

Proceedings of the annual meeting of the Southern Anthropological Society

Volume 40
Number 1 *Building Bridges in Anthropology*

Article 8

2012

“I Didn’t Evolve from No Monkey”: Religious Narratives about Human Evolution in the U.S. Southeast

H. Lyn White Miles

University of Tennessee, Chattanooga, egrove_hlwm@maildrop.cc

Christopher Marinello

egrove_cmu@maildrop.cc

Follow this and additional works at: https://egrove.olemiss.edu/southernanthro_proceedings

Recommended Citation

Miles, H. L. W. & Marinello, C. (2012). “I Didn’t Evolve from No Monkey”: Religious Narratives about Human Evolution in the U. S. Southeast. *Building Bridges in Anthropology: Understanding, Acting, Teaching, and Theorizing: Proceedings of the Southern Anthropological Society*, 2010, 40, 77-102.

This Part 2 is brought to you for free and open access by the Southern Anthropological Society at eGrove. It has been accepted for inclusion in Proceedings of the annual meeting of the Southern Anthropological Society by an authorized editor of eGrove. For more information, please contact egrove@olemiss.edu.

"I Didn't Evolve from No Monkey": Religious Narratives about Human Evolution in the US Southeast

H. Lyn White Miles and Christopher Marinello

OVERVIEW

Longitudinal data from a survey regarding beliefs about evolution and religion were taken from a 12-year sample of students enrolled in a general education introductory anthropology course at the University of Tennessee at Chattanooga from 1996-2007. The results show that 59 percent of the students accepted human evolution and combined scientific perspectives with Judeo-Christian religious views, spiritual or non-western views, or accepted evolution on its own. Student narrative explanations of their views showed evidence of William Perry's stages of college intellectual development. Fifty-two percent of the arguments gave internal justifications, while the remaining arguments were either ones from authority (e.g., "the Bible says...") or from evidence (e.g., "fossil evidence suggests..."). A historical themes and misunderstandings about evolution, including that human history began with Jesus or that species are commonly created through hybridization, were frequent. College anthropology instruction should address these misunderstandings explicitly, utilize active learning assignments and critical thinking, and reframe the creationism-evolution controversy as a dispute among alternative religious views as a means to increase acceptance of human evolution and close the culture gap.

INTRODUCTION

The ancient Greek philosopher Thales of Miletus, in the sixth century BCE, was one of the first scholars to question religious and mythological explanations for phenomena and to advocate for examining natural causes (Thales of Miletus, unknown/1957, cited in Kirk 1957). Since the advent of the scientific method, societies have had to grapple with the gap between existing religious worldviews and received knowledge, and with new ways of knowing based on reason and empirical evidence with changing paradigms. The culture lag and insecurity in religious acceptance of many scientific ideas, including human evolution, has become even more challenging given the rapid pace of scientific discoveries and technological change. Major world religions, such as Catholicism, Buddhism, Judaism, Hinduism, and mainline Protestantism, have incorporated evolutionary theory into their belief systems, but the fastest growing religious groups, fundamentalist Protestantism and Islam, have still advocated literal biblical interpretations at odds with science and have been much slower to accept biological evolution, especially for humans (Armstrong 2001; Burton, Johnson, and Tamney 1989).

In fact, acceptance of evolution in the United States has declined from 45 percent in 1990 to only 40 percent in 2010, and the United States now ranks only 33rd out of 34 developed nations in acceptance of human evolution, placing it below both European and Asian nations and just above Turkey (Miller, Scott, and Okamoto 2007). Miller, Scott, and Okamoto (2006) found that fundamentalism in the United States was more aggressive and uncompromising than fundamentalism in Europe and Australia, citing that the rate of acceptance of evolution even by college students has declined to 55 percent, down 10 percent over the last 20 years. Studies of college science teaching also report considerable misunderstanding and

extreme resistance of students to critical thinking about evolution (Dagher and BouJaoude 1997; Krammer, Durband, and Weinand 2009; Nelson 2007). Thus, our study sought to determine the acceptance of human evolution by a sample of Tennessee students, explore how students integrated evolution into their religious beliefs, examine their stages of intellectual development and misunderstandings about evolution, and formulate suggestions for teaching students whose beliefs are at odds with anthropological evidence.

METHODS

We surveyed students enrolled in social sciences courses from 1996 to 2010 in an ongoing longitudinal study of the integration of their religious beliefs and understanding of biological evolution. From a sample to date of 4,662 students, we selected a subsample of 846 students enrolled in Introduction to Anthropology during a 12-year period from 1996-2007. Introduction to Anthropology is a four-field general education course serving primarily freshmen and sophomore students at the University. The modal student in this course within the University of Tennessee system was a 19-year-old female who had taken one high school biology class with only a cursory treatment of evolutionary theory in earlier education (Krammer, Durband, and Weinand 2009).

