

Creationists are a perpetual thorn in the side of biology education. Every teacher, it seems, can share a favorite cartoon satirizing creationism or the ironies of so-called “intelligent” design. But ridicule or scorn do not seem very fruitful or respectful strategies in the classroom. How can we make evolution education more effective, or even more compassionate?

The standard prescription currently seems to be teaching the nature of science, such as naturalism and its limits, falsifiability, the meaning of “theories,” the nature of historical reasoning, or how to build explanatory models from piecemeal evidence. Students should thereby come to appreciate science and the evidence, and evolutionary knowledge should thus triumph (Nickels et al., 1996; Rudolph & Stewart, 1998; Working Group on Teaching Evolution, 1998; McComas et al., 2002). While research shows this approach to be somewhat effective, viewed pragmatically, the results seem marginal. We need to delve further into the problem and its solutions.

Here, I hope to open critical reflection on the typical anti-creationist hard line, the sacred bovine on this occasion. What might we learn by sympathizing with creationists – listening to them sincerely – *not* to entertain their arguments as legitimate, but to understand their ways of thinking? By appreciating their worldview, we might discover clues for framing evolutionary science in ways they might accept, psychologically, socially, and culturally. Might we resolve the age-old antagonism by dissolving it, rather than by confronting creationists and trying to bash them into submission? Can we do better than the ineffectual disdain and goading of Richard Dawkins, Daniel Dennett, and the like?

○ The Social Psychology of Creationist Community

So, an alternative strategy is to reorient from creationism to creationists. From the abstract ideas to concrete persons. We need to understand the individual psychology of knowledge claims, not the purported intellectual reasons or justifications. What are the contexts – personal, social, cultural, and ideological – in which the “unreasonable” creationist ideas fit and paradoxically seem so reasonable (Long, 2011; Latts, 2012)?

For over two decades now, I have maintained a friendship with bonafide young-Earth creationist (and Discovery Institute fellow) Paul Nelson. We chat about evolution and anti-evolution. Neither of us suffers from the illusion that we will convince the other. But we exchange notes. I find understanding the “insider’s” perspective informative.

By listening holistically, one quickly learns that although creationists tend to frame their arguments in terms of the scientific evidence, the evidence is not foremost in their actual thinking (Forrest & Gross, 2004; Eve et al., 2010). Indeed, they deploy many standard “scientific” tactics of skepticism, rigor, and falsification, and thereby reject much evidence outright as wrong or irrelevant. They are simply not persuadable on scientific terms. Why not? Cognitive psychologists have documented how our beliefs are shaped by many factors, and how some

apparent justifications are really retroactive rationalizations (Lehrer, 2009; Kahneman, 2011). Views of evidence, in this case, yield and bend to emotions and largely political beliefs. The crux of the problem is thus not at the level of encountering or understanding the evidence.

The first take-home lesson for teachers, then, might be that we regard the common textbook sections on the evidence for evolution as so much rhetoric. They “defend” the conclusions. They rarely lead one to understanding. Not without invested engagement in the original problems. Indeed, few instructional scenarios adopt a strategy of conceptual change: for example, by following the early naturalists who were led to conclude, quite unexpectedly, that species diverge and change through selective survival (for one fine example, see Friedman, 2010).

Second, we might acknowledge the social contexts of trust that govern acceptance of evidence. Creationists are not the only consolidated group to dismiss the consensus of scientific experts. Note too, historically, the anti-fluoridationists and HIV-AIDS denialists, as well as those who still maintain, despite retracted papers, that vaccines cause autism. They all cite “evidence”: the wrong evidence. All maintain belief in their “science” through powerfully cohesive social networks. Trustworthy evidence seems based principally on *who* you can trust (*Sacred Bovines*, Nov. 2012). That is, science communication, like all communication, is subject to social psychology. Among creationists, the value of social relationships is prior to, and thus eclipses, scientific methodology and evidence. As sociologist Raymond Eve (2009) noted, in reflecting on a visit to the Creation Museum in Kentucky:

it is easy to get wrapped up in the science debate as one goes through the museum, but it is also important to keep one’s eye out for how much of that debate is really driven by the social dynamics.

Addressing creationism is thus partly a problem in social psychology.

So, a second prospective strategy for educators is to engage with students socially and establish a context of trust. Of course, the conventional framework of teacher-authority coupled with student-obedience tends not to foster such relationships. This approach may challenge the whole institutional structure of schools. Well, no one said this would be easy. But the aim is to establish social relationships, through which the flow of information can then be trusted. We need to foster a context in which the evidence can be heard.

