0001

IN THE UNITED STATES DISTRICT COURT
FOR THE MIDDLE DISTRICT OF PENNSYLVANIA

TAMMY KITZMILLER,
ET AL.,

Plaintiffs,

V Case No. 04-CV-2688

DOVER AREA SCHOOL
DISTRICT and DOVER
AREA SCHOOL DISTRICT
BOARD OF DIRECTORS,

Defendants.

Oral deposition of BRIAN
ALTERS, Ph.D., taken at the law
offices of Pepper Hamilton, LLP, 3000
Two Logan Square, 18th & Arch
Streets, Philadelphia, Pennsylvania,
on June 2, 2005, at 9:01 a.m., before
Jennifer L. Bermudez, a Registered
Professional Reporter, and Notary
Public, pursuant to notice.

APPEARANCES:

PEPPER HAMILTON LLP
ERIC J. ROTHSCHILD, ESQUIRE
ROTHSCHILDE@PEPPERLAW.COM
3000 Two Logan Square
18th & Arch Streets
Philadelphia, Pennsylvania 19103
215-981-4000
and
AMERICAN CIVIL LIBERTIES UNION
OF PENNSYLVANIA
WITOLD WALCZAK, ESQUIRE
vwalczak@aclupgh.org
313 Atwood Street
Pittsburgh, Pennsylvania 15213
412-681-7736
Attorneys for Plaintiffs

THOMAS MORE LAW CENTER
EDWARD L. WHITE, III, ESQUIRE
www.thomasmore.org
24 Frank Lloyd Wright Drive
P.O. Box 393
Ann Arbor, Michigan 48106
734-827-2001
Attorney for Defendant

EXHIBIT INDEX

0003
BRIAN ALTERS, Ph.D., having been duly sworn, was examined and testified as follows:

EXAMINATION

BY MR. WHITE:

Q. Please state your name.

A. Brian Alters.

Q. My name is Ed White. I'll be taking your deposition today.

Can you explain your familiarity with the events involved in this lawsuit?

A. I understand that the Dover School Board instituted a policy that requires -- that did require teachers to read a four-paragraph statement; I understand that the teachers did not want to do that, wrote a letter to the superintendent; the assistant superintendent then went and read the four-paragraph statement to the students; that the policy also involved a change in the curriculum, specifically the evolution unit; that

0004
the book Pandas And People -- "Of Pandas And People" was put as a resource for the change in the curriculum, I read a press release concerning it from the school.

That's generally it. I probably know some more details, but I can't think of them at the moment.

Q. I didn't hear when you said, someone wrote a letter to the superintendent?

A. I saw a letter to Nielsen, I believe the name was, by six or seven teachers, I believe they were, stating their objections to the policy.

Q. And what was the change in the curriculum?

A. I don't have it memorized, but essentially it was to make students aware of gaps, problems, intelligent design. I don't have it in front of me, so I haven't memorized it.

0005
Q. Where was "Of Pandas And People" placed?
A. Where was it placed?
Q. Where was it placed?
A. I understand that 60 copies were donated to the Dover School District, and I don't know their final placement.
Q. Now, before your deposition you had an opportunity to speak with your attorney here today?
A. Yes, sir.
Q. And you understand what a deposition is all about?
A. I believe so.
Q. Do you have any questions you want answered right now about a deposition?
A. Do we get a good lunch?
Q. That's up to your attorney.
Now, although there is no judge in here today, it is a formal legal proceeding. It is the same as testifying in court.
0006
Do you understand what an oath is?
A. Yes.
Q. Do you understand that you need to tell the truth?
A. Yes.
Q. Have you ever been deposed before?
A. No.
Q. I'll be asking you questions. Your answers will be recorded by the court reporter, and she can only record your verbal responses. She can't record nods of your head, shakes of your head, huh-uh, nah-nah, anything like that, so yes, no, and other audible words. Okay?
A. I'll try to remember that.
Q. If not, I'll remind you.
A. Thank you.
Q. Now, if you don't understand a question that I ask, please let me know and I will try to

0007
rephrase it so you do understand it so I can get your accurate answer. Okay?
A. Okay.
Q. We'll be taking breaks periodically during the day. If you need a break beforehand, just let me know and we will just finish the line of questioning and then we will take a break. All right?
Now, during the deposition if you remember any information that applies to an earlier answer, just let me know and then you can state that new information on the record. Okay?
A. Okay.
Q. Are you on any medication or drugs at this time?
A. No.
Q. Have you had any alcoholic beverages in the past eight hours to drink?
A. No.
0008
Q. Are you currently under a doctor's care?
A. No.
Q. Is there any reason why you won't be able to answer my questions truthfully today?
A. No.
Q. Do you have any problem with your hearing?
A. No.
Q. Your eyesight?
A. No.
Q. Have you gone by any other names besides Brian Alters?
A. No.
Q. What is your current occupation?
A. University professor.
Q. Where?
A. McGill University.
Q. Where is that?
A. Montreal.
Q. Canada?
A. Yes.

0009
Q. Explain what you do as university professor at McGill.
A. That would take a long time. I'll try to --
Q. Give me a brief summary.
A. I teach teachers how to teach science. I teach graduate students, master's and doctoral level students, science education. I perform service for the university giving talks, helping museums and so forth, and I do a certain amount of scholarship writing.
Q. When you teach teachers to teach science, is there any difference in how you have to teach a teacher to teach science in Canada than in the United States?
A. I have also taught teachers how to teach science in the United States.
Q. Okay. But your current teaching in Canada, how does that differ for teachers who have to teach
0010
in Canada compared to the United States?
A. In general it doesn't.
Q. What level teachers are these? Are they going to be teaching in grade school, high school, college, what?
A. I've taught elementary and secondary, and some of my graduate students are university people.
Q. Where did you teach teachers to teach in the United States?
A. Harvard.
Q. How many classes currently are you teaching where you are teaching teachers how to teach science?
A. What do you mean by "currently"?
Q. This past year. This current year.
A. I've had a -- been on sabbatical this semester, so the

0011
first semester I taught one course.
Q. What was that course?
A. It was elementary science methods, approximately 200 students.
Q. What was your sabbatical? What did you do during your sabbatical?
A. Basically I collected materials to author another book.
Q. What is this book going to be about?
A. It's probably going to be about how the general public comes to understand creation, evolution, the difference between science and religion and its impact on education.
Q. When you say "probably," what do you mean "probably"?
A. I don't have a working title yet. I have a rough outline. I'm still collecting materials that may morph into something other than that description I just gave.
Q. Tell me more about what the
0012
book is going to be about. How does it all fit together? What's your thesis, your arguments?
A. I don't have that yet. It's too premature.
Q. Have you any previous writings upon which you are building for this book?
A. "Defending Evolution In The Classroom" might be relevant. "Teaching Evolution In Higher Education" might be relevant. "Teaching Biology In Higher Education" might be relevant.
Q. Now, is this new book going to be geared to the high school level or the college level?
A. Tentatively right now neither. It will probably be geared towards the general public.
Q. How far are you in the process of writing this book?
A. I don't even have a draft chapter.