Positions on Evolution

The survey instrument used in this study was based on positions on evolution adapted and modified from categories used by Eve and Harrold (1991), shown in table 1. Students reported demographic information, including age, sex, race/ethnicity, college year, major, and religion, and were asked to choose among five statements related to positions on evolution within a Judeo-Christian context: young

earth creationism, old earth creationism, theistic evolution, spiritual and non-Western evolution, and natural evolution. This was followed by an open-ended request: "Please explain your choice below."

NATURAL EVOLUTION

I believe that the earth was formed billions of years ago, and that life evolved from exclusively natural processes, without divine intervention or a supernatural force. New species of plants, animals, and humans have evolved and have also become extinct.

SPIRITUAL AND NON-WESTERN EVOLUTION

I believe in a higher power, order, earth mother, forces, or spirits that created and/or is expressed through nature and the earth. The universe is billions of years old, and plants, animals and humans have all evolved from earlier life forms with many species becoming extinct. This spiritual force or power acts through nature.

THEISTIC JUDEO-CHRISTIAN EVOLUTION

I believe in God as a divine being that created and/or expresses itself through the universe. The universe is billions of years old, and plants, animals, and humans have all evolved from earlier life forms with many species becoming extinct. God has acted through natural forces.

OLD EARTH CREATIONISM

I believe in God who created the world more than 6,000 years ago, and perhaps even billions of years ago. Plants and animals have undergone changes through time; but humans have NOT evolved from earlier life forms and were separately specially created by God.

<p>NATURAL EVOLUTION</p> <p>I believe that the earth was formed billions of years ago, and that life evolved from exclusively natural processes, without divine intervention or a supernatural force. New species of plants, animals, and humans have evolved and have also become extinct.</p>
<p>YOUNG EARTH CREATIONISM</p> <p>I believe in God who created the world in six literal 24-hour days, about 6,000 years ago. The species that God created have not changed AT ALL over time. Neither plants, animals, nor humans have evolved over time or become extinct. I do NOT accept human evolution.</p>

Table 4.1. Five basic positions on the evolution-creationism continuum

Eve and Harrold (1991) defined young earth creationism as a traditional fundamentalist position based on literal interpretations of the Bible that the world is only about 6,000 years old and was created in six literal 24-hour days. The young earth position holds that species have not changed over time, resulting in no evolution of plants, animals, or humans. Old earth creationism is characteristic of conservative Protestantism and allows for a much older age for the universe, some change in varieties or species of plants and animals, but no evolution of humans—only special creation. Many, but not all, intelligent design proponents are old earth creationists in that they allow for long-term and universal evolutionary processes but view the resulting order and complexity as requiring an intentional and intelligent creator and supernatural specialness of the human species in the creator’s image (Davis and Kenyon 1989). Theistic Judeo-Christian evolution combines both mainstream Judeo-Christian beliefs and an acceptance of the evolution of not only plants and animals, but also of humans. Spiritual evolution includes those who are more spiritual than

religious, with beliefs in a higher power or meaning to the universe. It includes non-Western monotheists and polytheists, New Age, Native American, or spiritual paradigms based on nature. The natural evolution position is based exclusively on non-supernatural scientific principles and evidence of plant, animal, and human evolution. Natural evolution rejects religious interpretations, finds them irrelevant, or takes an atheistic or neutral agnostic position toward them.

The student narratives were compared with the position they chose and in the few cases they differed, primacy was given to the narrative explanation. The most conservative position on evolution was scored for students who chose options in between two positions, and their dual selection was noted.

Perry Stage of Intellectual Development

Of the 846 responses, 759 contained narrative explanations of student views. To evaluate the students' critical thinking, we used William Perry's (Perry 1970, 1981; Rapaport 1984) schema of four stages of intellectual development of college students: dualism, multiplicity, relativism, and commitment. Perry (1970) found that in the first year of college, dualistic students believed that there were absolute right and wrong answers and did not realize that knowledge was culturally constructed. Multiplicity developed by the sophomore year after students were exposed to a variety of conflicting viewpoints in college and were overwhelmed or confused by them. Students made a choice but did not reflect on or articulate their reasons. By the junior year, relativistic students matured, recognized the importance of context, and began to discriminate among the diversity of views to which they had been exposed to make explicit reasoned choices. By the senior year, many students reached the commitment stage and integrated their knowledge with their personal experience and

identity, and were open to new responsibilities. These stages are not rigidly conceived. For example, millennial students now take longer than six years to complete college (Bowen, Chingos, and McPherson 2009), so there will be variation due to culture, region, context, and maturity level. However, Perry's schema is useful for understanding the progression of critical thinking as a measure of intellectual development and maturity.

The 759 narratives were also coded for type of argument, with 126 of the narratives containing multiple arguments, and thus, assigned multicode. The student explanations of their views were coded as an argument from religious, scientific, or parental authorities, argument from empirical evidence, or argument from internal self-justification. Common themes or misunderstandings about evolution were also categorized.

