

Guilty by association: Why Conservatives Shouldn't be Surprised that They are Perceived as Anti-Science and Why They Should be Concerned

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Abstract

Conservative politicians are frequently asked about their positions on controversial scientific topics, especially origins and climate change. The former topic is particularly important to a group of mainly conservative and fundamentalist Protestants who would like to see Creation Science and Intelligent Design taught in public schools. But these communities are often guilty of misrepresenting mainstream science to the point of undermining the credibility of their own camps. Conservative candidates who align, or appear to align, themselves with such groups will not be taken seriously by voters who are becoming more and more educated in the sciences. Conservatives need to approach these scientific topics as they really are: complicated. This is what the Science, Faith, and Technology program at Grove City College is doing. Conservative and fundamentalist Protestant communities ought to follow the lead of this unique program, and candidates should be sending their voters a positive message about mainstream science and its contribution to America's strong history of scientific success.

Just a Theory

Rick Perry is not the first politician to characterize evolution as a "theory" with "gaps."¹ Ronald Reagan did so during his bid for the presidency in 1980: "Well, it is a theory, it is a scientific theory only, and it has in recent years been challenged in the world of science and is not yet believed in the scientific community to be as infallible as it once was believed."² At a campaign stop in 2007, Ron Paul said, "I think it's a theory, the theory of evolution, and I don't accept it, you know, as a theory."³ In 2005 George W. Bush said, "Well, the jury is still out on evolution, you know."⁴ Comments like these inevitably lead to a firestorm of criticism in the press and the blogosphere. Shortly after Mr. Perry's remarks, the *New York Times* ran an op-ed by Paul Krugman titled, "Republicans against Science."⁵ The *Huffington Post* ran Leonard Steinhorn's piece, "How the GOP Became the Anti-Science Party."⁶ Both Krugman and Steinhorn mention Republican Party presidential candidate Jon Huntsman, who, in response to

comments by Mr. Perry and Michelle Bachmann on evolution and climate change, said on ABC News, “The minute that the Republican Party becomes the anti-science party, we have a huge problem.”⁷ Ms. Bachmann has also been the target of intense criticism since a live interview on Fox News in which she supported her position against mandatory HPV vaccinations with the story of a woman who claimed her daughter suffers from mental retardation as a result of the vaccine.⁸

Why does characterizing evolution as a “theory” warrant the accusation of being anti-science, when even scientists refer to the common descent of organisms by mutation, natural selection, and other mechanisms as evolutionary *theory*? The answer is that voters, scientists, and the press can read between the lines. It is obvious that when scientists say “theory,” they mean something different than those who say, “Evolution is just a theory.” Coming from conservatives, and especially religious conservatives, the phrase is obviously dismissive—intended to suggest evolution is little more than a tenuous hypothesis. In 1981, shortly after Mr. Reagan’s remarks, Harvard paleontologist Stephen Jay Gould pointed out in an article titled “Evolution as Fact and Theory” that although scientists periodically update the “theory of gravitation,” no one doubts the fact that gravity exists.⁹ Similarly, though evolutionists argue about the “theory of evolution,” they agree that the world’s data clearly indicate that all organisms have evolved by some mechanism. Gould argues that Mr. Reagan’s characterization of evolution as only a theory simply echoes the talking points of the Creationist Movement and their “play upon a vernacular misunderstanding of the word ‘theory’ to convey the false impression that we evolutionists are covering up the rotten core of our edifice.”⁹

To the scientist, the word “theory” means “explanatory structure,” that is, an organized explanation of some phenomenon, or “how something works.” For example, a *part* of

evolutionary *theory* (albeit highly simplified) is that if a group of organisms becomes isolated from its home population, the processes of random mutation, natural selection, and genetic drift will act uniquely on each group. At some point, the two groups may differ enough that they can no longer interbreed. They are then considered separate species. Of course, it is important to note here that there are many variations on this theme.¹⁰ Evolutionary theory is multifaceted and far more nuanced than generally thought. It frustrates scientists that the opponents of evolution think they can undermine evolution simply by referring to it as a “theory” instead of doing the hard scientific work necessary to evaluate its intricacies and the large body of data that evolutionists use to support it. Not surprisingly, the phrase “just a theory” is now simply viewed as creationist mantra. Even theist and Brown University biologist Kenneth Miller derides the phrase in the title of his recent book attacking the Intelligent Design (ID) movement: *Only a Theory: Evolution and the Battle for America’s Soul*.¹¹ In this climate, political candidates who say anything reminiscent of the phrase are viewed as aligning themselves with the Creationist or ID movements.

