



The Vise Strategy

Squeezing the Truth out of Darwinists

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*This information is privileged and confidential.
If it must be leaked, give it maximal exposure.*

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1 Introduction

The recent hearings conducted by the school board in Kansas (May 5-7, 2005) made it clear that what needs to happen is not for our side to be interrogated by Clarence Darrow manqués (like Pedro Irigonegaray, the attorney for the other side in Kansas) but for our side to get to interrogate the Darwinists. As I pointed out in my blog (uncommondescent.com, May 6, 2005, “Kansas Hearings: Scopes in Reverse? --Yes and No”), Darwinists have a long record of evading critical scrutiny, a problem that goes right back to the original Scopes Trial.

In the Scopes Trial, Clarence Darrow (cf. Pedro Irigonegaray) got to interrogate the evolution critics, but William Jennings Bryan (cf. Kansas attorney John Calvert for our side) did not get to interrogate the evolutionists. It is a little known fact that William Jennings Bryan agreed to be interrogated by Clarence Darrow *only if* Bryan could in turn interrogate Darrow on Darrow’s views of evolution. Darrow agreed, but then right after interrogating Bryan directed the judge to find Scopes guilty, thereby closing the evidence and thus preventing Bryan from interrogating Darrow (for the details about this ploy, see Edward Sisson’s essay in my book *Uncommon Dissent*).

Thus, in a crucial way, the Kansas hearings repeat the pattern set by the Scopes Trial, which has been repeated many times since, namely, evolutionists escaped critical scrutiny by not having to undergo cross-examination. In this case, they accomplished the feat by boycotting the hearings. I therefore await the day when the hearings are not voluntary but involve subpoenas that compel evolutionists to be deposed and interrogated at length on their views. There are ways for this to happen, and the wheels are in motion (e.g., Congressional hearings over the teaching of biology in federally funded high schools for military kids). For such hearings to have the desired effect, however, will require that evolutionists be asked the right questions. What I propose in this document (henceforth “The Vise Document”) is to lay out a strategy for interrogating the Darwinists to, as it were, squeeze the truth out of them. For a glimpse of what I have in mind, see the examination of Eugenie Scott by Robert George before the U.S. Commission on Civil Rights in the Appendix (p. 14 of this document).

2 Essence of the Vise Strategy

Over a decade ago, Phillip Johnson, in his public lectures, used to describe his critique of evolutionary naturalism as encapsulated in an analysis of three words: *science*, *evolution*, and *creation*. According to Johnson, by suitably equivocating about the meaning of these words, Darwinists were able to confuse the public and themselves into consenting to a theory that ordinary standards of evidence rendered completely insupportable.

The debate has moved along considerably since the early 90s when Johnson was mainly focused on critiquing evolution. Indeed, ID now offers a positive alternative to conventional evolutionary theory. I therefore propose that we add two words to Johnson's list: *design* and *nature*.

When interrogating Darwinists with the goal of opening up discussion in the high school biology curriculum about evolution (i.e., strengths, weaknesses, and alternatives), I therefore propose subjecting them to a sustained line of questioning about what they mean by each of these five terms: *science*, *nature*, *creation*, *design*, and *evolution*. In addition, it will help to keep in mind that for the purposes of interrogation, there are three types of Darwinists:

- (1) The Richard Dawkins Darwinist (abbreviated RD Darwinist), who is virulently against religion of any stripe and uses evolution as a club to beat religious believers. Richard Dawkins Darwinists despise religious belief and regard religious believers as having to check their brains at the door if they want to maintain both their faith and evolutionary theory.
- (2) The Eugenie Scott Darwinist (abbreviated ES Darwinist), who is not religious in any traditional sense (in particular, this type of Darwinist does not think God does or can act in any way that makes a difference in the natural world) but at the same time thinks it is ill-advised to antagonize religious believers by using evolutionary theory as a club. The Eugenie Scott Darwinist wants to placate religious believers by assuring them that they can be good followers of their faith as well as good Darwinists.
- (3) The Kenneth Miller Darwinist (abbreviated KM Darwinist), who is a traditional Judeo-Christian believer, holds that God has acted miraculously in *salvation history* (with such miracles as the parting of the Red Sea, the resurrection of Christ, the Virgin Birth, etc.) but denies that God's activity in *natural history* is scientifically detectable. The Kenneth Miller Darwinist is an orthodox religious believer and an orthodox Darwinist. He is the poster child for the Eugenie Scott Darwinist.

The vise strategy consists in subjecting each of these types of Darwinists to a sustained line of questioning about the five key terms (nature, science, evolution, creation, design), questions that they have no choice but to answer -- hence the "vise" metaphor. The aim of this line of questioning is to make clear to those reading or listening to the Darwinists' testimonies that their defense of evolution and opposition to ID are prejudicial, self-contradictory, ideologically driven, and above all insupportable on the basis of the underlying science.

There's a sixth term that could have been added to the five key terms, but is best kept in the background, namely, *religion*. Although the three types of Darwinists will need to be subjected to the same line of questioning regarding our five key terms, with regard to religion, the interrogation will need to be tailored to the type Darwinist being interrogated. Thus, for the RD Darwinists, the aim of the interrogation is to goad them into doing a Rumpelstiltskin, namely, get them to publicly tear themselves into pieces in their rage against religion. The prefect ending to such an interrogation would be for them to admit that they are Darwinists first and foremost because Darwinism is the most effective tool for destroying religion (this is the ideal -- don't expect to achieve it).

The ES and KM Darwinists, by contrast, need not so much to be antagonized or goaded as gently guided into an intellectually indefensible position regarding religious belief. Even so, the strategy for approaching these two types of Darwinists must be a bit different. The ES Darwinist wants to appear open minded and generous, assuring religious believers that Darwinism is compatible with their religious beliefs. For the ES Darwinists, the aim of the interrogation is to show that they are condescending elitists who don't have a religious bone in their bodies but who nonetheless presume to tell religious believers how they should make their peace with evolution.

Finally, the KM Darwinist actually does have a sincere religious faith, believing that God is the creator of the world and has acted miraculously in salvation history (maybe). For the KM Darwinists, the aim of the interrogation is to exploit the tension between their belief in divine creation and their vehement protestations that they are not creationists (note that under creationism they invariably include ID). The KM Darwinist wants to be an orthodox Darwinian and an orthodox religious believer. But being an orthodox religious believer means having a view of divine action that is at odds with Darwinian naturalism/scientific materialism and at the same time is compatible with creationism. KM Darwinists need to be pressed into admitting that their theology requires that ID be kept as a live possibility.

