

Evolution for John Doe: Pictures, the Public, and the Scopes Trial Debate

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According to Joseph Wood Krutch, the most dramatic event at the Scopes trial of 1925 occurred when William Jennings Bryan announced, incredibly, that he was not a mammal. Looking back from the 1960s, Krutch, who had covered the trial for the *Nation*, remembered the moment with amusement. H. L. Mencken, Krutch noted, had made a point of falling noisily from a table, as if to punctuate the absurdity of Bryan’s statement.¹ The trial transcript shows that Bryan did not precisely deny his place within the zoological class Mammalia. He did, however, emphatically object to a diagram that located humans among the mammals or, as he put it, in “a little ring . . . with lions and tigers and everything that is bad!” (See figure 1.) The diagrammatic balloon that so offended Bryan came from a discussion of evolution

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¹ Joseph Wood Krutch, *More Lives Than One* (New York, 1962), 153; Joseph Wood Krutch, “The Monkey Trial,” *Commentary*, 43 (May 1967), 84.

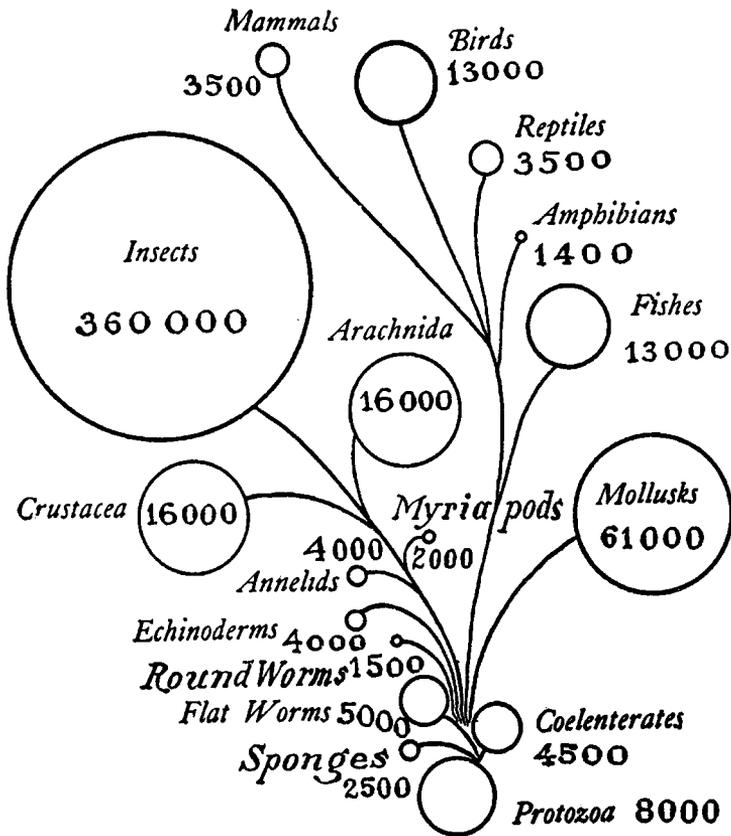


Figure 1. William Jennings Bryan objected to this diagram in *Civic Biology*, the 1914 textbook assigned to John Scopes's students. Both at the trial and in his *Memoirs*, Bryan complained that the diagram implied that humans were lost among the mammals in a small insignificant circle, rather than assigned a circle of their own. Reprinted from George William Hunter, *A Civic Biology Presented in Problems* (New York, 1914), p. 194.

in George William Hunter's *Civic Biology*, the textbook assigned to John Thomas Scopes's biology class. Bryan responded viscerally to the image.²

Bryan had a point. Although he never really understood evolution, he had an eye for ambiguity in evolutionary metaphors. Like many diagrams published by scientists and science popularizers of the time, Hunter's balloons could be interpreted as undermining common written and spoken defenses of evolutionary theory, defenses made vulnerable by the claims scientists made, the disarray of evolutionary theory in the 1920s, and a disjunction between public and scientific understandings of scientific illustration. Visual images played an important part in the public discourse

² *Tennessee Evolution Case: A Complete Stenographic Report of the Famous Court Test of the Tennessee Anti-Evolution Act, at Dayton, July 10 to 21, 1925, Including Speeches and Arguments of Attorneys* (Cincinnati, 1925), 174–77; George William Hunter, *A Civic Biology Presented in Problems* (New York, 1914), 194.

associated with the Scopes trial, but they did not necessarily convey the messages their authors intended.

The antievolution campaign of the 1920s caught many people by surprise. In the late nineteenth century American biologists had assimilated various forms of evolutionism. By the early twentieth century, most scientists thought that any tension between evolutionism and religion had long since been resolved. But the issue resurfaced in the early 1920s; the Scopes trial of 1925 was the most conspicuous moment in a longer public debate about evolution.

The Scopes trial seems firmly lodged in American mythology, portrayed sometimes as circus, sometimes as tragedy, and often as farce. Frederick Lewis Allen's durable *Only Yesterday* relegated the trial to a chapter on the ballyhoo of the decade; later writers fell in with Mencken's dismissal of Bryan and other antievolutionists as anti-intellectual religious zealots, the yokels of small-town America. Many people know the trial through the movie *Inherit the Wind*; but that movie is more an allegory of the McCarthy era than a work of history, portraying antievolutionists as a mob representing the repressive potential of the emotional masses. In recent years historians have corrected the mythology. Lawrence W. Levine and Garry Wills have shown that Bryan raised serious issues in the evolution debates, including concerns about social Darwinism and about the implications for democracy of the growth of scientific and technical expertise. Edward Larson, Ronald Numbers, and Paul K. Conkin have demonstrated that the creation/evolution debates of the 1920s had roots in a theological rift within American Protestantism and have explored antievolutionists' fears about the disruptive potential of what they called materialism. Indeed, though in the 1920s many people retained the Progressive Era faith in science, others began to suspect that science could be one of the more corrosive of the "acids of modernity." The debates culminating in the trial were not just about science. People who wrote and talked about evolution linked it to many other things: the role of science during the Great War; a cultural rift between rural and urban populations; the democratization of educational opportunities; sweeping demographic changes accelerated by the war; debates about race and immigration; and a growing discussion of the difficult balance between majoritarianism and individual civil liberties.³

³The phrase "acids of modernity" is Walter Lippmann's; see Lynn Dumenil, *The Modern Temper: American Culture and Society in the 1920s* (New York, 1995), 148. Frederick Lewis Allen, *Only Yesterday: An Informal History of the 1920s* (New York, 1931); *Inherit the Wind*, dir. Stanley Kramer (United Artists, 1960); Lawrence W. Levine, *Defender of the Faith: William Jennings Bryan, the Last Decade, 1915–1925* (Cambridge, Mass., 1987); Garry Wills, *Under God: Religion and American Politics* (New York, 1990); Edward Larson, *Summer for the Gods: The Scopes Trial and America's Continuing Debate over Science and Religion* (New York, 1997); Ronald L. Numbers, *Darwinism Comes to America* (Cambridge, Mass., 1998); Paul K. Conkin, *When All the Gods Trembled: Darwinism, Scopes, and American Intellectuals* (Lanham, 1998). For recent revisions of the Scopes trial and its context, see also Edward Larson, *Trial and Error: The American Controversy over Creation and Evolution* (New York, 1989); James Gilbert, *Redeeming Culture: American Religion in an Age of Science* (Chicago, 1997), 23–35; and George E. Webb, *The Evolution Controversy in America* (Lexington, Ky., 1994). On the reception of Darwinism, see Jon H. Roberts, *Darwin and the Divine in America: Protestant Intellectuals and Organic Evolution, 1859–1900* (Madison, 1988); Ronald L. Numbers and John Stenhouse, eds., *Disseminating Darwinism: The Role of Place, Race, Religion, and Gender* (New York, 1999); James R. Moore, *The Post-Darwinian Controversies: A Study of the Protestant Struggle to Come to Terms with Darwin in Great Britain and America, 1870–1900* (Cambridge, Eng., 1979); David L.

Scientists themselves grappled with general cultural change, the unsettled state of evolutionary theory, and the challenge of new roles. In the 1920s, when their assimilation of Charles Darwin's theory of natural selection remained incomplete and tentative, biologists labored to assure the public both that the foundation of evolutionary theory was secure and that evolution was compatible with religion. The difficulties of the task were exacerbated by scientists' involvement in the larger debates, and their scientific pronouncements were not easily separated from their extrascientific concerns.

Historians have not yet explored the reciprocal influences of science and larger cultural issues in this debate. This article begins to probe the nature of this relationship by focusing, not on the trial itself, but on the role of visual images of evolutionary ideas published during the debate. My intention is not to analyze public reaction, but to examine the ideas available to the public in symbolic form and to compare visual representations of scientific ideas with the messages scientists sought to convey in words. On a general level, I want to suggest that we cannot understand the complex relationship of science and its larger public if we look at words alone. Historians and historians of science have begun in the last twenty-five years to devise creative ways to analyze visual culture.⁴ Because of the power of visual representations of scientific ideas, attention to visual symbols can enhance our analysis of the circulation of scientific themes in American culture.

In particular, during the debates of the 1920s, the words published by scientists and science popularizers were often at odds with the messages implied in the illustrations that accompanied those words. This was so for two reasons. First, scientists, more than scholars in other disciplines, use diagrams and visual images not only to communicate their ideas but also to form them. Building on the insights of Martin J. S. Rudwick, historians of science have shown that for scientists diagrams are not simply decorations, but elements in a visual language with its own grammar and tacitly understood conventions. Scientists develop visual lexicons, sets of motifs that stand for ideas and assumptions familiar among colleagues. Scientists formed a community that increasingly spoke a private language, and even the pictures they drew contained specialized professional vocabularies. Outsiders might well have misunderstood.⁵

Hull, *Darwin and His Critics: The Reception of Darwin's Theory of Evolution by the Scientific Community* (Chicago, 1973); Peter J. Bowler, *Life's Splendid Drama: Evolutionary Biology and the Reconstruction of Life's Ancestry, 1860–1940* (Chicago, 1996); Peter J. Bowler, *The Eclipse of Darwinism: Anti-Darwinian Evolution Theories in the Decades around 1900* (Baltimore, 1983); Peter J. Bowler, *The Non-Darwinian Revolution: Reinterpreting a Historical Myth* (Baltimore, 1988); Peter J. Bowler, "Darwinism and Modernism: Genetics, Palaeontology, and the Challenge to Progressionism, 1880–1930," in *Modernist Impulses in the Human Sciences, 1870–1930*, ed. Dorothy Ross (Baltimore, 1994), 236–54; Mark Pittenger, *American Socialists and Evolutionary Thought, 1870–1920* (Madison, 1993); and Paul Jerome Croce, *Science and Religion in the Era of William James: Eclipse of Certainty, 1820–1880* (Chapel Hill, 1995). On the general cultural background of the United States in the 1920s, see Dumenil, *Modern Temper*; and Warren I. Susman, *Culture As History: The Transformation of American Society in the Twentieth Century* (New York, 1973).

⁴ On the recent literature analyzing visual culture in history, see George H. Roeder Jr., "Filling in the Picture: Visual Culture," *Reviews in American History*, 26 (March 1998), 275–93.