Of course, creationists, ID supporters, and politicians sympathetic to these camps might argue that they are right about origins, or at least have a right to be considered legitimate camps in the debate about cosmological and biological origins; but the situation is far more complex than this. It is not my intent in this paper to evaluate a list of arguments of creationists and ID supporters against evolution. Rather, I will present data that suggest that these camps have serious in-house problems that undermine their legitimacy in the eyes of the scientific community and a broad spectrum of the public, even religious people.

In-house problems

Clearly, problematic statements by the members, and even the leaders, of a particular camp do not, on their own, invalidate that camp's underlying position. Nevertheless, widespread problematic statements by the adherents and leaders of a particular camp undermine that group's credibility, and that of anyone who aligns or sympathizes with it.

In surveys I have conducted at a Christian college on the first day of a class on the intersection of science and religion (every semester since 2009), students were asked to respond to the statement: "Evolution is just a theory." 22% of the students strongly agreed and 36% agreed (n = 365). Only 6% strongly disagreed. The same students were then asked to respond to the following statement about evolutionary theory: "One valid argument against evolution is that it requires the sudden appearance of a male and female organism of the same 'newly evolved' species and that this is even more improbable than the evolution of a single new organism. Without such an occurrence the 'newly evolved' species could not reproduce, and all 'mutated' organisms would die without passing on their genes." 11% strongly agreed, 40% agreed, and 30% didn't know (n = 366). 4% strongly disagreed. The problem here is that this statement is a blatant straw-man argument. Neither Darwin's original evolutionary theory nor the modern version include mechanisms whereby new species appear in one generation. That is, when an individual in a population is born with genetic variation resulting from mutations, it is not so transformed that a new species arises in that individual. In fact, the effects of most mutations are hardly perceptible and the individual carrying those mutations can freely interbreed with other members of its population. This is how new genetic variation is spread. A study of complete genome sequences of two mother-father-offspring human trios reported in the July 2011 issue of *Nature Genetics* found that the children were born with approximately 35 - 49 new mutations

differentiating their genomes from those of their parents; and this is fewer mutations on average than estimated by past studies.¹² That is, it is known (and it has been for some time) that numerous genetic mutations are constantly being introduced to, and spread through, populations. Part of evolutionary theory says that genetic variation that imparts greater reproductive success to organisms tends to spread through a population, and over time, the entire population changes; and even “neutral” mutations are spread by random interbreeding. The claim that a male and female of some radically different mutant must evolve simultaneously for evolution to occur betrays a careless misunderstanding of evolutionary theory and genetics. Thirty years ago, Gould said, “Any evolutionists who believed such nonsense [i.e. a mutational event leading to the emergence of a new species in one generation] would rightly be laughed off the intellectual stage.”⁹

Interestingly, the surveyed students seem to understand the question. They know what distinguishes organisms as separate species—the inability to reproduce with each other. So they have been taught biology, and some evolutionary theory; but they have either been taught a misrepresentation of evolutionary theory, or they have not been taught enough about it and are too eager to agree with a good sounding argument that seems to support their position. Of course, some creationists know that this is not a valid argument, but it should concern the leaders of the Creationist and ID movements that 51% of the students at a conservative Christian college are quick to support an obvious straw-man argument. Furthermore, it is easy to see why the scientific community responds so negatively to the Creationist and ID movements when 81% of the students—the majority of whom (58%, n = 365) dismissed evolution as “just a theory,” and support the teaching of Intelligent Design in public schools (74%, n = 363)—show that they are wrong about (51%) or unsure of (30%) one of the most basic principles of the theory.

