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Answers to Frequently Asked Questions about Academic Freedom Bills

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1. What is the problem addressed by academic freedom bills?

Public school educators are often afraid to objectively cover controversial scientific topics in the classroom. Indeed, teachers who teach objectively about different scientific views on a topic like evolution may face disciplinary action from school administrators who wrongly believe the Constitution forbids such teaching. Academic freedom bills would protect the right of teachers to teach about controversial scientific topics in an objective manner without having to fear for their jobs.

2. What is the purpose of academic freedom bills?

The purpose of academic freedom bills is to provide an express statutory right to teachers who choose to present objectively the scientific strengths and weaknesses of scientific theories pertinent to the courses being taught—without having to fear negative repercussions to their jobs. The bills cover scientific topics that are already part of the curriculum, including controversial scientific topics. The legislation is needed because many teachers are unsure of the expectations and rights as teachers concerning how they should present information on controversial scientific topics, such as global warming, biological evolution, chemical evolution, and human cloning. When passed into law, an academic freedom bill enhances the effectiveness of science education because it allows the free flow of scientific evidence and information about controversial scientific theories.

3. Would an academic freedom bill authorize the teaching of creationism or religion?

No. Despite the talking points of critics, academic freedom bills would not authorize or protect the teaching of creationism or any other religious viewpoint. According to a number of federal court rulings, creationism is a religious viewpoint that is illegal to advocate in public schools.[1] **Consistent with these rulings, most academic freedom bills contain language that expressly excludes the teaching of religion and only protects the teaching of "scientific information."** Such bills also typically contain a provision akin to the following:

> The provisions of the Act shall only protect the teaching of scientific information, and shall not be construed to promote any religious or nonreligious doctrine, promote discrimination for or against a particular set of religious beliefs or nonbeliefs, or promote discrimination for or against religion or nonreligion.

Those who claim that academic freedom bills authorize the teaching of religion disregard the actual text of the bills.

4. Do academic freedom bills include intelligent design?

No. Intelligent design (ID) is different from creationism, but academic freedom bills say nothing about ID. Rather, the bills state that teachers should "be permitted to help students understand, analyze, critique, and review in an objective manner the scientific strengths and scientific weaknesses of existing scientific theories pertinent to the course being taught." Under this language, academic freedom bills only pertain to topics already in the curriculum. Since ID isn't part of the required curriculum anywhere in the United States, ID doesn't come under such bills.

5. Would an academic freedom bill change the required curriculum?

No, an academic freedom bill does not require teachers to teach anything differently. Topics like evolution will still be taught as a matter of required state law. All students will still need to learn and will be tested upon all aspects of state science standards. The bill still mandates that teachers follow the curriculum and teach the pro-evolution evidence. But it also gives teachers academic freedom to teach about credible scientific viewpoints that challenge the neo-Darwinian "consensus."

6. Does the bill only protect the right of teachers to criticize Darwinism?

No. The bill protects the rights of teachers to teach the scientific evidence *for* Darwinian evolution as much as the evidence against.

7. What do critics say about academic freedom bills?

Critics of academic freedom want to censor from students scientific views that dissent from the majority Darwinian viewpoint. They have one primary talking point—the assertion that academic freedom bills promote religion or "creationism." As can be seen, however, the critics' objection is not credible because academic freedom legislation typically contains an express provision **excluding** the teaching of religion from its protection.

Darwin lobbyists frequently brand scientific views they dislike as "religion" or "creationism" because they know the courts do not allow the teaching of religion in public schools and they view this charge as a convenient way of shutting down discussion. Those who love the First Amendment should be outraged. In essence, the Darwin lobby is taking the separation of church and state—a good thing—and misusing it to promote censorship.

8. Will academic freedom bills lead to lawsuits?

Critics sometimes use scare tactics to claim that academic freedom bills have led to lawsuits in various states. **These claims are false. There never has been a lawsuit challenging an academic freedom bill.** After an academic freedom bill passed into law in Louisiana in 2008, ACLU Executive Director Marjorie Esman reportedly conceded that "if the Act is utilized as written, it should be fine; though she is not sure it will be handled that way."[2] Likewise, a similar policy adopted in a public school parish in northern Louisiana in 2006, drew an admission from an attorney working with the ACLU that, "[o]n its face," the policy "is not objectionable."[3]

9. What do the different sides of this debate seek to accomplish?

For Darwin lobbyists, this is about falsely appealing to people's emotions and fears in order to suppress and censor from students scientific information that challenges Darwinian evolution. For proponents of academic freedom, this is about upholding the important value of academic freedom and the freedom to pursue legitimate scientific inquiry.