0013
Q. Is it more just an idea?
A. Collecting materials and trying to formulate ideas, at this point.
Q. What are the areas of expertise that you bring to this case on behalf of the plaintiffs?
A. Well, I have expertise in science education, and I have some knowledge of students' religious objections to evolution.
Q. Do you have expertise in this latter category?
A. Some expertise.
Q. When you say "some expertise," what does that mean?
A. I don't know how to quantify it.
Q. Have you written on that subject?
A. Yes.
Q. What types of articles have you written?
A. Probably the summation of

0014
the work would be the "Defending Evolution In The Classroom" book.
Q. What is that book about? Why does evolution need to be defended in the classroom, and defended from what?
MR. WALCZAK: That's a compound question. It can be taken one at a time.
BY MR. WHITE:
Q. Why does it need to be defended?
A. Evolution is under attack at various levels. It is somewhat of an example that we are here today, that it's under attack. Teachers feel intimidated, teachers feel pressured not to teach evolution. Teachers rarely feel that in science, physics, chemistry and biology and any other area.
Q. Why do they feel this pressure?
A. They feel pressure that --

0015
some people feel that evolution, the teaching evolution, counters their religious beliefs.
Q. So how does that pressure a teacher?
A. Teachers -- most teachers didn't go into teaching -- at least the ones I have spoken to, thousands over the years -- didn't go into teaching to have a fight with parents or administrators. They teach evolution, a parent complains to the principal, the principal then talks to the teacher and says, "How can we make this go away."
Or other students start arguing with the teacher concerning their religious beliefs, and teachers not wanting to have battles over this sometimes feel that maybe it is just better to deemphasize the teaching evolution, not teach it at all, or just teach it anyway but feel the pressure to do otherwise.
0016
Q. Do you have any quantified studies about this pressure that teachers feel?
A. The National Science Teachers Association did a study within this last year of their membership, and approximately one-third of teachers said they felt pressure in some way to deemphasize or not to teach evolution.
Q. How many members does this association have?
A. Over 50,000.
Q. Is it a national or an international organization?
A. Primarily national, but it does have international members.
Q. National in the United States?
A. Correct.
Q. How many teachers are there in the United States?
A. I don't know.
Q. More than 50,000?

0017
A. Yes.
Q. So not every teacher in the United States is a member of this organization?
A. Correct. It is the largest science teachers association in the world.
Q. Now, you are defending evolution from what?
A. Those that would rather not see it taught.
Q. Who are "those"?
A. Well, that's a large group, and it's a very varied group, but generally they come under the term "creationists."
Q. Now, do creationists want evolution not taught in the school?
A. Some do.
Q. What do they want taught in the school?
A. Some don't say. Some say they don't want it taught. Some say we would like to see supernatural
0018
causes in the classroom. Some say we want to see what we call young earth creationism taught. There's a great variety.
Q. Now, the plaintiffs have indicated that you'll be testifying about the standards of good pedagogy and science education, why it's important to teach students about evolution, and why intelligent design should not be taught in biology classes. Does that sound accurate to you?
A. Yes, I remember reading that.
Q. Is that what you plan to testify about?
A. I believe so.
Q. What is good pedagogy?
A. Well, that would take a few weeks to describe, but a short analysis, which I'm sure is what you want, would involve approximately the last 10 years, for example, maybe 15

0019
years, good pedagogy is under the terminology "constructivism."
Constructivism is a teaching theory, a learning theory, that we derive how to best teach science, and basically it says that students don't just learn something because you present it in various ways.
One has to encounter what the student knows coming in, what misconceptions, preconceptions, the student has, and then facilitate change in those preconceptions. That's it in a very, very short synopsis.
Q. Is that the only definition there is about pedagogy?
A. It's probably the best --
Q. Excuse me; good pedagogy?
A. It's probably the best short, well-agreed-upon basis of science education in the United States.
0020
Q. Now, who determines what a misconception is in a student?
A. What type of misconception?
Q. Well, what is a misconception? Who determines what is a misconception?
A. Are we talking a science misconception?
Q. Well, you said that part of this is that students come into science class with misconceptions and it's the teacher's role to correct those misconceptions.
A. Okay. Then I understand this to be a science misconception.
Q. Correct.
A. The scientific community.
Q. Who is the scientific community?
A. It is the community of scientists and their organizations, their journals, their writings.
Q. Is it monolithic?
A. I don't understand your

0021
question.
Q. Is it something that has just one view, the scientific community?
A. One could look to the leading scientific organizations, the world's largest maybe, or possibly the United States' most prestigious umbrella organizations, and if they all say something is a misconception, then teachers would then assume -- and I believe correctly so -- that is a scientific misconception.
Q. What would be examples of scientific misconceptions that a student would bring into a science classroom on the high school level?
A. Dinosaurs and humans coexisted.
Q. What else?
A. I can probably list a few thousand.
Q. Give me five of them.
A. The earth is approximately
0022
10,000 years old.
Q. Okay.
A. That animals evolved due to need. That a theory is somehow less scientifically important than a law.
Q. Say that again; I didn't hear you.
A. That somehow a theory, a scientific theory, is less important than a scientific law. That a scientific theory, given enough evidence, becomes the scientific law.
Are we up to five or six?
Q. Uh-huh.
Would a misconception be that there is a God?
A. That's not a scientific statement.
Q. But would that be a misconception a science teacher would have to correct in a science class?
A. Absolutely not.
Q. What is a scientific law?
A. It's a law within science.

0023
Q. Give me an example.
A. The law of gravity.
Q. How does that differ from a theory, a scientific theory?
A. Laws typically describe phenomena while theories explain phenomena.
Q. How is it a misconception that a scientific theory is less important than a scientific law?
A. The general public, the media and so forth, have a general definition of theory that's used outside of science, and it's that it's any sort of idea we have about anything; I have a theory about such and such that I just had when I got up this morning.
Scientific theories are explanations that have been rigorously tested, and no matter how much evidence one has for a theory, it doesn't become a law, the explanation never becomes a
0024
description.
But the general public generally uses the common term of theory, the nonscientific meaning of theory, to mean something that is very tentative, very unknown, very iffy; it can range from anything about a theory about why my coffee tastes bitter this morning, all the way up to X Files-type theories that are on television.
Q. Can a scientific law be disproven?
A. I don't like the word "proven." Your question is one that I find not to be able to answer.
Q. So, in other words, the scientific law of gravity cannot be disproven?
A. There might be evidence that would disconfirm it. Prove is generally a word that at least most science educators that I'm aware of, in the science education literature

0025
that I am aware of, would not use the word "proven" as if it's once and for all. We would say confirm or disconfirm. Prove is more of a mathematical term, as in geometrical proofs and so forth.
Q. So that the scientific law of gravity cannot be proven?
A. Confirmed, disconfirmed.
Q. It can only be confirmed or disconfirmed. Correct?
A. Correct.
Q. And if you could speak a little louder, I'm having a hard time hearing over the air vents.
A. I'll try.
Q. Okay?
Can a scientific law be disconfirmed?
A. Science is tentative. Anything is open to change; laws, theories.
Q. But a scientific law -- how does a scientific law, then, if you
0026
are going to put it on a scale, how does a scientific law differ in weight to a scientific theory?
A. It does not. Both are valuable.
Q. But both can be confirmed?
A. Explanations can have evidence that help confirm them. Laws can have evidence that help confirm them, also.
Q. So if a theory is confirmed, does it then become a scientific law?
A. No. That is a misconception.
Q. How does a scientific theory become a scientific law?
A. An explanation does not become a description.
Q. Are there any theories with regard to the law of gravity?
A. Yes, there are some.
Q. Give me a couple of them.
A. That's outside of my area

0027
of expertise.
Q. In your opinion, a school district that requires the teaching of evolution in high school biology class, that's exhibiting good pedagogy in science education?
A. I don't know if it is being taught well. It's in the curriculum, and I think that's prudent.
Q. So that as long as it's a part of the curriculum, that would be good teaching pedagogy, assuming it is taught correctly?
A. That's a large assumption of whether it is being taught correctly or not. Again, I'm not quite sure I understand your question. I think it's prudent that it's in the curriculum, but I don't understand about then implying that it's being taught well?
Q. Well, for you to know whether something is taught well, do you have to witness the teaching?
0028
A. That's a very difficult question. Part of it yes, part of it no. Part of it the teacher could describe how it's being taught.
It's always nice to be able to see teaching in person, also, just to see the social interactions, the social skills of the teacher, the art of the teacher in the classroom; but to a certain extent if the teacher were to describe in writing or verbally to someone how they went about teaching it, that would be helpful, also.
Q. Well, then how do you as an expert reach opinions about whether something is good teaching pedagogy or not?
A. From my knowledge about what we think that is.
Q. Explain that.
A. As I described earlier, for example, constructivism; if a teacher teaching a series of items in a class

0029
completely ignores or doesn't use any form of constructivism within that instruction, then probably something's amiss.
Q. When you described earlier your understanding of this case, how did you acquire that information?
A. I was contacted by Vic. I was sent documents that I read. I think that's what you want in the answer, no?
Q. Well, what I was asking is, how did you acquire the knowledge of what this case is about?
A. By reading the documents concerning the case.
Q. What documents did you review?
A. The complaint, the press release, the Dover press release, sections of "Of Pandas And People," sections of the Dover curriculum, a small section of the Pennsylvania curriculum.
0030
MR. WALCZAK: Would that be curriculum standards?
THE WITNESS: Yes. Thank you.
I think that's it. But for some reason I think there's one other document, but if I recall it during this deposition, I'll mention it.
BY MR. WHITE:
Q. Besides speaking with your attorney, did you speak to any other people to acquire information about this case?
A. Yes.
Q. Who?
A. Eugenie Scott, Eric Rothschild.
Now, I have a question. When you mean "about this case," you mean about the legal facts of this case or something else?
Q. To acquire information and knowledge to help you form your opinion.

