

Article

The Scopes Trial and Its Long Shadow

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Abstract

With the centennial this year of the Scopes “Monkey” Trial, this article examines the antagonistic relationship between American Christian fundamentalism and science, particularly evolution and other scientific knowledge challenging literal biblical interpretation. While the trial itself spanned only eleven days, its shadow has been quite long indeed. The article analyzes the background of the trial, fundamentalism then and now—including a later doubling down, contesting interpretations of the trial’s outcome, misremembrances and revisionism in the historical appropriations of the trial, and developments in evolutionary theory relevant to religion. In the process of these analyses, the article evidences the relationships of the Scopes trial on evolution and religion to law, politics, secondary and higher education, and communications and media. Finally, the article highlights past opportunities missed and lessons to be learned that might lessen conflict between religion and science in the future.

Keywords: the Scopes trial; evolution; Christian fundamentalism; William Jennings Bryan; Clarence Darrow; day-age theory; young-earth theory; doubling down

1. Introduction

The centennial of the Scopes trial this July 2025 offers an opportune time to examine that trial in terms of the antagonistic relationship between American Christian fundamentalism and science, in particular evolution and other scientific knowledge that challenges literal interpretation of the Bible. The trial of *The State of Tennessee v. John Thomas Scopes* lasted a mere eleven days, from 10 July to 21 July 1925. However, it serves us well to examine and to interpret this difficult relationship in the wider cultural context, from the background for the Scopes trial to the trial itself to its aftermath to our present—a present still informed or misinformed by that famous trial. This article then looks at the trial’s cultural backdrop, the significant differences between fundamentalism then and now—which I will argue represents a doubling down in the face of even more conclusive scientific evidence establishing the truth or evolution and speciation than in 1925, contrasting interpretations of the outcome of the trial—along with widespread acceptance of the anti-intellectual label for fundamentalism, misremembering important facts about the trial—including the influence of the play and movie *Inherit the Wind*, analysis of why fundamentalist antievolutionism generally failed on a state-wide level, fundamentalist antievolution successes in other venues, and new developments in evolutionary theory more amenable to religion than the neo-Darwinian synthesis. I will draw upon historical facts and various interpretations, as I pull together manifold facts, confirm some interpreters’ positions, and develop my own analysis, interpretations, theories, and conclusions. My concern is not to do a general overview of fundamentalism, or even fundamentalism



Academic Editor: Dyron B. Daugherty

Received: 2 June 2025

Revised: 28 June 2025

Accepted: 30 June 2025

Published: 4 July 2025

Citation: Nikkel, David H. 2025. The Scopes Trial and Its Long Shadow. *Religions* 16: 871. <https://doi.org/10.3390/rel16070871>

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in the political arena, from 1925 to the present. Rather, I will focus on fundamentalism in relation to the findings of science regarding evolution and the age of the universe. Nevertheless, I will take an interdisciplinary approach by analyzing the connections of the Scopes trial, and the continuing evolution-antievolution controversy in its shadow, to law, politics, secondary and higher education, and communications and media. Additionally, my article highlights past opportunities missed and hopefully lessons learned for the future relative to lessening conflict between religion and science. These opportunities and lessons particularly focus on education and the media.

2. Background

In the early twentieth century, attitudes towards evolution crossed ideological lines, a crucial point easily overlooked by contemporary assumptions. A notable feature of fundamentalism in the era of William Jennings Bryan—three-time Democratic presidential nominee—was that many fundamentalists were “liberal” or “progressive” in opposing laissez-faire capitalism, imperialism, militarism, and/or eugenics, which they associated with evolution.

This version of fundamentalism reflected Bryan’s own orientation, a political progressive to whom social Darwinism was anathema, paired with religious conservatism (for example, [Larson 2002](#), p. 291). Bryan believed that European acceptance of evolution served as a main cause of World I. Indeed, Bryan resigned as Woodrow Wilson’s secretary of defense when Wilson moved towards entering the war ([Segady 2006](#), p. 204). In his article, “The Scopes Trial Revisited: Social Darwinism versus Social Gospel,” Matthew J. Tontonož even argues that the populist Democratic, socialist-leaning Bryan ([Tontonož 2008](#), pp. 121–22) opposed evolution more for political and ethical reasons than for religious ones. He notes that the focus of Bryan’s closing argument for the Scopes trial—undelivered because the defense chose to waive closing arguments—focused on eugenics, Nietzsche’s Superman, and Leopold and Loeb, wealthy young men taken with Nietzsche’s philosophy who committed a murder to demonstrate their own superiority ([Tontonož 2008](#), pp. 127–33). Bryan also referred to Leopold and Loeb in arguing against allowing defense witnesses to testify ([Larson 1997](#), p. 177). Worth noting is that the textbook at the center of the Scopes Trial, George Hunter’s *Civic Biology*, expressed eugenic sentiment ([Larson 1997](#), p. 27; [Tontonož 2008](#), p. 135).

