

# The BEACON

News from

The Coalition for Excellence in Science and Math Education

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#### PRESIDENT'S MESSAGE

Much has happened in science education since the last issue of the Beacon. Here in New Mexico, on December 4<sup>th</sup>, 2007, the Rio Rancho Board rescinded that district's confusing "Science Policy 401." This policy was widely viewed as a vehicle for promoting "Intelligent Design" (ID) in science classes since its approval by the previous Board in 2005. There is a detailed account of this important decision in this issue of the Beacon.

Meanwhile, our neighboring state, Texas, has forced their public education science expert, Christina Comer, to resign, simply for having alerted colleagues to an upcoming talk by ID/creationism expert Prof. Barbara Forrest, co-author of Creationism's Trojan Horse. The Texas Education Agency declared that Comer's resignation was necessary to preserve "neutrality" between evolution science and ID/creationism. It's pretty scary when a public education agency thinks it must treat science and pseudoscience as equals.

In early January, the South Carolina board of education gave official approval to Kenneth R. Miller and Joseph Levine's excellent high school textbook Biology (Prentice-Hall). And Florida approved science standards in February that reflect evolution's prominent status in biology, a vast improvement over existing standards. A "compromise" was included, which required mentioning the "scientific theory of evolution" repeatedly in Florida's standards, but this was much less worrisome than the "academic freedom" and "teach the controversy" changes demanded by ID advocates. That the Discovery Institute decried the decision as a "Meaningless 'Compromise' to Retain Dogmatism" is, I think, a good sign for Florida's schools.

February 12<sup>th</sup> was Charles Darwin's 199<sup>th</sup> birthday, and CESE (as well as numerous other science organizations) observed the date in various ways. CESE founder Dr. Marshall Berman gave an excellent presentation on February 13<sup>th</sup>, titled "The 'Intelligently Designed' Attack on Science and Society," which is available in its entirety via the CESE website (www.cesamenm.org). CESE sponsored a free showing of biologist Randy Olson's film, "Flock of Dodos: The Evolution-Intelligent Design Circus" on Feb. 16<sup>th</sup>, followed by a lively panel discussion.

One thing that was mentioned repeatedly during this discussion was the effectiveness of ID/creationism slogans. Creationists intentionally target the general public's sense of fair play with polished soundbites which frame their Here are some of message. the most common: "Teach the Controversy," "Academic Freedom for Teachers," "Go Where the Evidence Leads," and "All we're asking for is to teach evidence both for and against evolution."

After the "Dodos" showing, the panel asked audience members to suggest new slogans

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which might be effective for promoting good science education with the public. Marshall Berman suggested the following slogan, based on Charles Darwin and Abraham Lincoln sharing the same birthday (February 12<sup>th</sup>, 1809): "Lincoln freed the slaves; Darwin freed our minds." Since then, Dr. Berman has found others expanding on the same theme (for example, see www.darwinday.org/englishL/newsviews/darlin.html). Here are some other catchy phrases donated by the CESE audience:

"Intelligent Design: school board science!"

"Intelligent Design" is really "Neo-creationism" "Teach the Data"

"Teach the Evidence"

"Teach the Science"

"Tiktaalik Lived!"

"Yes, There ARE Bat Fossils!" (re some recent findings!)

"Darwin was a Maverick"

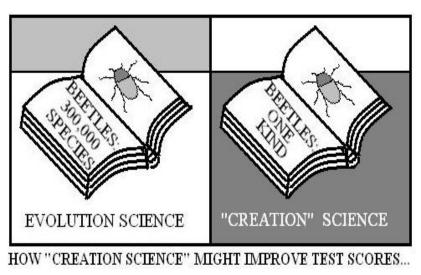
"Religion has its place, but it's not in Science

Class"

"In the Beginning, God created evolution" "Evolution: Gravity is a theory too" "Evolution Happens"

"Modern Science is not Medieval"