0031
A. Graham Bell. I think that's it.
Q. Who is Eugenie Scott?
A. Eugenie Scott. She is the executive director of the National Center for Science Education.
Q. And what information did she provide you about this case?
A. She summarized the case in probably three or four minutes to me, told me a couple of things that would probably occur, and took a look at one of my drafts of my expert report.
Q. How did she summarize the case? What did she say to you?
A. That the Dover School Board has decided to try to put intelligent design and attacking evolution language in front of the students. That essentially was it.
Q. You said "put intelligent design"?
A. I don't remember her exact words.
0032
Q. But what did you just say? Again, I'm having a hard time --
A. Oh, I'm sorry. I think I said "put."
Q. What does that mean, or what did you interpret that to mean?
A. I interpret it to mean that somehow in the science classroom within the realm of the science curriculum at Dover, that intelligent design would be brought up in some fashion and attacks against evolution would be brought up in some fashion.
Q. When she said attacks on evolution --
A. I'm not saying that I remember her exact words at all.
Q. You also said she said a couple of things would occur. What were those?
A. That the defense would probably put forth a teach the controversy, and gaps and problems with evolution language.

0033
Q. What do you mean by gaps-and-problems language?
A. That evolution has problems with gaps and it has problems with its theory, with its evidence.
Q. And what do you mean by "teach the controversy"?
A. This was the language she used. I don't know exactly what she meant about it. I can guess.
Q. What did you interpret it to mean?
A. I interpreted it to mean that teaching that there's a controversy within the scientific community concerning evolution and intelligent design.
Q. Is the Dover School District teaching the controversy?
A. I would have to review the documents to be sure, but the reference book "Of Pandas And People" has an area that instructs the teacher that a controversy is taking
0034
place. And I think, in essence, the four-paragraph statement has issues that may allude to that, but I'm not sure that would be exactly what was taken away by those who read it.
Q. You said she also reviewed drafts of your report?
A. Reviewed one draft.
Q. Did she give you any comments?
A. I think she said something like "pretty good." There might have been another comment, but I don't remember. Nothing substantive.
Q. Who is Graham Bell?
A. Graham Bell is an evolutionary geneticist.
Q. Where is he located?
A. McGill University.
Q. And what did he tell you about this case?
A. Oh, I don't think he knew anything about the case. I asked him a question concerning intelligent

0035
design within the journals that he's very familiar with as a scientist.
Q. What question did you ask him?
A. "Has the Journal of Evolutionary Biology or the journal Evolution ever had, to your knowledge, a paper on intelligent design?"
Q. And what was his answer?
A. No.
Q. Why did you need to ask him that question?
A. These are journals I do not read.
Q. How did you get involved in this case as an expert?
A. I was contacted by Vic.
Q. By who?
A. Vic (indicating).
Q. By Vic.
With regard to good teaching pedagogy, is it good teaching pedagogy to point out
0036
strengths and weaknesses in certain scientific theories?
A. It depends. If the bad outweighs the good, then no.
Q. Why is that?
A. If students are pointed out weaknesses in some sort of mathematical theory and then leave the classroom thinking two plus two equals five in elementary school, then it didn't pay off, they leave with a misconception.
Q. Well, with two plus two equals four, would that be the equivalent of a scientific law?
A. I'm not an expert in the equivalence of mathematical laws to scientific laws, so I can't answer that question.
Q. But two plus two equals four can be confirmed. Right?
A. I think most mathematicians would agree at the elementary school level that's the case, yes.

0037
Q. But in the mathematical community, the consensus would be that two plus two equals four?
A. I would hope so.
Q. So let me understand you, then. If there are more weaknesses in something than strengths, students should not be informed about those weaknesses?
A. No, I didn't say that.
Q. Well, say again what you said.
A. What I'm trying to say is that if by teaching some weaknesses you engender misconceptions and the goal is not to engender those particular misconceptions, then it is better not to teach those particular weaknesses. If students leave thinking two plus two equals five, this is not the goal of that particular unit of education.
Q. When you say "the goal," who sets the goal?
0038
A. That's somewhat of a complicated answer, and I will try to make it concise. It's generally a school district, school board, working with standards and curriculum from -- developed by their teachers, generally, working with state standards and working with national standards and looking to the national organizations of science both for science education and science in particular.
Q. When all is said and done, though, a school board needs to comply with its state academic standards. Correct?
A. I don't know the legalities concerning that.
Q. But when you are teaching future teachers, do you teach them to comply with whatever will be their given state standard?
A. I don't mention anything concerning that.

0039
Q. Well, when would a teacher learn about that?
A. They would learn that the state standards are there, but whether they comply or not is not in my realm of instruction.
Q. Whose realm would it be in?
A. I imagine compliance would be some sort of state or school board contractual obligation they have with their school, but I'm not aware of any particular answers to those questions.
Q. So then you have no knowledge whether a school board has to comply with its governing state academic standards?
A. I imagine it might go state by state.
Q. That's an assumption?
A. Yes.
Q. You don't know?
A. No.
Q. Please give me a summary of
0040
the opinions you have in this case.
A. Could you be more specific, please?
Q. Your coming here as an expert with opinions on behalf of the plaintiffs, I would like you to summarize for me your opinions.
A. You mean opinions specifically concerning what I read on the Dover Board policy?
Q. The opinions that you are setting forth as an expert in this case on behalf of the plaintiffs.
A. The Dover policy -- it's my opinion that the Dover policy engenders teachers to have bad pedagogy, or shall I say poor pedagogy. It requires teachers to ignore the leading scientific organizations in the United States. It requires science teachers to ignore the recommendations of the major science education organizations in the United States.

0041
It poorly prepares students for post secondary education, primarily colleges and universities, and I'm speaking specifically secular colleges and universities. The policy might help if they go to a Christian university or college. And it causes them to reject, or at least ignore, some of the training they have had in science education on how to be teachers of science.
Q. When you say "engender," what do you mean by that word?
A. Facilitate.
Q. So, in other words, assist in poor pedagogy?
A. Yes.
Q. Now, these opinions you have just set forth, is there anything else besides these four or five things you just listed?
A. I would have to see my expert report to see if my memory is correct. As best I can recall at
0042
this moment, that's essentially the opinions that I put in the report.
Q. The opinions that you bring to this case, those are just your opinions. Correct?
A. Correct.
Q. Do you have any personal knowledge about the facts of this case?
A. I don't understand the question.
Q. Have you personally gone to Dover?
A. No.
Q. Have you personally spoken to any of the teachers from Dover?
A. No.
Q. Have you personally spoken to any of the students at the Dover School District?
A. No.
Q. Or any of their parents?
A. No.
Q. Have you sat in any of the

0043
classes?
A. No.
Q. Have you been in the classroom when the four-paragraph statement was read to students?
A. No.
Q. So you haven't seen any of the reaction of students?
A. Correct.
Q. So the knowledge you have acquired to help you form your opinion, that's what has come to you from your attorneys, review of documents, and speaking to Eugenie Scott?
A. Correct.
Q. Now, are there other experts in your field of science education who may disagree with your opinions?
A. Possibly.
Q. Is there room for doubt in an opinion?
A. I have no expertise on the
0044
psychological question of whether there's room for doubt in an opinion. I guess maybe I don't understand your question.
Q. Is your opinion a fact?
A. Could you define "fact" for me?
Q. Is it something that is certain?
A. It's certain to me.
Q. But is it certain to everybody?
A. I haven't polled everybody.
Q. But you do agree that there are people, experts in the field of science education, who may have a different opinion from you as it relates to the Dover school policy?
A. Probably.
Q. Now, if the facts and assumptions that you relied on to form your opinion turn out to be wrong, would your opinion then be worthless?