To orient ourselves to the culture of the early twentieth century, we need to grasp popular understandings of the relationship between science and religion. Edward Larson, Pulitzer Prize winner in History for *Summer of the Gods: The Scopes Trial and the Continuing Debate over Science and Religion*, observes that “secular historians and essayists rather than theologians and scientists” were responsible for promulgating a narrative of diametrical conflict between science and religion, going back to Galileo and culminating with Darwin and his theory of evolution by natural selection ([Larson 1997](#), p. 21). Particularly influential were the historians John William Draper and Andrew Dickson White, who wrote in the latter third of the nineteenth century. Historians today concur that Draper and White offered a quite biased and inaccurate portrayal of the relationship. For our purposes, suffice it to say that many leading Protestant thinkers accepted evolution and that generally evolution did not present a significant theological challenge for Catholic teaching, as the implantation of an immaterial soul at the moment of conception relegated the genesis of the human body to a secondary concern. Despite our scholarly knowledge today, the conflict model of religion and science in the early twentieth century was very influential among both fundamentalists and more secular thinkers, also finding a prominent place in journalism of the period.

3. The Trial

At this point, a summary of the Scopes, or so-called “Monkey,” trial is in order. Crucially, it was a show trial rather than a serious prosecution. Its inception involved the support of leaders of the town who wanted to put Dayton, Tennessee, on the map and bolster its economy, and the American Civil Liberties Union, which wanted to challenge the constitutionality of the law (for example, [Larson 2002](#), p. 290). John Scopes had earned a bachelor’s degree, taking a panoply of courses and finally completing a law major. Deciding to teach for a few years, he was hired to teach mathematics and coach football at the Dayton high school, becoming well-liked in the community. When the principal and biology teacher became sick in the spring of 1925, Scopes took over his class. He did not actually remember ever mentioning evolution in the classroom; the textbook he used, though, the aforementioned *Civic Biology*, did cover evolution ([Johnson 2007](#), pp. 142–43). Given Scopes’ opposition to Tennessee’s Butler Act, entitled “An act prohibiting the teaching of the Evolution Theory” in public schools, he eagerly agreed to challenge the law. The biology teacher-principal, on the other hand, who had roots in the community, was not inclined to wade into the controversy. Perennial presidential candidate William Jennings Bryan volunteered to lead the prosecution, while famed lawyer Clarence Darrow agreed to command the defense. After having been allies on the rights of labor and unionization and on women’s suffrage, they found themselves on opposite sides on the theory of evolution. With arguably the two greatest orators of the day on board, Dayton had what the media immediately christened “the trial of the century” ([Larson 2002](#), pp. 290, 292). In keeping with the spirit of a show trial garnering great national interest, the judge allowed in the courtroom all the technology of the time. After the jury was impaneled, they were summarily dismissed for the consideration of motions. Notably, the defense moved that the Tennessee statute be declared unconstitutional, an arena into which a local judge was not about to venture.

Following uncontested testimony that Scopes had violated the law, Darrow moved to impanel a total of fifteen scientists and religion experts to testify as to the validity and harmlessness of the theory of evolution ([Larson 2002](#), p. 294). The judge, however, ultimately ruled such testimony irrelevant as to whether the law was broken. It appeared that the trial of the century would go out with a whimper rather than a bang, the issues of the constitutionality of the law and the validity of evolution needing to be adjudicated by a higher court. But . . . Darrow came up with the idea of calling Bryan as a witness, a hostile witness, for the defense. To the chagrin of his co-counsel and with the approval of a friendly judge keen to hear Bryan, Bryan readily agreed to defend his religious convictions ([Larson 2002](#), p. 294).

In his testimony, Bryan generally defended a literal reading of stories from the Hebrew Bible or Old Testament, with two exceptions. The first exception concerned whether the days of creation in Genesis 1 should be taken as literally twenty-four hours or as ages or periods. In an attempt to reconcile Genesis 1 with the scientific consensus of a very ancient earth, the day-age theory held that the days represented long periods of time. In fact, Bryan consistently held to the day-age position. Not surprisingly then, Bryan in the trial rejected as a non-starter the notion that the days of Genesis 1 were twenty-four-hour days. When Darrow raised a date for creation from the fore matter of a Bible introduced into evidence by Bryan, Bryan explicitly declared that he did not subscribe to Bishop Usher’s famous calculation that the earth began on October 23, 4004 B.C., at 9:00 a.m., and rather that the earth was significantly older ([Johnson 2007](#), p. 178). Riffing on multiples of six, Bryan indicated it would not be problematic for him if the earth were even 600 million years old ([Johnson 2007](#), p. 181). Noteworthily, a very ancient age for the earth was not problematic for most fundamentalists/antievolutionists at the time.

Before turning to the second exception, I will mention another then-current theory adopted to reconcile the Geneses 1 account with the scientific consensus of an ancient earth, known as the gap theory. It centers on Genesis 1:1, “In the beginning God created the heaven and the earth.” The most obvious way to interpret this verse is as a summary of what is to follow, including the creation of the firmament or heaven on the second day and the dry land or earth on the third. However, the gap theory interprets it to refer to a creation prior to the present one; thus, a gap exists between the first creation and our own.

Bryan’s concession that it was not the sun but the earth that stood still in Joshua 10:13 constituted the second concession to a literal reading of the Old Testament. For Bryan, it was not problematic that it appeared to Joshua that the sun stood still. Obviously, Bryan accepted heliocentrism.