⁵ Martin J. S. Rudwick's knowledge of scientific practice is firsthand: before becoming a historian, he was an invertebrate paleontologist and his early work is still cited by paleontologists. Martin J. S. Rudwick, "The Emergence of a Visual Language for Geological Science, 1760–1840," *History of Science*, 14 (Sept. 1976), 149–95; Martin J. S. Rudwick, *Scenes from Deep Time: Early Pictorial Representations of the Prehistoric World* (Chicago,

Second, nonscientists who misinterpreted the intended messages of scientific diagrams were not always entirely mistaken. Creative misreadings can tell us a good deal. Scientific images sometimes reveal extrascientific concerns on the part of scientists—assumptions, biases, or predilections of which they may be unaware, but that may strike a chord with lay observers. In the 1920s, scientific diagrams reflected ambivalences in the thinking of some evolutionists, sources of potentially confusing mixed messages. Biologists did not agree on the mechanisms of evolution, the proper role of scientists in public controversy, or even the boundaries of science. Cultural preoccupations infused the conflicts among scientists. Questions about the mechanism of evolution, for example, were linked to concerns about determinism and human will. And the image of evolution as a neat, frictionless progress toward a goal in which inferior forms yielded to superior ones reinforced beliefs that differences among humans—notably race—showed some as inferior to others. Conscious of occupying a position of cultural prestige, some scientists felt compelled to take public stances in the evolution debates, and they did so actively. The visual images they published often made the extrascientific concerns and ambiguities in their thinking strikingly evident.

For scientists in 1925, the *Civic Biology* diagram that troubled Bryan fit an established set of visual conventions. Humans held no special place; they resided within the rather small circle allotted to the mammals. That circle was small because the number of species in the class of mammals is small relative to the number in other zoological classes. Scientists familiar with such diagrams understood the chart to describe taxonomic relationships, those of the scientific system for classifying living things; they also understood it to maintain silence on questions of religious or political significance. Bryan knew better. He recognized what the size of the circles was intended to represent, but he took the diagram as a whole to have a larger meaning. In his *Memoirs* he returned to this theme: “No circle is reserved for man alone. . . . What shall we say of the intelligence, not to say religion, of those who . . . put a man with an immortal soul in the same circle with the wolf, the hyena, and the skunk?”⁶ For scientists this was a version of a familiar

1992). See also “Special Issue: Seeing Science,” *Representations*, 40 (Fall 1992); “Special Issue on Pictorial Representation in Biology,” *Biology and Philosophy*, 6 (April 1991); the special issue “Science and the Visual,” *British Journal for the History of Science*, 31 (June 1998); Stephanie Moser, *Ancestral Images: The Iconography of Human Origins* (Ithaca, 1998); Brian S. Baigre, ed., *Picturing Knowledge: Historical and Philosophical Problems Concerning the Use of Art in Science* (Toronto, 1996); Michael Lynch and Steve Woolgar, eds., *Representation in Scientific Practice* (Cambridge, Mass., 1990); Thomas L. Hankins and Robert J. Silverman, *Instruments and the Imagination* (Princeton, 1995); Bruno Latour, “Visualization and Cognition: Thinking with Eyes and Hands,” *Knowledge and Society*, 6 (1986), 1–40; Caroline A. Jones and Peter Galison, eds., *Picturing Science Producing Art* (New York, 1998); Stephen Jay Gould, *Full House: The Spread of Excellence from Plato to Darwin* (New York, 1996); Stephen Jay Gould, “Ladders and Cones: Constraining Evolution by Canonical Icons,” in *Hidden Histories of Science*, ed. Robert B. Silvers (New York, 1995), 37–67; Stephen Jay Gould, *The Mismeasure of Man* (New York, 1996), 401–12; and Charlotte M. Porter, “Essay Review: The History of Scientific Illustration,” *Journal of the History of Biology*, 28 (Fall 1995), 545–50.

⁶William Jennings Bryan and Mary Baird Bryan, *The Memoirs of William Jennings Bryan* (Philadelphia, 1925), 535. See also Levine, *Defender of the Faith*; Larson, *Summer for the Gods*, esp. 37–59; Wills, *Under God*, 97–137; and Stephen Jay Gould, *Bully for Brontosaurus: Reflections in Natural History* (New York, 1991), 416–31.

branching diagram depicting natural relationships. From Bryan's point of view it seemed to mock traditional verities about human significance. It was the human place in nature that was at stake.

During the debates of the 1920s scientists came forward to champion evolution, the scientific method, and academic freedom—some believed they were protecting rationalism itself. Not all scientists participated in those debates. Some worried that involvement in such public controversies might compromise their credibility and even dignity as scientists. Those who did join the fray shared certain rhetorical themes, prominent among them an insistence that evolutionary thought did not threaten Christian values. Many of the scientists participating most vocally in the debate were devout Christians who had themselves wrestled with possible contradictions between their faith and their scientific practice.⁷

Perhaps the part of evolutionary theory scientists engaging in the public debate defended *least* adamantly was natural selection. The Scopes trial came along at an awkward moment for biological scientists. Evolutionary theory was under assault from the outside at a moment when it suffered internal disarray. Scientists affirmed the fact of evolution, but they remained collectively vexed as to the mechanism by which it occurred. The problem was not simply that biologists could not reach a consensus as to the efficacy of Darwinian natural selection but also that many of them clung to the distinctly un-Darwinian notion of purposive directing mechanisms—teleologies. Teleology appealed especially to those who attempted to combine their religious beliefs and their understanding of evolution—exactly the scientists most active in the Scopes trial debates and most often encountered in newspaper and magazine stories about evolution.⁸

One of the scientists most conspicuous in the newspapers was the paleontologist Henry Fairfield Osborn, the influential president of the American Museum of Natural History in New York. Because he occupied a prominent place in American science, because he was an energetic defender of evolutionary ideas during the Scopes trial debate, and because he was ardently involved in designing many of the most widely published visual representations of evolutionary ideas, his would be among

⁷ Michael M. Sokal, "Promoting Science in a New Century: The Middle Years of the AAAS," in *The Establishment of Science in America: 150 Years of the American Association for the Advancement of Science*, ed. Sally Gregory Kohlstedt, Michael M. Sokal, and Bruce V. Lewenstein (New Brunswick, 1999), 50–102.

⁸ Peter J. Bowler suggests that paleontologists of the early twentieth century, while retaining a teleological evolutionary philosophy, had a view of evolutionary processes more complicated than the views predominant before 1900. Fragmentation and competition among newly professionalized disciplines exacerbated the unsettled state of evolutionary theory, pitting scientists in the young discipline of genetics, for example, against those in the older fields of morphology and paleontology, and laboratory-based scientists against field scientists. See Bowler, *Eclipse of Darwinism*; Bowler, "Darwinism and Modernism"; Garland Allen, *Life Science in the Twentieth Century* (New York, 1975); Ronald Rainger, Keith Benson, and Jane Maienschein, eds., *The American Development of Biology* (Philadelphia, 1988); Paul Lawrence Farber, *Finding Order in Nature: The Naturalist Tradition from Linnaeus to E. O. Wilson* (Baltimore, 2000); Ernst Mayr and William Provine, eds., *The Evolutionary Synthesis: Perspectives on the Unification of Biology* (Cambridge, Mass., 1980); and Vassiliki Betty Smocovitis, *Unifying Biology: The Evolutionary Synthesis and Evolutionary Biology* (Princeton, 1996).

the most frequently heard voices in the evolution debates of the 1920s. Osborn and his colleagues at the American Museum became outspoken proponents of evolution, debating Bryan and other antievolutionists frequently in the newspapers and on the radio. Their views on evolution did not always represent the profession as a whole, since there was no consensus; indeed, by the end of the decade they disagreed among themselves on essential points of evolutionary theory. Yet—in part because the museum supplied so many of the illustrations in books written for a popular audience—their ideas loomed large in the debate.⁹

In the year before the trial, Osborn had tangled with a prominent opponent of evolution over a visual representation of human evolution. In 1924 the Reverend John Roach Straton, the outspoken minister of Calvary Baptist Church in New York, gave a sermon that described his response to a sequence of skulls on display in the famed Hall of the Age of Man at the American Museum. Straton complained that the exhibit contradicted Osborn's statements about the nature of evolution. In a letter to Straton, Osborn had written that the Hall of the Age of Man "demonstrates very clearly not that man has descended from the monkeys or from the apes, but that he has a long and independent line of ascent of his own." Straton disagreed. "A casual glance naturally creates the impression," he complained, that the sequence of skulls from monkey to human forms a "sort of sliding scale." He expressed alarm about the effect on the many schoolchildren he had seen at the museum, worrying that "their wondering little eyes would gaze upon these gruesome bones, . . . and the children, with their immature minds, looking first at the skull of the little monkey at one end of the line, and on up to the skull of a man of today, would inevitably conclude that one came out of the other." Straton's visit to the museum and his sermon were reported at length in newspapers around the country, and he continued to cite his visit to the museum in debates with evolutionists.¹⁰

Straton was not alone in finding Osborn's avowals about humans' "long indepen-

⁹ On Henry Fairfield Osborn and his colleagues, the history of the American Museum of Natural History, and the history of museums generally, see Ronald Rainger, *An Agenda for Antiquity: Henry Fairfield Osborn and Vertebrate Paleontology at the American Museum of Natural History, 1890–1935* (Tuscaloosa, 1991); John Michael Kennedy, "Philanthropy and Science in New York City: The American Museum of Natural History, 1868–1968" (Ph.D. diss., Yale University, 1968); Sheila Ann Dean, "What Animal We Came From: William King Gregory's Paleontology and the 1920's Debate on Human Origins" (Ph.D. diss., Johns Hopkins University, 1994); Edwin H. Colbert, *William Diller Matthew, Paleontologist: The Splendid Drama Observed* (New York, 1992); Donna Haraway, *Primate Visions: Gender, Race, and Nature in the World of Modern Science* (New York, 1989), 26–58; Charlotte Porter, "Henry Fairfield Osborn and the Hall of the Age of Man," *Museum Studies Journal*, 1 (Spring 1983), 26–34; Greg Mitman, *Reel Nature: America's Romance with Wildlife on Film* (Cambridge, Mass., 1999); Sally Gregory Kohlstedt, "Essay Review: Museums: Revisiting Sites in the History of the Natural Sciences," *Journal of the History of Biology*, 28 (Spring 1995), 151–66; and Steven Conn, *Museums and American Intellectual Life, 1876–1926* (Chicago, 1998).

¹⁰ Newspapers as far from New York as California covered the Osborn-Straton exchange. See letters and clippings about it, folder 4, box 21, Osborn Papers (Library, American Museum of Natural History, New York, N.Y.). See especially Henry Fairfield Osborn to John Roach Straton, March 8, 1924, *ibid.*; John Roach Straton, "Making Poison Plausible," sermon, 1924, *ibid.*; and John Dickenson Sherman, "'Treason to God Almighty': Rev. Dr. J. R. Straton Denounces American Museum of Natural History," newspaper clipping, *Fort Bragg [California] News*, May 3, 1924, *ibid.* See also John Roach Straton and Charles Francis Potter, *Evolution versus Creation: Second in the Series of Fundamentalist-Modernist Debates* (1924), in *Creationism in Twentieth-Century America: A Ten-Volume Anthology of Documents, 1903–1961*, ed. Ronald L. Numbers, vol. II: *Creation-Evolution Debates* (New York, 1995), 21–131.

dent line of ascent” unpersuasive when compared with museum displays. The *New York Times* published an account early in 1926 of an address to the Catholic Library Association titled “Ignorance and Evolution.” The *Times* reported Monsignor Joseph H. McMahon’s observation that “scientists do not assert dogmatically that man is descended from the ape, yet the average man is led so to believe by the exhibitions in our museums.”¹¹ Many people visited the American Museum, but its influence extended far beyond New York, partly because of the interest Osborn and his colleagues took in designing exhibits and distributing images based on them. They used lantern slides extensively in public presentations, provided slides and pictures to teachers around the country, and supplied illustrations to writers of textbooks and popular books about science.