Do you, the reader, have a slogan or catchy phrase that will engage the general public to be enthusiastic about good science education? If so, please send it along to CESE care of Dave Thomas, at <nmsrdave@swcp.com>. We will print the best responses in the next Beacon. Until then, be vigilant. Creationists may be many things, but being quitters is not one of them.



http:/cesame-nm.org

# GAME OVER IN RIO RANCHO, NM: SCIENCE 1, WEDGE 0 by Dave Thomas, Kim Johnson and Marshall Berman

After producing division and confusion for more than two years in Rio Rancho (New Mexico) science classes, the Rio Rancho School Board formally terminated the ill-fated experiment known as "Policy 401." First passed in August of 2005, the policy did not mention "Intelligent Design" (ID) by name, but was perceived by the community and press as favorable to ID and creationism arguments, and as encouraging discussion of these "alternatives" to evolution.

The original policy declared that "The Rio Rancho Board of Education recognizes that scientific theories, such as theories regarding biological and cosmological origins, may be used to support or to challenge individual religious and philosophical beliefs. Consequently, the teaching of science in public school science classrooms may be of great interest and concern to students and their parents. ... discussions about issues that are of interest to both science and individual religious and philosophical beliefs will acknowledge that reasonable people may disagree about the meaning and interpretation of data."

The policy was met with strong opposition before and after its passage, from both the science community and the science teachers affected by the decision. Policy 401 was modified in March of 2006, leaving in language that was already in statewide science standards, but removing the remark "that reasonable people may disagree about the meaning and interpretation of data." Still, the policy was perceived by the general public and the media as allowing and promoting discussions of ID and creationism in district science classes. The main reason for this perception was the continuing claims by many ID supporters, most notably the Intelligent Design Network of New Mexico, that the policy was ID/creationism friendly. More than a year after 401 was modified, Joe Renick, the executive director of IDnet-NM. declared on Christian Radio station KNKT (107.1 FM in Albuquerque, NM) that "We already have a very good policy statement that was written for the Rio Rancho district, that basically does something, and so help me, Peter, I believe that this may be the first time in the country that any school district has ever done this, this is simply to acknowledge that yes, the teaching of biological origins has religious implications... If we had a dozen school districts in New Mexico that came up with a policy on science education similar to that one that was passed by the Rio Rancho school board, that would shake the ground. ... That would be the start of a revolution."

When the host of the talk show, Peter Benson, responded by saying "If you just have a curiosity about some of these amazing things going on, within Intelligent Design, within Creation, just looking, looking again, anew at God's Creation... It's pretty amazing," Renick's reply was immediate: "You find His fingerprints everywhere."

The policy was first passed in 2005, when three people on the five-member board were supporters of ID: pastors Marty Scharfglass and Don Schlichte, and Kathy Jackson, whose husband Kevin Jackson had previously had a formal family organization send copies of Michael Behe's "Darwin's Black Box" to state science teachers. Jackson was later elected Mayor of Rio Rancho, but was forced to resign after a series of financial scandals. In the last school board election, Kathy Jackson was replaced by science supporter Divyesh Patel, and pastors Schlichte and Scharfglass suddenly found themselves in the minority regarding Policy 401. Patel was joined by the two members who opposed the policy from its inception, board president Lisa Cour and member Margaret Terry, and the topic of this divisive policy was re-visited, culminating in a vote on December 3<sup>rd</sup>, 2007.

Of the fourteen people who made public comments before the vote, eleven supported the board's decision to revoke the policy, while three wanted the policy to be retained. Jesse Johnson talked

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about the divisive nature of the Dover, PA situation, warning everyone that "One teacher promoting creationism, plus one angry parent, equals a divided community and an expensive lawsuit." Another speaker mentioned that science changes and progresses, while religion remains static, and urged the board to consider the advice of Father George Coyne (former Vatican astronomer) to keep science religion separate. and Teacher Teresa Walker supported revocation of the policy because it redundantly restates state science standards, and therefore implies that Rio Rancho's science teachers are incapable of following these standards.