4. The Outcome(s)

Of course, the question of who won the Scopes trial inevitably arises. Bryan regretted that he did not get to make his closing argument, because under Tennessee’s legal procedures, the defense determined whether there would be any such arguments. Nevertheless, he delivered that statement to various crowds in Tennessee (Johnson 2007, p. 90), after which it was published and widely circulated. Bryan believed that he had at least held his own on the question of evolution. And of course he claimed victory with the conviction of Scopes. Bryan died peacefully in Dayton in his sleep five days after the trial (Larson 1997, p. 199; Iannone 1997, p. 31). Darrow and the defense for their part found satisfaction that his questioning showed that Bryan did in fact interpret the Bible: Bryan judged how literally or metaphorically to interpret biblical passages with some awareness of modern science. The Bible did not interpret itself—therefore, others should have the freedom to interpret the Bible for themselves. Additionally, Bryan’s literal reading of such things as Eve’s creation out of Adam’s rib, Jonah and the big fish, and the genealogy of Genesis such that humans have existed for only several thousand years made Bryan appear foolish to educated Americans in Darrow’s eyes. Those staunchly opposing evolution and those strongly supporting evolution each thought that their respective side had won.

The appeal to the Tennessee Supreme Court did not represent a truly decisive victory for either side. In 1927 the Court vacated Scopes’ minimum \$100 fine on the technicality that the jury did not determine the amount of the fine per Tennessee law.¹ The Court did not expressly rule on the constitutionality of the Butler Act, so it remained in effect. However, the Court also urged officials not to prosecute anyone who might violate the law (Johnson 2007, p. 94).

Immediately after the trial, where was popular opinion on which side won? Larson concludes that among observers not too emotionally invested in the trial’s outcome, most considered it a draw, and none perceived a decisive victory for either side. (Larson 2002, p. 297) Anne Janette Johnson holds that public opinion split geographically, based on different responses from Northern versus Southern newspapers. She cites the *New York Times* characterization of Bryan’s responses to cross-examination by Darrow as “an absurdly pathetic performance,” while observing that several Southern papers declared “that the ‘Great Commoner’ had succeeded in maintaining his dignity and defending the faith,” though some Southern newspapers found Bryan wanting on scientific knowledge (Johnson 2007, p. 90). The Texas legislature did outlaw textbooks covering evolution after the trial in October 1925, while the legislators of Mississippi enacted a law banning the teaching of evolution in March 1926. (Earlier, in 1923, the Florida legislature passed a non-binding resolution characterizing the teaching of evolution as “improper and subversive to the best interests of the people.”) We can conclude that in the aftermath of the trial, public opinion on the whole did not perceive either side as enjoying a clear-cut victory.

While disagreement reigned as to which side, if either, had won the trial, historian of American education Adam Laats sees the Scopes Trial as establishing a widely shared image of fundamentalism as anti-intellectual (Laats 2010, pp. 100–20). This image could be viewed in a negative light as backwards ignorance that refuses reason or in a positive light as a righteous defense of the faith against the harmful ideas of presumptuous secular reason. While some conservative antievolutionists upheld the necessary role of reason in theology and ethics, many fundamentalists defiantly wore anti-intellectualism as a badge of honor (Laats 2010, pp. 185–88). One might characterize these anti-intellectualists as taking a Protestant faith-alone stance, but not in Luther’s sense of focusing on a right personal relationship with God, but by insisting that particular beliefs concerning the nature of the world be taken by faith alone. As sociologist Thomas Segady puts it, the Scopes Trial “moved traditional [Protestant] religion away from personal experience and faith into a mode of belief that was to become much more firmly bound to the defense of religious texts as mediated by religious authorities” (Segady 2006, p. 202). I can’t help but note the ironic parallel of Martin Luther’s inveighing against Catholic Church authorities expecting adherence to their interpretations of the Bible.

Despite the ambiguity as to which side won, fundamentalists drew inspiration and energy from Bryan’s defense of the supernatural creation of humankind, magnified by his perceived martyrdom, given their belief that his death shortly after the trial resulted from the stress of Darrow’s disputatious questioning. Betokening this commitment, large crowds gathered to honor Bryan as his remains traveled by train to Washington, D.C where “more than twenty thousand silent mourners filed past the closed casket” (Lienesch 2007, p. 171). The fundamentalist movement introduced bills banning the teaching of evolution in at least twenty-three states. The decision of the Tennessee Supreme Court to let the Butler Act stand probably helped secure the last state-wide victory against evolution in education as Arkansas voters passed a referendum banning its teaching in 1928 (after the legislature defeated a ban). However, the hoped-for passage of such a law in Minnesota—promoted by Minnesotan William Bell Riley, the most influential anti-evolution fundamentalist thinker—failed decisively in 1927 (Szasz 1969, pp. 210–16). That failure manifested the counter inspiration and energizing that evolutionists derived from Darrow’s scoring of points against Bryan.