Data Analysis

The data were analyzed using PASW Statistics 18 and Excel 2007. The qualitative narratives were analyzed by matching student statement to idealized content for each Perry stage or argument type and by identifying shared themes. Data derived from other courses from Spring 1996, Fall 1997, and Fall 1997 were used to develop internal consistency of coding by four raters, including the two co-authors and two student research assistants, and a reliability of 93 percent was obtained. We hypothesized that the majority of students would accept human evolution but that creationist students would be a significant subgroup within the sample. We hypothesized that most students would be in Perry dualism or multiplicity stages and that both evolutionist and non-evolutionist students would justify their views with external, especially religious, authority.

RESULTS

Perspective on Evolution

Figure 4.1 shows that about 59 percent (499/846) of students chose theistic, spiritual, or natural evolution and were able to combine evolution with their religious beliefs, if they had them. Students not accepting human evolution comprised 41 percent (347/846) of the sample.

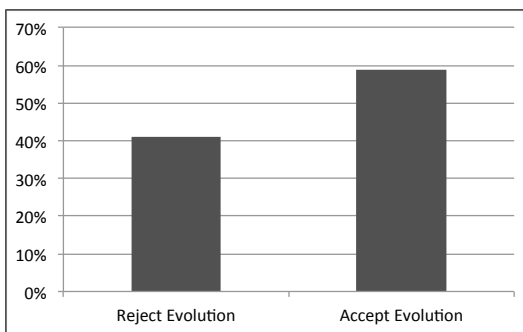


Figure 4.1. Perspective on evolution

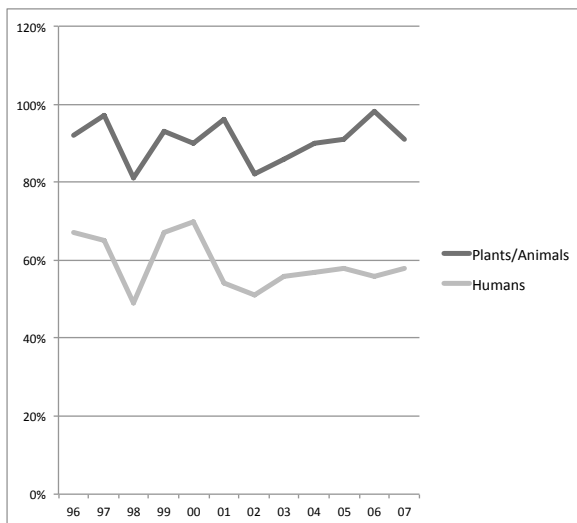


Figure 4.2. Degree of acceptance of plant, animal, and human evolution

Figure 4.2 shows that about 92 percent of students accepted plant and animal evolution or change within species, with a slight increase over time but that the acceptance of human evolution actually declined from 67.35 percent in 1996 to 58.17 percent by 2007.

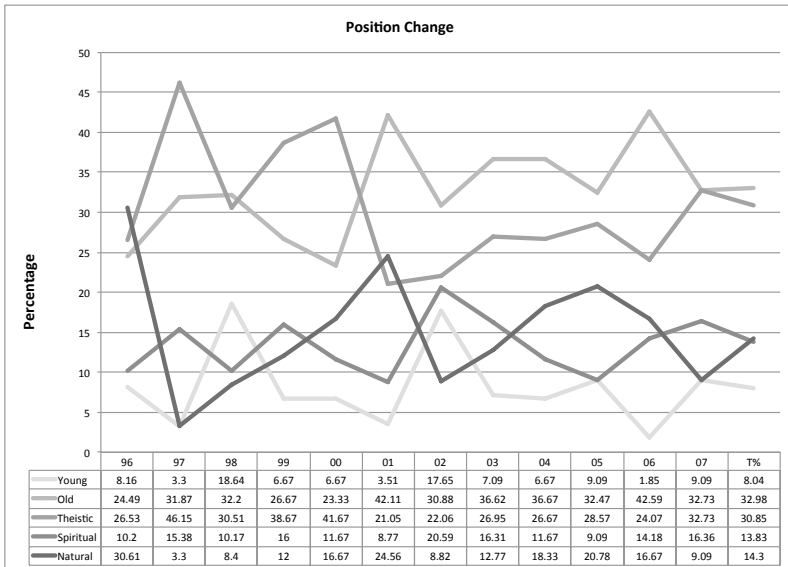


Figure 4.3. Distribution of five positions on evolution: young earth creationism, old earth creationism, theistic evolution, spiritual evolution, and natural evolution

Figure 4.3 shows that the most frequent position selected by students was old earth creationism (32.98 percent), the belief in plant and animal change over billions of years with no human evolution. Theistic evolution was the second most frequent position at 30.85 percent; but when combined with spiritual evolution (13.83 percent) to show those who accept both religion and science, it is the largest group, at 44.68 percent. The two opposite extremes of young earth creationism and natural evolution were selected by only 8.04 percent and 14.30 percent of students, respectively. Over the 12-year period,

old earth creationism and theistic evolution increased slightly from 24.5 percent to 33 percent and 26.6 percent to 30.9 percent, respectively, while natural evolution actually declined.