The evolution debates inspired a prolific group of science popularizers, advocates, and boosters. During the 1920s proselytizers for evolution offered the public many works belonging to the category of “outline of” books in vogue in the 1920s. Books on evolution for a lay audience were so numerous that for several weeks during the summer of the Scopes trial a Brentano’s bookstore in New York devoted an entire window display to them. Reviewers commented regularly on the proliferation of popular explanations of evolution. Such books sold well enough that they continued to appear throughout the decade; a 1929 column in the *World’s Work* called “Books for Babbitt” remarked on their continuing popularity, and several of them were on a list of best-selling books as late as 1929.¹²

The genre might be identified by the title of one of the more widely advertised of them, *Evolution for John Doe*, by Henshaw Ward. Ward, a teacher and textbook writer, asserted that

the average man . . . thinks evolution is ‘the doctrine that man is descended from monkeys,’ and he is so amused or offended at this theory that his whole mind is occupied with it. His conception is ridiculously false. Until John Doe discards that notion and takes a fresh start, he will never understand the subject.

Ward’s solution to this misapprehension, to eliminate from his book any “attention to the ‘monkey doctrine’ [or] reference to any ape-like creature,” was unusual. More often, scientists acknowledged the common ancestry of humans and apes but emphasized that there was no simple linear descent from monkey to human—that we did not, as the pundits would suggest, “have a monkey for a grandfather.” The books implicitly addressed to Mr. Doe (and, presumably, his wife) adopted a variety of rhetorical strategies, but most of them attempted to reassure readers that,

¹¹ *New York Times*, Jan. 14, 1926, p. 6.

¹² The Osborn Papers at the American Museum of Natural History contain many reviews of his own and others’ books of this type. For materials relating to *Men of the Old Stone Age*, see box 99, Osborn Papers; to *Earth Speaks to Bryan*, box 92, *ibid.*; to Mason, ed., *Creation by Evolution*, box 14, *ibid.* Sales figures for Osborn’s books during the 1920s are in folders 7–11, box 56, *ibid.* On the window display at Brentano’s, see Sterling Galt to Charles Scribner, memo, July 21, 1925, folder 2, box 92, *ibid.* “Books for Babbitt,” *World’s Work*, 58 (June 1929), copy of clipping, folder 14, box 14, *ibid.* See also Susman, *Culture as History*, 105–21; James Steel Smith, “The Day of the Popularizers: The 1920’s,” *South Atlantic Quarterly*, 62 (Spring 1963), 297–309; and Joan Shelley Rubin, *The Making of Middlebrow Culture* (Chapel Hill, 1992).

properly understood, evolution need not upset Christian views of the human place in nature.¹³

Many of these books shared illustrations, and the pictures the authors chose complicated the reassuring messages about the compatibility of evolution and religion that they put into words. Popularizers drew liberally from the visual repertoire of evolutionary biologists, especially those who designed museum displays, often for the American Museum of Natural History in New York. As Bryan and Straton understood, ideas about the human place in nature were implicit in images of evolution, whether or not such writers as Henshaw Ward chose to acknowledge it. Paintings and sculptures of human ancestors evoked emotion on their own, and as Straton noted, the arrangement of such figures also carried messages. In particular, the sequence of skulls lambasted in his sermon was related to the tradition of evolutionary tree diagrams.

One convention of scientific illustration is the use of family trees to visualize natural relationships.¹⁴ As the ancient concept of a *scala naturae*, or a linear and hierarchical chain of being, began to give way in the late eighteenth and early nineteenth centuries, it was increasingly supplanted in zoology by an image of the natural world as organized in a complex, branching pattern. When Darwin published *On the Origin of Species* in 1859, the evolutionary tree diagram he included was the only illustration in all 495 pages of the book. (See figure 2.) The historian Howard E.

¹³ Henshaw Ward, *Evolution for John Doe* (Indianapolis, 1925), 15. Other books in this genre include Henry C. Crampton, *The Coming and Evolution of Life: How Living Things Have Come to Be As They Are* (New York, 1931); Edwin Grant Conklin, *The Direction of Human Evolution* (New York, 1922); Benjamin C. Gruenberg, *The Story of Evolution: Facts and Theories on the Development of Life* (Garden City, 1929); John Langdon-Davies, *The New Age of Faith* (New York, 1925); Frederic A. Lucas, *Animals of the Past: An Account of Some of the Creatures of the Ancient World* (New York, 1922); Richard Swann Lull et al., *The Evolution of Man* (New Haven, 1922); Frances Mason, ed., *Creation by Evolution: A Consensus of Present-Day Knowledge As Set Forth by Leading Authorities in Non-Technical Language That All May Understand* (New York, 1928); Kirtley Mather, *Sons of the Earth: A Geologist's View of History* (New York, 1930); Shailer Mathews, ed., *Contributions of Science to Religion* (New York, 1924); Horatio Hackett Newman, *Readings in Evolution, Genetics, and Eugenics* (Chicago, 1921); Horatio Hackett Newman et al., *The Nature of the World and of Man* (Chicago, 1926); Henry Fairfield Osborn, *Men of the Old Stone Age: Their Environment, Life, and Art* (New York, 1916); Henry Fairfield Osborn, *The Origin and Evolution of Life* (New York, 1918); Henry Fairfield Osborn, *Man Rises to Parnassus: Critical Epochs in the Prehistory of Man* (Princeton, 1928); Lucretia Perry Osborn, *The Chain of Life* (New York, 1925); Harold Peake and Herbert John Fleure, *Apes and Men* (New Haven, 1927); Chester A. Reeds, *The Earth: Our Ever-Changing Planet* (New York, 1931); William Berryman Scott, *The Theory of Evolution: With Special Reference to the Evidence upon Which It Is Founded* (New York, 1923); G. Elliott Smith, *The Evolution of Man: Essays* (London, 1924); Adam Gowans Whyte, *The Wonder World We Live In* (New York, 1921); H. G. Wells, Julian Huxley, and G. P. Wells, *The Science of Life* (New York, 1929); and H. G. Wells, *Outline of History: Being a Plain History of Life and Mankind* (New York, 1920). See also Ronald C. Tobey, *The American Ideology of National Science, 1919–1930* (Pittsburgh, 1971).

¹⁴ On the history of evolutionary tree diagrams, see Stephen G. Alter, *Darwinism and the Linguistic Image: Language, Race, and Natural Theology in the Nineteenth Century* (Baltimore, 1999); Gould, "Ladders and Cones"; Stephen Jay Gould, *The Lying Stones of Marrakech: Penultimate Reflections in Natural History* (New York, 2000), 115–43; Bowler, "Darwinism and Modernism," 247–54; Robert J. O'Hara, "Representations of the Natural System in the Nineteenth Century," *Biology and Philosophy*, 6 (April 1991), 255–74; William Coleman, "Morphology between Type Concept and Descent Theory," *Journal of the History of Medicine and Allied Sciences*, 31 (no. 2, 1976), 149–75; H. J. Lam, "Phylogenetic Symbols, Past and Present," *Acta Biotheoretica*, 2 (Oct. 1936), 153–94; Edward G. Voss, "The History of Keys and Phylogenetic Trees in Systematic Biology," *Journal of the Scientific Laboratories of Denison University*, 43 (Dec. 1952), 1–25; Howard E. Gruber, "Darwin's 'Tree of Nature' and Other Images of Wide Scope," in *On Aesthetics in Science*, ed. Judith Wechsler (Cambridge, Mass., 1978), 121–40; and Theodore D. McCown and Kenneth A. R. Kennedy, eds., *Climbing Man's Family Tree: A Collection of Major Writings on Human Phylogeny, 1699 to 1971* (Englewood Cliffs, 1972).

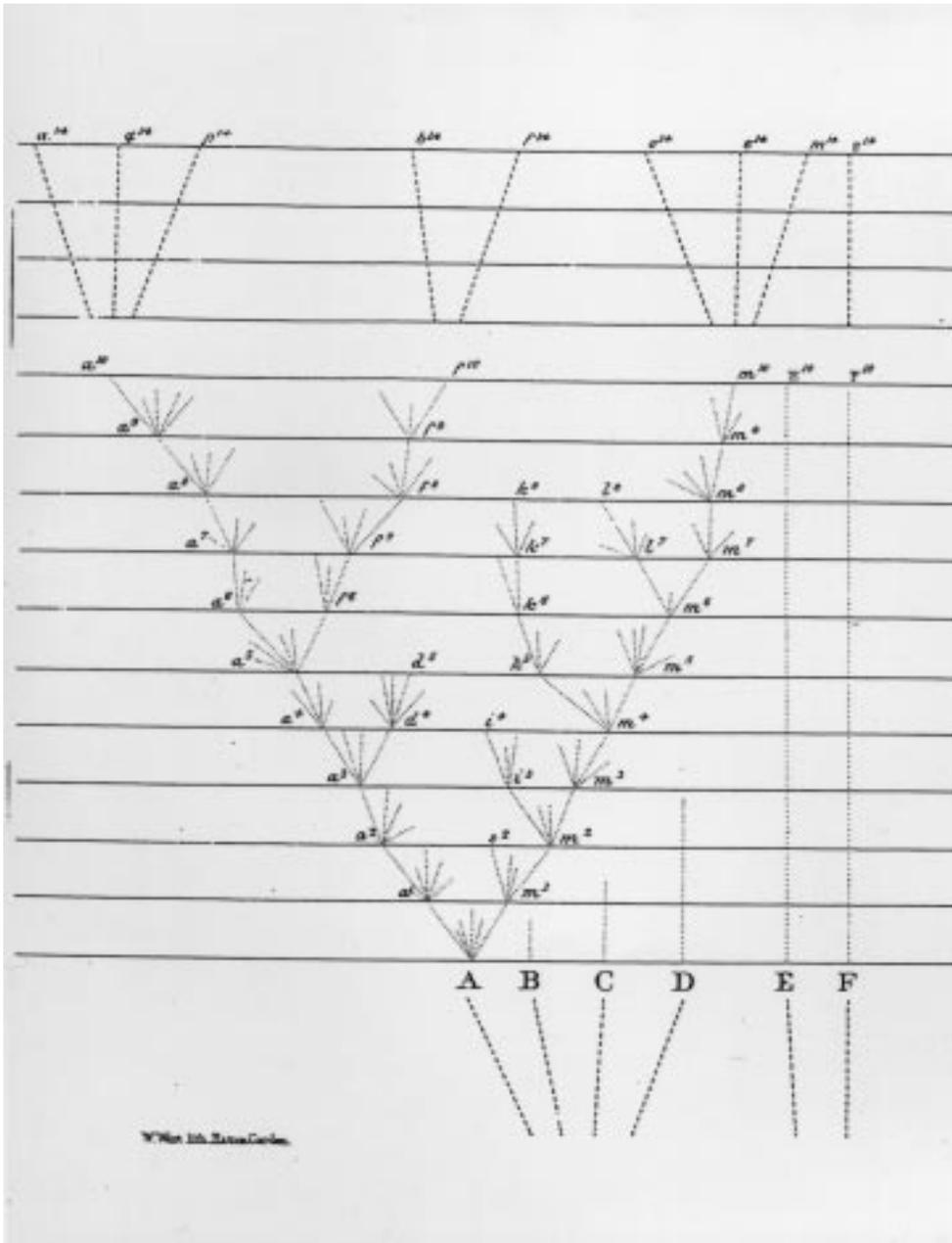


Figure 2. Charles Darwin developed this branching diagram, the only illustration in *On the Origin of Species* (1859), to think through his concept of evolution. It shows ancestral forms (capital letters) and their descendants (lower-case italic letters) through successive generations (superscript arabic numbers). Both forms that persist unchanged (F) and those that become extinct (B, C, D) appear. It depicts evolution as a complex process, without a single direction, in vivid contrast to the tradition of presenting nature as a linear chain of being. Only part of Darwin's original diagram is reprinted here. Reprinted from Charles Darwin, *On the Origin of Species: A Facsimile of the First Edition* (1859; Cambridge, Mass., 1964), foldout page following p. 116.