Political scientist Michael Lienesch notes that, by the end of the 1920s, the fundamentalist movement was in disarray, hobbled by ideological and organizational infighting (Lienesch 2007, p. 227) and incompetent leadership “(Lienesch 2007, p. 171), even as it divided its attention on other issues, such as defending Prohibition (Lienesch 2007, p. 172). Professor of History and Politics Mark Edwards supports Lienesch’s position regarding the inadequacy of leadership, ideological disagreements, and organizational infighting, emphasizing that no one was able to take on the mantle of Bryan (Edwards 2000, pp. 101–6). Edwards rightly disputes those claiming that in the wake of the Scopes trial, fundamentalists went underground—humiliated and defensive (Edwards 2000, pp. 89–90, 191, 105–6). As I have indicated, fundamentalists claimed victory in the trial, were energized by Bryan’s perceived martyrdom, and did have a few state-wide victories after the trial. As I will say more about later, they also successfully pressured against evolution in education at the local level, the results of which included textbook publishers eliminating or downplaying content on evolution, and went on to found fundamentalist schools, colleges, and seminaries. I do contend that the fundamentalist antievolution movement did retreat from attempting to promulgate its views state-wide relative to legislation or nationally with the general public. Edwards concurs that “fundamentalist leaders decided to conduct antievolution activity outside of the national and state spotlight” (Edwards 2000, pp. 99–100, 105). This contrasts with Bryan’s reaching a wide audience before the trial (Edwards 2000, p. 95) (as well as the

wide-spread dissemination of *The Fundamentals* earlier in the twentieth century). Edwards posits that the loss of Bryan rather than the impact of the Scopes Trial prevented a politically successful nationwide antievolution campaign (Edwards 2000, pp. 90–91, 99, 105–6). I find this proposition most unlikely. Despite fundamentalist energy over the perceived victory and martyrdom of Bryan, all the other state-wide legislative efforts in the 1920's failed, save the few already mentioned. Given that an objective viewpoint would score the trial as more or less a draw, it is hardly surprising that banning the teaching of evolution failed in twenty states and most likely would have even if Bryan had lived many more years. In a related vein, Edwards acknowledges that in the wake of the trial “the ridicule of Mencken and the Northern press no doubt played a part in turning public opinion against the fundamentalists” (Edwards 2000, p. 106). Furthermore, Edwards concedes that the cause lost support when most religious people tired of the controversy over evolution (Edwards 2000, pp. 101–2, 106).

5. Misremembering and Revisionism

Perhaps the pulling back from state-wide and national spotlights by the fundamentalist movement and its widespread reputation for anti-intellectualism opened the door for a revision in public perception of the outcome of the trial. In 1931 the journalist Frederick Lewis Allen published a history of the 1920's, *Only Yesterday*, widely used as a college textbook for the next fifty years, which fueled the popular belief that fundamentalist antievolutionists had suffered a discrediting and humiliating defeat with the Scopes trial, due to Darrow's interrogation of Bryan (Larson 2002, pp. 225–27). Mid-twentieth-century historians followed Allen in declaring the Scopes trial a victory for evolutionists (Larson 2002, pp. 234–36).

Then came the play and film, *Inherit the Wind* (Lawrence and Lee 1955; Kramer 1960, respectively). The political and social context for the writing of the play was McCarthyism. The work intended to associate a supposedly narrow and mean-spirited fundamentalism, boasting a dogmatic disregard for both truth and its effect on peoples' lives, with McCarthy and his ilk, who recklessly charged or blacklisted people for alleged Communist connections. The work is highly fictionalized with stand-in characters for the principals of the Scopes trial, as well as several invented characters, including the rigid fundamentalist minister of the town (who oddly wears a clerical collar). Discrepancies with the actual trial are legion, including (1) the Scopes stand-in is interrupted while teaching a class on evolution, arrested, and jailed (2) the Bryan stand-in is feted, while the Darrow stand-in enters town unnoticed (3) an angry mob comes to the jail shouting threats—even including lynching—against the Scopes stand-in and a thrown bottle breaks on the bars of his cell window (remember Scopes was well-liked by the townspeople!) (4) the Bryan stand-in insists that Bishop Usher is correct and the earth is only 6000 years old (5) at the end of the Darrow stand-in's questioning of him, the Bryan stand-in becomes unhinged and goes on a rather incoherent rant that includes a recitation of the names of Old Testament books (6) when unable to deliver a closing statement (which as mentioned earlier was indeed the case), the Bryan stand-in attempts his speech anyway and is ignored by the press covering the trial. Indeed, as he rants, the Bryan stand-in collapses and dies, apparently distressed at how the trial concluded. The play premiered in 1955, running for three years and then going on national tour, while the movie came out in 1960 (Johnson 2007, p. 101) and the play received a Broadway revival starring Tony Randall in 1996. The general public did not recognize how much the play/film distorted the historical event it was based on, so the notion that fundamentalist antievolutionism suffered a crushing defeat continued and gained strength. In fact, the lack of awareness of this distortion was not limited to the general public: In 1994 the National Center for History in Schools recommended to

teachers that they take excerpts from *Inherit the Wind* to teach the respective positions of Bryan and Darrow (Collins 2012, p. 44). I know of a faculty member who recently used the film to depict Protestant fundamentalism. The interpretation of the Scopes Trial as a decisive defeat for fundamentalism and its anti-scientific ideology still wields unwarranted influence today.