To see that this approach to the KM Darwinists is not far-fetched, consider that the real Kenneth Miller, in his book *Finding Darwin's God* (226-232), is critical of intelligent design in biology but nonetheless argues for an intelligence or purposiveness that underlies the laws of physics (laws that are necessary for the universe to be life-permitting). Miller's reward for proposing this very mild form of intelligent design at the level of physics and cosmology is to be called a creationist by University of California professor Frederick Crews. In reviewing Miller's book, Crews writes:

When Miller then tries to drag God and Darwin to the bargaining table [by finding design or purpose underlying the laws of physics], his sense of proportion and probability abandons him, and he himself proves to be just another "God of the gaps" creationist. That is, he joins Phillip Johnson, William Dembski, and company in seizing upon the not-yet-explained as if it must be a locus of intentional action by the Christian deity.
(New York Review of Books, October 18, 2001)

In summary, the essence of the vise strategy is to interrogate Darwinists on what they mean by the terms science, nature, creation, design, and evolution. Moreover, this strategy requires adjusting the interrogations so that on the question of religion RD Darwinists come across as the

bigoted extremists that they really are, so that the ES Darwinist come across as the condescending elitists that they really are, and so that the KM Darwinists come across as the closet ID theorists that they really are.

3 Suggested Questions

What follows, then, is a series of questions aimed at Darwinists. These questions are to be employed in settings where Darwinists cannot evade answering them (e.g., through boycotts or simply by refusing to answer them). I expect to keep adding to and refining these questions over time. Ideally, these questions will constitute a steel trap that leave the Darwinists no room to escape. Unless otherwise indicated, the questions listed are intended for all three types of Darwinists. Comments are placed in brackets. In posing these questions, I follow the advice given to me by Edward Sisson, a litigator with an excellent grasp of this debate:

Cross-examination is largely a matter of 2 things: (1) stating as a fact a point we believe true, and asking the witness if it is true (example: “Doctor, isn’t it true that the earth revolves around the sun?”) and (2) asking the witness to admit that two statements are contradictory (example: “Doctor, doesn’t Mr. Jones’s statement that the earth revolves around the sun directly contradict your statement that the sun revolves around the earth?” If one of the statements is true, the other must be false, correct?”)

Is it fair to say that you regard intelligent design as not a part of science? Would you agree that proponents of intelligent design who characterize it as a “scientific discipline” or as a “scientific theory” are mistaken?

Would you characterize intelligent design as a “pseudoscience”?

Would it be fair to say that, in your view, what makes intelligent design a pseudoscience is that it is religion masquerading as science? If ID is something other than science, what exactly is it?

Are you a scientist?

Do you feel qualified to assess whether something is or is not properly a part of science? What are your qualifications in this regard? [*Take your time here.*]

Do you think that simply by your being a scientist, you are qualified to assess whether something is or is not properly a part of science?

Have you read any books on the history and philosophy of science?

[*If yes:*] Which ones? [e.g., *Herbert Butterfield, Ronald Numbers, Thomas Kuhn*]

Would you agree that in the history of science, ideas that started out as “pseudoscientific” may eventually become properly scientific, for example, the transformation of alchemy into chemistry?

Is it possible that ID could fall in this category, as the transformation into a rigorous science of something that in the past was not regarded as properly scientific? [*If no, return to this point later.*]

Are there precise criteria that tell you what belongs to science and what doesn’t?

[*If no.*] Then on what basis do you preclude ID from being science? In that case, isn’t your ruling out ID as belonging to science purely a subjective judgment? How do you rule it out as not being science if you have no criteria for judging what’s in and what’s outside of science?

Please list all the criteria you can think of that demarcate science from non-science. [*Take your time with this.*] Are you sure these are all of them? If you are not sure these are all of them, how can you be sure that your criteria are the right ones?

Do these criteria work in all cases? Do they tell you in every instance what’s in and what’s outside of science? Are there no exceptions?

[*If yes:*] Tell me about the exceptions? [*After several of them:*] Are there any more exceptions? Is that everything? [*Take your time with this.*]

Let’s consider one very commonly accepted criterion for what’s in and what’s outside of science, namely, *testability*. Would you say that testability is a criterion for demarcating science? In other words, if a claim isn’t testable, then it’s not scientific? Would you agree with this?

Would you give as one of the reasons that ID is not science that it is untestable? [*Return to this.*]

Let’s stay with testability for a bit. You’ve agreed that if something is not testable, then it does not properly belong to science. Is that right?

Have you heard of the term “methodological materialism” (also sometimes called “methodological naturalism”)?

Do you regard methodological materialism as a regulative principle for science? In other words, do you believe that science should be limited to offering only materialistic explanations of natural phenomena?

[*If you experience resistance to this last question because the witness doesn’t like the connotations associated with “materialism” try:*]

This is not a trick question. By materialistic explanations I simply mean explanations that appeal only to matter, energy, and their interactions as governed by the laws of physics and chemistry. Do you regard methodological materialism in this sense as a regulative principle for science?

[It's important here to get the witness to admit to methodological materialism -- this is usually not a problem; if the question of emergence/non-reductive higher-order processes is raised, pose the following question:]

I see. You think there are higher-order phenomena that cannot be accounted for in terms of any sort of reductive materialism. Would you then admit that intelligence is a higher-order process that's fundamental to nature and that can be invoked in scientific explanations? Would you be comfortable in claiming that intelligence constitutes a legitimate category of explanation within the natural sciences? If so, then how can you say that intelligent design is non-scientific? If not, then how can you deny holding to methodological materialism? *[Once the admission is made that intelligence as such cannot count as a legitimate category of explanation in the natural sciences, we've got what we need and can move on.]*

Could you explain the scientific status of methodological materialism? For instance, you stated that testability is a criterion for true science. Is there any scientific experiment that tests methodological materialism? Can you describe such an experiment?

Are there theoretical reasons from science for accepting methodological materialism? For instance, we know on the basis of the second law of thermodynamics that the search for perpetual motion machines cannot succeed. Are there any theoretical reasons for thinking that scientific inquiries that veer outside the strictures of methodological materialism cannot succeed? Can you think of any such reasons?