Gruber has argued convincingly that Darwin included this diagram because it played a crucial role in his thinking about evolution, beginning long before 1859. Darwin actually formulated his theory by devising and contemplating this mental picture of evolutionary patterns, according to Gruber.¹⁵ Darwin's famous tree illustrates his understanding of the complexity, contingency, and fecundity of the evolutionary process. It is an abstract tree: It does not describe the fate of specific organisms or lineages; it describes a process. It indicates increasing diversity, without a single direction of growth. Darwin explicitly intended his tree to be nondirectional, not a literal tree with a main trunk and side branches, but a branching diagram.

The durable notion of a linear chain of being would not give way so easily, though. Trees that took themselves literally as trees rather than as branching diagrams grew out of a late-nineteenth-century tradition. The evolutionary tree motif became familiar to the American public through Ernst Haeckel's family tree diagrams. Haeckel's influential "Pedigree of Man" (figure 3), widely published in the 1870s, was a prototype for later trees. Haeckel's tree was unusual, yet curiously representative of several underlying assumptions and conflicts in late-nineteenth-century biology. Most evolutionary diagrams of the time were simple line drawings; Haeckel's "pedigree" was drawn to look like a real (if somewhat misshapen) tree. But though it had branches, it revealed an essentially linear concept of evolution, and an undeniably hierarchical one. Its most obvious feature was that it culminated in "man," who resided not only at the summit of the tree but at the top of the main trunk, surrounded by the next "higher" animals, the other primates. Other kinds of animals occupied outlying branches, which were atrophied and unimpressive. They looked like evolutionary dead ends, not like growing branches. The categories were inconsistent: Closely related groups of mammals, such as rodents, and ecological types, such as "beasts of prey" and "beaked animals," that do not constitute related groups were both given branches. The top quarter of the tree was devoted to the mammals. Taxonomic categories were amplified toward the top of the tree, by implication magnifying the significance of the "higher orders." Lower orders, such as rodents, were confined to single branches—although they might include large numbers of species—while a subset of the primate order, the family of the apes, adorned the crown of the tree; the four genera of apes surrounded the single species "man," at the pinnacle. Though the diagram in some sense presented a branching concept of evolution—echinoderms, such as starfish, were not positioned as steps in the progression toward humans but as a side branch—in essence it retained the old concept of the chain of being, a main trunk progressing from monera to man. Furthermore, Haeckel's tree, unlike Darwin's branching diagram, conveyed no sense of time. It was static, apparently complete, including no labels or other conventions to indicate time's passage and no extinct animals. The appearance of the "lower" taxonomic groups on the tree's lower branches implied that those groups appeared on earth earlier. Starfish and monera continue to exist and to evolve, but Haeckel's diagram

¹⁵ Charles Darwin, *On the Origin of Species: A Facsimile of the First Edition* (1859; Cambridge, Mass., 1964); Gruber, "Darwin's 'Tree of Nature' and Other Images of Wide Scope."

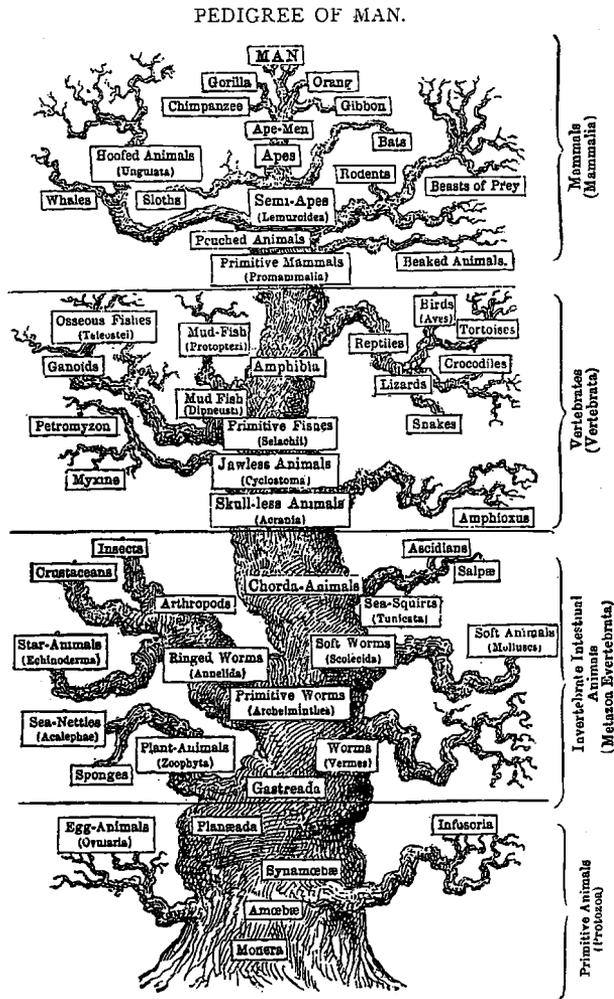


Figure 3. Widely published in popular books about evolution, Ernst Haeckel's "Pedigree of Man" (1866), unlike Darwin's branching diagram, depicts a literal tree and conveys an essentially linear vision of evolutionary relationships. It includes no convention for revealing change over time or for distinguishing between extant and extinct taxonomic groups. *Reprinted from Ernst Haeckel, The Evolution of Man (1866; New York, 1896), p. 189.*

offered no way to show this. A position near the bottom of the tree seemed to mean a low position in the hierarchy of nature more than an early appearance on earth.¹⁶

Trees such as Haeckel's caused a backlash among scientists. Some biologists rejected them, complaining that they were too speculative to be scientific. Osborn

¹⁶ Ernst Haeckel, *The Evolution of Man* (1866; New York, 1896), 189; Jane M. Oppenheimer, "Haeckel's Variations on Darwin," in *Biological Metaphor and Cladistic Classification: An Interdisciplinary Perspective*, ed. Henry M. Hoenigswald and Linda F. Wiener (Philadelphia, 1987), 123–35; Alter, *Darwinism and the Linguistic Image*, 108–45; Bowler, "Darwinism and Modernism," 247–54; Gould, "Ladders and Cones."

acknowledged this sentiment, but he did not share it. In a 1910 book aimed at a general audience, *The Age of Mammals in Europe, Asia, and North America*, he noted that evolutionary tree diagrams had “fallen into disfavor,” yet, he suggested, “the present reaction against these trees does not seem to be altogether wise, for we must remember that they are among the working hypotheses of this science, which serve to express most clearly the author’s meaning.”¹⁷ Osborn pioneered the creation of evolutionary diagrams incorporating ecological, historical, and morphological information and ideas about animals.

That diagrams functioned as “working hypotheses” was an astute observation, but when published or put on display in museums, diagrams conceived in a spirit of exploration and hypothesis testing could suggest a misleading certainty. Publication in popular books or museum display magnifies the influence and increases the longevity of such images. And whether the diagrams always “express most clearly the author’s meaning” is problematic. In some cases the author’s meaning would not be transparent without reference to the visual grammar of the scientific vernacular. In other cases the diagrams may have expressed their authors’ ideas more clearly than they realized or may have reflected mixed feelings.

Many of the diagrams designed by Osborn and his colleagues at the American Museum of Natural History resembled Darwin’s diagram in their bushiness, especially those illustrating the concept Osborn named “adaptive radiation,” the diversification of related organisms as they adapt to different environments. Darwin’s branching concept of evolution was not, however, the primary image offered to the public in diagrams of the 1920s. A characteristic example is the tree (figure 4) in Benjamin C. Gruenberg’s *The Story of Evolution*, a highly stylized, conventionalized rendering, including no information about time or extinction, conveying the impression that there is a single “main line” of evolution, culminating in “man” (in a suit!).¹⁸

Why were trees like this offered to the public in place of more complex and informative diagrams? Remnants of the underlying conception of evolution displayed by Haeckel’s tree, so much at odds with Darwin’s branching concept, remain in evidence in many images found in the popular literature of the 1920s, even some grounded in a relatively Darwinian view. Among the most frequently reprinted tree diagrams of the 1920s were illustrations of the evolutionary history of horses, especially those produced by the geologist William Diller Matthew, working under Osborn, for exhibit at the American Museum. Representations of the fossil record of horses had been favorite illustrations of evolution ever since Thomas Henry Huxley, touring the United States as Darwin’s most famous public advocate, visited the fossil horse collection of Othniel Charles Marsh at Yale College in 1876. The Yale horses made such a convincing case for evolution that Huxley immediately included them in lectures during his American tour. The horse diagram most widely published in the

¹⁷ Henry Fairfield Osborn, *The Age of Mammals in Europe, Asia, and North America* (New York, 1910), 7.

¹⁸ A similar tree, used as the frontispiece for a 1921 book, outfitted the human at the top of the tree in the garb of the stereotyped “cave man.” See Whyte, *Wonder World We Live In*, n.p. The cave man is obviously taken from a 1911 picture published in the *Illustrated London News* and reproduced in Moser, *Ancestral Images*, 155.

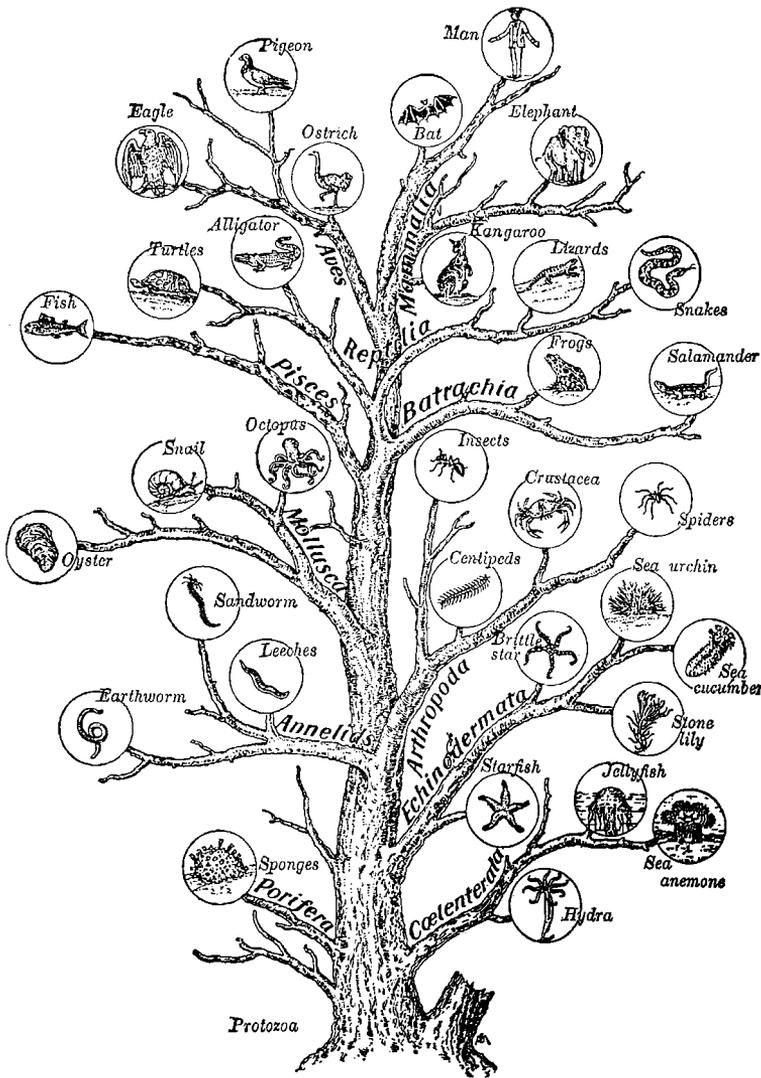


Figure 4. Benjamin C. Gruenberg's 1919 family tree diagram, depicting living animals perched on branches of a realistic tree, is typical of evolutionary diagrams in textbooks of the period, as is the whimsical use of clothing in the figures representing humans. The cutoff branch near the base of the tree represents a trunk for families of plants, depicted on another page. *Reprinted from Benjamin C. Gruenberg, The Story of Evolution: Facts and Theories on the Development of Life (Garden City, 1929), p. 71.*