Stages of Intellectual Development

Of the 846 responses, 759, or 89.72 percent, had narratives explaining the student’s choice that could be coded for Perry stages. (Some students chose a position but did not provide a narrative explanation.)

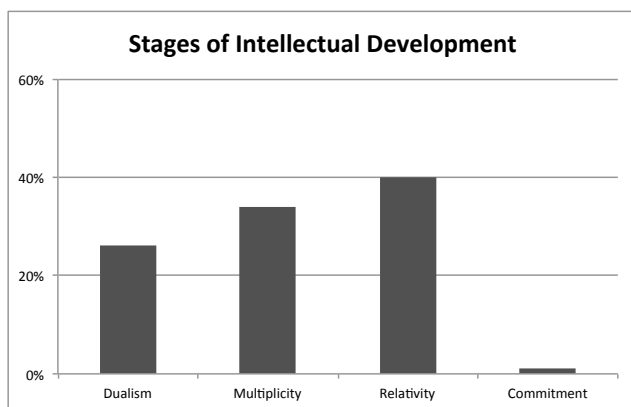


Figure 4.4. Distribution of Perry stages of intellectual development: dualism, multiplicity, relativism, and commitment

Figure 4.4 shows the distribution of the stages of intellectual development. Dualism was found in 25.69 percent of the narratives. Typical dualism statements are presented verbatim below:

Old Earth creationism

I believe this because this idea is what I have been taught. The Bible that I read, King James version teaches me this. Starting in the book of Genesis where it tells that God created earth, man being (Adam) and from man a woman (Eve).

Theistic evolution

I think that God did create the world long ago. He made us so that we will evolved throughout thing such as plants animals, and other living organisms. We will keep evolving until God tell us not to do so. This all God's plan.

Natural evolution

"Option 4 Big Bang Theory"

Multiplicity was represented in 33.73 percent of the explanations, in which students acknowledged at least two views and then made their choice with little or no explanation or expressed confusion or bewilderment:

Young Earth

My opinion closely resembles options 1 [Young Earth] and 2 [Old Earth] because I believe that god did create the earth in 6 24-hour days. I believe that some species have evolved while others have stayed relatively the same.

Old Earth

I don't know what to believe because I don't feel that I have seen accurate proof of any of this. I don't typically worry about how we came to be I just know that we are and someday I will know. If I don't—then so be it. The world is bigger than me and I have bigger things to worry about.

Interestingly, 39.92 percent of students gave evidence of Perry's relativism stage, the largest category, by making reasoned choices and explaining their viewpoints more completely:

Old Earth

My religious beliefs are not clearly defined, but I think this idea is right. God being the creative force that started everything. One day in the creation = millions or billions of years in evolution. The whole creation story is the series of events in chronological order. So basically they agree with each other.

As expected, commitment was a rare response, with less than 1 percent indicating integration of their views, identity, and their future career or personal commitment to others:

Spiritual Evolution

Biology has long fascinated me, and evolutionary biology is no exception. I plan to attend graduate school studying zoology and/or evolution. As of now, I am a Methodist, but I wrote multi-denominational [on my survey] because I may start going to a different type of church...

Argument Type

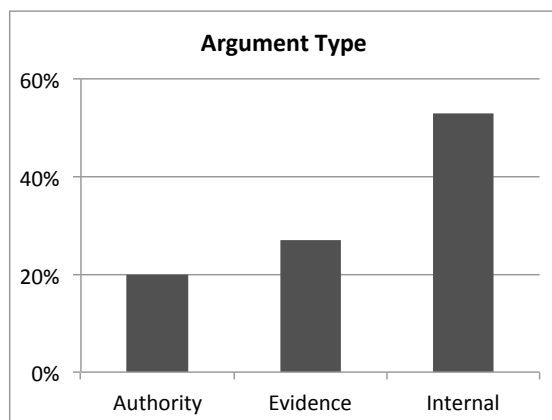


Figure 4.5. Distribution of Argument Types: Authority, Evidence, and Internal

Figure 4.5 shows that internal arguments were the most common, representing 52.99 percent of the narratives. Internal arguments showed the effects of enculturation and previous training, but the students did not rest their primary justification on external authorities or evidence to draw their conclusions:

Natural Evolution

To me there is no other logical explanation. I've tried in my life to get some sort of spiritual enlightenment, but it always seems to be questionable or too many grey areas. Faith in god seems too faint to base one's entire life around.

Evidence arguments were the second most frequent, representing 27.23 percent of the narratives:

Old Earth

I believe that humans have evolved mentally, more than physically. Fossil remains of earlier humans show different shaped skulls, but they are basically the same as ours today.