6. Evolution in Education and What-Ifs on the Trial and the Media

While antievolutionist fundamentalism by 1930 abandoned the attempt to pass state-wide legislation and to speak to the larger public, as mentioned above, it retained great influence in the South over boards that chose textbooks statewide. As historian of science in America Adam Shapiro demonstrates, the fundamentalist attempt to influence textbook selection began before the Scopes trial. Earlier in the twentieth century, biology textbooks generally did cover evolution explicitly, in keeping with the Deweyan educational reform movement that promoted experiential, civic-minded learning, seen as leading to social progress (Shapiro 2013, pp. 1–11). Recall that the book at contention in the Scopes Trial was Hunter's *Civic Biology*. By 1924 and 1925 prior to the trial, some new textbooks eliminated or downplayed discussion of *evolution*, at least in terms of the actual word (Shapiro 2013, pp. 85, 141–46). Shapiro argues that Bryan opposed evolution not so much because it contradicted the biblical account of origins as that its naturalistic account of origins undermined belief in all things supernatural, such as miracles, the Virgin birth and resurrection of Christ, and immortality of the soul (Shapiro 2013, 101–3). That constitutes Shapiro's interpretation of the speech that Bryan gave to the judge, spectators, and national audience (the jury still sequestered), arguing against allowing the defense's scientists and religion experts to testify.

I would respond that Bryan opposed evolution on both counts—its naturalism and its contradicting some biblical origin narrative. Shapiro contrasts a literalism of authorship of the Bible—that God inspired every word of the Bible—with literal interpretation of the Bible, attributing only the former to Bryan and most fundamentalists of his day (Shapiro 2013, p. 103). In the history of theology, the former is known as plenary inspiration, which John Calvin promulgated (though Martin Luther did not concur). Of course, we have seen that Bryan did not interpret the twenty-four hours of Genesis 1 literally. *However*, he did take the creation of human life and all life in Genesis 1–2 literally. He vehemently rejected the evolution of human life, as humankind was so significant that it had to be created directly, supernaturally, by God. Given Bryan's understanding of evolution as ruthless “tooth and claw” competition, naturalistic evolution of humans was anathema, which is made clear in some of Bryan's writings as well as in his opening argument at the trial. To allow the evolution of any species, however simple, was for Bryan to let the camel's nose under the tent. Therefore, I have no doubt that the Scopes Trial influenced for decades the elimination or downplaying of evolution in many (though not all) biology textbooks. And as Lienesch documents, fundamentalist success was not limited to textbooks, as they campaigned to have school officials and teachers remove all references to evolution from curricula and classrooms (Lienesch 2007, p. 204).

Shapiro raises the issue of whether the sharp conflict between evolutionism and religious antievolutionism might have been ameliorated if the trial had proceeded differently. He notes that the defense originally planned “to promote a vision of science and religion as harmonious” (Shapiro 2013, p. 101). Professor of Journalism Perry Parks lists defusal of the conflict between science and religion first among the three main objectives articulated by supporters of Scopes' challenge to the Butler Act (Parks 2015, p. 444). Both defense scientists and theological witnesses planned to testify that evolution was consistent with the best interpretations of the biblical stories of creation. The twelve present to testify for the defense included eight

scientists, three of whom planned to testify not only on evolution but on its compatibility with Genesis 1–2, and four religion experts—the well-known Christian theologian Shailer Matthews, a rabbi and Hebrew Bible scholar, and two liberal Tennessee ministers (Larson 1997, p. 186). With the denial of the opportunity for the defense witnesses to testify, the opportunity to highlight for the public that the interpretation of the Bible such that divine creation is in harmony with evolution was lost. (The twelve witnesses' statements were read into the record of the trial for the purposes of an appeal.) Bryan did by the way get to speak at some length against evolution on moral, religious, and supposedly scientific grounds, in his opening statement as well as in arguing against allowing the defense witnesses to testify on those matters! Of course, Bryan and other fundamentalists of the time knew that more liberal Christians accepted evolution. But the trial could have led to greater understanding by fundamentalists of the beliefs of other Christians.

The trial could also have led to a greater understanding of evolution by the general public. Zoologist Maynard Metcalf did in fact get to testify on the stand in detail about evolution, though the jury could not hear his testimony, he did not get to finish it, and the judge later ruled it inadmissible. And the planned testimony of this Sunday School teaching scientist for the next day on the compatibility of evolution and the Bible never happened. While major newspapers covered Metcalf's testimony, most his testimony did not receive prominent coverage. Parks' survey of coverage of the Scopes Trial by newspapers and magazines yields the following:

Of the more than 630 news, features, and noneditorial opinion items mentioning evolution, only about 70 had evolution science as their primary focus. These items included news reports of scientists' testimony in the Scopes trial, reviews of evolution-based books, and a smattering of stories about scientific research. Overall, more than three hundred news items pertained directly to the Scopes trial, but just over one tenth of those place more emphasis on science than on procedure, conflict, personality, or rhetoric (Parks 2015, p. 450).

Professor of United States History and Politics Tom Arnold-Forster goes further, contending that the circus and spectacle atmosphere of the trial aggravated the conflict (and set a precedent for later political conflicts) (Arnold-Forster 2022). I agree, in that allowing testimony on evolution science and on the compatibility of some forms of religion and providing media coverage dealing more with science and non-fundamentalist religion, the Scopes trial could have yielded greater public understanding of evolution and arguments for theistic evolution—and perhaps some fundamentalists would have become less adamant in opposing evolution in public education.