0045
A. If the most prestigious scientific organization in the United States and the largest scientific association on the planet and the largest science teaching organization on the planet and the largest biology teaching organization on the planet and college biology textbooks and high school biology textbooks said that intelligent design and teaching weaknesses in evolution that cause question in the scientific community as to whether evolution occurred or not, then, yes, my opinion would change.

Q. Now, you just said that if there's weakness -- weakness is taught about evolution to question -- what did you say -- the occurrence?

A. If it is taught that -- if all those organizations I just mentioned and all the textbooks I just mentioned were to agree that there is such weakness in

0046
evolutionary theory that it is causing doubt in the scientific community to the occurrence of evolution, then, yes, I would change my opinion.

Q. But if the weaknesses that are being pointed out regarding evolution do not cause doubt in the occurrence of evolution but just pointing out that evolution has some weaknesses, simply, would that cause, as you are saying here, the sky to fall down?

A. I don't understand your question. There are -- there is no evidence to show that there is weaknesses in the occurrence of evolution.

Q. But not in the occurrence of evolution, just in the theory of evolution.

A. What do you mean by "the theory of evolution"?

Q. The ideas that form

0047
evolution, the theories of evolution. I'm not saying that there is no such thing as evolution, but just that the theories about evolution may have some weaknesses.
A. There are no weaknesses, that I'm aware of, concerning whether evolution occurred. Concerning how evolution occurred there are various opinions, scientific opinions, on how evolution occurred, and they are being debated in the scientific community.
Q. But your opinion here is that the Dover policy questions whether evolution occurred.
A. I think that statement definitely would engender those thoughts in 15-year-old children, yes.
Q. But is that what the statement that's read to the students says?
A. I would have to see the
0048
statement again. I don't have it memorized.
Q. But from your review of all the information in this case that led you to write your report, is that what your understanding is about the statement?
A. Could you repeat your question again? I'm sorry; I don't understand.
Q. It's your understanding, if I'm correct, that the statement read to the students in the Dover School District says that there's weaknesses in the idea of whether evolution even occurred.
A. I think that's what 15-year-old children would take away from hearing that statement, yes.
Q. But is that, from your memory, what the statement says?
MR. WALCZAK: He's already said that he doesn't remember the exact language. If you want to show

0049
him the statement, then maybe he can answer the question.
BY MR. WHITE:
Q. From your review of everything -- you have been paid, I assume?
A. No.
Q. No? Okay. But you have spent time looking over the information?
A. A little bit.
Q. You have prepared an expert report?
A. Yes.
Q. Okay. From your understanding of that, is it that the statement that is being read to the students that there is weakness in the idea that there is even the occurrence of evolution?
MR. WALCZAK: I'm going to object. You have asked this question now at least twice, maybe three times. He has testified to what,
0050
from his recollections --
MR. WHITE: Objections are not supposed to be an argument here.
MR. WALCZAK: Well --
BY MR. WHITE:
Q. So if you can't answer my question, we can get to it later.
MR. WALCZAK: Are you asking him about what this engenders?
MR. WHITE: I'm asking him a question --
MR. WALCZAK: Okay. Why don't you restate your question.
BY MR. WHITE:
Q. Well, my question is, from your memory that led you to draft your report, is it that the statement being read to students is that there is weakness with the idea that evolution ever occurred?
A. It can be interpreted to mean that.
Q. But is that what the

0051
statement, from your memory, was?
A. Not word for word, no.
MR. WHITE: Why don't we take a break.
(Recess taken.)
(Alters Exhibit 1 was marked for identification.)
BY MR. WHITE:
Q. I want to show you what has been marked as Exhibit 1. If you can tell us what that is.
A. This is my expert report.
Q. Is your expert report, is that a true and correct and complete expression of the opinions that you bring to this case?
A. I believe so.
Q. Is that a yes?
A. Are you asking me whether I have other opinions relevant to this case?
Q. Yes.
A. Probably. I haven't formulated them.
0052
Q. Do you plan on supplementing your report with any new opinions?
A. Not presently, no.
Q. So besides any unformulated opinions, your formulated opinions are what are expressed in this report. Correct?
A. Yes.
Q. Now, who prepared this report?
A. I did, with the help of Vic.
Q. Anyone else help you, besides Eugenie Scott who looked over a draft?
A. No one.
Q. How long did it take you to prepare and write this report?
A. Ten, maybe 15 hours.
Q. Was this report prepared as carefully as you would prepare your regular professional work?
A. I don't know how to compare

0053
the two, but I certainly took it seriously and did it what I considered to be carefully.
Q. Are you related to anyone who's involved in this litigation?
A. Not that I'm aware of.
Q. Do you belong to any of the organizations that are involved in this litigation, for example, the American Civil Liberties Union?
A. No.
Q. The Americans United for Separation of Church and State?
A. No.
Q. Are you a member of the National Center for Science Education?
A. Yes.
Q. How long have you been a member of that group?
A. I don't know exactly, but I think approximately ten years.
Q. As a member, what's your role in the organization?
0054
A. I don't know if members have a role. I receive a newsletter. I don't know if members have a role as far as responsibility, work, something like that.
Q. Now, besides being a member, do you have any other role in the organization?
A. Yes.
Q. What role is that?
A. I'm an associate editor of their journal.
Q. What's the name of the journal?
A. Reports of the National Center for Science Education.
Q. Anything else? Any other role in the organization?
A. Yes.
Q. What else?
A. Currently as of February, March, I'm a member of the board.
Q. That's the governing board of the organization?

0055
A. Correct.
Q. How did you become the associate editor of their publication?
A. I was asked to be.
Q. By whom?
A. Andrew Petto.
Q. Who is he?
A. The editor of the journal.
Q. What do you do as an associate editor?
A. He occasionally sends me articles of an education focus and asks me to review them or my opinion on them.
Q. Is that a peer-review journal?
A. Yes. I don't know if all articles in it are peer reviewed, but certainly many of them are.
Q. And when you review a potential article, what exactly do you do with it?
A. I read it through, see if
0056
it's accurate, to the best of my ability, see if my areas of expertise can help the author improve it, make comments on it for improvement, if it needs comments for improvement. Generally, the editor asks whether in my opinion it's appropriate for the journal. There are other things, too, but that's basically it.
Q. How does that role differ, if it does, from a reviewer for the peer-review aspect of the journal?
A. I am part of the peer review.
Q. So does every article that is going to be published in that publication go through you?
A. No.
Q. Is it just articles where you would have an area of expertise in them?
A. Yes.
Q. Now, you are a member of the board since the early part of

0057
2005?
A. Yes.
Q. How did you become a member of the board?
A. I was asked to be.
Q. By whom?
A. If I remember correctly -- I can remember correctly --
Q. I'm sorry; did you say can or can't?
A. I can remember correctly. I was at NCSE, the National Center for Science Education, and I was asked by the president of the board whether I would consider being a member of the board.
Q. Who's the president?
A. Kevin Padian.
Q. Can you spell that for her, too?
A. Kevin. Padian, P-A-D-I-A-N.
Q. Who is Kevin Padian?
A. What would you like to
0058
know?
Q. Who is he and what does he do?
A. He's a paleontologist at the University of California at Berkeley.
Q. Where is the National Center for Science Education based out of?
A. It's a city next to Berkeley. I can't recall the name of the city.
Q. What do you do as a board member for the National Center for Science Education?
A. So far I have done nothing, no role as board member in the month or two since I have been on the board.
Q. What do board members do for that organization?
A. I'm not quite knowledgeable of the full extent, but I believe they give opinions, they meet once a

0059
year, they help answer questions or provide advice to the executive director. I believe in some occasions they might help out in fundraising.