Natural Evolution

Option 4 b/c with the presence of water and our so called bubble (ozone) around the earth makes our livable environment which can sustain life and we developed from micro-organisms to where we are today.

Surprisingly, external authority represented only 19.77 percent of the explanations, the majority of which were made by young and old earth creationists:

Young Earth

“I have always been taught this throughout my entire life from both of my parents. Also I attend church on a regular basis therefore it is a belief that is taught to me on a weekly basis.” Another student explained, “I don’t think humans came from no animals. That is none sense to me. God created Adam and Eve not a monkey or some other animal. If I agree with anything else I would strongly be going against my religion.”

Narrative Themes

A strong theme present in the explanations was that college classes should present both creationism and evolution together and allow students to choose between them: “I hope that when we cover this subject in class, it is covered equally on both sides. It would not be fair to try to try to persuade students to one side or the other.”

Many creationist students also were uncomfortable that evolution regards humans as an animal species, and they sought to distance humans from other animals as “special”: “God created humans to be Christ-like and animals to be just that. Nothing more. Nothing less. No relation to me!!”

Students also showed a basic lack of understanding of the genetic code and relatedness of species, seeing life forms as separate “types” that shared no similarities. Students argued that for humans to share the four-base pair genetic code with animals would be like being “half-dogs”: “He created after our seed so humans can’t be half dogs & half persons. An elm tree can be half elm and half apple. Cat is not a half cat & half dog nor are any species that were created by God.”

Both creationist and evolutionist students often thought incorrectly that species were commonly formed through hybridization, including the human species: “I know that occasionally different

types of animals & plants will be bred together to create a slightly different plant or animal. How is this explained? Same with humans."

Many students saw most of creation, including plants and animals, as "old," while humans were regarded as "new" and special: "the discovery of fossils and other items ... have been proven to be over millions of years old. Man however I believe is special and has only inhabited this planet for about 6,000 years."

A number of natural evolution students mentioned that God had died or noted that God was merely an idea made up by humans for comfort: "God may have created the universe but if so He died in the process or has left it alone ever since." "I believe in God, but sometimes I find myself wondering what if we did evolve and there is no higher power. Sometimes I wonder if God is someone or something that we made up to motivate and give us hope." Some students were uneasy with the lack of absolute answers from science and longed for security and assurance: "The anthropology book said that science doesn't have a definite answer for everything and neither do Christians. But Christians can at least be sure of one thing ... God."

Especially disturbing was the surprisingly frequent claim that all of time and human history began 2,000 years ago with Jesus of Nazareth: "I really don't believe anything existed before Christ. I mean, come on, what was going on before then? Why would God make the Earth and wait billions of years to make people? He's not lazy." These statements did not seem to be metaphorical; they seemed to be meant literally.

DISCUSSION

Intellectual Development

The student narratives included earnest searches, humorous commentary, adamant religious statements, and involved scientific arguments. The large number of relativists among the students can be

explained in part by the presence of some upper-class students in the course, but is more likely due to our instructions to the students to explain their position. If they complied, this immediately placed them in the relativism stage, greatly skewing our results. The fact that dualism and multiplicity narratives actually did not comply with our instructions and constituted 60 percent of the responses is the more salient finding. These nearly two-thirds of students gave flat one-sided statements or acknowledged the other side of the issue but made no attempt to relate their choices to their identity, major, or understanding of science or religion. There seemed to be two distinct groups of students: those whose worlds and experience were smaller and who focused on stable and secure received knowledge without much reflection or critical thinking and those who were more aware of context and evidence and less focused on absolute answers. These latter students were disproportionately found in the theistic, spiritual, or natural evolution categories. Internal arguments may also have been skewed because several students later commented that the survey made them worry that they would be chastised for their beliefs, which, of course, was not the case. It is possible that this artificially reduced the number of arguments from authority and increased the number from evidence and internal justification.

Most problematic was the theme in a number of the narratives that creationism and evolution should be taught as two alternatives to the human origins issue and that science could consist of supernatural explanations. The US National Academy of Sciences has stated that creationism and other supernatural perspectives are not science because they are not testable according to the scientific method (National Academy of Sciences and Institute of Medicine 2008). Nevertheless, creationism/evolution co-instruction has been desired by 56 percent to 80 percent of students from the 1980s to the present (Fuerst 1984; Krammer, Durband, and Weinand 2009;

Nelson 2007; Zimmerman 1986) in other student samples. This confirms that students feel forced to choose science or God, which can make preparation for social science or traditional college STEM careers in science, technology, engineering, or mathematics difficult.

Somewhat shocking was the number of students who dismissed prehistory and ancient history and questioned whether it existed at all. They argued that God would have only "wasted time" between the Big Bang and Jesus, and thus it "couldn't" have occurred. The notion that scientists and scholars would invent earlier periods of history shows the degree of disconnection with Western scholarship and intellectual discourse.