A compelling reason for holding to methodological materialism would be if it could be demonstrated conclusively that all natural phenomena invariably submit to materialistic explanations. Is there any such demonstration?

[Suppose here the success of evolutionary theory is invoked to justify methodological materialism -- i.e., so many natural phenomena have submitted successfully to materialistic explanation that it constitutes a good rule of thumb/working hypothesis. In that case we ask:]

But wouldn't you agree that there are many natural phenomena for which we haven't a clue how they can be accounted for in terms of materialistic explanation? Take the origin of life? Isn't the origin of life a wide open problem for biology, one which gives no indication of submitting to materialistic explanation.

[If they claim that it isn't an open problem, continue:]

Are you claiming that the problem of origin of life has been given a successful materialistic explanation? If so, please state the “theory of life’s origin” comparable to the neo-Darwinian theory for biological evolution. Can you sketch this widely accepted theory of life’s origin? How does it account for the origin of biomacromolecules in the absence of the biosynthetic machinery that runs all contemporary living cells? Furthermore, how does such a theory provide a materialistic explanation for how these biomacromolecules came together and organized themselves into a living cell in the first place?

Would you agree, then, that methodological materialism is not scientifically testable, that there is no way to confirm it scientifically, and therefore that it is not a scientific claim? Oh, you think it can be confirmed scientifically? Please explain exactly how is it confirmed scientifically? I’m sorry, but pointing to the success of materialistic explanations in science won’t work here because the issue with materialistic explanations is not their success in certain cases but with its success across the board. Is there any way to show scientifically that materialistic explanations provide a *true* account for *all* natural phenomena? Is it possible that the best materialistic explanation of a natural phenomenon is not the true explanation? If this is not possible, please explain why not. [*Keep hammering away at these questions until you get a full concession that methodological naturalism is not testable and cannot be confirmed scientifically.*]

Since methodological materialism is not a scientific claim, what is its force as a rule for science? Why should scientists adopt it? [*The usual answer here is “the success of science.”*]

But if methodological materialism’s authority as a rule for science derives from its success in guiding scientific inquiry, wouldn’t it be safe to say that it is merely a *working hypothesis* for science? And as a working hypothesis, aren’t scientists free to discard it when they find that it “no longer works”?

It’s sometimes claimed that the majority of scientists have adopted methodological materialism as a working hypothesis. But have *all* scientists adopted it? Is science governed by majority rule?

If [*as the witness will by now hopefully have admitted*] methodological materialism is not a scientific claim, how can it be unscientific for ID theorists to discard it as a working hypothesis for science? In the absence of methodological materialism as a regulative principle for science, what else is there that might prevent ID from being developed into a full-fledged science? You claimed earlier that ID is not testable. Is that the reason you think ID cannot be developed into a full-fledged science?

But how can you say that ID is not testable. Over and over again, Darwin in his *Origin of Species* compared the ability of his theory to explain biological data with the ability of a design hypothesis to explain those same data. Moreover, Darwin stressed in the *Origin* that “a fair result can be obtained only by fully stating and balancing the facts and arguments on both sides of each question.” How, then, can you say that ID is not testable when Darwin clearly claimed to be simultaneously testing a design hypothesis against his own theory?

Okay, you are still not convinced that ID is testable. Consider the following possibility:

Darwinian biologists provide detailed testable scenarios for how the bacterial flagellum and other irreducibly complex molecular machines that Michael Behe has identified could have been produced by, as Darwin put it, “numerous successive slight modifications.” In that case, wouldn’t you agree that ID would be tested and found wanting? [Keep pressing this on this. We’re not talking about ID being definitively refuted – nothing in science ever is. What we are talking about is strong disconfirming evidence against ID. Get the Darwinist to admit that such evidence could turn up and count against ID and that this possibility shows that ID is in fact testable.]

Let’s talk about creation and creationism a bit. Is it fair to say that you think ID is a form of creationism? Why do you think that?

Does ID try to harmonize its scientific claims, like those about specified complexity and irreducible complexity, with the Bible? If so, please indicate. [If witnesses invoke some of my theological writings where I connect ID with my Christian beliefs, draw the distinction between my publications with religious publishers and my publications with academic publishers, e.g., “Yes, but is there any connection with the Bible in Dembski’s Cambridge monograph *The Design Inference*?”]

Is it fair to say that ID is not in the business of matching up its scientific claims with the Genesis record of creation or any other system of religious belief? If otherwise, please indicate.

Is it fair to say that ID is not *young earth creationism*, also known as *scientific creationism* or *creation science*? [The important thing with this line of questioning is to get the witness to agree that ID is not creationism in any conventional sense.]

Is it possible to hold to ID and not be a Christian, Jew, or Muslim? Is it possible to be a Buddhist and hold to ID? Is it possible to be a Hindu and hold to ID? [The answer in all these cases is yes and there are respected scientists from all these systems of religious belief who hold to ID.]

Is it possible to hold to ID for philosophical reasons that have nothing to do with any sort of conventional belief in God? In other words, can one hold to ID and not believe in God, much less a creator God? Would you agree that Aristotle, who held to an eternal universe and an inherent purposiveness within nature (i.e., not imposed on nature from the outside), did not have a conventional belief in God but would today properly be regarded as an ID advocate? Are you familiar with Antony Flew’s recent embracing of intelligent design despite his rejection of conventional belief in God (for instance, he explicitly rejects personal immortality)?

Let’s now turn to someone like Kenneth Miller, who has remarked “I’m an orthodox Catholic and an orthodox Darwinian.” [Miller made this remark on the PBS evolution series that aired September 2001.] Miller, as a Catholic believer, holds to a doctrine of creation. Is Miller a creationist? [Obviously, adjust this question if it is actually addressed to Miller. The answer to this question will be no -- unless we’re talking a Frederick Crews or

Richard Dawkins style Darwinist who does not see the strategic value of trying to keep KM Darwinists within the Darwinian fold and outside the creationist fold.]

[To KM Darwinists; I'll make off the question is directed to Miller; adjust for other KM Darwinists; pose the question hypothetically to non-KM Darwinists:] Prof. Miller, as an orthodox Catholic, is it fair to say that you subscribe to orthodox views of divine action. In particular, do you believe that God has acted miraculously in salvation history, parting the Red Sea, performing miracles in the life of Jesus, notably his miracles of healing, transforming water into wine, and above all the Virgin Birth and Christ's Resurrection? Were these miracles plain to see? For instance, when Jesus changed the water into wine, was it evident that a miracle had taken place?