I think that's about it. There might be something else, but I have not been given a list of things that board members do.

Q. Do board members direct the path of the organization?

A. I don't know that to be true.

Q. What is the mission of the National Center for Science Education, if it has one?

A. Well, I don't remember the exact words, but it's to defend the teaching of evolution in public schools and to promote science education in general.

Q. And defend the teaching of evolution in public schools from whom?

0060
A. Those that would like to see it diminished and/or removed.

Q. Now, for evolution to be diminished, what do you mean by that?

A. There are probably a thousand ways in which the teaching of evolution could be diminished, but one way may simply be that teachers will spend less time teaching it.

Q. Well, what's the role of a teacher when it comes to deciding how much time they should spend on a particular subject?

A. That's another complicated answer and varies from teacher to teacher, but generally the time allocation is devoted, as it is in Dover, by the curriculum.

Q. So if a teacher teaches something in compliance with the curriculum, then the teacher is meeting his or her obligations as a teacher?

A. The operative word in that

0061
question is "if."
Q. So I just asked you, if.
A. The teacher can discuss various areas of evolution and not discuss other areas of evolution because the teacher feels pressured discussing evolution.
Q. You didn't answer my question.
A. Okay. Could you repeat your question?
Q. I said if a teacher is in compliance with the curriculum, is the teacher properly teaching the course?
A. "Properly" in that you mean the best pedagogy possible?
Q. Adequate pedagogy.
A. I don't know that necessarily complying with the curriculum then implies adequate pedagogy.
Q. Well, meeting the standards set by that particular state.
0062
A. I don't know if states delineate what good pedagogy or adequate pedagogy are.
Q. Meaning the standards of the school board?
A. I don't know if the school board delineates what adequate pedagogy is.
Q. Who determines adequate pedagogy?
A. By and large it's the individual teachers decide at the end of the day if they have done a fairly good job or not.
Q. So a teacher who teaches in compliance with the curriculum can at the end of the day say "I did good pedagogy today"?
A. Presuming that the school board has what others might consider an appropriate amount, in this case, of time devoted to the subject.
Q. And if the school board said to the teacher "Teach in

0063
compliance with the governing state academic requirements," and the teacher did that, would then the teacher be exhibiting good pedagogy, at least in the teacher's mind?
A. I have no idea of what would be in the teacher's mind.
Q. So good pedagogy, then, lies with the teacher?
A. No. It's not simply a matter of what goes on in the teacher's head.
There is good pedagogy and there is bad pedagogy; but at the end of the day the teacher feels that they have facilitated learning well in their students, then probably that teacher would feel that they have done a good job of teaching that day. Whether in fact or not they have is another point.
Q. But if a teacher -- this is a general rule -- if a teacher teaches pursuant to the curriculum
0064
required by the school district and pursuant to the state governing standards, then the teacher reasonably is adequately teaching the students?
A. No, I don't believe so. You are conflating the difference between good teaching and "covering" the material.
Q. You'll agree that not all teachers are the same. Right?
A. Correct.
Q. Now, a teacher needs to cover material so that students can advance to the next grade. Correct?
A. Presumably.
Q. Well, isn't that a general goal of a teacher?
A. Well, just because the teacher "covers" the material doesn't mean the student learned the material.
Q. But if a student then goes through the course and is able to

0065
take a standardized exam and passes it --
A. Provided the standardized exam is a good instrument to measure learning.
Q. Well, it's a standardized exam, and it depends on whatever that state's standard is. Correct?
A. I don't know. I would have to see it.
Q. Now, can a teacher be a good teacher but not cover the curriculum?
A. Could you define "good" for me?
Q. Well, you have been using these terms, "good, poor pedagogy." Can a teacher have good pedagogy, as you have been using it, but not cover all of the curriculum?
A. They may use good pedagogy in what they are teaching, but it's another question of the coverage. They may do an excellent job teaching
0066
one part, and then if they don't cover other parts of the curriculum, that's another question.
Q. So what is the goal of a teacher?
A. To facilitate learning.
Q. And how does a teacher facilitate learning in the public high school?
A. Any teacher, science teacher, biology teacher?
Q. Well, let's stick with your area, science.
A. Could you focus the question?
Q. Teaching biology class.
A. It would depend on the particular concept being taught; however, again, I will go back to the general basis of constructivism, in general, is our major learning theory and methods derived from that learning theory for science education in the United States.

0067
Q. So then what is the -- then explain to me for a biology teacher in high school what should that teacher's goal be with regard to his or her students.
A. To increase understanding and knowledge in biology in relation to the school curriculum.
Q. Also, in relation to the state standards?
A. Well, again, that brings us back to what I mentioned previously. It depends on how the school derives its curriculum.
The schools that I'm aware of and the schools that I've read about develop their curriculum in consultation with their science teachers, science specialists, possibly, if the school board has them, state standards, national standards, recommendations from scientific organizations concerning education, and recommendations and
0068
positions of national science education organizations.
Q. So increasing knowledge and understanding biology in relation to the school's curriculum -- is that what you said -- that's a goal of a teacher?
A. Yes.
Q. And the school curriculum is derived through these various steps you were just talking about?
A. I don't know specifically the Dover District does that, but my understanding in general, that's how a curricula is developed.
Q. And school curriculum, generally, is supposed to be in compliance with the state governing standards. Correct?
A. Again, I don't know the legalities concerning that.
Q. But in your area of expertise of science education, you have no knowledge on this matter?

0069
A. I have no knowledge that there aren't particular states that have varying rules concerning that.
Q. So when you are teaching teachers to teach and they graduate from McGill, are they, as a general rule, staying in Canada to teach?
A. I would say the majority of the high school teachers are not from Canada. Of the ones I teach at Harvard, almost all of them are from the United States. The elementary school teachers are primarily from Canada.
Q. And they graduate from either Harvard or McGill and they go off to a high school in Nebraska, let's say, okay, what have they learned from you as far as how they are supposed to properly teach in compliance with the governing standards of Nebraska?
A. Very little, if anything. The compliance issue changes from
0070
school to school, school district to school district. Many of the students may go to private schools in which the compliance issue is compliance within that particular school and maybe not even a school board.
Q. So then who determines compliance?
A. Compliance, to me, is a legal term; it's not in my area of expertise.
Q. So what do you teach teachers as far as how they are supposed to comply with school curriculum or state standards?
A. Teachers, in my experience, don't need to be taught how to read curriculum and understand what's to be done.
Q. Do you teach teachers how to prepare lesson plans?
A. No.
Q. So what is it exactly that

0071
you are teaching teachers to do?
A. I teach the methods on how to teach science.
Q. And one of them is this constructivism?
A. All of them are based, basically, upon constructivism that I teach.
Q. Are there other methods of teaching besides constructivism, teaching science?
A. I have read others who base some of their teaching methods on other learning theories besides constructivism, but, again, I go back to the major, most-accepted theory of education and science education is constructivism.
Q. What are some of these other theories, teaching theories?
A. Some feel that simply having students do science they will discover the methods and theories of science and laws of science on their
0072
own. Some feel that you do not need to diagnose misconceptions of the students ahead of time, that facilitating change in that regard is not that prudent. And that covers a wide variety of other teaching methods.
Q. Now, are these other teaching methods taught in universities?
A. Not that I am aware of.
Q. So no other universities, that you are aware of, teach teachers how to teach these other methods in high school biology classes?
A. I have not polled other universities' science instructors to find out what they teach; but when I attend national conferences and so forth, I see very little, if anything, of other things that aren't based upon some form of constructivism.
Q. Do you have a business

0073
relationship with anyone or any entity involved in this case?
A. I don't understand the question.
Q. I mean, do you have any business relationship with any of the book publishers in this case?
A. No.
Q. Or any financial interest at all in this case?
A. No.
Q. And you say you are not being paid?
A. Correct.
Q. Why is that?
A. Part of my job at McGill University, and which I am paid to do, is approximately 40 percent research scholarship, approximately 40 percent teaching, and approximately 20 percent service. Those figures aren't rigid, but that's generally it, and I consider this part of service.