Teaching Human Evolution

The misunderstandings of students with poor science backgrounds or conflicting religious beliefs raises the issue of how to approach their instruction in an anthropology or other science class (Alters and Alters 2001; Brickhouse, et al. 2000; Loving and Foster 2000; Sinclair, Pendarvis, and Baldwin 1997). In this anthropology course, we explicitly discussed the intellectual stages and drew a parallel with how science works. We pointed out that scientists might start out thinking they are absolutely right (dualism), then become aware of alternative explanations or evidence (multiplicity), experience a paradigm shift (relativism), and finally develop an applied aspect (commitment). The Piltdown hoax, the shift from savanna to swamps in hominid evolution scenarios, or debate about DNA contributions of Neandertals are examples that show science changes as old ideas are discarded for new ones.

Second, we present the semester's survey results to students who are curious about where they stand compared with their classmates. This makes clear that there is great diversity in the class, and we stress that student positions might change as they learn more about

evolution. It is important to make explicit that a college education, unlike high school, means that students engage with the material and see how knowledge has been culturally constructed. We stress that all religious views are respected but that students are learning the methods, theories, and values of anthropologists. At times, teaching these students seems like fieldwork, with culture shock and need for cultural relativism, because their worldviews are so dissimilar.

Third, we take a full lecture to review the history of how Western scholars came to distrust literal Biblical interpretations based on translations, copying errors, and contextual interpretations, at the same time that scientists determined the great age of the universe, saw that fossils were earlier lifeforms, and developed evolutionary theory to show the origin of new species. We model how science itself was in turmoil and had to adjust to the accumulation of evidence. We also present Web sites and documents of religions and their positions on evolution and how many have changed over time.

Fourth, research suggests that concrete experiential assignments rather than abstract lecturing is beneficial (Knapp and Thompson 1994; Nelson 2007). Gipps (1991) suggested hands-on fossil cast exercises to put the student into the role of scientist, and we use this and a number of active learning group assignments as well. For example, in one assignment, two panels of students confer with each other and physically arrange a group of fossil skull casts into lineages in chronological order. Then, we compare the two lineages and ask the evidential basis for the order and how the order would or would not be consistent with evolutionary theory. In another assignment, students form two chimpanzee or bonobo bands, create identities within the group; for example, dominant female, out-migrating sub-adult, tool innovator, etc., and demonstrate great ape cultural behaviors, such as termiting, nut cracking, medicine, political alliances, etc., to which they have been exposed in lectures, reading, and documentary films.

These exercises allow students to do anthropology at the same time that they create sensory empirical evidence, where students have had to reflect on ape-human similarities and fossil sequences.

Fifth, it is best to discuss misunderstandings about human evolution up front early on in a course (Skehan and Nelson 2001). Krammer, Durband, and Weinand (2009) identified five key misunderstandings as discussion points beginning with "science has proven that evolution is true" as a means to introduce the dynamic tentativeness of scientific theories. They next present evolution as a theory and creationism as a supernatural-based non-scientific approach, lacking falsifiability, testability, and the need for natural causation. Then they address the dichotomous thinking we also found in our sample, that if you believe in evolution you cannot believe in God. Last, they ask students to define evolution as a means to "out" all the misunderstandings. Krammer, Durband, and Weinand (2009, 27) found that seniors in college do not necessarily understand evolution better than freshmen and that "the basic foundations of science and evolution may not be communicated effectively and are not occupying a central role in some college-level ... courses."

Finally, enhancing overall critical thinking skills during the introductory course may be of ultimate benefit (Alters and Nelson 2002). Critical thinking is the process of conceptualizing and analyzing information with an eye to clarity, consistency, and depth and breadth of understanding, combined with an awareness of assumptions and cultural fictions, in order to evaluate various claims with a degree of confidence (Moore and Parker 2007). Many students come into class passively expecting only lecturing from an authority who will "teach the test" (Bowen, Chingos, and McPherson 2009; Meier and Wood 2004). Presenting repeated opportunities for active learning and discovery and doing critical thinking in all subfields of anthropology could generalize to more sophisticated means to engage with evolution.

Culture Lag and Acceptance of Evolution

Auguste Comte identified three stages in the social evolution of an idea (Lenzer 1997). A society first seeks theological religious explanations, followed by metaphysical and higher social concepts, and finally develops a scientific approach. Sociologist William Ogburn (1956, 1966) described culture lag as a maladjustment that occurs during periods of great cultural change. Woodward (1934) noted that symbolic culture lags most frequently behind material, scientific, and technological culture. Both pointed out that social conflict results if broad consensus is lacking, as we have seen in the recent court trials about human evolution in the schools. Closing of the gap may simply be due to later generations being born after the new discovery, so they take the new information for granted and integrate it into their worldview (Barnes 1974).