When students within the same group were asked: “Which describes your political leaning?” 75% indicated “Conservative,” 20%, “Moderate,” and 5%, “Liberal” (n = 155). Furthermore, 90% indicated that they had had a discussion about biological origins within the last year, 45% within the past month (n = 230). So not only do college-aged adherents of Creationism and ID exhibit fundamental misunderstandings about evolutionary theory, but a significant number of them are frequently discussing the topic with others.

These characteristics are common among individuals and organizations apparently viewed as authorities by creationists and conservative and fundamentalist Christians. In an article titled “Creationists Point to Huge Holes in Evolution [sic] ‘Theory,’” Robert H. Congelliere (M.S., Chemical Engineering), writing for the organization Creation Science Evangelism (CSE), asks,

What are the odds that, of the millions of species of animals, birds, fish and insects, a male of each species developed at the same time and in the same place as a female of the same species, so that the species could propagate?¹³

It is, perhaps, not entirely surprising that a group of conservative Christian college sophomores from various majors embraced a blatant straw-man argument against evolution; but that a well-known creationist organization has had this article posted online for at least six years with no erratum undermines the organization’s credibility.

This is just one of several equally problematic straw-man arguments made by Congelliere; and to make matters worse, he tells students to print a copy of the article and see if their teachers can answer the questions he raises. He continues, “Also, give copies to your fellow students so that they, too, will be aware that there are huge flaws in the theory of evolution. It is still a theory, not a ‘fact.’” The sad fact is that if any student takes his advice, they will truly be “laughed off the intellectual stage.” Again we see the pattern of misrepresentation, or

misunderstanding, mixed with a passion to engage people on the issue. And once again we see the “just a theory” mantra.

But such errors do not only show up in lay surveys and on creationist websites. The male/female straw man occurs in the creationist biology textbook *Exploring Creation with Biology*, published by Apologia Educational Ministries. Apologia’s well-produced 75-page catalogue of resources for homeschoolers includes fifteen science textbooks, seventeen online courses, and many other books and materials. The organization has been in existence since 1996 and its science curriculum was recently ranked first by *Practical Homeschooling*, a magazine that claims a readership of 100,000.¹⁴ The authors of the biology textbook—Jay Wile (Ph.D., Nuclear Chemistry) and Marilyn Durnell (B.S., Medical Technology)—use the male/female straw-man argument in connection with a misunderstanding of a hotly debated theory regarding the pattern of evolution called punctuated equilibrium (PE). PE was proposed by Stephen Jay Gould and fellow paleontologist Niles Eldredge of the American Museum of Natural History in 1972 to explain the “rarity of transitional series” and of other gradual change observed in the fossil record.¹⁵ Wile and Durnell write,

If evolution happens as quickly as punctuated equilibrium exists [sic], it becomes hard to understand how it could happen in populations that sexually reproduce. After all, if an individual gets several large mutations at once, it is significantly different from the other members of its species. However, when an individual is significantly different from the other members of its species, it is hard for that individual to sexually reproduce with them. If punctuated equilibrium really did occur, it would have to occur *slowly* enough to allow the mutant organism to sexually reproduce with others in its own species (so that its mutation could be passed on to the next generation), but *quickly* enough so that the mutants would not appear in the fossil record. Either that, or there would have to be *several* mutants in one generation, all of them having essentially the same mutations so that they could still sexually reproduce with one another. Both scenarios seem to be rather far-fetched.¹⁶

The second scenario is far-fetched, but it has nothing to do with PE. The first scenario reflects a fundamental misunderstanding of the time-scales of PE. In actuality, Eldredge and Gould

claimed that for most populations of organisms the fossil record reveals long histories of little evolutionary change, or “stasis.” Significantly different yet closely related organisms *seem* to appear suddenly in the fossil record without a series of fossils detailing the step-by-step changes, or “transitional series,” leading to the new organisms; and they seem to appear already in stasis. Eldredge and Gould went on to argue that given “allopatric speciation”—a well-accepted mechanism proposed by Harvard evolutionary biologist Ernst Mayr,¹⁵ describing how new species arise—one might indeed expect the evolutionary history of life to be one marked by equilibria (populations in stasis) punctuated by *geologically* brief speciation events (not the sudden emergence of a new species due to major mutations in one or more individuals in a few generations). Says Gould in 2002, “Punctuated equilibrium makes no claim about the possibility of substantial change at rates that would be called rapid by measuring rods of a human lifetime.”¹⁷