10. Is it constitutional to teach scientific critiques of neo-Darwinian evolution?

Yes. As long as teachers fulfill all other required aspects of the curriculum and stick to teaching science, it is constitutionally permissible for them to teach about legitimate scientific critiques that exist of neo-Darwinism (the modern theory of evolution currently held by most biologists). As the U.S. Supreme Court stated in the case *Edwards v. Aguillard*, "We do not imply that a legislature could never require that scientific critiques of prevailing scientific theories be taught."[4]

11. What educational benefits come from academic freedom legislation?

Courts and legislative bodies have found that it is legitimate to pass curricular policies about evolution in order to:

- Enhance the effectiveness of science education and encourage critical thinking;
- Help defuse the controversy caused by teaching evolution;
- Teach students to be informed citizens who can distinguish the data and testable theories of science from religious or philosophical claims that are made in the name of science.

Academic freedom bills yield each of these benefits. Teaching students about scientific questions and debates allows them to learn how scientists debate scientific issues and gain critical thinking skills. This will make them better scientists and better thinkers.

12. Is it good educational philosophy to protect academic freedom?

Yes. A 2010 paper in the journal *Science* found that students learn science best when they are asked "to discriminate between evidence that supports … or does not support"[5] a given scientific concept. Likewise, leading science education authorities, such as the U.S. National Academy of Sciences, suggest that students learn science using the inquiry method:

> Inquiry is a multifaceted activity that involves making observations; posing questions; examining books and other sources of information to see what is already known; planning investigations; reviewing what is already known in light of experimental evidence; using tools to gather, analyze, and interpret data; proposing answers, explanations, and predictions; and communicating the results. *Inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations.*[6]

Academic freedom legislation protects teachers who choose to use such inquiry methods and cover scientific controversies in an objective fashion. The First Amendment allows for

open discussion. Students cannot be expected to make well informed decisions if they're only hearing part of the story. Making informed decisions requires having good information. Allowing the communication of one viewpoint or theory and claiming it's the only viewpoint is indoctrinating, not educating.

13. Should schools teach both the strengths and weaknesses of Darwinian evolution?

Yes. Darwinian evolution should be fully and completely taught in public schools, and schools need to teach more about evolution, not less. Unfortunately, most biology classrooms teach a one-sided, Darwin-only curriculum that censors serious scientific critique of neo-Darwinism. Instead, schools should teach about both the strengths and weaknesses of neo-Darwinian and chemical evolutionary theories.

Teaching students about both the scientific evidence for and against modern Darwinian theory turns the classroom instruction away from indoctrination and toward genuine education. Critically analyzing Darwinian evolution teaches students more about the facts of biology and produces scientifically minded students with good critical thinking skills. As Charles Darwin himself wrote in *The Origin of Species*: "a fair result can be obtained only by fully stating and balancing the facts and arguments on both sides of each question."[7]

14. Are there legitimate scientists who challenge neo-Darwinian evolution?

Yes. Over 850 Ph.D. scientists have signed a statement declaring that they "are skeptical of claims for the ability of random mutation and natural selection to account for the complexity of life" (see www.dissentfromdarwin.com). Moreover, many articles in the mainstream scientific literature discuss scientific challenges to neo-Darwinian evolution.[8] Scientific critiques of modern Darwinian theory have a legitimate scientific basis in peer-reviewed scientific studies and teaching students about these scientific arguments against Darwinian evolution in no way injects religion into the classroom.

15. What are scientific weaknesses in modern evolutionary science?

- ***Genetics: Mutations cause harm and do not build complexity.***

Darwinian evolution relies on random mutations that are preserved by a blind, undirected process of natural selection that has no long-term "goals." Such a random and undirected process tends to harm organisms and does not improve them or build complexity. In the words of leading geneticist Lynn Margulis, a member of the National Academy of Sciences, has said: "new mutations don't create new species; they create offspring that are impaired."[9] Similarly, past president of the French Academy of Sciences, Pierre-Paul Grasse, contended that "[m]utations have a very limited 'constructive capacity'" because "[n]o matter how numerous they may be, mutations do not produce any kind of evolution."[10] According to the research of University of Wisconsin biologist Ralph Seelke, mutations can break features in bacteria but they cannot put even modestly complex features back together.[11] Likewise, biochemist Michael Behe and physicist David Snoke have published research in the journal *Protein Science* showing that even simple biochemical features like protein-protein interactions cannot be built by random mutation.[12]

Biochemistry: Random and undirected processes do not seem capable of producing cellular complexity.