1920s (figure 5) was actually executed in 1902. At that time, horse evolution remained the most convincing instance of evolution, and the diagram creatively incorporated geologic strata, associating them with changes in parts of horse anatomy over time. The 1902 diagram was exhibited at the museum and published in successive museum leaflets. But by 1925 Matthew realized that horse evolution was much more complex than his own most famous diagrams might indicate. He had highlighted the net

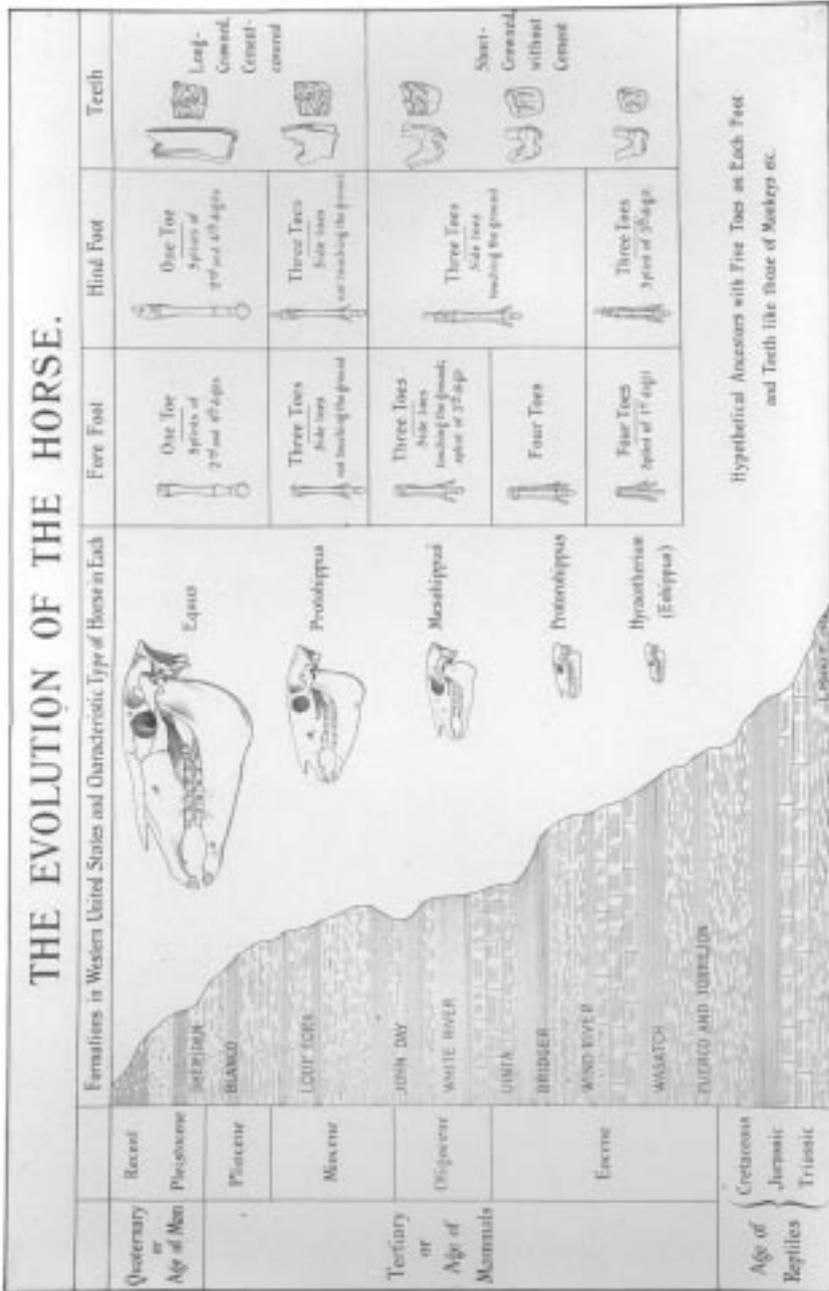


Figure 5. Horse evolution has long been used to illustrate and to prove evolution. This diagram, designed in 1902 and on display at the American Museum of Natural History in the 1920s, was widely reproduced in science popularizations and textbooks of the decade. It incorporates geological and anatomical observations to depict the pattern of change over time. It also conveys a linearity that could mislead anyone unfamiliar with the complexity of horse evolution. *Courtesy American Museum of Natural History, New York. Neg. no. 35522.*

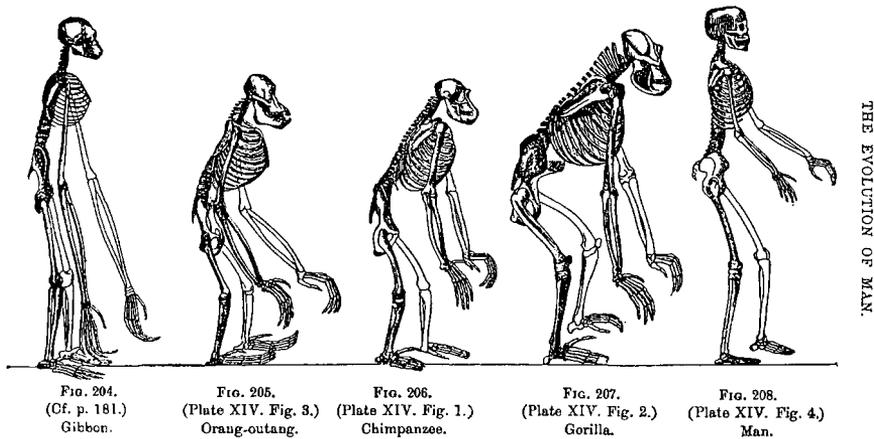


Figure 6. Originally published as the frontispiece to Thomas Henry Huxley's 1863 book, *Man's Place in Nature*, this sequence appeared often in the 1920s. Though Huxley conceded "the vastness of the gulf between civilized man and the brutes," the human in this figure is positioned no farther from the gorilla than the gorilla is from the chimpanzee. Reprinted from Thomas Henry Huxley, *Man's Place in Nature* (1863; *Ann Arbor*, 1959), frontispiece.

direction from *Eohippus* to *Equus* partly to demonstrate evolutionary sequence. In the face of challenges to evolution in the 1920s, science popularizers used the diagram heuristically—to demonstrate the *fact* of evolution even though it simplified the *pattern* by emphasizing large trends and net direction and neglecting complexity and side branches. And museum display and publication fixed these images in a canon, obscuring their dynamic function as "working hypotheses."¹⁹

The construction of museum exhibits—which was expensive—extended the life span of Matthew's most linear horse images. The prominence of the American Museum exhibits meant that those diagrams were widely reproduced in books and magazines for John Doe. By 1930, they were also included in books for children, such as *The Earth for Sam*.²⁰ Matthew's familiar horse diagrams implied a linear, teleological evolutionary pattern that could readily be extrapolated to human evolution. And in 1925, evolution meant human evolution, books for John Doe notwithstanding. If horse evolution followed a linear trajectory, the obvious conclusion was to extrapolate and assume a linear ascent to the "highest" form of animal—humans.

The apparently linear views of human evolution in museum exhibits and in popular culture may have confirmed belief in a deterministic, progressive, teleological pattern of evolution—evolution with humans as its goal. In 1925 many of the scientists who sought to persuade the public of the harmony of evolution with the tenets

¹⁹ Horse diagrams were often drawn to support Osborn's linear, progressive model of evolution. See Rainger, *Agenda for Antiquity*, 164–65, 208–10. W. D. Matthew, "The Evolution of the Horse: A Record and Its Interpretation," *Quarterly Review of Biology*, 1 (no. 2, 1926), 139–85; American Museum of Natural History, *Evolution of the Horse* (New York, 1924); Thomas Henry Huxley, *American Addresses* (London, 1877), 71–90; Gould, *Full House*, 57–88; Gould, *Bully for Brontosaurus*, 168–81; George Gaylord Simpson, *Horses: The Story of the Horse Family in the Modern World and through Sixty Million Years of History* (Garden City, 1961).

²⁰ W. Maxwell Reed, *The Earth for Sam* (New York, 1930).

of Christian faith perceived evolution as progressive in that sense. They did not, however, see evolution as a simple linear pattern; even committed believers in progress and direction in evolution knew that the patterns of evolution were complex.²¹

The impression of a linear ascent to humans was reinforced by another diagram frequently reproduced in the 1920s. (See figure 6.) Originally published by Thomas Henry Huxley in *Man's Place in Nature* in 1863, the sequence of skeletons of the four great apes—a gibbon, an orangutan, a chimpanzee, and a gorilla—and a human appeared amid the debates that followed publication of *On the Origin of Species*. In that context Huxley's primary concern, like Matthew's in 1902, was to establish relationship and thus the fact of evolution. In his debate with the anatomist Richard Owen over human origins, Huxley's strategy was to argue that anatomical similarities among the brains of primates implied a close relationship. Although he sought to establish the physical relationships of humans and the great apes, he conceded "the vastness of the gulf between civilized man and the brutes . . . whether *from* them or not, he is assuredly not *of* them."²² Even so, his ape-to-human series implied equal distances separating the four great apes from each other and the fourth from the human. That would be the obvious inference when the sequence was removed from the anatomy lab and reproduced in popular books. And it was widely reproduced, beginning in the 1870s in successful books by Haeckel and continuing in the 1920s John Doe genre.

Scientists often cited the cultural distance between humans and apes; some of them prized that distance as much as Bryan did. But Huxley's diagram implied something different. Based on anatomical studies of extant species, the series included no reference to evolutionary time or ecological context, and the proximity of the human figure to the apes, along with the left-to-right direction from apes to human, would evoke familiar echoes of the old notion of a linear chain of being. From the perspective of those unfamiliar with its context, Huxley's ape-to-human series could imply that the distance separating the human from the gorilla was no greater than that between the gorilla and the chimpanzee. This visual series survived as a recurrent motif for the 1920s literature.

Huxley's diagram provided a template for a visual cliché—easily used in a standard evolution joke. This cliché appeared in press coverage of the Scopes trial in 1925. A cartoon in the *New Yorker* invoking it illustrates the cultural backdrop of the evolution debate. Called "The Rise and Fall of Man," the series progressed from chimpanzee to Neanderthal to Socrates, then—by implication, descended—to William Jennings Bryan. (See cover illustration.)²³ For the editors of such magazines as the *New Yorker*, the evolution debates were more about cultural issues than about the substance of science, and those magazines—and cartoons like this one—played

²¹ Bowler, "Darwinism and Modernism."

²² Thomas Henry Huxley, *Man's Place In Nature* (1863; Ann Arbor, 1959), frontispiece (n.p.), 129–30. See also Nicholas Rupke, *Richard Owen: Victorian Naturalist* (New Haven, 1994); and Adrian Desmond, *Huxley: From Devil's Disciple to Evolution's High Priest* (Reading, 1997).

²³ For a discussion of recent versions of this joke, from a perspective that differs from mine, see Gould, "Ladders and Cones," *New Yorker*, June 6, 1925, p. 3. For another example, see *Judge*, July 18, 1925, p. 2.

an important role in keeping cultural conflict at the center of the debate. Such cartoons caricature evolution in order to make jokes about human culture. The joke may consist in the exposure of some human pretense in the face of our animal origin or highlight the peculiar status of humans as evolutionary anomalies. In general, though, the final figure supplies the punch line, diverting attention from the assumptions underlying the sequence, including the very notion that it *is* a sequence, marking progress from left to right, as in a language of words. The cliché became a kind of common knowledge. The common knowledge in this case included the linear, goal-directed version of evolution and human descent directly from apes, views that were far more controversial among scientists in 1925 than published diagrams revealed.