Mayr proposed that, for several reasons, most evolutionary change should occur in small break-off groups at the periphery of larger populations: (1) more intense natural selection at the edge of an organism’s geographic range; (2) the difficulty with which genetic variation takes hold in a large population vs. the comparable ease in a smaller population; and (3) complex effects on fitness due to genetic subsampling from the larger population.^{10, 15} It follows that, since fossilization is rare, we are far less likely to find fossils from small break-off groups than from large, evolutionarily stagnant populations. Moreover, finding a transitional series would require the even more unlikely possibility of finding several fossils from the same small group spread out over the time it was changing. We would only expect to find several fossils from a break-off group if it reached a significant size, at which time, according to PE, it would likely be in stasis. Furthermore, a migration of the small group away from (and even back to) the

geographical location of the ancestral population could amplify the apparent “gap” in the fossil record,¹⁷ since transitions (assuming they fossilize) could be spread over a large geographical range, making them difficult for paleontologists to locate, and seem to emerge suddenly in the ancestral range. Wile and Durnell’s apparent Catch-22 is itself a straw man. It underestimates the time-scales of PE by ignoring the roles of population size, genetics, ecology, geography, migration, and the conditions necessary for fossilization.

Since 1972, the debate over PE has raged in the evolutionary biology community and even Eldredge and Gould have agreed that the processes of speciation and stasis are far more nuanced than a simple combination of allopatric speciation and population dependent gene flow.^{10, 17-20} Furthermore, evolutionists definitely do not view PE as the sole pattern of evolution. There is paleontological, theoretical, genetic, and other biological data that support evolutionary change by both gradual and punctuated processes.^{10, 21-24} Most importantly, Gould^{9, 17} and others¹⁰ state clearly that PE is not to be understood as a new kind of evolution in which mutations must happen at a greater rate, or in which several serendipitous mutations happen in one individual, though creationists began to portray it that way soon after it was proposed.⁹ Apologia’s creationist textbook perpetuates this history of misrepresentation and uses it to build the male/female straw-man argument in spite of forty years of lively and high-level interchange regarding PE in the literature.^{10, 15, 17-24}

Finally, the same misrepresentation of evolution and PE can be found on the website of one of the most well-known creationist organizations, Answers in Genesis. Gary Parker (M.S., Biology and Ed. D.) writes:

During the late ’70’s [sic] and early ’80’s [sic], a group of evolutionists led by Harvard’s Stephen Gould tried to resurrect the idea that evolution happened in big jumps, “The Return of Hopeful Monsters” Gould called it. The hopeful-monster idea (variously expressed as punctuated equilibrium, saltatory evolution, or quantum speciation) was

proposed to explain why the links required by gradual evolution have never been found. But the “big jumpers” were never able to explain how these big jumps could occur genetically, nor could they answer this crucial question about the first appearance of any hopeful-monster: *with what would it mate?*²⁵

Ironically, in the article “The Return of the Hopeful Monsters,” which Parker cites, Gould accuses evolutionists of misrepresenting Richard Goldschmidt’s infamous theory of evolution by “hopeful monsters” as a theory of “big jumps,” and in the same piece Gould himself attacks the idea of evolution by “big jumps” citing the very issue of reproduction:

We can well imagine such a non-Darwinian theory of discontinuous change—profound and abrupt genetic alteration luckily (now and then) making a new species all at once. Hugo de Vries, the famous Dutch botanist, supported such a theory early in this century. But these notions seem to present insuperable difficulties. With whom shall Athena born from Zeus's brow mate?²⁶

Gould explains that part of what Goldschmidt actually suggested was that a mutation in genes that regulate the development of an organism, from single cell to adult, might lead to more significant variation in one generation than a mutation in a gene for a specific trait.²⁶ That variation does not make the organism a new species. Contrary to what Parker suggests, Gould simply agrees that this mechanism is reasonable and might explain some changes in evolution, especially those which are hard to imagine occurring in a series of smaller steps. Interestingly, there is a relatively new field of evolutionary biology called evolutionary developmental biology—evo-devo for short—that investigates this very role of developmental genes in evolution.²⁷ In his 1981 article, Gould writes, “I am attracted to some aspects of the non-caricatured version [of Goldschmidt’s theory], but Goldschmidt's theory still has nothing to do with punctuated equilibrium;”²⁹ yet Parker equates the two. That Answers in Genesis allows this sort of obvious misrepresentation of evolutionists on their website undercuts their credibility.