[To KM Darwinists:] So you agree that God is able to act miraculously and that God has indeed acted miraculously and discernibly in salvation history. What then prevents God from acting miraculously and discernibly in natural history? [The answer here will likely hinge on the success of Darwinian evolution.]

Okay, let me get this straight. Miller is an orthodox Catholic. He holds to a creator God who has acted miraculously in history. And yet he is not a creationist. On the other hand, there are ID proponents (like David Berlinski) who have no religious belief and who, simply in virtue of supporting ID, are, according to you, creationists. Wouldn't it be fair to say that it is simply an abuse of language to identify ID with creationism? *[What the Darwinist finds totally unacceptable about ID is that it claims that material causation is an incomplete category for scientific explanation; it's this incompleteness that the Darwinist wants to label creationism. Our line of questioning must point up that this label is tendentious.]*

Your main beef with ID seems to be that it claims that material causation is an incomplete category for scientific explanation. Is that true or is there any other criticism that you think is more significant? If it is true, how can you claim that ID is creationism? Creationism suggests some positive account of an intelligence creating the world. But your problem with ID seems to be in its denial that a certain category of causation can account for everything in nature?

Are you merely a methodological materialist or are you also a metaphysical/philosophical materialist? In other words, do you pretend that everything happens by material causation merely for the sake of science but then bracket that assumption in other areas of your life? Or do you really hold that everything happens by material causation -- period? If the latter, on what grounds do you hold to metaphysical materialism? Can that position be scientifically justified? How so? If you claim merely to be a methodological materialist, then whence the confidence that material causation is adequate for science? *[This cycles back to some previous questions.]*

What is the nature of nature? Does nature operate purely by material causation. If not, how could we know it?

Consider the following riddle (posed by Robert Pennock): If you call a tail a leg, how many legs does a dog have? Wouldn't you agree that the answer is four: calling a tail a leg doesn't make it one. Accordingly, wouldn't it be prejudicial to define nature as a closed system of material entities in which everything happens by material causation? Wouldn't you agree that nature is what nature is, and it is not the business of scientists to prescribe what nature is like in advance of actually investigating nature?

Consider the following statement: "To make methodological materialism a defining feature of science commits the premodern sin of forcing nature into a priori categories rather than allowing nature to speak for itself." Do you consider this statement right or wrong? If wrong, why?

Let's return to the issue of testability in science? Do you agree that for a proposition to be scientific it must be testable? Good.

Would you agree, further, that testability is not necessarily an all-or-none affair? In other words, would you agree that testability is concerned with confirmation and disconfirmation, and that these come in degrees, so that it makes sense to talk about the degree to which a proposition is tested? For instance, in testing whether a coin is fair, would finding that the coin landed heads twenty times in a row more strongly disconfirm the coin's fairness than finding that it landed only ten heads in a row? [*Keep hammering on this until there's an admission that testing can come in degrees. Examples from the history of science can be introduced here as well.*]

Okay, so we're agreed that science is about testable propositions and that testability of these propositions can come in degrees. Now, let me ask you this: Is testability symmetric? In other words, if a proposition is testable, is its negation also testable? For instance, consider the proposition "it's raining outside." The negation of that proposition is the proposition "it's not the case that it's raining outside" (typically abbreviated "it's not raining outside" -- logicians form the negation of a proposition by putting "it's not the case that ..." in front of a proposition). Given that the proposition "it's raining outside" is testable, is it also the case that the negation of that proposition is testable?

As a general rule, if a proposition is testable, isn't its negation also testable? [*If you don't get a firm yes to this, continue as follows:*] Can you help me to understand how a proposition can be testable, but its negation not be testable? To say that a proposition is testable is to say that it can be placed in harms way of empirical data -- that it might be wrong and that this wrongness may be confirmed through empirical data, wouldn't you agree? Testability means that the proposition can be put to a test and if it fails the test, then it loses credibility and its negation gains in credibility? Wouldn't you agree? [*Keep hammering on this until you've gotten full submission.*]

Doesn't it then follow that whenever a proposition is testable, so is its negation, with a test for one posing a test also for the other?

Let me therefore ask you, are the following propositions scientific and, as a consequence, testable: (1) Humans and other primates share a common ancestor. (2) All organisms on Earth share a common ancestor. (3) Life on Earth arose by material causes. Are the negations of these propositions therefore scientific and testable? If not, why not?

Let's focus on the third of these propositions. How is it tested? How would its negation be tested? If its negation is not testable, how can the original proposition be testable? Wouldn't it then simply be like arithmetic -- simply a necessary truth and not something in contact with empirical data?

Let's now turn to evolution. Back in 1989 Richard Dawkins remarked that those who don't hold to evolution are "ignorant, stupid or insane (or wicked, but I'd rather not consider that)." Is Dawkins right?

Evolutionists distinguish between common descent (also known as universal common ancestry) and the mechanisms of evolution. Common descent is a historical claim. It says that all organisms trace their lineage back to a last universal common ancestor (sometimes abbreviated LUCA). Do you hold to common descent? Why? Please be as detailed as you can in describing the scientific evidence that leads you to that belief.

Are you familiar with the work of Carl Woese and Ford Doolittle? What is their view of the origin of life? Is it monophyletic or polyphyletic (i.e., does it have a single origin or are there multiple origins)? Do you accept their conclusions? Why or why not? Would you agree that these are reputable scientists? Doesn't their work throw into question common descent? If not, why not? Do you accept that there were multiple origins of life but that the multi-cellular life that now exists traces its lineage back to a last universal common ancestor?

No doubt you have heard of the Cambrian explosion. Isn't it the case that fossil evidence suggests that many of the animal phyla first appear over a period of 5 to 10 million years in the Cambrian rocks without evident precursors?

What multicellular precursors are there to the Cambrian fauna? [*Usually the Ediacaran fauna are invoked here.*] Why should we think that these are ancestral to the Cambrian fauna?

Stephen Jay Gould and Simon Conway Morris have both cast doubt on whether the Ediacaran fauna are ancestral to the Cambrian fauna. Are you familiar with their arguments? Do you share their doubts? If not, why not?

Consider an octopus, a starfish, an insect, and a fish. To what phyla do these belong? Is there solid fossil evidence that these share a common ancestor? If so, please provide the details.

Do you regard the Cambrian explosion as providing a challenge to common descent? If not, why not?