Our cells contain incredible complexity, like miniature factories using machine technology but dwarfing the complexity and efficiency of anything produced by humans. Cells use miniature circuits, motors, feedback loops, encoded language, and even error-checking machinery to decode and repair our DNA. Darwinian evolution struggles to build this type of integrated complexity. As biochemist Franklin Harold admits: "there are presently no detailed Darwinian accounts of the evolution of any biochemical or cellular system, only a variety of wishful speculations."[13] Biochemist Michael Behe has found that Darwinian evolution tends to break molecular functions rather than building new ones.[14] Likewise, biochemical engineer Douglas Axe has published work in the *Journal of Molecular Biology* and elsewhere showing that amino acid sequences which yield functional protein folds are too rare to be produced by Darwinian processes.[15]

- ***Paleontology: The fossil record typically lacks intermediate fossils.***

The fossil record's overall pattern is one of abrupt explosions of new biological forms, and possible candidates for evolutionary transitions are the exception, not the rule. This has been recognized by many paleontologists such as Ernst Mayr who explained in 2000 that "[n]ew species usually appear in the fossil record suddenly, not connected with their ancestors by a series of intermediates."[16] Similarly, a zoology textbook observed that "Many species remain virtually unchanged for millions of years, then suddenly disappear to be replaced by a quite different, but related, form. Moreover, most major groups of animals appear abruptly in the fossil record, fully formed, and with no fossils yet discovered that form a transition from their parent group."[17] This pattern is contrary to what would be expected from Darwinian evolution.

- ***Taxonomy: Biologists have failed to construct a "tree of life."***

Biologists hoped that DNA evidence would reveal a grand tree of life where all organisms are clearly related. It hasn't. Trees describing the alleged ancestral relationships between organisms based upon one gene or biological characteristic very commonly conflict with trees based upon a different gene or characteristic. As the journal *New Scientist* put it, "different genes told contradictory evolutionary stories" leaving the tree of life project "in tatters, torn to pieces by an onslaught of negative evidence."[18] The eminent microbiologist Carl Woese explained that such "[p]hylogenetic" conflicts "can be seen everywhere in the universal tree, form its root to the major branchings within and among the various taxa to the makeup of the primary groupings themselves."[19] This implies a breakdown in common descent, the hypothesis that all organisms share a common ancestor.

- ***Chemical Evolution: The chemical origin of life remains an unsolved mystery***

The mystery of the origin of life is unsolved and all existing theories of chemical evolution face major problems. Basic deficiencies in chemical evolution include a lack of explanation for how a primordial soup could arise on the early earth's hostile environment, or how the information required for life could be generated by blind chemical reactions. As Greg Easterbrook recently commented in *Wired* magazine, "What creates life out of the inanimate compounds that make up living things? No one knows. How were the first

organisms assembled? Nature hasn't given us the slightest hint. If anything, the mystery has deepened over time."[20] Or as evolutionary biologist Massimo Pigliucci says, "we really don't have a clue how life originated on Earth."[21]

- ***Icons of Evolution: Textbooks often overstate or misstate key lines of evidence for modern evolutionary theory.***

Modern biology textbooks have a chronic habit of papering over scientific evidence that dissents from the standard lines of evidence—or "icons"—used to support Darwinian evolution. For example, when attempting to demonstrate common ancestry, textbooks frequently portray drawings of vertebrate embryos which *inaccurately overstate* the similarities between different organisms in their earliest stages of development.[22] Textbooks also often present examples of small-scale "microevolution" and overextrapolate the evidence to make unwarranted claims about "macroevolution." They discuss minute changes in the sizes of beaks on the Galápagos finches or small changes in the colors of peppered moths[23] to claim that fundamentally new types of organisms can evolve via Darwinian processes. As evolutionary biologist Robert L. Carroll asks: "Can changes in individual characters, such as the relative frequency of genes for light and dark wing color in moths adapting to industrial pollution, simply be multiplied over time to account for the origin of moths and butterflies within insects, the origin of insects from primitive arthropods, or the origin of arthropods from among primitive multicellular organisms?"[24] Many scientists feel the answer is "no"—but biology textbooks never inform students of this fact. This is all the more reason why teachers need academic freedom to inform students about the facts when textbooks don't tell the full story.