One should not underestimate the strength and resilience of the influential social bonds. Statistically, evangelicals who support the Bible as biology also tend to encourage others to share their beliefs. As sociologist Barbara Hargrove noted:

They represent a segment of the population most nearly characterized by a form of social solidarity that Emile Durkheim called “mechanical.” That is, the basis of

social unity for them lies in the likeness of members of the society; anyone too different becomes a threat to stability and so tends to be gotten rid of, physically or psychologically. (1986, p. 31)

Evangelism and other conservative networks seem very much about community and social cohesion through shared beliefs. As a Midwestern teacher noted to me once, working to persuade some students of evolution is akin to trying to rip the fabric of their family apart. It not only seems difficult, it seems disrespectful.

○ Epistemology

The social ideology of conceptual uniformity reflects deeper views about epistemology (that ungainly term by which philosophers denote simply the nature of knowledge). Here, the epistemological belief is that reasonable disagreements are not possible. Alternative claims, if legitimate, implicitly threaten the certainty of the knowledge and the authority of its source. That is, most creationists view knowledge itself as already established, beyond interpretation. Even doubt is unacceptable. Dissent thus sows social as well as philosophical discord. Again, Hargrove observes: “These are people who see diversity of opinion as dangerous, who cannot count as friends persons with whom they disagree” (1986, p. 31). Hence, the creationist community would seem closed even to education from outsiders, its views strongly shielded from alternative modes of thinking.

If this is the case, then an appropriate third teaching strategy would seem to be showing how scientists can disagree while making discoveries, as they develop knowledge. Reasonable people can indeed disagree, as demonstrated historically. Of course, the challenge is to get beyond the preconception that one scientist in a dispute must have been “right” from the very outset, and the other “wrong” and, thus, likely inept. One needs to underscore how two persons could each make reasonable interpretations of, or conclusions from, the same data. In addition, one might show how scientists debate concepts and can ultimately resolve their disagreements by appeal to evidence. This begins to shift the authority of knowledge to the evidence, rather than the person speaking. One needs to underscore the role of interpretive stances. Usually, scientists who disagreed were each partly right. Perspectives and interpretations are linked. Evidence is not necessarily univocal or unambiguous. The lesson is all about knowledge in general, but it is well suited to science classes (and accessible in topics wholly unrelated to evolution).

The concept of discussing the nature of knowledge in the science classroom is neither new nor completely strange. Indeed, many recent reports on reform of science education underscore the role of reflecting on the nature of science. But teachers need to acknowledge the dramatic shift. Emphasis will shift from content and concepts to the scientists and scientific practice. From ideas to the human context. The textbook (and the convenient authority that it seems to provide) must be set aside. While curriculum materials are available to support this new aim, they do not follow the conventional patterns of education, channeled through artificially simplistic multiple-choice tests. To teach the nature of knowledge, we need to shift to the real-life contexts of science, often as rendered in historical cases (*Sacred Bovines*, Jan. 2011). By addressing creationism seriously, we could thus help foster a revolution, albeit a fruitful one, in science education.

A closely related epistemological view, also typical of creationists, is that knowledge is fixed, unchanging. Hargrove notes that

Their world is one in which the social order of their childhood, as well as the visible order of nature in our time, are taken as givens.... Categories are firm and fixed – whether they be physical species, human races, social classes, or national boundaries. The order of all

things is [also] to them a moral order, and patterns of behavior given by their tradition are a part of that moral order – God-ordained and permanent. (1986, p. 33)

The concept of knowledge as static is another layer of cognitive “insulation” that can make it difficult to engage a student in critical reflection by posing alternatives. Indeed, education itself may seem a challenge:

Theirs is an orderly world, and the primary learning task, as they see it, is to come to comprehend that order in all its beauty and complexity. Those who would question the order, whether of legal or parental authority, of natural law or of religious principles, are as foolish as the person who would question that four is the sum of two and two. (Hargrove, 1986, p. 33)

The challenge for the science teacher – indeed, for any teacher – seems formidable.

Again, reliance on conventional science textbooks, with their aura of permanence, only tends to reinforce this epistemological view. To address the nature of conceptual change, a teacher needs, again, to go “off text.” And again, a prospective fourth solution is to engage students in historical studies of science – on this occasion, cases where knowledge has changed and we can confidently trace the transition from one idea to another. These can be informative, if the outcome is not divulged at the outset. Spoilers upstage the blind process moving forward and the surprising revised conclusion. Once again, this can be done on topics and cases unrelated to evolution. Through exemplars, we might (hopefully) convey that knowledge is developmental and, yet again, that new observations and evidence are important resources in broadening our understanding.