An evolutionary tree diagram by another American Museum paleontologist, William King Gregory, made explicit the dimension of geological time left out of the popular cliché. (See figure 7.) Most evolutionists understood this dimension to be implied in linear diagrams. The familiar sequence, appearing at the top of the tree, represented the living remnants of a long history, products of a more complex branching pattern. Gregory reversed the conventional left-to-right order by placing humans on the far left, perhaps intending to undermine the usual connotation of progress toward humans. His inclusion of “undiscovered ancestors” at the base of the diagram highlighted its function as “working hypothesis,” which may explain why trees like this were not common in books for John Doe.²⁴

In his writings Gregory suggested that earlier taxonomists, under the influence of the old chain-of-being model of linear evolution, had simplified evolutionary trends by assuming that animals evolve from simple to complex or generalized to specialized. In reality, he suggested, each species of animal is a mosaic of primitive and advanced characters. Furthermore, some features have greater diagnostic value for classification than others. Trained as a comparative anatomist, Gregory began with skeletons and reasoned backward through all of the forces that contribute to the forms that skeletons take: the constraints of physiology, development, genetics, and evolutionary history. His scientific work had a strong ecological bent. The animal we see in the modern world is the complex result of a subtle combination of ecological and historical forces. An evolutionary branch occurs under the influence of a particular set of ecological circumstances, and once taken, that branching is irrevocable. So the ecological history of an animal is a part of both its past and its future. Animals evolve in response to ecological circumstances, but they have to use the raw material their evolutionary history has given them.²⁵

²⁴ Thanks to George Roeder for the observation that William King Gregory's diagram made its “working hypothesis” nature explicit, and for the suggestion that this could explain why such trees did not find their way into popular books. William King Gregory and Marcelle Roigneau, *Introduction to Human Anatomy: Guide to Section I of the Hall of Natural History of Man* (New York, 1934).

²⁵ For Gregory's discussions of human evolution, tree diagrams, and mosaic evolution, see, for example, William King Gregory, “Studies on the Evolution of the Primates,” *Bulletin of the American Museum of Natural History*, 35 (1916), 239–355; William King Gregory, *Our Face from Fish to Man: A Portrait Gallery of Our Ancient Ancestors and Kinsfolk together with a Concise History of Our Best Features* (New York, 1929); William King Gregory, “The Origin, Rise, and Decline of *Homo sapiens*,” *Scientific Monthly*, 39 (Dec. 1934), 481–96; and William King Gregory, “Supra-specific Variation in Nature and in Classification: A Few Examples from Mammalian Paleontology,” *American Naturalist*, 71 (Jan.–Feb. 1937), 268–76.

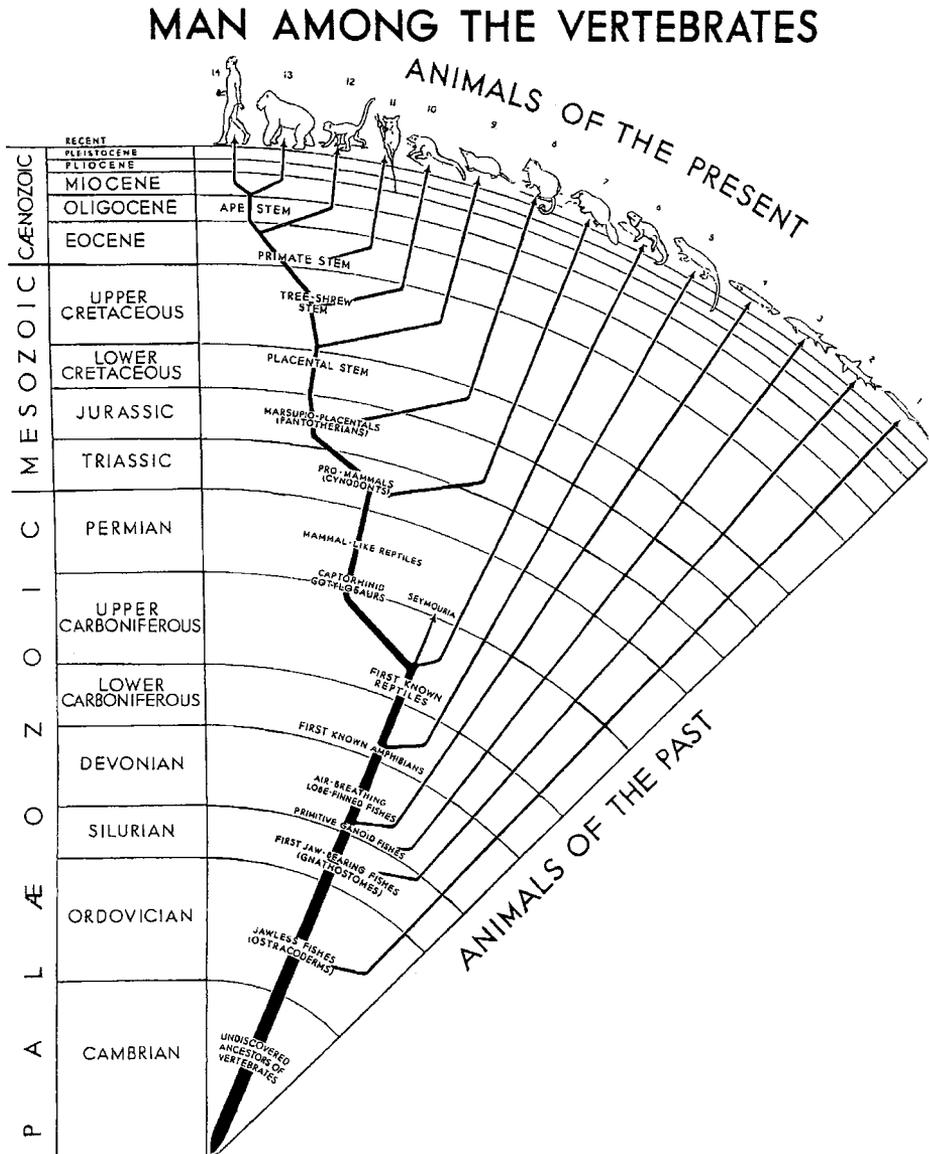


Figure 7. William King Gregory’s 1934 diagram makes explicit a dimension—that of time—understood by scientists to be implied in linear illustrations such as Thomas Henry Huxley’s but often neglected in the depictions of evolution in popular texts. By including “undiscovered ancestors,” this diagram represents scientific process—and the role of diagrams in scientific hypothesis testing—more realistically than most popularizations did. *Reprinted from William King Gregory and Marcelle Roigneau, Introduction to Human Anatomy: Guide to Section I of the Hall of Natural History of Man (New York, 1934), p. 27. Courtesy American Museum of Natural History, New York. Neg. no. 313712.*

Seeing the living animal as a mosaic of adaptation to past as well as present ecological circumstances, Gregory designed family tree diagrams of individual animal features, for example, the primate hand or the mammal skull. A single animal might combine both primitive and advanced characteristics. In his diagrams of hands or skulls “from fish to man,” Gregory intended the complexity of evolutionary processes to be assumed. In the heat of the Scopes trial debates, however, some of those diagrams were reprinted out of context, conveying an impression that a single feature, the primate hand, for example, was responsible for an animal’s relative success—denoted by its position on the family tree.

In claiming that tree diagrams “express most clearly the author’s meaning,” Osborn was both right and wrong. The function of the diagrams as working hypotheses of science was belied by their authority as truth and their longevity on display and in print. The effort to use them as persuasive devices obscured the syntax of scientific convention necessary to comprehend the full intentions of their authors. Extrascientific messages, intended or not, would often be more evident to audiences.

John Doe need not have been a creationist, an anti-intellectual, or a fool to react with discomfort to the hierarchical diagrams used by defenders of evolution. Several of the fish-to-man diagrams suggest an evolutionary hierarchy redolent of social and political preoccupations of the time. According to the caption for the frontispiece of Gregory’s book *Our Face from Fish to Man*, the series culminates in a “Roman athlete.” (See figure 8.) The figure beneath the Roman athlete—but superior to a chimpanzee—represents, the caption tells us, a Tasmanian. The face of the Tasmanian contrasts oddly with its antecedents. Half smiles seem to play across the faces of the “lower” animals, giving them benign, almost friendly appearances. In its facial expression the gorilla is the most anthropomorphic of the animal faces, suggesting a progression of animal sentiments from fish to man. The Tasmanian, unlike the lower animals, scowls, betraying a distinctly less friendly attitude.²⁶

To some members of the public, the diagrams conceived at the American Museum might seem to include entirely too many ideas. Both Gregory and Osborn, his mentor at the American Museum, were active in the eugenics movement. As has often been pointed out, racial and eugenics themes were prominent in the famous Hall of the Age of Man exhibit whose construction began in 1915; indeed, Osborn made special efforts to complete the exhibit in time for the International Eugenics Congress held at the museum in 1921. Since many biologists of the time were active in the eugenics movement, it would be hard to say that eugenicist views were disproportionately represented among the scientists defending Scopes in the press. But it is certainly true that many of his defenders held such views and voiced them relentlessly. Textbooks—including Hunter’s *Civic Biology*—routinely incorporated messages about racial hierarchy and eugenics. It is reasonable to ask whether those ideas limited their audience—Osborn, for example, referred to

²⁶ Gregory, *Our Face from Fish to Man*, frontispiece (n.p.). The caption accompanies the frontispiece, which shows the same faces in a more tree-like arrangement. I am grateful to Richard Areson Clark for his perceptive reading of this diagram.

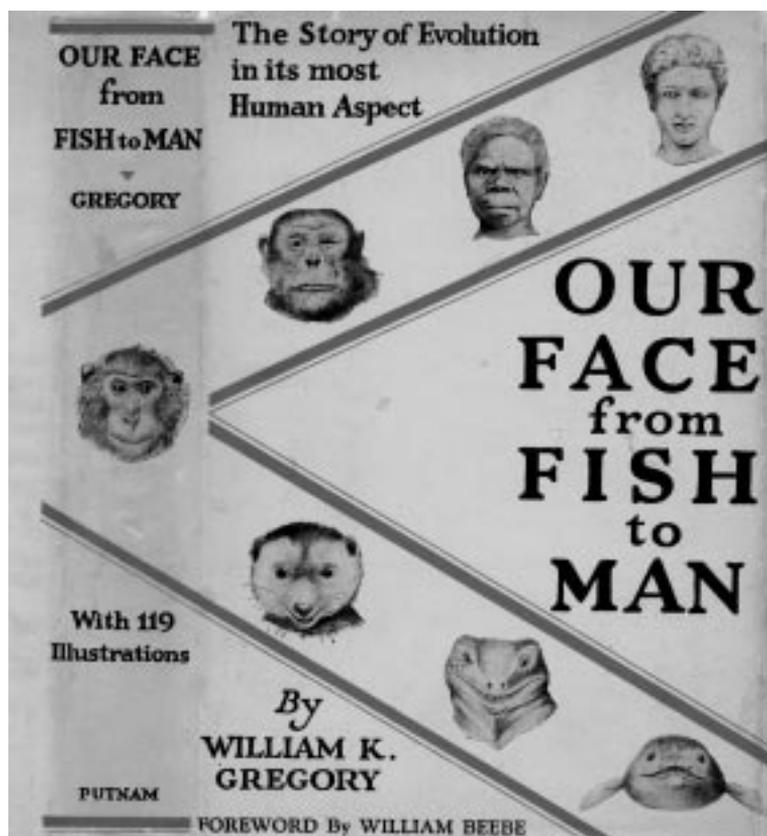


Figure 8. The dust cover of William King Gregory's 1929 book, *Our Face from Fish to Man*, displays a variation of a treelike diagram. Within the book the penultimate figure is identified as a Tasmanian and the topmost as "a Roman athlete." Reprinted from William King Gregory, *Our Face from Fish to Man: A Portrait Gallery of Our Ancient Ancestors and Kinsfolk Together with a Concise History of Our Best Features* (New York, 1929).