At some point, Parker must have recognized his oversight regarding Gould and Goldschmidt. The webpage with Parker’s words above indicates they come from his book

Creation: Facts of Life, but they must come from an early edition. In the most recent edition the passage is different.²⁸ Nevertheless, Parker does little more than oversimplify and prematurely dismiss the field of evo-devo and fails to repair his straw-man arguments. He still claims that PE is equivalent to the hopeful monster theory and suggests that Gould invokes major changes that result in a new species in one generation.

Similar in-house problems are evident when it comes to the topic of the age of the earth. I asked students to respond to the following statement: “The layer of cosmic dust encountered by astronauts on the moon is much less than expected by old earth scientists based on the rate that cosmic dust falls on the moon, and is one of the strong supporting arguments that the moon was created thousands of years ago, not billions.” Not surprisingly, due to the fact that this argument was discredited decades ago²⁹ and even repudiated by most creationist organizations,³⁰ 69% of my students surveyed (n=365) responded, “Don’t know” and 8% disagreed or strongly disagreed. But the fact that 23% either strongly agreed (5%) or agreed (18%) with this statement in light of the argument’s history reveals one or more of the same in-house problems described earlier: supporting a verifiably false argument because it supports a favored position, or having been taught wrong information. Indeed, one student volunteered that she was taught the moon dust argument at her Christian school.

As is clear above, I am not claiming that all creationists ignore scientific findings that are relevant to their position, but an alarming number of adherents to Creationism are teaching and supporting their position with misrepresentations and misinformation. This problem is no secret to the leaders of the Creationist Movement. To its credit, *Answers in Genesis* has a webpage dedicated to arguments it says creationists should avoid.³⁰ The moon dust argument is first on the list of arguments never to use and “Evolution is just a theory” is first on the list of arguments to

avoid—although they do say, “[It] is better to say that evolution is just a hypothesis or one model to explain the untestable past.” Whether or not there are creationists who are more careful about the claims they make and who strive to keep in step with the findings of mainstream science is beside the point. There are too many examples like the ones discussed here, and they lead to justified concern from the mainstream scientific community.

Of equal concern is the focus of creationist organizations more on communicating to lay people than on engaging mainstream scientists. At a recent speaking engagement, young earth creationist astronomer Jason Lisle, who is associated with Answers in Genesis, suggested that talking about the evidence for creation and against evolution with mainstream scientists is generally unproductive because the interpretation of data depends too heavily on worldview. Lisle said, “An evolutionist can always invoke what we might call a ‘rescuing device.’ He can come up with a hypothesis that will save his position from what at least appears to be contrary evidence.”³¹ To Lisle’s credit, he did admit this goes for creationists as well, but this view of knowledge is too pessimistic. Not only does it alienate the scientific community, it is not an accurate representation of how science works. For example, the moon dust argument has been rejected, even by most of the leaders of the Creationist Movement, because hypotheses and theories can be evaluated. It is certainly true that a person can often pose an alternative explanation of a particular phenomenon, but that alternative is only taken as seriously as it is reasonable, and as data or other observations support it. There is no question that what a person believes to be true can have a major impact on how they interpret the world’s data and even result in wanton bias, but it is certainly an exaggeration to say that the same scientific method whose success has led to technologies like personal computers, passenger jets, and vaccines is suddenly rendered impotent when the questions turn to origins. Creationists sometimes raise the

issue that reconstructing the past involves a sort of science that is less powerful than the science of the present,³⁰ but that is, at best, a complicated philosophical argument.³²⁻³⁵ It is not clear that one should always assume that certain theories of origins might not consistently and by progressive updates fit the world's data more compellingly than alternate and contradictory theories or hypotheses.