0074
Q. How is this part of service?
A. Well, I help -- think I'm helping science education, or at least hope that I am.
Q. What other service projects do you do to fulfill this 20 percent?
A. Speaking engagements, primarily.
Q. Speaking engagements where?
A. Universities, conferences, museums, sometimes television, radio, doing interviews with the press.
Q. So then McGill University paid your fare down here?
A. No.
Q. Who paid your fare to come down here?
A. I did.
Q. Are you going to be reimbursed?
A. I hope so.
Q. How long have you been at McGill University as a teacher?

0075
A. Just finishing my eighth year.
(Alters Exhibit 2 was marked for identification.)
BY MR. WHITE:
Q. Let me show you what has been marked as Exhibit 2. Is this the press release you were talking about earlier?
A. Yes, it is. This is one of the items I read in preparation of my expert report.
And I did remember during break another person which I spoke to concerning the preparation of my expert report, and that was Eric Modsky -- Nick Modsky of the National Center for Science Education.
Q. And how did Nick help you prepare your expert report?
A. I believe he provided me with a document. It may have been this document, this press release. In fact, I'm very sure it is.
0076
Q. Are you talking about Exhibit 2 there?
A. Yes.
Q. What else, if anything, did Nick Modsky do to help you with your report?
A. I believe that was it.
Q. Now, on this Exhibit 2 towards the bottom third of Page 1 and carrying over to the second page, it notes the updating of the curriculum.
Do you see that in the first indented paragraph, which says: "Students will be made aware of gaps/problems in Darwin's theory and of other theories of evolution including but not limited to intelligent design, the origin of life is not taught"?
A. Yes.
Q. Now, as far as you know, is that statement read to students in the Dover School District?

0077
A. To my knowledge, no.
Q. Two paragraphs above from that is a paragraph that begins: "Teachers in the science department researched and recommended to the administration the science textbook 'Biology' (Prentice Hall) for its high school biology class"?
A. Yes.
Q. And it goes on to say that the school district purchased many copies of those. Are you familiar with that book, "Biology"?
A. I remember reviewing a copy of it; I believe it was the late '90s. I can't recall exactly, but it was somewhere in the late '90s.
Q. Who did you review that for?
A. Prentice Hall.
Q. When you say review it, what do you mean by that?
A. They had me read a section of the book and make comments.
0078
Q. Do you remember which section of the book you read?
A. Probably the evolution section, but, no, I don't recall. Too many years ago.
Q. And this "Biology" textbook, do you recall if that's the one by Professors Miller and Levine?
A. Yes, it is.
Q. And that's the recommended textbook in Dover High School?
A. That's what I understand from reading these documents.
Q. The next paragraph talks about the book "Of Pandas And People"?
A. Yes.
Q. Have you ever reviewed "Of Pandas And People"?
A. Reviewed for a publisher?
Q. Well, either for a publisher -- first, for a publisher.
A. No.
Q. Have you ever reviewed it

0079
for any other entity?
A. No.
Q. Have you reviewed it for yourself?
A. Yes.
Q. The entire book?
A. I believe I read the entire book when it first came out, the second -- I believe Second Edition in -- oh, ten years ago. I have since read, due to this case, sections of it.
Q. Which sections of it have you recently reviewed?
A. I read Page -- a paragraph on Page 99 and 100 solely because I had it marked with a Post-it note from ten years ago. I read the Conclusions section. There's a section in the back of the book titled something like A Note To The Teachers, something like that, I can't recall exactly; I read that. I believe that was it.
0080
Q. And the version you have recently read is the most recent version of "Of Pandas And People"?
A. To my knowledge, yes.
Q. It's the Second Edition?
A. I remember looking in the front for this case and there were two dates, and it was -- I believe '89 comes to mind, but maybe it was '92. In any case, it had two dates, so it would be the Second Edition.
Q. Now, on this Exhibit 2 at the bottom of Page 1 to the bottom of Page 2, that is the statement that is read to students at the Dover School District?
A. That's my understanding from reading the complaint.
Q. Would you do me a favor, please, and just read that statement.
MR. WALCZAK: To himself or out loud?
MR. WHITE: Out Loud.

0081
Thank you, Vic.
THE WITNESS: The statement starting with "The Pennsylvania academic standards"?
BY MR. WHITE:
Q. Yes.
A. "The Pennsylvania academic standards requires students to learn about Darwin's theory of evolution and eventually take a standardized test of which evolution is a part. Because Darwin's theory is a theory, it continues to be tested as new evidence is discovered. The theory is not fact. Gaps in the theory exist for which there is no evidence. The theory is defined as a well-tested explanation that unifies a broad range of observations.
"Intelligent design is an explanation of the origin of life that differs from Darwin's view. The reference book 'Of Pandas And People' is available for students who might
0082
be interested in gaining an understanding of what intelligent design actually involves. With respect to any theory, students are encouraged to keep an open mind. The school leaves the discussion of the origin of life to individual students and their families. As a standards-driven district, class instruction focuses upon preparing students to achieve proficiency on standards-based achievements."
Q. How often --
A. I'm sorry; "standards-based assessments."
Q. That's the final words of the statement?
A. Yes.
Q. How often is this statement read to students in the Dover School District?
A. I believe, from the press release and the complaint, it was read once.

0083
Q. Do you know when during the biology class it's read the one time?
A. No.
Q. Do you know whether the student -- or this statement is read to students who are not in attendance when it's read the one time?
A. I recall something in the teachers' letter to the superintendent about students may opt out, and I don't understand from the letter whether it meant they can opt out of the statement or not.
Q. So from what you understand, then, is that a student does not have to be in the classroom when this about a one-minute statement is read?
A. I'm not sure I understand from the teachers' letter whether that's the case or not, but it's vague enough to where I would ask if that's a possibility.
Q. Is this statement attached

0084
to any of the textbooks used in the Dover High School, as far as you know?
A. No.
Q. Is this statement posted anywhere in the Dover High School classrooms?
A. Not that I'm aware of.
Q. Have you interviewed any students who have heard this statement to find out what their views are with regard to this statement?
A. No.
Q. Do you have any studies to show that the reading of this statement to students has been detrimental to their education?
A. No.
Q. Have you spoken to any students or parents who have indicated that their education at Dover High School has been harmed by hearing this statement?

0085
A. No.
Q. According to Exhibit 2, and from your understanding, "Of Pandas And People" is not a required textbook in that Dover biology classroom. Correct?
A. Correct.
Q. And the Dover School District has the "Of Pandas And People" book as a reference book?
A. Correct.
Q. Do you know whether that book is kept in the classroom for the students?
A. I do not know.
Q. Do you know whether "Of Pandas And People" is in the main library?
A. I do not know.
Q. Do you know whether there are any books in the library at the Dover High School that may be critical of evolution?
A. I know of no books within
0086
the Dover library.
Q. Would it be improper to have a book in the Dover public school library that is critical of the theory of evolution?
A. I believe the books that are in a school library should be decided upon by the local community, and I have no problem with "Of Pandas And People" being -- if I lived in the area and I sent a child to the school, I have no problems with "Of Pandas And People" being in the school library.
Q. Do you have any problem with any student reading "Of Pandas And People"?
A. I would like to see the student told ahead of time that this book does not represent the views of the scientific community.
Q. My question was, do you have a problem with a student reading "Of Pandas And People"?