I want next to turn to the mechanisms of evolution. What are the mechanisms of evolution? [Get as many out of the evolutionist as possible. Natural selection and random mutation will be at the top of the list, with genetic drift, lateral gene transfer, and developmental factors also receiving mention.] Are these all of them? [Take your time. Wait until the witness admits that these are all he/she can think of.]

So, you're not sure that these are all the mechanisms that drive the process of biological evolution. Is intelligence a mechanism? If you can't be sure that you've got all the relevant mechanisms of evolution, how can you rule out intelligence as a factor in biological evolution?

Okay, you're convinced that the neo-Darwinian mechanism of natural selection and random genetic change is the most important factor in biological evolution. Why is that? What is the evidence that it deserves this place in evolutionary theorizing?

Are you familiar with the bacterial flagellum, a miniature bidirectional motor-driven propeller that moves certain bacteria through their watery environments? Are you familiar with the standard account told about its evolution, namely, that a microsyringe embedded in this system eventually evolved into it? Do you accept this explanation?

Would you agree that this microsyringe, known as a type three secretory system (abbreviated TTSS), is much simpler than the flagellum (requiring only about 12 different proteins whereas a full flagellum requires about 40 different proteins)? How then does pointing to the TTSS as a precursor of the flagellum explain it? How is this different from pointing to a motor of a motorcycle and saying that the motor evolved into the motorcycle? How does pointing to the TTSS give us the "numerous successive slight modifications" that Darwin described as necessary in any evolutionary pathway?

Have you read the work of Milton Saier at UCSD? Are you aware that Saier's work suggests that the TTSS evolved from the flagellum rather than into it? Wouldn't you agree that the challenge of evolution is to explain how you get complex systems from simpler ones and not vice versa? Thus, if Saier is right, wouldn't you agree that to explain the TTSS as evolving from the flagellum is only of limited evolutionary interest and that it leaves untouched the evolution of the bacterial flagellum in the first place?

Are you familiar with the writings of James Shapiro (who is on faculty at the University of Chicago) and Franklin Harold (who is an emeritus professor at Colorado State University)? Shapiro is a molecular biologist, Harold a cell biologist. They both claim that there are no detailed Darwinian accounts for the evolution of systems like the flagellum. Do you agree with their assessment? Are there any other evolutionary mechanisms that yield a detailed, testable scenario for the origin of the bacterial flagellum?

Theodosius Dobzhansky, one of the founders of the neo-Darwinian synthesis remarked toward the end of his life that nothing in biology makes sense except in the light of evolution. Do you accept this statement?

But isn't it the case that for systems like the bacterial flagellum, evolutionary biology has no clue how they came about? [*If the witness balks, keep pressing for detailed evolutionary accounts of such irreducibly complex systems.*] So was Dobzhansky wrong? [*Be careful here. Someone like Ken Miller will want to find some particularly simple systems or aspects of systems that do in fact evolve under the Darwinian mechanism. The point is to focus on classes of complex systems that -- as whole classes -- have resisted conventional evolutionary explanations. The key class in these discussions comprises Michael Behe's irreducibly complex biochemical machines.*]

Earlier you expressed reservations about ID being testable? Do you also share such reservations about the testability of evolutionary theory? No? Could you explain how evolutionary theory is testable? What sort of evidence would count against evolutionary theory?

The evolutionist J. B. S. Haldane once remarked that what would convince him that evolutionary theory was wrong was finding a rabbit fossil in Precambrian rocks. Would such a finding convince you that evolutionary theory is wrong? And wrong in what sense? Would it show that common descent is wrong? If such a fossil were found in Precambrian rocks, why not simply explain it as an evolutionary convergence?

Suppose we bracket the issue of common descent and accept, for the sake of argument, that all organisms trace their lineage back to a last universal common ancestor. In that case, why should we believe that natural selection and random genetic change is the principle mechanism driving biological evolution? Is that claim testable?

Darwin in his *Origin of Species* remarked that if it could be demonstrated that some complex structure "could not possibly" have come about "by numerous successive slight modifications" that his theory would absolutely break down. But he hastened to add that he could think of no such case. But how is restricting evolutionary paths as proceeding by "numerous successive slight modifications" any restriction at all? How could the claim that some system did not evolve by numerous successive slight modifications ever be tested? Please describe in detail how this possibility could be tested. If it cannot be tested, then how can evolutionary theory be regarded as scientific?

Do you accept that there are other mechanisms involved in biological evolution besides natural selection and random genetic change? If so, how do biologists know that the totality of these mechanisms account for all of biological complexity and diversity? Is the claim that these mechanisms account for all of biological complexity and diversity itself testable? Have you tested it? How so? How can it be tested? If it should be tested and disconfirmed (as can always happen to testable propositions), then what is the alternative hypothesis that correspondingly is confirmed? Wouldn't it have to be a design hypothesis? If not, why not?

[*Note: with these questions, we don't need to get into the positive ID program -- i.e., what ID is doing specifically to advance our understanding of biology. That will come out under cross-examination of our side. It's not for the critics to lay out our positive program. Let's not give them that opportunity, since they'll be sure to botch it -- and purposely so.*]

Appendix: Robert George Interrogating Eugenie Scott

Curriculum Controversies in Biology

U.S. Commission on Civil Rights

Hearing, August 21, 1998, Seattle, Washington

<http://user.tninet.se/~rwp570o/civilright.html>

Excerpt:

COMMISSIONER GEORGE: Thank you, Madam Chair. As I understand the debate, there's a certain asymmetry here. Dr. Scott is taking the position not only that evolution must be taught in science curriculum in K through 12, but also that alternatives or criticisms of evolution must not be taught. Dr. Meyer by contrast, and here is the asymmetry, is not arguing that evolution may not be taught, but only arguing that criticisms of evolution must be taught along with evolution. Now, let me just pause here to ask whether I've represented both of your points of view accurately.

MS. SCOTT: I'm afraid not in my case.

COMMISSIONER GEORGE: Okay. Could you correct me.