Recent evidence for evolution and an “old earth”

Since conservative politicians have consistently made statements that make them sound skeptical of the mainstream scientific theories of origins, I will now present information that should, at the very least, convince them that those theories should not be so quickly dismissed. That is, the case for young earth creationism is not as straightforward as creationists suggest. There is a growing body of compelling evidence in support of evolution and a 4.6 billion-year age of the earth.

In his recent book, *The Edge of Evolution*, even the ID guru and Lehigh biologist Michael Behe writes, “There’s no reason to doubt that Darwin had this point right, that all creatures on earth are biological relatives,” and, “The bottom line is this. Common descent is true....”³⁶ For Behe, the evidence comes from similar *errors* in the DNA of organisms. Opponents of evolution are quick to point out that similarity does not prove kinship—one should expect to find similar DNA in similar organisms. This is true to some extent, but the situation is more nuanced than this. For example, if two students taking a test get the exact same questions wrong and perhaps even use the same unusual misspellings³⁶ of the wrong answers, this is compelling evidence that they cheated, i.e. the grades are related, not just similar. Thanks to rapid advances in DNA sequencing technology, more and more genetic evidence shows that similar organisms share similar mistakes in their DNA. Many of these mistakes, or mutations, occur in genes that were

already broken down when we inherited them, and when our parents inherited them, and so on. They no longer lead to the traits they once did in the more distant past. Behe mentions a broken down gene in the DNA of all human beings that would otherwise allow us to make vitamin C. Other organisms have the same gene, and it is functional in many species. In actuality, the gene is one of several needed for a pathway that produces vitamin C. We, and other organisms with this broken down pathway, survive because we get vitamin C in our diets. Interestingly, of the species whose vitamin C gene pathway is broken down, the specific mutation that explains its failure to operate is the same in humans and other primates. In guinea pigs, whose vitamin C pathway is also broken down, the damage is not the same as in primates.

Other broken down genes in humans tell the same story. Behe explains that both humans and chimpanzees have a broken down hemoglobin gene with the exact same four errors.³⁶ It is not easy to explain why independently created humans and chimps would have identical mutations in a broken-down gene. Common descent deals with the problem easily—the mutations occurred in the ancestral population of both chimps and humans. Jerry Coyne,³⁷ Dennis Venema,³⁸ and Francis Collins³⁹ offer several more examples and other compelling genetic evidence.

Genetic data also suggest an age for the human race much older than the young earth creationist view of approximately 6,000 years. Multiple independent lines of evidence from recent studies of the diversity in modern human genetic sequences suggest that the human population was never fewer than several thousand individuals within the last 200,000 years.⁴⁰ For example, comparisons of human Y-chromosomal sequences point to a human population of several thousand existing about 50,000 years ago. Human mitochondrial DNA sequences push that date back to approximately 170,000 years ago.^{41, 42}

Geological data also point to an earth much older than 6,000 years. Sedimentary rock layers called rhythmites, which exhibit repeated thin layers of sand and silt, are compelling evidence that the earth is billions of years old.^{43,44} The variation in thickness and composition of successive layers suggest they were laid down by daily tidal flows, showing fluctuations as would be associated with spring and neap tides, the changing distance of the moon from the earth due to its elliptical orbit, the annual change in declination of the sun, yearly sea level changes, and the almost 20-year cycle of lunar declination. One particularly good rhythmite record from South Australia, spanning 60 years of tidal flows, has been used to calculate the past mean Earth-Moon distance by three independent principles of celestial mechanics.⁴³ The calculated values differ by less than 0.5% while they differ from current values by about 3%, further validating the interpretation of these rhythmites as records of tides driven by the Earth-Moon system.

