938, 1944); F. Fitzpatrick and R. Horton, *Biology* (Houghton Mifflin, 1935, 1937, 1940) are those mentioned in bibliographies or by our states most often.
39. T. Moon, *Biology for Beginners* (Holt, New York, 1933, 1938).
40. J. Peabody and A. Hunt, *Biology and Human Welfare* (Macmillan, New York, 1934).
41. F. Smith, *Exploring Biology* (Harcourt, Brace, New York, 1938, 1943, 1949, 1952, 1954, 1959).
42. E. Kroeber and W. Wolff, *Adventures with Living Things* (Heath, Boston and New York, 1938).
43. T. Moon and P. Mann, *Biology: A Revision of Biology for Beginners* (Holt, New York, 1941, 1946).
44. T. Moon, P. Mann, J. H. Otto, *Modern Biology* (Holt, New York, 1947, 1951, 1956, 1958).
45. Our usage figures for 1947 to 1953 show seven states adopting Moon (44), more than any other book for this period. The states are California, Kentucky, Mississippi, Tennessee, Texas, Utah, and Virginia. For the period 1954 to 1965, 12 states use Moon—again more than any other text. According to W. L. Hill [see (37)], *Modern Biology* (44) "almost completely dominated the field for 15 years."
46. D. E. Meyer (of Harcourt, Brace & World) stated in a personal communication that "Modern Biology sales grew until they exceeded half the market. . . . Today [1965!] *Modern Biology* is still the single leading textbook" (letter of 19 October 1965).
47. Our usage figures for 1947 to 1953 show six states using either of two books by F. D. Curtis, O. Caldwell, and N. Sherman: *Everyday Biology* (Ginn, New York and Boston, 1940, 1943, 1946, 1953) or *Biology in Daily Life* (Ginn, New York and Boston, 1949, 1953, 1955); and four states using W. M. Smallwood, I. L. Reveley, and G. A. Bailey, *Elements of Biology* (Allyn & Bacon, New York, 1948, 1952, 1959). Ritchie (48) was used in five states, Vance and Miller (49) in six.
48. J. W. Ritchie, *Biology and Human Affairs* (World, Yonkers, 1941; revised and shortened, 1946).
49. B. B. Vance and D. F. Miller, *Biology for You* (Lippincott, Philadelphia and Chicago, 1946, 1950, 1954, 1958).
50. The Harvard University Library; the New England Deposit Library; the Library of Congress; the Los Angeles Public Library; the Honnold Library of the Claremont Colleges; the Biology Library of the University of California, Berkeley. There may well have been some "special" editions (34, 35). To find such regional editions is a difficult task at this late date, since most school districts—and even college libraries—give away or destroy their outdated high school textbooks. But the finding of such expurgated editions would only strengthen our thesis that textbooks were altered because of real or anticipated fundamentalist pressure.
51. See M. Shipley, *The War on Modern Science* (Knopf, New York and London, 1927), pp. 123, 331, 338, for example.
52. G. W. Hunter and L. Spore [*Sci. Educ.* **25**, No. 7, December 1941] report a 1941 study by H. B. Glass, according to whom 25.1 percent of students in the southern states take biology, compared with a national average of 18.70 percent. The Pacific states are second with 21.20 percent. The north central states have only 16.90 percent of their students taking biology. The total school enrollment in the southern states, according to Glass, is 78,683; that of the north central states, 134,795. Yet the biology enrollments are very close to equal: 22,647 in the north central states, 19,770 in the south.
53. P. D. Hurd, *New Directions in Teaching Secondary School Science* (Rand McNally, Chicago, 1969), especially pp. 152-172.
54. G. G. Simpson, "One Hundred Years without Darwin are Enough," *Teachers' College Record* **60**, 617-626 (1961), reprinted in G. G. Simpson, *This View of Life* (Harcourt, New York, 1964), pp. 26-41.
55. *Sci. Am.* **220** (No. 2), 17 (1969).
56. J. Nelson and G. Roberts, *The Censors and the Schools* (Little, Brown, Boston, 1963).
57. R. Hofstadter, *Social Darwinism in American Thought* (Beacon, Boston, 1955), p. 200.
58. See, for example, chap. 1 in Ginger (2); chap. 5 in R. Hofstadter, *Anti-Intellectualism in American Life* (Vintage, New York, 1966); and the book *Only Yesterday* by Allen (3).