0087
A. I probably have very little problem with a student reading virtually anything as long as it is age appropriate, but we are way outside of my field of science education here. So you are asking my personal opinion on what 15-year-old children should read?
Q. Well, no. I'm asking, first off, as a person who has expertise in science education, is it improper for a high school student to read "Of Pandas And People"?
MR. WALCZAK: You are not -- I'm going to object because you are not giving any context to this. I mean, just pick up and read it on their own?
MR. WHITE: An objection is not supposed to be argumentative or not suggestive, so please keep it within the federal rules.
BY MR. WHITE:
Q. What I'm asking you is, in
0088
the context of high school education, and based on your expertise as a science educator, is it improper for a student to go into the library of the Dover High School and read "Of Pandas And People"?
A. I think the student should be able to choose -- when they walk into their local high school library to choose any book they wish to read.
Q. So, in other words, if a student chooses to read "Of Pandas And People," that would be fine, as far as you are concerned?
A. If it is a book within the school library, I feel any student should have the right to read any book within the school library.
Q. So if "Of Pandas And People" is in the school library, then you have no problem with a student reading that book. Correct? It's a yes or no.
A. I don't believe it's yes or

0089
no. I believe there's a gradation.
If you are asking my
personal opinion, there are books I
would recommend the student to read,
and there are books that I would not
recommend the student to read, but I
believe, no matter what my
recommendation, that the student has
the right to read any book in their
public library, their school library.
Q. So in your expert opinion,
as a person with knowledge of science
education and pedagogy and
learning -- I would assume you have
expertise in scientific learning,
correct, and what's the best methods
of learning? Correct?
A. Correct.
Q. An education isn't just a
lock-step method, is it, with regard
to you only learn one thing and one
thing only? Right?
A. Correct.
Q. And in education people can
0090
consider various theories and compare
and contrast them with other
theories. Correct?
A. If you are asking me in my
realm of science education,
scientific theories to compare and
contrast, yes.
Q. In your area of expertise,
then, what I'm asking, is it proper
or is it improper for a high school
student to read "Of Pandas And
People" as part of his education in
science?
MR. WALCZAK: Wait a
minute. Now the facts here in your
question, the underlying facts and
premises, are changing.
MR. WHITE: If I am asking
questions, object properly. I don't
need a speech.
MR. WALCZAK: I'm objecting
because I don't understand the
question, and if I don't understand
the question, I'm not going to let

0091
him answer it.
MR. WHITE: Then let her repeat the question.
Please repeat the question.
(The court reporter read back the following:
"Q. In your area of expertise, then, what I'm asking, is it proper or is it improper for a high school student to read "Of Pandas And People" as part of his education in science?")
MR. WALCZAK: Because you have changed it from can a student go in and read whatever they want to is it proper as part of their science education.
MR. WHITE: Then you understood the question --
MR. WALCZAK: Now I do. I want to make sure that we are not doing bait and switch here.
THE WITNESS: I hear the words in the question "proper" and
0092
"science education." "Of Pandas" -- it's my opinion that the book "Of Pandas And People" would be a poor book for students to read to gain proper science education in high school.
BY MR. WHITE:
Q. Now, what if a student read "Of Pandas And People" as part of his education in high school, if it's just one of many science books the student is looking at?
A. The question is improper, because I don't consider it a science book.
Q. Okay. Of any book students are reading that has something to do with science.
A. For 15-year-old children in public high schools, most are not going to read many books, and Pandas -- "Of Pandas And People" would be down near the very bottom of my recommendation of books to read at

0093
that age for science education.
Q. And that's just your opinion?
A. Correct.
Q. Now, what do you base that opinion on with regard to "Of Pandas And People"?
A. Sections that I have read in "Of Pandas And People."
Q. But you said earlier that it's been, what, about ten years or so since you read the book from cover to cover?
A. Cover to cover, yes, but sections just recently.
Q. And what is your problem with these sections you have read?
A. I don't have the book in front of me to examine.
Q. I will show it to you.
MR. WHITE: I'm not going to mark this as an exhibit, if that's okay with you, Vic.
MR. WALCZAK: That's fine.
0094
MR. WHITE: But this is the second edition of "Of Pandas And People" with the copyright of 1989 and 1993.
Off the record.
(Discussion off the record.)
THE WITNESS: Page 99 and 100, it states, "Intelligent design means that various forms of life began abruptly through an intelligent agency with their distinctive features already intact, fish with fins and scales, birds with feathers, beaks and wings," et cetera.
I don't know of that view existing in science education. I've never seen it in high school biology textbooks. I've never seen it in college biology textbooks. I've heard the national organizations in education say that is improper, that that is not science.
And I have read from the

0095
national scientific associations that
that is not only science, they
consider it a discredited idea in
science, but yet it is being
presented here in this book as
science without any of the caveats,
without any of the objections below
that -- nowhere does it state this is
not science.
BY MR. WHITE:
Q. Now, along those lines,
then --
MR. WHITE: Well, let me
just -- just keep your thought. I
have a question here.
BY MR. WHITE:
Q. Along those lines, though,
where you are talking about Pages 99
and 100, about life forming abruptly,
if a student in the Dover High School
using the "Biology" book by Miller
and Levine being taught pursuant to
the state standards is taught the
theory of evolution, okay, what, as
0096
far as the student's overall
education, is wrong with a student
reading about an alternative view to
that, which may run contrary to what
the student is being taught in the
classroom?
A. One, it is not a contrary
scientific view, as you state.
Second, within science
education it is not a goal to teach
students misconceptions. In fact, if
anything, we do our best not to
engender needless misconceptions, and
this is a needless misconception.
Q. Based on your view?
A. No. Based on my reading of
the National Association of Science
Teachers, based on the National
Association of Biology Teachers,
based on the National Academy of
Sciences, based on the American
Association for the Advancement of
Science, based on biology textbooks I
have read, biology textbooks I'm

0097
1 familiar with at the college level,
2 at the high school level, scientists
3 I have spoken to personally, and
4 probably more, but I can't recall at
5 the moment.
6 Q. So, in other words,
7 students should not read about any
8 alternative views whether you agree
9 with those views or not?
10 A. I did not say that.
11 Q. Is it fine for a student to
12 read alternative views as far as a
13 student's education to, if anything,
14 solidify what the student learned,
15 because now the student can contrast
16 it to something that's different?
17 MR. WALCZAK: I'm going to
18 object.
19 THE WITNESS: You are going
20 to have to break that question down
21 for me.
22 MR. WALCZAK: Are you --
23 MR. WHITE: Let me ask him
24 a question.
0098
1 BY MR. WHITE:
2 Q. What I'm asking for is, as
3 far as a student's education, overall
4 education, if a student is taught
5 something in the classroom, okay, and
6 then the student goes into the
7 library and takes a book off of a
8 shelf that may have a contrary view
9 of what the student just learned,
10 doesn't that comparing and
11 contrasting aid a student's
12 education?
13 MR. WALCZAK: I'm going to
14 object.
15 BY MR. WHITE:
16 Q. Answer the question.
17 A. The child would be
18 comparing and contrasting a science
19 view to a nonscience view. This book
20 does not bring that difference up to
21 the child; therefore, I would put it
22 at the bottom of books that I would
23 recommend for a child to read.
24 Q. But a child could still