What is remarkable about these records of past tides is that they indicate, with little room for error, that there were once many more days in a year than there currently are. The South Australia rhythmites reveal that there were once 400 +/-7 days in a year.⁴³ Since the length of a year does not change significantly over time,⁴³ this indicates the earth must have been spinning faster in the past; that is, days were shorter. And, in fact, it has been estimated from astronomical data over the past 2,700 years that deceleration of the earth's rotation has added 1.8 +/- 0.1 milliseconds to the length of a day per century (ms/day/cy), largely due to tidal friction.^{45,46} In order for there to be 400 days in a year, a day would have to be 21.9 hours long. That's 2.1 hours, or 7,560 seconds, fewer than in a modern day. Assuming 1.8 ms/day/cy, it would take 420 million years for the length of a day to go from 21.9 to 24 hours. For the earth to be 6,000 years old, the earth's average rotational deceleration rate between 2,700 and 6,000 years ago would need to have added 229,000 ms/day/cy—127,000 times greater than the 1.8 ms/day/cy

added during the past 2,700 years; and that assumes that these rhythmites were deposited exactly 6,000 years ago. If they were deposited more recently, then the deceleration rate would need to be even greater. By contrast, the maximum short-term changes (lasting 10-20 years) observed in the earth's rotational deceleration over the past 200 years have added only about +/- 40 ms/day/cy, or 22 times the average rate; and these are simply fluctuations about the average (1.8 ms/day/cy).⁴⁵ Long-term values fluctuate about the average in the small single digits.⁴⁵ Even if the highest fluctuation observed in the short-term rates of deceleration were maintained, the rhythmites would date to 18 million years ago.

In actuality, based on their position in the geological column, the South Australia rhythmites mentioned above date to approximately 600 million years ago.^{47,48} This is different from my estimate of 420 million years, but in that estimate I used the rotational deceleration rate for the past 2,700 years. A slightly different deceleration rate in the past—one that added 1.2 - 1.3 ms/day/cy instead of 1.8—would explain the difference. Computer models support this explanation, suggesting that the recent deceleration rate is indeed higher due to a resonance involving specific tidal and oceanic factors.⁴⁴ Another set of rhythmites deeper in the same South Australia column, dating to about 750 million years ago by position in the column, indicates, as expected, that there were more days in a year at that time (410).⁴⁸ A deceleration rate that adds 1.2 – 1.3 ms/day/cy would make these rhythmites consistent with the radiometric dates of the strata around them and the previously mentioned rhythmites.⁴⁸ Other, less complete, rhythmite records suggest past years with as many as 514 days, and support an age of the earth on the order of billions of years.⁴³ For these latter rhythmites to be 6,000 years old a deceleration rate that added 753,000 ms/day/cy, on average, would have been necessary for the first 3,300 years of the earth's existence. That is 418,000 times the historic average and about 18,000 times the

maximum observed value.⁴⁵ Furthermore, assuming a linear decrease to 1.8 ms/day/cy, the value would actually have to drop from 1,560,000 ms/day/cy in 3,300 years.

Don't liberals and evolutionists have in-house problems, too?

It would be natural at this point for conservatives and creationists to argue that liberals and evolutionists are guilty of in-house problems of their own. This is no doubt true. For example, Jerry Coyne, in his book, *Why Evolution Is True*, fails to tell the whole story regarding annual and daily growth rings in fossil corals, which he uses to support radiometric dating and an old earth view.³⁷ Coyne uses a 1963 study that reported 400 daily growth rings per year (range of 385 – 410) in coral from the Middle Devonian period.⁴⁹ The problem is that more recent studies suggest that coral growth-ring data may be unreliable as a paleontological clock and even “biased toward the expected results.”⁴³ Granted, several fossil growth-ring studies like those of Wells prior to 1980 show some consistency,⁴³ but Coyne overstates the evidence. It is surprising he did not mention tidal rhythmites, which are far more definitive.

What does this have to do with politics?

It is beside the point that both sides are sometimes guilty of problematic representations and interpretations of scientific evidence. My intent here is not to suggest that one group is guilty and the other innocent. Voters will not excuse candidates for aligning with, or appearing to align with, groups that make patently false statements about science just because the opponents of those groups sometimes do the same. My intent is to point out that these scientific issues represent a particular challenge, and are a potential stumbling block, to conservatives, and to suggest a new approach to the situation.