The head of the district's Scimatics Academy, science teacher Dan Barbour, had some of the most penetrating commentary: "The policy has done exactly what the Wedge Strategy is designed to do: divide our community, discredit the scientific process, and promote religious explanation as a scientific explanation."

Former State Board of Education member and article author Marshall Berman, a physicist, mentioned that ID claims such as the lack of evidence of evolution in the fossil record are patently false, and that supporting such claims resulted in the Dover PA board members losing their elections, while the district ended up paying a million-dollar fine. Science teacher Jennifer Miyashiro talked about how distracting and divisive the policy had been in her own classes, and how the district was running the risk of alienating both good science teachers and high-tech businesses. Another science teacher complained that giving students spoon-fed questions straight out of ID texts was hardly "critical thinking," and asked why, out of 800 state performance standards and benchmarks, was this single standard subjected to such meddling. Physicist and article author Kim Johnson talked about the Lemon Test, and mentioned that Policy 401 certainly engaged both the Effect and Entanglement clauses regarding unconstitutional mixing of religion with public policy, and quite likely the Intent clause as well.

Among those arguing that the board should retain the policy were a parent who said that since neither evolution nor creation could explain new species, both should be taught, and a speaker who cited Einstein's comment that "Science without religion is lame." The executive director of IDnet-NM, Joe Renick, read a lengthy statement defending the policy's "honorable intentions and clear language." Renick said the policy simply promoted neutrality through objective science education, and blamed the speakers against the policy for being the ones who got things so entangled with religion. He also called them the Darwinist SWAT team!

Article author Dave Thomas was the last commenter, and

he read Renick's statements on the Christian radio station to the board, explaining that statements such as these were the *real* reason the policy was perceived as supportive of religion, ID, and creationism.

The board members then discussed their own views on the policy. Members Cour, Patel and Terry gave brief and eloquent reasons for their opposition to the policy. Scharfglass said he still supported his policy because biology indeed challenges the religious beliefs of some students, that evolution should not be a topic of indoctrination, and that NM's standards do not say "Other data should be excluded." Schlichte went on for many minutes, backed up by a Powerpoint presentation which he said was necessary because "Not everyone in our culture understands these issues." He went on for quite a while on the claim that all laws stem from beliefs, some religious in nature, and cited bad laws (Nazi extermination of Jews, Communist suppression, Prohibition) as well as good laws (women's suffrage) as all being based on belief. He said that bad legislation results in the sacrifice of Truth and Freedom, and said that the First Amendment of the Constitution has been reinterpreted from its original purpose (no state-sponsored Religion) to a new, invalid purpose (separation of God from public institutions). He declared that the Supreme Court was schizophrenic for thinking this way, and yet allowing "In

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God We Trust" to be printed on US currency, or "One Nation Under God" to be included in the Pledge of Allegiance. Schlichte then declared that evolution is just a theory, not a fact, and that students could not learn how to get to Mars if facts like 2+2=4) were stripped out of science texts. However, he claimed, if all references to evolution were torn out of biology texts (and he complained that they all mention evolution), students would not be impaired one whit in getting to Mars. He then compared the "Two Models," one being "Matter=>Monkeys=>Man" and the other being in the Book of Genesis, and involving the Creator mentioned in the Declaration of Independence. He said it was better just to remove evolution from school rather than indoctrinate students into believing it as fact, and cited the preponderance of public support for creationism (over 50% in some polls) as evidence that there are valid theories besides evolution.

Board president Cour made a few additional comments, pointing out that the Rio Rancho School District already has policies regarding "Controversial Issues" (Policy 426) and "Freedom of Expression" (Policy 354), and said that students are quite free to pray on their own, and to discuss God and religion in humanities classes like sociology or philosophy, where the discussions are much more respectful and restrained than in science classes. Cour reiterated that students are encouraged to think critically about

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all topics, not just about evolution, and that she trusts science teachers to follow state curriculum guidelines without redundant coercion by the District. Board president Cour also stated that "Just because evolution is embraced by evil and unethical people, it does not mean evolution is evil."