It was not until circa 1960 that things began to change with biology textbooks. A concern with countering the Soviet Union, given extra impetus by the launching of Sputnik, led to the Biological Science Curriculum Study, a five-year program that began in 1958. Its own textbooks began publication in 1963 and eventually landed in almost half of American high schools, though not without some successful pushback by antievolutionists (Lienesch 2007, pp. 205–6). Other textbook publishers also got on the evolution bandwagon during this era.

7. Latter-Day Fundamentalism and Science

An important turn in the antievolutionist movement occurred through the aegis of George McCready Price, a Seventh Day Adventist influenced by the visions of Ellen G. White on Noah's flood. Though Bryan referenced Price's critique of evolution at the Scopes trial, he rejected his young-earth creationism, as did most fundamentalists of that time (Ronald Numbers n.d.). Price came to embrace the popular opinion that antievolutionism had been decisively defeated with the trial, doing so even more emphatically than secular commentators. He wanted to dissociate himself from both Bryan's day-age interpretation

and political liberalism. In the 1940's he disclosed that he had unsuccessfully advised Bryan to advocate at the trial for a young earth, with the fossil record created by the flood (Lienesch 2007, p. 204). I find ludicrous McCready's notion that the trial's outcome would have been more favorable for fundamentalism had Bryan only followed his advice. Fundamentalism had been rather successfully painted with the anti-intellectual brush, as it was. Adding the contention, not even shared by most fundamentalists, of a young earth could only have made things worse. Yet Price's historical revisionism had some legs. In 1981 the Rev. Jerry Falwell published the inaccuracy that Bryan had lost the respect of fundamentalists of his time because of his day-age position (Larson 1997, p. 237).

Today most fundamentalists accept not only the antievolutionism of creation science or intelligent design but a young earth. They have publicized their theories and attempted to have them taught in public schools as much as the courts will allow. While some purveyors of the supposedly scientific theories of creationism, and even more so of intelligent design, have allowed that life may be ancient or that more complex forms of life may have developed later than simpler forms, they insist that evolution or any other natural process cannot account for complex life. Rather, a supernatural creator or designer must have been directly involved. And most also support a young earth. The question arises: how can this be so? While the scientific case for evolution was overwhelming at the time of the Scopes trial, it is even more overwhelming now. That case now includes fossils of many hominids and pre-hominid ancestors of homo sapiens, as well as of other extinct human species who coexisted with our species, many other fossils of other species discovered since 1925, DNA evidence, more knowledge of rock sedimentation and layering, more accurate radioactive/radiometric dating as well as additional methods of dating, and continental drift. Relative to the age of the universe, the solar system, and the earth, we now have knowledge of the Big Bang and our expanding universe, background radiation going all the way back to near the beginning of the universe 3.8 billion years ago, knowledge from particle accelerators of how fundamental forces and particles developed, knowledge of the types of stars and their respective lifecycles and of the generations of stars gradually leading to the formation of heavier elements, and better dating methods for rocks, meteorites, and moon rocks.

Part of the explanation for the rejection of scientific evidence for evolution and a very ancient earth lies in the turning away from appealing to a national audience of fundamentalism circa 1930 and the concomitant founding of fundamentalist schools, colleges, universities, and seminaries. An anti-intellectualism regarding claims not based on approved biblical interpretations encouraged this founding movement. (Scholar of Sociology and Political Science Alfred Darnell and Scholar of Sociology and Religious Studies Darren E. Sherkat found that "fundamentalist beliefs and conservative Protestant affiliation" have "substantial negative influences on educational attainment above and beyond social background factors." [Darnell and Sherkat 1997, p. 306]). More importantly, this anti-intellectualism constitutes a factor in the doubling down by fundamentalism in the face of overwhelming scientific evidence. Doubling down represents one psychological response to evidence very strongly suggesting that an important belief one holds is wrong. The movement of most fundamentalists from a selective literalism—choosing which passages inconsistent with established science to take literally and which to take metaphorically—to an absolute commitment to the literal truth of the Bible in itself represents a doubling down within that subculture.

However, forces within the larger culture have facilitated that doubling down. Relativism—both cultural relativism and individual subjectivism—wields significant influence, much of it on a tacit level. Science in particular has received criticism that plays on Thomas Kuhn's concept of paradigm shifts (Kuhn 1962), taking the concept in a radi-

cal postmodern direction and interpreting it to entail that established scientific facts and theories are social constructions without a normative connection to the natural world. Especially in the complicated arena of human health, changing recommendations on diet, medications, treatments, and so forth, are (rightly) well publicized. Alternative medicines compete with scientifically verified medicines. All of this creates an atmosphere where fundamentalist thinkers and followers can believe that any group or individual may have their own “science.” This attitude overlooks the reality that science is a cumulative communal tradition that accepts certain standards in terms of background beliefs, coherence, evidence, verifiability, and fruitfulness towards future discoveries—articulated well by scientist turned philosopher of science and epistemology Michael Polanyi, who wrote about the equivalent of a “paradigm shift” before Kuhn did ([Polanyi 1958](#)). The clincher for fundamentalists is that, since everyone can have their own science, relativism reigns on the human level—you have your science, and I have mine—but God guarantees that only creation science is true. Only fundamentalists hold a divine trump card.