MS. SCOTT: Alternatives to evolution can certainly be taught if they are, in the words of *Edwards v. Aguillard*, have a secular intent and are not religiously based. I mean, you have to teach secular alternatives to evolution, not religious alternatives. The problem is that Justice Brennan was a wonderful jurist, but he didn't know zip about science and there are no scientific alternatives to evolution that are recognized by scientists. Now, the whole history of the creation/evolution controversy from creation science to the recent alternatives to evolution intelligent design theory or varieties has always been, well, we're going to teach the evidence against evolution, and because evolution is not true, that means our position is true. I congratulate Steve and his colleagues because they are at least attempting to come up with some sort of positive arguments for intelligent design. My personal opinion and that of most others is that they haven't succeeded. They may yet. If they do succeed, then they have a right to be taught. But they have to earn their spurs so to speak within the body of scholarship that decides what is state of the art science.

I mean, we've all had papers rejected, right? I mean, we've all had our ideas, some are accepted, some aren't. I don't think that we should make a decision as to what to teach at the K-12 level until these issues have been decided at the level of scholarship which is most appropriate which is the college and professional level.

COMMISSIONER GEORGE: Then I'm not sure that I did misrepresent your position.

MS. SCOTT: Well, maybe I was just unclear on what you said.

COMMISSIONER GEORGE: Let me try again. You take the view that at least for now students may not be presented with any punitive reasons not to believe evolutionary theory.

MS. SCOTT: I think that students who are presented with these alternatives to evolution such as the ones discussed in my statement are receiving bad science. They may not be getting anything illegal, but it is definitely bad science. And if you look at the statements from the National Science Teachers Association and the National Association of Biology Teachers, they would agree with this.

As somebody who values scholarship and as a former academic, it pains me to rely upon authority for decision-making. This is not a comfortable feeling for me, but I think to some degree, we do. I mean, I don't know how many of you could tell me why perpetual motion machines don't work, but we all agree that we will not teach perpetual motion manufacture in the schools.

COMMISSIONER GEORGE: Surely, Dr. Scott, you believe that competing accounts of evolution such as those given by Gould, say, on the one hand or my old colleague at New College Oxford, Richard Dawkins.

MS. SCOTT: Dawkins?

COMMISSIONER GEORGE: Dawkins, ought to be taught although one side is plainly right and the other side plainly wrong.

MS. SCOTT: What you are talking about are debates about how evolution takes place. And I was saying before, if we were going to have debates among students as a critical thinking exercise, we should have them debating things that are validly considered --

COMMISSIONER GEORGE: But those are debates where there are minority and majority decisions.

MS. SCOTT: Those are debates about how evolution takes place, not whether.

COMMISSIONER GEORGE: Oh, I understand that. But It's a ferocious debate, is it not?

MS. SCOTT: uh-huh.

COMMISSIONER GEORGE: By which there have been claims of irrationality made by both sides against the other, and besides the fact that they're in minority and majority positions, you think it's a good thing to teach the conflict.

MS. SCOTT: Actually, I would be a little reluctant to have students engage in a who will be the Dawkins side and who'll be the Gould side debates, because they don't know enough about evolutionary theory to debate this issue.

COMMISSIONER GEORGE: Well, which do we teach them then? Do we teach them Dawkins' view or Gould's view?

MS. SCOTT: You know the irony of this is that students get so little evolution at all in school.

COMMISSIONER GEORGE: You're evading the question, Dr. Scott. Which would it be? Really, seriously, which should they be taught?

MS. SCOTT: How would you characterize Dawkins, view and Gould's view, because we may have a different understanding. The way I would look at it is they are both talking about natural selection, but they are both talking about difference of importance. The effect of natural selection in different kinds of contexts has different importance and explains different aspects of the fossil record.

COMMISSIONER GEORGE: Are we agreed that in speaking of evolution, we're speaking not only of descent from a common ancestor, but of a mechanism of random mutation and natural selection? Can we agree about that?

MS. SCOTT: And others, other mechanisms as well. The random mutation and natural selection is Darwinism. There are other mechanisms of evolution in addition.

COMMISSIONER GEORGE: In addition or as competing accounts in the mechanism?

MS. SCOTT: In addition.

COMMISSIONER GEORGE: All right.

MS. SCOTT: Because nobody says natural selection doesn't work. That's a double negative, but you know what I mean.

COMMISSIONER GEORGE: Let me follow that that nobody says natural selection --

MS. SCOTT: Everyone agrees evolution works. Everyone agrees natural selection is a major component.

COMMISSIONER GEORGE: Everybody who -- everybody who both believes evolutionary theory and -- well, that is just a tautology. People who believe in natural selection, believe in natural selection.

MS. SCOTT: No.

COMMISSIONER GEORGE: Or is it not true that there are some people who believe in descent from a common ancestor, but not in the mechanism of natural selection?

MS. SCOTT: I think there would be very few because natural selection -- what natural selection does is shape groups within -- shaped populations within species. That, coupled with the phenomenon of reproductive isolation and speciation mechanisms is what causes speciation.

Now, that basic picture is something I think you would find in all the textbooks and you'd get all

the evolutionary biologists to agree with. Where these people square off and start arm wrestling is over the presence or absence of other factors such as reorganizations of the genome to various genetic processes, developmental biological processes and these other --

CHAIRPERSON BERRY: Before you guys go too far afield from civil rights issues, let me just ask again, am I clear that you said that you didn't mind discussions of evolution and criticisms and different theories being presented so long as that they were not based on religion and so long as they were secular in nature. Did I understand you to say that, quoting Aguillard when you first began there? You said you didn't mind the definition in Aguillard. That was before you complained about Brennan not knowing anything about science. And you were asked whether you thought people shouldn't discuss criticisms of evolution or different theories, and you said something about so long as they had a secular purpose and they were not based on religion. Did I hear you right or not? If I didn't, then tell me.

MS. SCOTT: Criticisms of evolution based on religion are unacceptable.

CHAIRPERSON BERRY: That's what I mean. Is that what you said?

MS. SCOTT: If there are solid scientific criticisms of evolution, of course, they can be heard.

CHAIRPERSON BERRY: I'll give it back to Commissioner George.

COMMISSIONER GEORGE: Let me take it back in a civil rights angle. Did I hear Dr. Scott right to say that she would object to criticisms such as those offered by Berlinski and Behe and all these other -- Dembski and all these people, she would not object to those criticisms being presented on grounds that they were religious and therefore a violation or separation of church and state or something, but rather, that she would object to them on the grounds that they're bad science.

MS. SCOTT: You lumped a lot of people into the same hopper, Berlinski and Behe differ enormously in their attitude.

COMMISSIONER GEORGE: But they're critics of -

MS. SCOTT: The point is they're dealing with different matters completely.