After some more backand-forth between the opposing poles on the board, the vote was taken, and Policy 401 was revoked at 8:02 PM. Reason and civility are expected to be restored in science classes beginning on December 4<sup>th</sup>, 2007.

#### Commentary

When the school board meeting was over, we learned that the Rio Rancho Public Schools lawyer had come to the conclusion that any suit brought against the 401 policy would have been dismissed, because of its benign wording adopted a year ago. While it might be true that a suit brought to dismiss the policy may have been dismissed if this were the only issue, in fact the policy would have almost certainly been named as implemental in any suit brought against the school system for teaching ID creationism. It appears that the real nature of the battle escaped the legal eyes of the lawyer. After the religious intent of 401 was fully established by the two pastors by their own words, and as perceived by the public and press, and after the effect was reported by science teachers, and after the observed entanglement with ID creationism was established, it is not at all clear that the school district would have escaped the cost for and loss of a court suit.

The district should be thankful for all those people who fought for over two years to rescind this policy. The rescission of the policy may very well have kept Rio Rancho Public Schools from being the next "Dover." It is fairly clear that the two pastors will never either intellectually or viscerally understand this, just as they do not understand science and especially the science of evolution. It is clear that the pastors and like-minded people will probably never understand that the intent of the First Amendment has always been to keep the federal government and any state governments (via the 14th Amendment) from establishing religion in school.



Kim Johnson addresses the Rio Rancho School Board

#### THE CONFIDENCE GAME

The terms: "confidence level", "confidence limit", and "confidence interval" are bandied around a lot, but there might be a few of us who don't have a precise meaning fixed in our minds. Unfortunately, the terms are so interrelated that we almost have to define one in terms of others. For the nonce, let us take "confidence level" as a given and use it to define the other two. We will get back to confidence level later.

It is understood that whatever value we find in a single sample or on a single trial might not be exactly the true average value. Suppose we have only a few samples. At, say, the 95% confidence level, we have 95% "confidence" that the true level will lie within the <u>confidence interval</u>. The upper and lower <u>confidence limits</u> are the boundaries of the confidence interval. If the sample values are symmetrically distributed the upper and lower confidence limits will be equidistant from the true value.

Now let's get back to <u>confidence level</u> or just plain confidence. We can think of it in either of two ways. In the long-run definition, if we have a very large number of trials and our confidence level is 99%, we would expect that no more than 1% would fall outside the confidence interval. The state-of-belief definition is a little more complicated. Our state-of-belief can be illustrated by a bet we are both equally willing to make. Suppose we settle on the 99% confidence level. Both you and I are willing to make the following bet. I put up one dollar and you put up 99 dollars. I will bet that the next event lies outside the confidence interval. If I lose you get my one dollar. If you lose, I get your 99 dollars. We both think that this is a fair bet. That shows the strength of our belief that 99% of values lie within the confidence interval. Although the adherents of each definition vigorously insist that theirs alone is right and the other wrong, numerically they give exactly the same result.

You probably say "Wait! No sane person would make such a one-sided bet!" The asymmetry of the bet tells you how strong the belief in a 99% confidence level must be. If we are willing to make such a one-sided bet, the confidence interval has to be very wide. The lower confidence limit must be so low that we are sure that very few values lie below it, and the upper confidence limit likewise has to be very high. If we are talking about a small number of items in a trial, we would guess that it's probably less representative of the true value than a very large sample, so we would demand a wider confidence interval