The gap created by the culture lag eventually closes, depending upon the degree of culture change and factors that might increase or slow its acceptance to the point that prior understandings now seem peculiar and unthinkable. For example, in 1835, two centuries after Galileo was tried for heresy and tortured for arguing that the earth revolved around the sun, the Church came to agree with the heliocentric view and began to honor Galileo for his achievement (McMullin 2005). After one Pope vilified Darwin (2009/1859) in the 1800s, in 1996, a hundred years later, Pope John Paul II (1997) finally accepted human evolution, declaring evolution to be not only a scientific fact but a discovery that aided Catholic religious understanding.

In the opinion of those who accept evolution, including many Christian clergy, the debate is no longer science versus religion but a conflict among alternative religious worldviews (National Academy of Sciences and Institute of Medicine 2008) that will take a number of generations to resolve. Our research shows that 59 percent, or slightly more than the average college acceptance of 56 percent,

begin the course with no conflict with evolution. But what of the approximately 40 percent who disagree? The southeastern students in this pilot study who disagree do not have centuries to change—they have only a semester in which to adapt. Evolution is less extensively taught in southeast high schools than in the northeast (Krammer, Durband, and Weinand 2009; Lerner 2000; Moore 2001), and religious worldviews are often grounded in medieval thought. As a result, these students have only three months in a course to cover what took centuries to achieve. A deeper awareness of how they process and integrate scientific evidence about human evolution with their religion can help anthropologists understand how belief systems change and can assist anthropology programs to better formulate their instruction.

Still, the decline in the acceptance of evolution, and rise in court cases challenging it, is disturbing. The Scopes Monkey Trial in 1929 had a negative effect on science education (Eve and Harrold 1991; Larson 1997), and the recent 2002 Cobb County, Georgia, textbook sticker challenge and Dover Area School District (Pennsylvania) effort to introduce intelligent design as science has not helped (Petto 2005, 2008a, 2008c, 2008c). Some anti-evolutionary efforts are meeting with success; for example, the Louisiana Science Education Act 2008, which introduces creationism as a scientific alternative although it does not subscribe to scientific principles of falsifiability, replicability, and the evaluation of empirical evidence (Petto 2008b). But if anthropologists can combine experiential learning and excitement about empirical evidence with awe and wonder about the complexity of life, we may be able to reach out and move closer to closing the cultural science and religion gap for all students.

ACKNOWLEDGMENTS

We would like to thank Ralph Covino, Ph.D., Craig Nelson, Ph.D., and Shela Van Ness, Ph.D., for their comments on this research; Jessica Brand and Amanda Pippin for data analysis; and the UC Foundation for support of this research. The inspiration of Katharine Clemens, who served as a long-term mentor and friend who always encouraged the anthropological desire to see through cultural fictions, is gratefully acknowledged—she will be dearly missed.

REFERENCES

- Alters, Brian, and Sandra Alters. 2001. *Defending Evolution: A Guide to the Evolution/Creation Controversy*. Sudbury, MA: Jones and Bartlett Publishers.
- Alters, Brian, and Craig Nelson. 2002. "Perspective: Teaching Evolution in Higher Education." *Evolution* 56(10):1891-1901.
- Armstrong, Karen. 2001. *The Battle for God: A History of Fundamentalism*. New York: Ballantine Books.
- Barnes, Barry. 1974. *Scientific Knowledge and Sociological Theory*. Boston: Routledge and Kegan Paul.
- Bowen, William, Matthew Chingos, and Michael McPherson. 2009. *Crossing the Finish Line: Completing College at America's Public Universities*. Princeton, NJ: Princeton University Press.
- Brickhouse, N. W., Z. R. Dagher, W. J. Letts, and H. L. Shipman. 2000. "Diversity of Students' Views About Evidence, Theory, and the Interface Between Science and Religion in an Astronomy Course." *Journal of Research in Science Teaching* 37(4):340-362.

- Burton, Ronald, Stephen Johnson, and Joseph Tamney. 1989. "Education and Fundamentalism." *Review of Religious Research* 30(4):344-359.
- Dagher, Z. R., and S. BouJaoude. 1997. "Scientific Views and Religious Beliefs of College Students: The Case of Biological Evolution." *Journal of Research in Science Teaching* 34:429-445.
- Darwin, Charles. [1859] 2009. *The Annotated Origin: A Facsimile of the First Edition of On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*. Cambridge, MA: Harvard University Press.
- Davis, Percival, and Dean H. Kenyon. 1989. *Of Pandas and People*. Mesquite, TX: Haughton Publishing Company.
- Eve, Raymond, and Francis Harrold. 1991. *The Creationist Movement in Modern America*. Boston, MA: G. K. Hall.
- Fuerst, P. A. 1984 "University Student Understanding of Evolutionary Biology's Place in the Creation/Evolution Controversy." *Ohio Journal of Science* 84(5):218-228
- Gipps, John. 1991. "Skulls and Human Evolution: The Use of Casts of Anthropoid Skulls in Teaching Concepts of Human Evolution." *Journal of Biological Education* 25(4):283-290.
- John Paul II. 1997. "Magisterium Is Concerned with Question of Evolution for It Involves Conception of Man: Pope John Paul II Message to Pontifical Academy of Sciences, 22 October 1996." *Catholic Information Network*. <http://www.cin.org/jp2evolu.html>.
- Knapp, P. A., and J. M. Thompson. 1994. "Lessons in Biogeography: Simulating Evolution Using Playing Cards." *Journal of Geography* 93:96-100.