COMMISSIONER GEORGE: But they're all critics of evolution.

MS. SCOTT: Yes. They're all critics of evolution.

COMMISSIONER GEORGE: And you wouldn't object to their views being presented on the grounds of separation of church and state or any constitution. You would object to their criticisms to -- they give reasons against believing at least certain theories of evolution.

MS. SCOTT: And some of these are religious reasons and some of these are secular reasons.

COMMISSIONER GEORGE: And say Berlinski's, you wouldn't object to Berlinski. Berlinski's not a believer how are you going --

MS. SCOTT: Berlinski, if you read Berlinski's criticisms of evolution, he's just rehashing creation science except he leaves out the age of the earth. He talks about the second law of thermodynamics.

COMMISSIONER GEORGE: Does he get excluded then on religious grounds? Are you going to say now you can't have students exposed to that, that's not only bad science, that's religion?

MS. SCOTT: He would be excluded on the grounds of bad science.

COMMISSIONER GEORGE: But not religion. So we don't have a civil rights --

MS. SCOTT: He's pretty careful about not mentioning religion.

COMMISSIONER GEORGE: Is that a hint about his motive or

MS. SCOTT: Uh-huh.

COMMISSIONER GEORGE: So you're suggesting that his motive really is religious and therefore you're going to exclude him.

MS. SCOTT: No, no. I don't think either of us think David is religious. I have other reasons for thinking -- I think David is doing something different with this exercise.

COMMISSIONER GEORGE: But I want to get to the civil rights. In other words --

MS. SCOTT: It is a difficult issue because we are talking about civil rights and civil liberties. We're also talking -- and I at least part of the time am talking about tautological issues, what's good science and science literacy.

COMMISSIONER GEORGE: Okay. If we could just keep it -

MS. SCOTT: And we may have slipped back and forth.

COMMISSIONER GEORGE: And I appreciate that in your unusual position because you are both a scientist and an advocate, political advocate. But could we just stay on the civil rights dimension so that we could say that there are some people as much as you might object to them on scientific grounds and object on straight out school curricular grounds, you wouldn't object on civil rights/civil liberties grounds to their positions being presented in biology classes.

MS. SCOTT: I would not make a blanket statement.

COMMISSIONER GEORGE: Well, I'm not asking for a blanket statement. I'm not saying everybody. I'm saying there are some people like Berlinski's views.

MS. SCOTT: I don't know Berlinski's agenda. I think you're asking for a hypothetical that I'm reluctant to give you.

COMMISSIONER GEORGE: No. I'm asking for a specific. It's not a not hypothetical. You know Berlinski's view very well. Okay. If Berlinski's view is to be excluded, but not on the grounds that it's religious, but on some other civil rights/civil liberties grounds, what's the civil rights/civil liberties grounds for excluding --

MS. SCOTT: Berlinski's view is not unique to him.

COMMISSIONER GEORGE: So.

MS. SCOTT: I mean, the position Berlinski advocates has been advocated by those who on the purpose prong of Lemon are definitely intending for religious establishment.

COMMISSIONER GEORGE: People argue for civil rights on the basis of religion and on the basis of secular things. Were we going to say because some people work for civil rights on religious grounds and invoke God and the brotherhood of man, that any advocacy of civil rights was itself a violation of civil rights?

MS. SCOTT: If you are familiar with the arguments that are raised in the creation science the vast majority of them never mention God. A lot of them have to do with supporting ideas like the whole world being supported by things, inundated by a flood, by evidence that the world is actually young, an awful lot of the literature not the stuff --

COMMISSIONER GEORGE: But that's not Berlinski. If Berlinski's view were being presented to students, would there be anything objectionable on civil rights/civil liberties grounds?

MS. SCOTT: I would want to ask a lawyer.

COMMISSIONER GEORGE: Okay. Then, let me ask is it your position, Dr. Scott, that the evolution that you would like to see presented in schools without criticism, because none -- at least there's at the moment no criticism that would be sufficiently serious to put forward, okay, that you were presenting is a view that has no preconditions or premises that are not themselves empirically verifiable, in other words, it rests on no questionable metaphysical assumptions. That's your view?

MS. SCOTT: My view is that science should be -- evolution should be taught as science without metaphysical implications.

COMMISSIONER GEORGE: And that to believe in evolution with the mechanisms that we've discussed and perhaps additional mechanisms, say, natural selection, one can believe that without any nonempirical assumptions being made. In other words, to believe in that does not presuppose as people like Phillip Johnson claim it does, certain assumptions that are not

themselves empirically variable, certain assumptions that are metaphysical rather than --

MS. SCOTT: I think Phillip Johnson is dead wrong in his depiction of evolution as a fundamentally naturalistic philosophical system. It is no more naturalistic than heliocentrism. Excuse me. It is no more philosophically naturalistic than heliocentrism.

COMMISSIONER GEORGE: Dr. Meyer, would you like to comment?

MR. MEYER: One of the -- let me first clarify my position and then come back. What we are advocating is teaching the controversy within the limits of the law. And there are legitimate scientific reasons for criticizing Darwinism. I started to point out Behe's molecular motor here. Some 50 book reviews have been written about Behe's book, many by scientists, most often conceded his point that there are no neo-Darwinian explanations for the origin of these motors. And so the grounds for exclusion, which is of his view has been again this convention of methodological naturalism, it's against the groundrules which we have decided --

COMMISSIONER GEORGE: Can I just interrupt?

MR. MEYER: Yes, sure.

COMMISSIONER GEORGE: When you say, his view, I take it his view being the denial of the neo-Darwinian mechanism --

MR. MEYER: Right.

COMMISSIONER GEORGE: -- not descent from a common ancestor because as I understand Behe's position, he does not deny a common ancestor.

MR. MEYER: He's either in favor of that or agnostic about that.

MR. GEORGE: Go ahead.

MR. MEYER: So my concern for science education has been rhetorically the same as Eugenie's. It's the bad science. We have a selective presentation of evidence going on. Its not fair to say that because you don't have a lot of people using the jargon, that there is not a significant scientific dispute here. Paleontology journals are full of discussions of the problem that the Cambrian explosion poses for the neo-Darwinian gradualistic model. Behe did a literature search in his book on systems like this and looked for neo-Darwinian explanations for their origin and found virtually none.

There is weighty evidence for this, and we want the evidence -- students to be exposed to the evidence that supports these other viewpoints.