To repeat, creationists seem securely entrenched by two fundamental yet naive epistemological postures: regarding knowledge as permanent and unchanging; and regarding knowledge as certain, unambiguous, and derived from authority. (On distinguishing five dimensions of epistemology, see Schommer, 1990). In both cases, science teachers have an opportunity to contribute to more sophisticated views by engaging students in historical examples where knowledge changed and/or where scientists disagreed, and where they developed their knowledge and resolved their differences by being open to new observations, investigations, and other independently verifiable claims.

○ Social Order & Morality

Finally, for this brief survey, one might consider the emotional flash-points that ignite the most strident and vitriolic criticisms from creationists, sometimes in their unguarded moments. What advocates of creationism insist on, in part, is a moral society and an unshakable justification for moral rules. What they seem to fear in evolution – and in any science where empirical evidence is the arbiter – is loss of a social order (Toumey, 1997; Forrest & Gross, 2004; Allchin, 2009b). Their image is that Darwinism justifies so-called Social Darwinism, or a human culture “red in tooth and claw” (*Sacred Bovines*, Feb. 2007). As Hargrove notes, they believe that

Human beings need some understanding of their nature and destiny that has the power to entice them to put aside some private gratifications for the good of the whole. They need somehow to be motivated to the task of culture-building. Without that, there is no reason to resist attacking the weak or the old to take their goods, however pitiful; to resist looting and burning an apartment house in order to collect insurance; to refrain from dipping into the company till or from beating one’s spouse; or to prevent beginning a nuclear holocaust. (1986, p. 35)

The preoccupation with moral order seems why, although creationists attack science (or “secular humanism”) generally, they nonetheless focus with particular virulence on evolution. Evolution becomes a scapegoat for almost any kind of perceived social ill: communism, homosexuality, gender relations, school gun violence, ruthless capitalism, hedonism, anarchy. These views have been paraded in such books as Benjamin Wiker and William Demski’s *Moral Darwinism: How We Become Hedonists* (Intervarsity Press, 2002) and John West’s *Darwin Day in America: How Our Politics and Culture Have Been Dehumanized in the Name of Science* (Intercollegiate Studies Institute, 2007). The titles themselves tell the story of why evolution ultimately matters to them.

The solution here, of course, seems more obvious. As a fifth tactic, we need to teach how evolution is not only consistent with a moral society, but also contributes to interpreting its challenges. Our moral feelings and moral capacities are products of evolution. So, too, are our capacities for aggression, greed, compassion, discussion, and reasoning. Science can help inform our reflections and discourse. But its role will be invisible if not addressed explicitly in biology classes. Speaking now from personal experience, I know this to be eminently achievable. We can teach the evolution of moral behavior (Allchin, 1999, 2009a).

○ Into Action

Contextualizing creationists by delving into their perspectives and interpreting the motivational psychology of their actions, as exemplified in these five brief reflections, invites an approach to teaching science and evolution that diverges sharply from current norms. Yet the prospective

strategies also seem well within reach for the average biology teacher. At the same time, they promote stronger science education, regardless of their consequences for creationism. Still, their implications for understanding evolution might well be explored in more detail. Most important, perhaps, these lessons function orthogonally to religion proper. In fostering a deeper appreciation of science, they need not eclipse or challenge faith or religious beliefs.

Still, the prospective strategies explored above can only be viewed as fragments. They do not constitute a full-fledged or coherent program to solve, once and for all, the enduring Creationist Crisis in biology education. Further analysis might indicate more, or different, approaches. Such reflections and ongoing discussion should be welcome. For example, the first target may well be biology teachers themselves. One-eighth seem not to address evolution at all. Another one-fifth to one-quarter seem to present creationism instead as legitimate biology (Moore & Cotner, 2009; Berkman & Plutzer, 2010, pp. 174–193).

Nor should one imagine that these various perspectives have all been tested in the classroom and shown conclusively to be effective in creationist contexts. But the analyses would suggest that they are at least as likely to have an impact as current methods. Sometimes, we need to prod our sacred bovines to spur creativity and inspire action.

Ironically, the solution to creationism may not be primarily more or better teaching of evolution itself, at least not in the current environment. The targets should be, instead, profiling the basic dimensions of knowledge, or epistemology; developing social relationships that nurture educational trust; and addressing evolution and moral order. Only then will students be ready for meaningful evolution – and science – education.



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DOUGLAS ALLCHIN has taught both high school and college biology and now teaches history and philosophy of science at the University of Minnesota, Minneapolis, MN 55455; e-mail: allchin@sacredbovines.net. He is a Fellow at the Minnesota Center for the Philosophy of Science and edits the SHiPS Resource Center (ships.umn.edu). He hikes, photographs lichen, and enjoys tea.

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