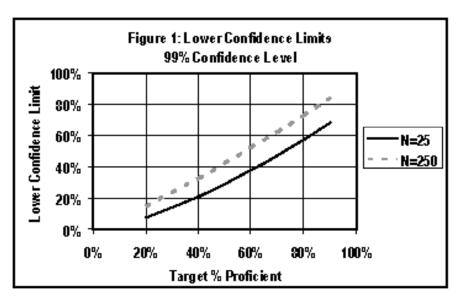
Suppose you are a teacher giving a test to a group of students. Suppose that P% pass. You know that doesn't necessarily reflect their true ability. Maybe the weather was severe and that put them off, or the examination room was stuffy, or they all happened to study extra hard, or you were a bit cranky and they were afraid you were going to fall apart on them. We can't be sure that their performance in that one test measures their real ability. If you could give the test repeatedly with an amnesia pill between tests, the fraction proficient would probably differ from one test administration to the next. The fraction proficient in a long sequence of trials is a binomially distributed random variable. The binomial distribution gives us the probability of getting R successes with N subjects if we know the true long-run probability of success. If we had a very large number of test administrations, the values would be centered on the "true" value of student proficiency.

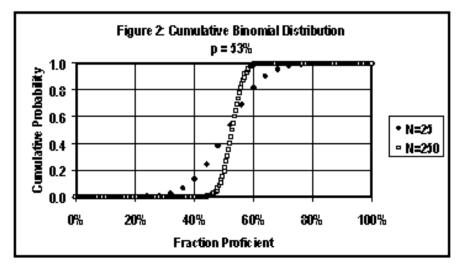
If we could administer the test many, many times, we could narrow down the true level and see if it met or surpassed the Annual Measurable Objective. Absent that possibility, we can at least estimate the width of the confidence interval. If the AMO is assumed to be the long run target for success, then any fraction proficient below the lower confidence bound centered on the AMO can be confidently assumed <u>not</u> to have met the AYP. There are some hideously complex formulas for the confidence limits. One marginally simpler approximation gives a wider interval than a more complicated but more accurate formula. New Mexico uses the formula that gives the wider interval. The state could say they wanted to be absolutely certain that you really passed, so you have to exceed the upper confidence limit. This is such a stringent rule that very few schools would ever pass. The state is not willing to accept that danger, so they say you have passed if you can at least get up to the lower confidence limit. They make that lower limit very low indeed by using a 99% confidence level in the crude but generous formula and by adjusting for the number of students tested. This means that the "passing" grade is a lot lower for small schools than for large schools. This gives some schools a chance of passing AYP.

Figure 1 shows the lower confidence limits for a small rural school with only 25 students in a subgroup and an urban school with 250 students in a subgroup. At a target proficiency of 53% (the reading AMO for grades 6-8 in 2008), the small school passes AYP with only 31.4% proficient. The larger school has to have 45.7% proficient to pass. If you wonder why rural schools seem to make AYP more often than urban schools, there is the answer.

Figure 2 shows the cumulative binomial probability distribution for the two schools if the "true" proficiency is 53%. The small school might realistically experience almost any fraction proficient between 30% and 70% on any specific test administration with at least some reasonable probability. The only realistic values for the larger school are in a narrow band close to the long run average proficiency. That is the reason for the wider confidence interval for small schools.

Perhaps it intuitively seems that a 99% confidence level would be more conservative than a 90% confidence level. Actually, it is much <u>less</u> conservative in this application. If we wanted to be conservative, we could say that the fraction proficient has to be at least as high as the AMO, without any quibbling about sample size or confidence levels. You make it or you fail. Fortunately, the state gives us a better deal.





Walt Murfin CESE Statistician

http:/cesame-nm.org

# **COURT DECISIONS**

Significant cases regarding evolution and creationism in public schools.

#### 1. Epperson v. Arkansas, 1968

The U.S. Supreme Court invalidated an Arkansas statute that prohibited teaching evolution. The First Amendment does not allow a state to require that teaching must be tailored to the principles or the prohibitions of any particular religious sect or doctrine.

#### 2. Segraves v. California, 1981

Sacramento Superior Court found that the California State Board of Education's science standards accommodated children's free exercise of religion by providing that class discussion of origins focus on "how" and not "ultimate cause" of origins.

#### 3. McLean v. Arkansas, 1982

A federal court held that an Arkansas statute requiring "balanced treatment" of "creationscience" and "evolution-science" violated the Establishment Clause of the U.S. Constitution. The court declared that "creation-science" is not an actual science, and that the theory of evolution does not presuppose either the absence or the presence of a creator.