So far, court decisions have ruled unconstitutional the teaching in public schools of creationism or intelligent design as science, as well as posting caveats that evolution is only a theory not a fact. (This latter statement misunderstands that theories comprise comprehensive or systematic accounts that explain a multitude of facts. Theories, like relativity and evolution, can be proven and established as true.) Additionally, all biology textbooks today adoptable for public schools cover evolution. However, that does not mean that all high school students receive solid coverage of evolution. Because of the controversy surrounding it, including pressure from administrators or parents, and sometimes because of their own religious beliefs, some biology teachers avoid teaching evolution or give it short shrift. I taught the Religion and Science course at my university multiple times. In polling my students, a clear majority overall indicated that they had little to no exposure to the theory of evolution in their high school biology classes—though students from major metropolitan areas were more likely than other students to have had significant exposure. The last time I taught the course, however, a clear majority indicated that they did receive significant coverage of evolution—which may warrant some cautious optimism. Of course, my polling depends upon the reliability of students’ memories and interpretations of their high school experience, and my samples were relatively small. “Somewhat more surprising,” in the words of Lienesch, than the downplaying of evolution is that studies conclude that a not insignificant proportion of biology teachers “include some treatment of creationism in their classes” ([Lienesch 2007](#), p. 233).

8. Developments in Evolutionary Theory

Let us turn now to evolutionism, in particular, the so-called neo-Darwinian synthesis, which developed in the 1930’s and 1940’s. I will argue that the extreme nature of fundamentalist antievolutionism has contributed to a needlessly narrow and reductionist model of evolution in the United States. French philosopher of science and paleontologist Jean Staune notes that European scientists, not needing to defend against significant cultural influence by creationist or intelligent design proponents, have shown much more openness to possible evolutionary forces besides the environment working on random genetic mutations and other chance happenings ([Staune 2005](#)). I will expound upon several possible such forces. Biologists, neuroscientists, and philosophers Francisco Varela and Humberto Maturana applied their term “enactivism” to evolution as they posited structural coupling between organism and environment ([Maturana and Varela 1980](#)). Finding support from biologists Richard Lewontin and Susan Oyama, Varela, phenomenologist Evan Thompson, and cognitive psychologist Eleanor Rosch further develop the theory of a mutual defining or determination of a perceiving/acting organism and its world as applying to the evolu-

tionary process itself (Varela et al. 1991, pp. 193, 198–200, 202). That is, evolving organisms and environments mutually specify each other. A self-organizing, dynamic biological system has an integrity that puts pressure on the environment, even as the environment puts pressure on it. This notion dissents from the dominant neo-Darwinian concept of optimal fit. Between the organism and its environment, optimal fit lays all the influence, all the causative power, on the side of the environment: the environment defines the organism, but the organism exercises no effective specification upon the environment.

Varela and company note various difficulties with standard neo-Darwinian theory. Pleiotropy is the linkage of genetic traits. Optimal fit however should work against pleiotropy: maximal independence of traits would provide maximal flexibility to adapt to each environmental change. Relative stability of species over time also creates problems for optimal fit. Exemplars of such stability include the stasis of certain species—species that remain unchanged through eons of tremendous environmental change—as well as the phenomenon of punctuated equilibrium. This latter concept points to the evolutionary record of major changes coming only after a “critical mass” of environmental change causes a tipping point. The all-pervasive influence posited by optimal fit does not fit well, though, with punctuated equilibrium: rather one would expect ongoing gradual changes corresponding to ongoing changes in the environment (as well as major changes in periods of sudden, climactic shifts). As an alternative to optimal fit, enactivism proffers “satisfactory” or adequate fit. Biological organisms, as self-organizing systems, have their own integrity that pushes back against and partially determines that environment. Therefore, the evolutionary adaptive requirement is the less stringent one of adequacy, rather than that of optimal bending to each and every environmental modification. While the environment of course places constraints on “viable trajectories,” at the same time the organism’s perceptual, motor, and cognitive capabilities partially create its world (Varela et al. 1991, pp. 188–97). On this score, we may first think of very tangible ways that a species modifies its environment, such as beavers building dams, various mammals digging tunnels and burrows, and birds constructing nests—or the diverse ways we humans put (tremendous) pressure on the environment.

Charles Darwin himself devoted much research to sexual selection. The neo-Darwinian synthesis holds that an animal’s selection of an attractive mate is not ultimately based on any appreciation of beauty for its own sake, but rather that the appearance of beauty “signals” the overall fitness of the mate to adapt to its environment, survive, and reproduce. Darwin himself never advanced such a hypothesis; indeed, he believed that sexual selection often worked against individual fitness for survival. If one thinks about beautiful or handsome people, does it seem that the most sexually attractive persons are generally the smartest, most skillful, strongest, and healthiest? I don’t think so. While physical attractiveness may help one to land a job among more or less equally qualified persons as well as to land a mate, it appears that the traits of fitness I have mentioned are rather randomly distributed in relation to sexual attractiveness. Ornithologist Richard Prum expounds that the abilities to produce and appreciate beauty co-evolve. This applies not only to sexual attractiveness but to other forms of beauty as well. Prum highlights the plumage, choreographed dancing, and/or creative singing of birds. These forms of beauty require major utilization of food, other resources, and energy. They appear very wasteful if selected merely as signals of overall fitness with respect to the larger environment rather than for some aesthetic value in themselves. Furthermore, bright and/or complex plumage makes birds more vulnerable to predators. In the case of the peacock, its magnificent tail not only makes it more vulnerable but also less able to flee a predator. Prum thinks that signaling accounts for only a fraction of sexual attractiveness, while the appreciation of beauty accounts for the lion’s share. As

Prum quips, “I do not say that the ‘Emperor [of signaling] wears no clothes.’ Rather, I would predict that the ‘Emperor wears a loincloth’” (Shufro 2011, pp. 48–49).