COMMISSIONER GEORGE: Now, do you take the view, contrary to Dr. Scott's view, do you take the view that in fact some nonempirical assumption must be made either way?

MR. MEYER: Yes.

COMMISSIONER GEORGE: So that there are metaphysical hypotheses not themselves empirically verifiable which must be made prior to one's adoption of either the design theory or evolutionary theory.

MR. MEYER: Right. In the diagram, I show a two-way arrow between world view assumptions and theoretical viewpoints. The two can inform each other. And secondly, I think this is clearly the case by something that Eugenie has said already that she accepts the principle of methodological naturalism. That's not an empirical or empirically verifiable principle. That is a philosophical principle. It's something that is a ground rule if you will --

MS. SCOTT: On both sides.

MR. MEYER: -- which is not established by viewing nature. It's something which has I would say rather dubious philosophical arguments.

COMMISSIONER GEORGE: Doctors of all science may take that to mean --

MS. SCOTT: Not just of evolution, of all science.

COMMISSIONER GEORGE: -- that although it's a nonempirically verifiable assumption, it is nevertheless a noncontroversial one. I take it that your view over Dr. Meyer is that it cannot be made in a way that does not shade over into a more comprehensive naturalism.

MR. MEYER: Correct.

COMMISSIONER GEORGE: So it looks to me -- and then I'm going to let Dr. Scott come back and take a shot at me on it. It looks to me like your side has radicalized the discussion in such a way, radicalized meaning going to the root, in such a way as to drive the issue out of the realm of science precisely to the realm of philosophy where you make the orthodox scientists defend on philosophical grounds --

MR. MEYER: A latent philosophical principle of their whole enterprise, exactly.

COMMISSIONER GEORGE: Dr. Scott.

MS. SCOTT: I think the link between methodological naturalism and philosophical naturalism is faulty. One can be a methodological naturalist without being a philosophical naturalist.

COMMISSIONER GEORGE: Now, there you disagree --

MS. SCOTT: Absolutely.

COMMISSIONER GEORGE: -- not only with people like Dr. Meyer, but also with people like Dawkins and Lewontin.

MS. SCOTT: Dawkins and -- will provide and others of that particular persuasion, will admit that there are people who are methodological naturalists who are theists.

COMMISSIONER GEORGE: Oh that's a -- we know that. But don't they take the view, and I can tell you they do because I had this discussion with Dawkins, that if you understand, if you have a correct understanding of evolution, you realize that there's no possibility of theism.

MS. SCOTT: I don't agree with Dawkins either. Philosophically, I'm more similar to him than -

COMMISSIONER GEORGE: So if we talk Dawkins' view, this I guess is the point, if we talk Dawkins, view in school, we'd be committing a civil liberties violation.

MS. SCOTT: Oh, absolutely, yeah. I have discouraged that. In fact, Will Provine and I have gone back and forth on this on a number of occasions.

COMMISSIONER GEORGE: So the Blind Watchmaker or Provine's works really shouldn't be taught --

MS. SCOTT: No, no, no. The philosophical views that they have, Provine has done very good work in History of Science and, you know, there reason to --

COMMISSIONER GEORGE: Not all his works, but, I mean, look at the Blind Watchmaker. Look at Dawkins' book. In Dawkins, book it quite exclusively --

MS. SCOTT: It had --

COMMISSIONER GEORGE: -- adopts naturalist views so --

MS. SCOTT: It also presents a lot of straight science.

COMMISSIONER GEORGE: Well, yes, but I mean, are we going to permit it to be -- wouldn't that be --

MS. SCOTT: We should not be advocating the view that evolution or science equates with disbelief because it's false and it also is an establishment problem or free exercise problem.

COMMISSIONER GEORGE: Just to conclude my line of questioning. So you both agree that there shouldn't be a viewpoint discrimination, and Dr. Scott would say therefore Dawkins' Comprehensive Naturalism and Meyer's, Berlinski's and others design theory ought to both be excluded. It would be viewpoint discrimination to allow Dawkins, Comprehensive Naturalism a place, but not Meyer's design theory, but I take the real difference is that just Dr. Scott says there are no legitimate scientific reasons that can be presented at least for now against evolution and therefore viewpoint discrimination isn't a problem between evolution and non-evolutionary views, at least at the moment, because there's no plausible non-evolutionary view.

MS. SCOTT: And you have to distinguish between keeping out Dawkinzoid metaphysics and intelligent design or creationist metaphysics, and whether or not you teach science as methodologically naturalist.

COMMISSIONER GEORGE: And your position you're trying to make out here is that I've got a view and we, the orthodox scientists and biologists have a view that itself does not have any questionable metaphysical presuppositions.

MS. SCOTT: Not per se, although it certainly has implications. But it's clear that -- I mean, look at something -- look at an idea like natural selection. Natural selection was taken by Marx and modified to suit his agenda. It was taken by the Nazis and modified to suit their agenda. It was taken by the robber barons and modified to suit their agenda.

Now, you've got very, very different social and political ideas here, all claiming to be derived from natural selection. So clearly, I mean, I've often joked you could probably take photosynthesis and make a religion out of it if you wanted to. You should not confuse the philosophical implications or ideas people derived from a science with a science itself.

COMMISSIONER GEORGE: If something is random, it can't be directed, yes?

MS. SCOTT: Now, this is again a little bit of fancy foot work that goes on in this debate. When people who oppose evolution talk about randomness, they are generally using random in the sense that the man on the street is going to understand it, that there's nothing out there except just stuff falling into the place, and obviously you're not going to get a brick wall by all the bricks falling into their actual position, or the tornado that goes through the hangar and constructs the 727.

COMMISSIONER GEORGE: But on the other side, there's also Dawkins who says, yeah, random --

MS. SCOTT: But random as a concept important to evolution refers to the production of genetic variation, which is random in respect to the, quote, needs of the organism. Now, evolution is not a random process, particularly, if natural selection is the mechanism that directs it, which most of us accept. Natural selection is the opposite of randomness. This is why this matter becomes so very complicated. We can get bogged down real fast at school board levels, in the operations like this talking about very technical scientific elements.

What really matters I think is how do we decide what to teach in the curriculum. We can't make everybody happy. I suggest in an essay that I wrote two teachers ways that they could teach evolution without ruffling too many feathers. And I would encourage you to consider them when you make your report.

COMMISSIONER GEORGE: Thank you.