"our" Nordic heritage in his articles in the American Museum's popular magazine *Natural History*.²⁷

Americans of non-Nordic ethnic heritage might have found the linear view of evolution implied in many diagrams less than compelling, since the linear model was implicitly—and sometimes explicitly—hierarchical. Diagrams presenting humans as the apex of the evolutionary process often positioned particular humans at the pinnacle and others closer to the animals or to more "primitive" branches of the family tree. Even diagrams intended to convey the complexity of evolutionary patterns, as many of Gregory's were, could reinforce the message of racial hierarchy. Osborn had

²⁷ Henry Fairfield Osborn, "Our Ancestors Arrive in Scandinavia," *Natural History*, 22 (March–April 1922), 116–34; Rainger, *Agenda for Antiquity*; Dean, "What Animal We Came From"; Daniel J. Kevles, *In the Name of Eugenics: Genetics and the Uses of Human Heredity* (New York, 1985); Philip J. Pauly, "Essay Review: The Eugenics Industry—Growth or Restructuring?," *Journal of the History of Biology*, 26 (Spring 1993), 131–45.

photographs of one of Gregory's tree diagrams from the Hall of the Age of Man sent to Dayton, Tennessee, for the edification of Scopes trial jurors and the public. The same tree appeared in several newspapers during the summer of the trial, in some cases with a photo of Osborn as an inset. This diagram suggested some of the themes in Gregory's "Animals of the Past, Animals of the Present" diagram (figure 7), but with a significant difference. Focused on a single, bifurcated branch of a larger tree whose existence was indicated by a trunk at the left side of the picture, it implied that human evolution occurred somewhere other than at the pinnacle of the tree. The lineage of the primates was decisively separated from that of humans and their ancestors. But the living members of the primate family aligned themselves in the familiar chain-of-being pattern, this time vertically, at the right-hand side of the diagram. At least one newspaper that published a photograph of this diagram included an exceptionally long caption, explaining to the public what the image meant. The verbal explanation emphasized that the white race of humans—represented by an "American"—belonged on "the topmost twig" of this vertical hierarchy and that "on the same stalk, in lower order, are placed the Australian native, the negro and the Chinese." The public had reason to be all too familiar with the grammar of racial messages and with the cartoon brutalizing of ethnic "others." The "ape-man" (supposedly intermediate between apes and humans) so often mentioned in the popular press of the 1920s had a long history of association with ethnic imagery.²⁸

Despite the best efforts of evolutionary biologists, the average man or woman, John or Jane Doe, had good reason for associating evolution with ape-men. Newspaper accounts of the trial referred endlessly to the event in Dayton as the "monkey trial." The more combative opponents of evolution, such as Billy Sunday and John Roach Straton, gleefully labeled evolution "the jungle theory" and hammered relentlessly on the monkey theme. Moviegoers could see Dr. Challenger confront and vanquish ferocious ape-men in *The Lost World*. Monkeys appeared everywhere in 1925, as they had in the years following Darwin's publication of *On the Origin of Species* in 1859.

Even as staunch a defender of evolution as Henry Fairfield Osborn found the notion of a close relationship between humans and the great apes unsavory. Osborn's trees revealed a profound ambivalence about human evolution. Indeed, the trial seems to have ignited an already smoldering disagreement between Osborn and many of his colleagues over the evolutionary distance separating humans and anthropoid apes. Osborn insisted more and more forcefully—and publicly—during and after the trial that the lineage that led to humans had split off from the rest of the primates as long ago as the Eocene—at the base of the human family tree—a theory in which very few evolutionary scientists concurred. Increasingly, Osborn attempted to reassure a hesitant public by suggesting that the "ape-man theory" of human descent was a myth, which would

²⁸ For a reference to this diagram in a context that emphasizes Osborn's disagreement with Gregory, see Dean, "What Animal We Came From," 220, 291. "Ascent to Utopia Evolution's Aim, Says Savant, Decrying Quibbling," *Poughkeepsie Enterprise*, June 22, 1925, clipping, folder 14, box 19, Osborn Papers; *New York Times*, July 12, 1925, sec. 8, p. 1; William King Gregory, "Did Man Originate in Central Asia?," *Scientific Monthly*, 24 (May 1927), 385–401; George Grant MacCurdy, "Old Problems and New Methods in Prehistory," *Scientific American*, 134 (May 1926), 308–9; L. Perry Curtis Jr., *Apes and Angels: The Irishman in Victorian Caricature* (Washington, 1997); Moser, *Ancestral Images*.



Figure 9. American Museum of Natural History exhibits emphasized the scientific reasoning that went into the reconstruction of these human ancestors by the biologist and artist J. H. McGregor. Nevertheless, antievolutionists seized on them as examples of scientific imagination—or duplicity—run amok. Fundamentalists challenged the reconstructions themselves and their arrangement in space. *Courtesy American Museum of Natural History, New York. Neg no. 313682.*

eventually be replaced with his own far more palatable “dawn-man” theory. William King Gregory engaged in public debates with his mentor in which he suggested that Osborn’s religious convictions had clouded his scientific judgment. Gregory perceived Osborn’s debates with Fundamentalists as ironic, remarking that Osborn, a religious and conservative person, sought to resolve concerns about human ancestry “by abolishing apes” from the family tree. “In this way,” Gregory commented wryly, “sensitive souls may be able to hear the word ‘gorilla’ without shuddering.” In the heat of the debate with Fundamentalists, Osborn had become, Gregory joked, a “pithecofobiatic.”²⁹

While antievolutionists such as Bryan demanded that diagrams put spatial distance between the human and the ape, Osborn, who had spent most of his life thinking in terms of geologic time, insulated humans from their anthropoid relatives by allocating extra millions of years to the recent period for the two lineages to grow apart. He tried to accomplish this buffering not only by altering the shapes of family tree diagrams but also—through his influence on artists and scientists who created them—in the design of busts and murals depicting human ancestors. Picto-

²⁹ Henry Fairfield Osborn, “Recent Discoveries Relating to the Origin and Antiquity of Man,” *Proceedings of the American Philosophical Society*, 66 (1927), 373–89; Henry Fairfield Osborn, “Is the Ape-Man a Myth?,” *Human Biology*, 1 (Jan. 1929), 4–9; Osborn, *Man Rises to Parnassus*; Osborn, *Men of the Old Stone Age*. On the disagreement between Osborn and Gregory, see Rainger, *Agenda for Antiquity*, 228–41; and Dean, “What Animal We Came From,” 4, 259–300. For Gregory’s statement, see George Gaylord Simpson, “William King Gregory, 1876–1970,” *American Journal of Physical Anthropology*, 35 (Sept. 1971), 158.

rially, the distance between early and more recent human ancestors could be represented rather subtly. A popular display at the American Museum, a series of busts of hominids created by the biologist J. H. McGregor, again under Osborn's direction, attempted to illustrate not only the appearances of human ancestors but also the method used to reconstruct them from fossils. (See figure 9.) Incorporating McGregor's method in its display, for example, by including busts that exposed the skull on one side of the head and displayed a fleshed-out image on the other, the exhibit emphasized scientific objectivity. In an article in *Natural History*, the museum's journal aimed at a popular audience, McGregor wrote that in reconstructing the features of a Neanderthal male from fossils he had "tried to be conservative, to follow only the guidance of anatomical fact, minimizing my personal equation in the work as far as possible, and avoiding any inclination to make the result either bestial or brutal." McGregor admitted that "as a concession to popular taste" he had added hair styles and, in the case of the Neanderthal figure, a beard—obviously not deducible from fossil evidence. "But," he added, "the Neanderthal species was human, not brute."³⁰

Scrupulously scientific as he intended to be, McGregor cautioned readers that busts reconstructed from fossil evidence could never be "individual portraits, but type models or *racial portraits*." In the article on his restoration of the Neanderthal, he stressed that pictures representing Neanderthals as African had been mistaken: "the negroid condition is almost certainly not a primitive character, but a racial specialization."³¹ This was not a trivial point. Expeditions financed by the American Museum fanned out across central Asia in search of hominid fossils that might prove that continent to be the "birthplace" of humankind, dismissing claims for Africa and discounting the 1924 discovery of the first specimen of *Australopithecus africanus*.

The links between racial prejudice and the search for an Asian hominid ancestor were made explicit in a newspaper article by the British paleontologist Arthur Keith. Conceding that the evidence for African origins of *Homo sapiens* was strong, Keith insisted that the most advanced of human ancestors, Cro-Magnon, must have come from somewhere other than Africa. Why? Setting aside all archaeological evidence, he wrote frankly, "My preference for Asia is founded on a belief in the virtues of race. . . . My racial prejudice leads me to seek for the Cro-Magnon cradle—the evolutionary center of the white man—in . . . Asia . . . partly because the native peoples of Africa lack the progressive genius of the Asiatic." We know, Keith furthermore asserted, that the Cro-Magnon artists had to have been white people, because they had a gift for art.³²

For eugenicists such as Osborn and Keith, a lot was at stake in the definition of Cro-Magnon people. A subtle interpretive refinement in the series of busts for the

³⁰ J. H. McGregor, "Restoring Neanderthal Man," *Natural History*, 26 (May–June 1926), 288–93; Rainger, *Agenda for Antiquity*, 170–73.

³¹ McGregor, "Restoring Neanderthal Man," 289, 293.

³² On Keith's ideas about human evolution in the context of his celebration of European imperialism, see Bowler, "Darwinism and Modernism," 252–54. Rainger, *Agenda for Antiquity*, 99–104; Arthur Keith, "Whence Came the White Race?," *New York Times Sunday Magazine*, Oct. 12, 1930. A clipping of this article is in folder 2, box 12, Osborn Papers.

American Museum served to separate the more recent human ancestors, Neanderthal and Cro-Magnon, from their progenitors. McGregor made earlier hominids—*Pithecanthropus*, or “Java Man,” and *Eoanthropus*, the fabricated Piltdown specimen—somewhat openmouthed (if not quite slack-jawed), in contrast to the resolute looking Neanderthal and the more recent Cro-Magnon, who vaguely resembled Thomas Jefferson. The museum supplied slides of the McGregor reproductions to many teachers for use in classrooms. Like many other exhibits from the museum, the series frequently found its way into textbooks and John Doe books. It also adorned advertisements for those books, as well as for books not exclusively about evolution, such as a 1925 edition of H. G. Wells’s *Outline of History*, and even for antievolution books. When the McGregor sculptures appeared in advertisements for antievolution books, the progressive sequence of human ancestry was replaced by a single bust, of one of the more primitive members of the family. *God—or Gorilla*, a well-publicized book by Alfred Watterson McCann, focused explicitly and at length on the exhibits at the American Museum, accusing Osborn and McGregor of duplicity and deceit. McGregor’s reconstructions, McCann charged, were shameless fabrications, works of determined imagination based on an appalling lack of evidence. An advertisement promoting the book, referring to “the Tadpole and Monkey Theory of Evolution” as “barnyard materialism” was illustrated with a single picture, a reproduction of McGregor’s openmouthed *Pithecanthropus*. A privately published antievolution book by Nathan G. Moore, a lawyer, also reproduced McGregor’s figures but on widely separated pages, emphasizing his contention that the sequence was imaginary. This sort of thing must have exasperated Osborn, who revealed in an essay in the *Forum*, “I am perhaps more proud of having helped to redeem the character of cave men than of any other single achievement of mine in the field of anthropology.”³³

In a 1925 issue of the *Forum*, he recounted a trip to see cave paintings in Europe, recording his admiration for the artists. A silhouette of a Cro-Magnon cave artist graced the advertisement in the *New York Times Book Review* for his 1925 book, *The Earth Speaks to Bryan*, dedicated to John Thomas Scopes. (See figure 10.) The silhouette came from a magnificent painting by the artist Charles R. Knight, part of a series for exhibit at the museum, depicting what Osborn called the ascent from Neanderthal to Cro-Magnon and painted, as usual, under Osborn’s direction. Among the most popular exhibits at the American Museum, these murals of early humans represented an unusually large investment, and they were widely disseminated by reproductions in books for John Doe.³⁴

Knight composed his painting to focus on the Cro-Magnon artist, a shaft of light (in a technique reminiscent of the tradition of European Christian religious art)

³³ Ad for *God—or Gorilla* by Alfred Watterson McCann, *New York Evening Post*, June 3, 1925, p. 11; Alfred Watterson McCann, *God—or Gorilla* (New York, 1925); Nathan G. Moore, *The Theory of Evolution (An Inquiry)* (Chicago, 1931); Henry Fairfield Osborn, “Evolution and Daily Living,” *Forum*, 73 (Feb. 1925), 171.