The Baldwin effect is the theory that learned behavior of organisms can select for the survival of those who learn the fastest and most accurately. This is the one form of organisms putting some pressure on the environment that most biologists now, including those otherwise accepting the neo-Darwinian synthesis, have come to accept.

Finally, genetic mutations themselves do not follow completely random trajectories: they occur more frequently when organisms undergo stress from the environment. This in itself constitutes another way that organisms may take some initiative in the selection process, rather than being utterly determined by the environment and utter chance. Moreover, the mutations may, at least given the proper circumstances, tend towards more complex forms of life. The fundamental dynamics of self-organizing systems, which include biological organisms, is that in certain situations far from equilibrium, when sufficient energy is available, less complex and less integrated forms spontaneously organize into more complex and more integrated forms. Biochemist/biophysicist Stuart Kauffman advocates for the self-organizing properties of organisms towards greater complexity through evolutionary history (Kauffman 1993; Kauffman 2008). Mathematician Ian Stewart contrasts the circumscribed nature of the actual distribution of genetic mutations in accordance with the non-linear equations associated with dynamic complex systems versus all the mathematically possible mutations (Stewart 1998). Such thinking challenges the neo-Darwinian model that evolutionary changes relative to complexity are completely random.

While some of the ideas countering the neo-Darwinian synthesis were only advanced or strongly developed after the 1930’s and 1940’s, still its framers back then ignored available countering evidence: Darwin’s own work on sexual selection; that species did have some affect on the environment to which they were adapted; and cooperation within and between some species, contesting the all-encompassing focus on environmental pressure on individual animals and their genes.

9. Conclusions

The Scopes trial and media coverage at the time have provoked diverse reactions and interpretations down through the decades as the United States has gone through various political, social, and cultural changes. I judge that the trial and its coverage then, as well as the various responses to these over the decades—the long shadow, have aggravated the conflict between Christian fundamentalism and the scientific community on evolution and the age of the universe, the earth, and life. What if media coverage of the trial and what was broadcast live to the nation, instead of focusing on spectacle and circus atmosphere, had dealt significantly with evolutionary science and forms of religion compatible with evolution? The content then might have included (1) the press dealing more with the nature of evolution and different possible religious responses to it and less with personalities and conflict, (2) the defense’s scientists and religion experts speaking publicly to the nation about the scientific theory of evolution and its possible compatibility with Christian and theistic belief, and (3) broadcasting of Bryan’s closing statement to the nation—where it might have become evident to some that much of his opposition arose from Social Darwinist interpretations of evolution, which were not the only possible interpretations. Probably under that scenario, responses to the trial would have been less dipolar and the conflict between conservative religious antievolutionism and the science of evolution would not be as pronounced as it is today. What of responses that aggravated the conflict? As indicated, the trial confirmed an anti-intellectualism of fundamentalism with regard to established science found threatening. This anti-intellectualism constituted one motive for the founding of institutions of secondary and higher education. More importantly, this

anti-intellectualism represented one factor in the psychology of doubling down in the face of ever more overwhelming evidence establishing the reality of evolution in speciation, including the evolution of humans, and of the great age of the universe. We also should not forget the over-reaction of biologists to fundamentalist antievolutionism in embracing the neo-Darwinian synthesis, as another response exacerbating the conflict.

How can lessons about what led to increased conflict inform actions today to advance knowledge about evolution and about the compatibility of some religious beliefs and practices with evolution? Information from all kinds of media—including textbooks, other books, newspapers, magazines, blogs, YouTube, social media, and by all kinds of contributors—including biologists and other scientists, religious leaders, scholars of religion, journalists—can help educate people. This education should concern evolution—evolution based on a less reductive model than the neo-Darwinian synthesis—and the age of the universe, our solar system, and earth, as well as the overwhelming evidence for these from so many different, independent directions. It should include education about moderate and liberal forms of the classical world religions and specifics from their religious philosophical and theological traditions on how they interpret their scriptures and traditions in ways compatible with a universe whose vastness in time and space is mind-boggling and with an amazingly complex and even awe-inspiring story of evolution.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: No new data were created in this study. Data sharing is not applicable to this article.

Conflicts of Interest: The author declares no conflicts of interest.

Note

- ¹ I want to say a word about John Scopes' fate as affected by the trial: expert defense witnesses formed a committee to raise funds from scientists, which enabled Scopes to pursue a Master's degree in geology at the University of Chicago (Johnson 2007, p. 146; Moore and McComas 2016, p. 107). Successfully completing that degree, he was nominated for a fellowship for the Ph.D. degree in geology at that university. However, the president of the University removed him from consideration because of his alleged atheism (Johnson 2007, p. 146). (I could find no record of Scopes being an atheist, only "an admitted agnostic" (Starr 2015).)

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