Since Creationism and ID are viewed as challenging mainstream scientific positions, and since they are movements largely motivated by politically conservative religious groups, it is

much more of a curiosity when conservative candidates indicate their positions on origins publically. By contrast, it is of little interest to the public or the press when liberal candidates align themselves with mainstream science regarding origins, even if they claim to be theists. As demonstrated by the insignificant and short-lived backlash associated with the appointment of Francis Collins to the directorship of the NIH, it is acceptable to a significant portion of the public and the scientific community for a public figure to be a Christian and a proponent of mainstream science.

This situation poses a problem for conservative presidential hopefuls. Just how closely can they align with groups that are viewed as scientifically illegitimate, and who have verifiable in-house problems, in an attempt to win the party nomination without undermining their own legitimacy as a candidate in the general election among more moderate voters, including those in their own party? The campaigns of Ms. Bachmann and Mr. Perry suffered following statements that aligned them with groups that lack scientific credibility, and, as mentioned earlier, those statements resulted in a flurry of articles and statements accusing the GOP of being the anti-science party. Conservatives might be tempted to suggest that these accusations are nothing more than political rhetoric, or simply a sign of the bias of the “liberal media” toward government regulation, naturalistic evolution, and global warming, but this would be an oversimplification. The fact remains that there is no definitive research that links immunizations and retardation;⁵⁰ there are serious credibility problems in the Creationist Movement; and even a recent study by a climate skeptic from Stanford, partly funded by the Koch Foundation,⁵¹ concluded that average global temperatures are indeed rising.⁵² Mainstream scientific positions are supported by compelling evidence packaged, to a large extent, in highly specialized bodies of literature that require careful consideration and advanced knowledge to evaluate fully. If conservatives want to

be taken seriously and win moderate support in an increasingly scientifically educated America, they need to avoid aligning with groups that oversimplify scientific issues for political and religious reasons. They need to represent these scientific issues as being as complicated as they actually are.

Conservatives should have a no-tolerance policy when it comes to groups that fail to police their pseudoscientific factions. Turning a blind eye to them may not have undermined electability in the past, but it is hard to imagine that continuing in a climate where, for example, in the area of origins, leading Christians in the sciences, such as Francis Collins, and even leaders in the ID movement like Michael Behe, are affirming common descent. Attempting to satisfy, for example, the anti-evolution segment of voters with nebulous buzz phrases such as “evolution is just a theory” and “evolution is a theory with gaps” will simply make a candidate come across as naïve, and moderates will be less likely to vote for them. The current presidential campaign may suggest that conservative politicians need to reject this paradigm altogether, but this move should be less about strategy and more about integrity.

My advice to conservative politicians

My suggestion to conservative candidates who are asked about their position on origins and its impact on their policy decisions is to reply, “I know that scientists are working very hard on these questions, and I enjoy learning about the things they find out. I won’t deny that I believe God had something to do with how all this came to exist, but I believe that our scientists are doing their job with integrity and an open mind. Look, I’m not a geologist, I’m not a biologist, and I’m not an astrophysicist. I trust our scientists, science educators, and lawmakers to work together to make good decisions about what should be taught in the science classroom. That should be based on scientific research, not ideologies. I respect the rights of those who wish

to challenge mainstream science—that’s part of what America is all about. But those groups need to earn the right to be taken seriously and should expect to be held to the same standard of excellence that has made America’s record of scientific progress possible.” Similar statements could be made regarding other topics where science and politics collide.

What is at stake here goes well beyond winning elections. The entanglement of conservative politics, conservative Christians, and problematic approaches to scientific issues is undermining the legitimacy of Christianity in the eyes of many in and out of the Christian community. Fortunately, there are several Christian organizations taking an academic approach to the issues at the intersection of science and faith, approaching mainstream science respectfully, with humility, and honestly—believing this to be a Christ-like approach. Grove City College models this in its Science, Faith, and Technology program. All students are required to take a course, mainly taught by professors or teams of professors with both theological and scientific training, that faces the hard questions at the intersection of science and faith head on, raising the conversation to the level of the real academic arena. The conservative Christian community should support and expand such initiatives in its schools and churches if it desires to maintain its legitimacy as a contributor to the human conversation it hopes to impact.

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