³⁴ Ad for *The Earth Speaks to Bryan* by Henry Fairfield Osborn, *New York Times Book Review*, July 12, 1925, p. 18. For the correspondence between Osborn and Charles R. Knight about this painting see box 1, Charles R. Knight Papers (New York Public Library, New York, N.Y.); and folders 8 and 9, box 12, Osborn Papers. Moser, *Ancestral Images*, 159–60; Rainger, *Agenda for Antiquity*, 174–77; Sylvia Massey Czerkas and Donald F. Glut, *Dinosaurs, Mammoths, and Cavemen: The Art of Charles R. Knight* (New York, 1982), 68–69.

highlighting the production of a sophisticated cave art. Osborn and Knight clearly intended this Cro-Magnon artist to represent the gulf separating early from advanced humans—the difference was art. This painting represents the essence of Osborn's response to concerns, like Bryan's, about the place of the human soul in evolution.

In *The Earth Speaks to Bryan*, Osborn asserted, "We naturalists accept as transcendent the teaching that the universe is by no means the result of accident or chance, but of an omnipresent beauty and order, attributed in the Old Testament to Jehovah, in our language to God." Not all of the scientists engaged in the Scopes debate would travel as far as Osborn in this direction, but many of them navigated the same path. Similar rhetoric colored statements of such defenders of evolution as the biologists Edwin Grant Conklin, David Starr Jordan, John C. Merriam, and Charles Doolittle Walcott, all eminent figures. Such language also appeared in a "Joint Statement upon the Relations of Science and Religion, by Religious Leaders and Scientists," published in *Science* and known as the Millikan Manifesto because it was written and promoted by the physicist Robert A. Millikan, a Nobel laureate.³⁵

The editors of the *New Republic* took statements "defending evolution as the very pattern of God's wisdom" as part of a rhetorical strategy adopted by scientists, and one they deplored. An editorial described a movie about evolution made under the direction of American Museum scientists and "shown in all the better theatres" in the summer of the Scopes trial as "quite remarkable" in its effects. But the film concluded with a disturbing message, drawn from a ubiquitous piece of doggerel: "Some call it evolution / And others call it God." Naming Osborn as one of the scientists broadcasting this sentiment in the popular media, the editor complained, "It can do no good to point out that 'god' is not a scientific conception, that scientific researches reveal nothing but material facts, that spiritual principles are as irrelevant to biological evolution as jabberwocky. Every scientist knows this." Emphasizing Osborn's stature explicitly, he went on, "No one understands better than the president of the American Museum of Natural History that in the process of biological evolution the one test of fitness is the fact of survival. . . . Nothing could be further from any 'spiritual principle' than biological evolution."³⁶

But Osborn apparently understood no such thing. In the *Forum* essay recording his admiration for the cave artists, Osborn wrote: "Creation of this man of a higher order, known as the Cro-Magnon, with his moral, spiritual, and intellectual powers, is utterly incomprehensible as purely a process of the survival of the fittest." Ironically, Osborn's insistence that science was not only compatible with religion, but

³⁵ Henry Fairfield Osborn, *The Earth Speaks to Bryan* (New York, 1925); "Joint Statement upon the Relations of Science and Religion, by Religious Leaders and Scientists," *Science*, June 1, 1923, pp. 630–31.

³⁶ The film quoted the last two lines of a poem by William Herbert Carruth. The complete poem is: "A fire-mist and a planet, / A crystal and a cell, / A jelly-fish and a saurian, / And caves where the cave-men dwell. / Then a glimpse of law and beauty / And a face turned from the sod:— / Some call it Evolution / And others call it God." It was published and quoted often in the 1920s. See, for example, Straton and Potter, *Evolution versus Creation*, in *Creationism in Twentieth-Century America*, ed. Numbers, II, 49; and Langdon Smith, *Poems of Evolution* (Girard, 1924); Editor, "The Scientist Bends the Knee," *New Republic*, Aug. 5, 1925, pp. 280–81.

*By Henry
Fairfield
Osborn*

**The Earth
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Dedicated to John Thomas Scopes

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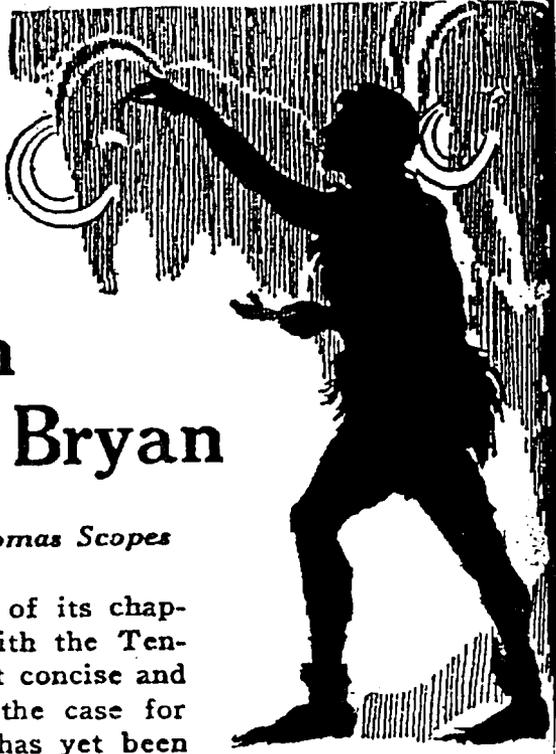


Figure 10. The silhouette of the Cro-Magnon cave artist used in this 1925 *New York Times* advertisement for Henry Fairfield Osborn's book, *The Earth Speaks to Bryan*, comes from a mural painted by the artist Charles R. Knight for the Hall of the Age of Man at the American Museum of Natural History. Knight's painting reveals his respect for the Cro-Magnon artists and their work and counters the popular stereotype of the cave man. *Reprinted from the New York Times Book Review, July 12, 1925.*

"furnished" "a sublime conception of God" meant that he ultimately insisted on the separation of all of human evolution from animal evolution, a limited form of consolation at best. In his efforts to weave God into the fabric of evolutionary theory, he failed to convince antievolutionists and alienated scientific colleagues. It might have surprised Bryan to learn that in a discussion of the mechanism of evolution, the geneticist Thomas Hunt Morgan had accused Osborn of having exempted mammals from the processes of evolution. "I am sorry to hear," Morgan wrote to Osborn, "that the mammals have not evolved by mutation. It would be too bad

to leave them out of the general scheme, . . . and I cannot but hope that you will relent some day and let us have the mammals back.”³⁷

Osborn and Knight’s Cro-Magnon cave artist suggested a noble vision of the human past, a vision that might distance the human essence from the ape-to-man sequence and offer doubters such as Bryan a separate circle for the human soul. It would almost seem that he and Osborn ultimately shared similar concerns. And they did. Ironically, had Osborn been able to assert with the editor of the *New Republic* that the question of the soul, like that of God, lay beyond the boundaries of science, his responses to Bryan might have been more convincing. But in his insight that scientific diagrams are not necessarily neutral about issues of values, Bryan put his finger on an important problem in the evolution debates.

The nobility implicit in Osborn’s image of the human essence as artist was severely compromised by his insistence on associating that image with messages about racial hierarchy. In addition, Osborn, like many biologists of the decade, was unable to relinquish the vision of a purposeful evolution, and this version of evolution shaped many of the scientific illustrations he put on exhibit at the museum. By 1925 the idea of purpose in evolution was hotly contested among scientists; it also failed to compel not only Bryan and his followers but many other thoughtful people, including more secular-minded members of the public. As one letter to the *New Republic* pointed out, “it is difficult to imagine anything more terrible than the laws of nature with purpose read into them.”³⁸

Another writer who objected strenuously to the implication that science could reveal anything important about values and religion, the novelist and essayist G. K. Chesterton, published a book in 1925 that dwelt on the public image of cave men. It was pure fantasy, Chesterton wrote, to derive any message about cave people from the existing evidence, with one exception. The one thing known without a doubt about cave people was that they produced a subtle and sophisticated art. We could therefore infer that they were human. “Art is the signature of man,” Chesterton declared, sounding a good deal like Osborn. Unlike Osborn, though, he argued that cave art implied that the one thing that really mattered—the human soul—was not something science could contemplate. Art, and therefore the human soul, had appeared suddenly and complete: “Monkeys did not begin pictures and men finish them; Pithecanthropus did not draw a reindeer badly and Homo Sapiens draw it well.” The cave man caricature in the comics obscured the important lesson.³⁹

The cave artists from whom Chesterton and Knight drew meaning were not necessarily able to compete in the public’s imagination with the cave men and women populating the cartoons. Under any circumstances the popular press might have found the potential humor of monkey images irresistible, but the mixed messages sent by science advocates undoubtedly exacerbated the confusion. The linear chain-

³⁷ Osborn, “Evolution and Daily Living,” 171; Osborn, *Earth Speaks to Bryan*, 87; Thomas Hunt Morgan to Osborn, folder 1, box 16, Osborn Papers; Rainger, *Agenda for Antiquity*, 136.

³⁸ James J. Porter to editor, *New Republic*, Aug. 12, 1925, p. 323.

³⁹ G. K. Chesterton, *The Everlasting Man* (New York, 1925), 34–35; Simeon Strunsky, “About Books, More or Less: Chesterton’s Faith,” *New York Times Book Review*, Nov. 22, 1925, p. 4.

of-being images of evolution so prevalent in the literature for John Doe probably did more to undermine assurances that humans are not directly descended from apes than words could have done. And as a colleague, William McDougall, wrote to Osborn, “surely the question the public is interested in is not whether man is ascended from some existing species of ape, but whether from any ape-like form.” McDougall wondered if Osborn’s argument was not disingenuous: his statements discarding the “ape-monkey theory” were accompanied by diagrams supporting that very theory.⁴⁰

No matter how many words evolutionists wrote acknowledging the complexity of evolutionary patterns, the public discourse was saturated with visual allusions to a linear, goal-directed, and hierarchical version of evolution. For a public accustomed to the visual cacophony of the monkey motif and linear hierarchies from fish to man, the story the pictures told was exactly the story that *Evolution for John Doe* denied, “the doctrine that man is descended from monkeys.” This was the common sense made familiar in evolution-based cartoons, jokes, science fiction, and movies. It was reinforced by the very people who tried to counter it with scientific images. Scientific diagrams may never have convinced anyone to switch sides in the evolution debate, but they did something more important. They subtly conveyed the notion that evolution works in a linear, goal-directed fashion, and they did this in a context that inextricably linked evolutionary progress with the racist obsessions of the time.

In the political and cultural context of 1920s America, images of evolutionary history that implied linear ascent perhaps inevitably evoked more familiar cultural hierarchies. While scientists rallied to the defense of evolution, their messages were often inconsistent, and cultural preoccupations were woven into them. The pictures presented to the public during the Scopes trial debate told eloquent stories, saying both more and less than their authors intended.

⁴⁰ Osborn once wrote that if he could, he would prohibit young people from ever reading “the irreverent funny pages.” Henry Fairfield Osborn, *Creative Education in School, College, University, and Museum* (New York, 1927), 47. William McDougall to Osborn, July 15, 1925, folder 2, box 92, Osborn Papers.