- Krammer, Andrew, Arthur Durband, and Daniel Weinand. 2009. "Teaching the 'E-Word' in Tennessee: Student Misconceptions and the Persistence of Anti-Evolutionary Ideas." *Reports of the National Center for Science Education* 29(2):18-28.
- Larson, Edward. 1997. *Summer for the Gods: The Scopes Trial and America's Continuing Debate Over Science and Religion*. New York: Basic Books.
- Lenzer, Gertrud, ed. 1997. *Auguste Comte and Positivism: The Essential Writings*. New Brunswick, NJ: Transaction Publishers.
- Lerner, L. S. 2000. "Evolution: How Does It Fare in State K-12 Science Standards?" *Reports of the National Center for Science Education* 20(4):44-46.
- Loving, C. C., and A. Foster. 2000. "The Religion-in-the-Science-Classroom Issue: Seeking Graduate Student Conceptual Change." *Science Education* 84:445-468.
- McMullin, Ernan, ed. 2005. *The Church and Galileo*. Notre Dame, IN: University of Notre Dame Press.
- Meier, Deborah, and George Wood. 2004. *Many Children Left Behind: How the No Child Left Behind Act is Damaging Our Children and Our Schools*. Boston, MA: Beacon Press.
- Miller, Jon, Eugenie Scott, and Shinji Okamoto. 2006. "Public Acceptance of Evolution." *Science* 313:765-766.
- Moore, Brooke, and Richard Parker. 2007. *Critical Thinking*. Columbus, OH: McGraw-Hill.
- Moore, R. 2001. "Teaching Evolution: Do State Standards Matter?" *Reports of the National Center for Science Education* 21(1-2):19-21.

- National Academy of Sciences and Institute of Medicine. 2008. *Science, Evolution, and Creationism*. Washington, D.C.: National Academies Press.
- Nelson, Craig. 2007. "Teaching Evolution Effectively: A Central Dilemma and Alternative Strategies." *McGill Journal of Education* 42(2):265-284.
- Ogburn, William F. 1957. "Cultural Lag as Theory." *Sociology and Social Research* 41(3):167-174.
- . 1966. *Social Change: With Respect to Cultural and Original Nature*. Oxford, England: Delta Books.
- Perry, William. 1970. *Forms of Intellectual and Ethical Development in College Years: A Scheme*. New York: Holt, Rinehart, and Winston.
- . 1981. "Cognitive and Ethical Growth: The Making of Meaning." In *The Modern American College*, edited by Arthur W. Chickering, 76-116. San Francisco: Jossey-Bass.
- Petto, Andrew. 2005. "Victory in Cobb County." *National Center for Science Education*, January 13. <http://ncse.com/news/2005/01/victory-cobb-county-00590>.
- . 2008a. "Intelligent Design on Trial: Kitzmiller v. Dover." *National Center for Science Education*, October 17. <http://ncse.com/creationism/legal/intelligent-design-trial-kitzmiller-v-dover>.
- . 2008b. "Louisiana Antievolution Law Draws Scrutiny." *National Center for Science Education* 29(6):18-22, 27-28.
- . 2008c. "A Settlement in Selman v. Cobb County." *National Center for Science Education* December 19, 2006. <http://ncse.com/news/2006/12/settlementselman-v-cobb-county-00804>.

- Rapaport, William. 1984. "Critical Thinking and Cognitive Development." *Proceedings of the American Philosophical Association* 57:610-615.
- Sinclair, A., M. P. Pendarvis, and B. Baldwin. 1997. "The Relationship Between College Zoology Students' Beliefs about Evolutionary Theory and Religion." *Journal of Research in Developmental Education* 30:118-125.
- Skehan, James, and Craig Nelson. 2001. *The Creation Controversy and the Science Classroom*. Arlington, VA: National Science Teachers Association.
- Thales of Miletus. Unknown/1957. "Fragment No. 91." In *The Presocratic Philosophers: A Critical History With a Selection of Texts*, 2nd ed., edited by G. S. Kirk, J. E. Raven, and M. Schofield, 76-99. Cambridge: Cambridge University Press.
- Woodard, James W. 1934. "Critical Notes on the Culture Lag Concept." *Social Forces* 12(3):388-398.
- Zimmerman, M. 1986. "The Evolution-Creation Controversy: Opinions from Students at a 'Liberal' Liberal Arts College." *Ohio Journal of Science* 86(4):134-139.