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[1] *See Edwards v. Aguillard,* 482 U.S. at 578 (1987); *Webster v. New Lenox Sch. Dist. #122*, 917 F.2d 1004 (7th Cir. 1990); *Freiler v. Tangipahoa Parish Bd. of Educ.*, 185 F.3d 337 (5th Cir. 1999), *cert. denied*, 530 U.S. 1251 (2000); *McLean v. Ark. Bd. of Educ.*, 529 F. Supp. 1255 (D.C. Ark. 1982).
[2] WWLTV.com, ACLU Plans To Keep Eye On Science Bill (June 24, 2008), http://www.wwltv.com/local/stories/wwl062408tpscienceact.37767059.html.
[3] Barbara Leader, *School Board Commended for Science Education*, *News Star*, December 1, 2006 at 1B.
[4] *Edwards v. Aguillard*, 482 U.S. 578, 593 (1987).
[5] Jonathan Osborne, "Arguing to Learn in Science: The Role of Collaborative, Critical Discourse," *Science*, Vol. 328 (5977): 463-466 (April 23, 2010).
[6] National Research Council, *Inquiry and the Science Education Standards: A Guide for Teaching and Learning*, pp. 13-14 (National Academy Press, 2000) (emphasis added).
[7] Charles Darwin, *The Origin of Species*, p. 66 (J. W. Burrow eds., Penguin Group 1985) (1859).
[8] There are many such papers, some of which are cited in this document. For example, see endnotes 11, 12, 14, 15, 22, and 23.
[9] Lynn Margulis, quoted in Darry Madden, UMass Scientist to Lead Debate on Evolutionary Theory, Brattleboro (Vt.) Reformer (Feb 3, 2006).
[10] Pierre-Paul Grassé, *Evolution of Living Organisms: Evidence for a New Theory of Transformation* (Academic Press: New York NY, 1977).
[11] Ann K Gauger, Stephanie Ebnet, Pamela F Fahey, Ralph Seelke, "Reductive Evolution Can Prevent Populations from Taking Simple Adaptive Paths to High Fitness," *BIO-Complexity*, Vol. 2010 (2010).
[12] Michael J. Behe & David W. Snoke, "Simulating Evolution by Gene Duplication of Protein Features That Require Multiple Amino Acid Residues," *Protein Science*, Vol 13:2651-2664 (2004).
[13] Franklin M. Harold, *The Way of the Cell: Molecules, Organisms and the Order of Life*, p. 205 (Oxford University Press, 2001).
[14] Michael J. Behe, "Experimental Evolution, Loss-of-Function Mutations and 'The First Rule of Adaptive Evolution'," *Quarterly Review of Biology*, Vol. 85(4) (December, 2010).
[15] Douglas D. Axe, "Estimating the Prevalence of Protein Sequences Adopting Functional Enzyme Folds," *Journal of Molecular Biology*, Vol. 341: 1295-1315 (2004); Douglas D. Axe, "Extreme Functional Sensitivity to Conservative Amino Acid Changes on Enzyme Exteriors," Journal of Molecular Biology, Vol. 301: 585-595 (2000). See also: Douglas D. Axe, "The Limits of Complex Adaptation: An Analysis Based on a Simple Model of Structured Bacterial Populations," *BIO-Complexity*, Vol. 2010 (2010).
[16] Ernst Mayr, *What Evolution Is*, p. 189 (Basic Books, 2001).
[17] C.P. Hickman, L.S. Roberts, and F.M. Hickman, Integrated Principles of Zoology, p. 866 (1988, 8th ed).
[18] Graham Lawton, "Why Darwin was wrong about the tree of life," *New Scientist* (January 21, 2009).
[19] Carl Woese "The Universal Ancestor," *Proceedings of the National Academy of Sciences USA*, Vol. 95:6854-9859 (June, 1998).
[20] Gregg Easterbrook, "Where did life come from?," *Wired Magazine*, p. 108 (February, 2007).
[21] Massimo Pigliucci, "Where Do We Come From?," p. 196, *Darwin Design and Public Education* (Stephen C. Meyer and John Angus Campbell, eds., Michigan State University Press, 2003).
[22] Jonathan Wells, "Haeckel's Embryos & Evolution: Setting the Record Straight," *American Biology Teacher*, Vol. 61(5):345-349 (May, 1999).
[23] Jonathan Wells, "Second Thoughts about Peppered Moths," *The Scientist*, Vol. 13(11):13 (1999).
[24] Robert Carroll, *Patterns and Processes of Vertebrate Evolution*, pp. 8-10 (Cambridge University Press, 1997).