# 4. Edwards v. Aguillard, 1987

The U.S. Supreme Court said Louisiana's Creationism Act was unconstitutional. According to the court, the act endorsed religion by allowing evolution instruction only when accompanied by creationism instruction.

#### 5. Webster v. New Lenox School District, 1990

An Illinois court found that a school district could prohibit a teacher from teaching creationism.

# 6. Peloza v. Capistrano School District, 1994

A California court found that a teacher's First Amendment right to free exercise of religion is not violated by a school district's requirement that evolution be taught in biology class.

# 7. Freiler v. Tangipahoa Parish Board of Education, 1997

A Louisiana district court rejected a policy requiring teachers to read aloud a disclaimer promoting "critical thinking" when teaching evolution. This decision also recognized intelligent design as being the same as creationism.

# 8. Rodney LeVake v. Independent School District 656, 2000

The case of a high school teacher wanting to teach "evidence both for and against" evolution was rejected by a Minnesota state district court judge. The teacher's desire did not match the district's curriculum.

# 9. Selman et al. v. Cobb County School District et al., 2005

In Georgia, a federal judge ruled that it violated the First Amendment to put the following warning label on textbooks: "This textbook contains material on evolution. Evolution is a theory, not a fact, regarding the origin of living things. This material should be approached with an open mind, studied carefully, and critically considered."

# 10. Kitzmiller et al. v. Dover, 2005

A federal judge ordered the Dover, Pa., area school board not to include in the science curriculum a statement that read, "Students will be made aware of gaps/problems in Darwin's theory and other theories of evolution, including, but not limited to, intelligent design." The judge said it violated the First Amendment.

Source: National Center for Science Education kcromer@star-telegram.com KATHERINE CROMER BROCK, 817-685-3813

Contributed by Marshall Berman

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# STRANGE DAYS ON PLANET EARTH

Join the producer of this series for a unique preview and behind-the-scenes stories about this special program.

Co-sponsored with KNME-TV, New Mexicans for Science and Reason (NMSR) and CESE."Strange Days on Planet Earth" is a unique production that integrates cutting-edge research, state of the art graphics, and globe spanning investigations, all presented as a high-tech detective story. In partnership with National Geographic, the program raises public understanding about how individuals are interconnected to our planet's life systems. The inaugural PBS series, hosted by Academy-award nominated actor Edward Norton, earned 14 major film festival honors. This April a new season will focus on global ocean and freshwater issues. Mark Shelley is Executive Director of Sea Studios Foundation. He has used film-making to spotlight some of the most pressing issues of our times - from climate change to invasive species, from the loss of biological diversity to the loss of large predators and landscape fragmentation, and the vital role of our oceans in Earth's life support systems.

He is internationally recognized for his underwater filmmaking skills. Mark is an expert diver, submersible pilot, and airplane pilot.

Museum of Natural History Tuesday, April 15, 7:00 PM Cost: \$2 public/\$1 members, seniors, students

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#### **Return Service Requested**

This addendum just in from Tish Morris: Re "Strange Days on Planet Earth", (see page 9). Strange Days on Planet Earth will be airing on KNME-TV Wednesday, April 23rd at 9:00 p.m.

2nd: a brief mention of the Annual Meeting:

Please make note of the CESE 2008 Annual Meeting. This will be held on Saturday, June 21, at 1-4 PM, at the Maxwell Anthropology Museum Lecture Hall (room 163). The meeting will include a presentation by noted Darwin actor Brian "Fox" Ellis of Fox Tales International (www.foxtalesint.com).

Last, a mention of the new Science Watch Podcast:

NMSR's Science Watch, heard on Saturdays at 2 PM on 1350 AM in Albuquerque, can now be enjoyed on your computer, at any time of day, from any location! Podcasts of several recent and "Best Of" Science Watch shows are now available at

http://web.mac.com/nmsrorg/iWeb/scienceWatch/Home.html

Have a listen!