0099
read this book. Correct?
MR. WALCZAK: You know what, because you keep jumping back and forth here trying to get him to say whether it's okay --
MR. WHITE: Object properly, Vic.
MR. WALCZAK: Okay. No.
MR. WHITE: Just object. If you don't like the question --
MR. WALCZAK: Okay. I'm objecting, but your question is unclear as to whether you are talking about a student going on their own to the library and taking out a book --
MR. WHITE: Well, I will then clarify. Just object if it's not clear.
MR. WALCZAK: -- or whether a teacher should refer this book.
MR. WHITE: It's not --
MR. WALCZAK: Because your questions aren't getting any clearer, so if I don't explain it, you are not
0100
going to know how to clarify the question.
MR. WHITE: Well, give me a chance, then. Okay?
MR. WALCZAK: Please.
BY MR. WHITE:
Q. What I'm asking is, if a student on his own --
MR. WHITE: Is that fair, Vic?
MR. WALCZAK: Thank you. I appreciate the clarification.
BY MR. WHITE:
Q. -- on his own goes into the library after having learned about evolution in the classroom and reads, for example, "Of Pandas And People"?
A. I think the child should be -- have the right to read any book in the public school library, and if the child wishes to read about demons causing disease in the public school library, and there is a book on demons causing disease in the public

0101
1 school library and they heard about
2 germ theory in their biology class
3 and they want to compare demon
4 possession to germ theory, then of
5 course the child should have the
6 right to read any book in that public
7 library or school library.
8 Q. And that contributes to the
9 overall education of the child.
10 Correct?
11 A. It might engender
12 misconceptions about science and
13 actually be very detrimental to the
14 child's education.
15 Q. But that's a speculation on
16 your part?
17 A. 15-year-old children are
18 very susceptible to believing what's
19 in print.
20 Q. How do you know that?
21 A. Many studies have shown
22 that.
23 Q. Name a few.
24 A. I don't recall at the
0102
1 moment.
2 Q. Well, is that your opinion,
3 then?
4 A. No.
5 Q. So you don't have any
6 expertise in the area of what a
7 15-year-old understands or how a
8 15-year-old can reach misconceptions?
9 A. 15-year-olds can reach
10 misconceptions through many, many
11 different ways, part of them through
12 teaching misconceptions.
13 Q. But as far as what a
14 15-year-old -- how a 15-year-old
15 interprets something, do you have any
16 expertise on that?
17 A. I have no expertise on how
18 students interpret most areas of
19 nonscience.
20 Q. What about areas of
21 science?
22 A. To a little extent, yes.
23 Q. So do you hold yourself out
24 as an expert in that area?

0103
A. To the extent at which how difficult it is to extinguish misconceptions with proper conceptions of science, yes.
Q. Okay. But without that qualification that you just made?
A. And what is the question again; I'm sorry?
MR. WHITE: Could you please repeat the question.
(The court reporter read back the following:
"Q. So do you hold yourself out as an expert in that area?")
BY MR. WHITE:
Q. In the area of students reaching misconceptions in science.
MR. WALCZAK: Your original question was do you hold yourself out as an expert in misperceptions, I think.
BY MR. WHITE:
Q. Do you hold yourself out as
0104
an expert in misperceptions in science as it goes to a 15-year-old?
A. Not in all areas of science, no. I don't know anyone who could be.
Q. But have you done any studies in that area?
A. I have studied students' misconceptions concerning evolution, yes.
Q. Have you done any studies as far as how students reach misconceptions?
A. No.
MR. WHITE: Why don't we take a break. We have been going about 50 minutes. Another five, ten minutes.
(Recess taken.)
BY MR. WHITE:
Q. Professor, what other sections of that "Of Pandas And People" book did you review?
A. I reviewed a section

0105
1 starting on Page 153 titled A Note To
2 Teachers.
3 Q. Okay. And what is your
4 opinion about the note to teachers?
5 A. It's misleading to teachers
6 and students who may read this
7 section.
8 Q. How is it misleading?
9 A. It states on Page 153 that:
10 "Teachers can show their students the
11 rough and tumble of genuine
12 scientific debate." The sentence is
13 in context concerning intelligent
14 design versus evolution. There is no
15 genuine scientific debate in the
16 scientific community concerning
17 intelligent design, so I find this
18 misleading.
19 Q. Do scientists debate
20 intelligent design?
21 A. Do you want to go through
22 each section separately as I bring
23 something up? I don't mind either
24 way.
0106
1 Q. You just made this point,
2 so I want to before we forget. Do
3 scientists debate intelligent --
4 A. The leadership and the
5 representative organizations of
6 science have reported that it is not
7 science, that there is no body of
8 research in the relevant scientific
9 literature on intelligent design,
10 ergo they don't.
11 Q. So no scientists debate?
12 A. Oh, there might be
13 individual scientists. There are
14 individual scientists who debate that
15 humans and dinosaurs coexisted, that
16 the age of the earth is 6 or 10
17 thousand years old.
18 I have heard of some
19 scientists debating all sorts of
20 things that we consider
21 misconceptions within science; but if
22 a student were to answer that the
23 earth was 10,000 years old on a
24 standardized scientific exam, it

0107
would be considered wrong.
Q. So when you are saying there is no debate, you are talking about within the scientific organizations?
A. I have knowledge that there are individual scientists who support and try to push intelligent design as being science. I am not a scientist, but when I look to the leading scientific organizations in this country, they report that that intelligent design that these scientists are pushing is not accepted by the scientific community, that in fact it's rejected.
Q. So if individual scientists are debating intelligent design, is that, in your view, a meaningless debate, if the leading organizations, as you point out, don't debate it?
A. I'm not a scientist. I can't adjudicate whether it's meaningless or not; but for
0108
15-year-olds in high school, we teach mainline accepted science in the scientific community, not ideas that have been rejected by the scientific community.
Q. As far as you know, in the Dover School District, the school district is teaching evolution pursuant to the Pennsylvania academic standards. Correct?
A. This is a question specifically about evolution?
Q. Uh-huh.
A. I did not compare the Dover curriculum to the state curriculum, so -- or state standards, so I'm not sure.
Q. So you don't know?
A. I don't know.
Q. But as far as you know from Exhibit 4, this statement that's read to the students -- did I say 4 or 2; I'm sorry?
A. You said 4.

0109
Q. I'm sorry; 2. The statement that is read to the students is that Pennsylvania academic standards require that students learn about Darwin's theory of evolution and take an exam on it. That's at the bottom of the first page. The first paragraph of the statement read to students.
A. This is what it says here, yes.
Q. So that's as far as you know? You don't know anything opposite of that, do you?
A. Correct.
Q. Now, if you turn the page to the last paragraph of the statement read to students is that: "As a standards-driven district, class instruction focuses upon preparing students to achieve proficiency on standards-based assessments." Correct?
A. That's what it says here.
0110
Q. Do you have any information that would contradict that statement?
A. I do not.
Q. Are there any weaknesses in Darwin's theory, that you are aware of?
A. Are we still on this page?
Q. We'll come back to that. We'll come back to that. I just had a question about --
A. Could you restate the question, please?
Q. Are there any weaknesses in Darwin's theory that you are aware of?
A. There's no evidence refuting any part of evolution. There are no evidence refuting the occurrence of evolution. There is no counterevidence to the occurrence of evolution. However, there is discussion in the scientific community concerning the role of various mechanisms within evolution.

0111
1 I would not necessarily
2 refer to that as a weakness, but it's
3 a point at which consensus is not
4 arrived as far as the mechanisms of
5 evolution.
6 Q. So, in other words, there
7 is not evidence to support every
8 aspect of the theory, Darwin's
9 theory?
10 A. There are two parts to this
11 answer. The first part is the
12 occurrence of evolution. There is
13 overwhelming evidence to support the
14 occurrence of evolution as reported
15 by the scientific community.
16 The second part is
17 concerning the mechanisms, the how of
18 evolution. This is the part where
19 the members of the scientific
20 community still have not received --
21 come to a major consensus.
22 Q. The how of Darwin's theory,
23 isn't that also part of his theory?
24 A. Yes.
0112
1 Q. So you said that there's
2 not evidence to support all of the
3 mechanisms or the how of evolution.
4 Correct?
5 A. This is what the scientific
6 community reports, yes.
7 Q. And the mechanisms of the
8 how is part of Darwin's theory.
9 Correct?
10 A. There is the occurrence and
11 there is the how. If you wish to
12 include those, as many people do,
13 into one type of concept, then, yes,
14 there's people who do.
15 And other people state that
16 there's the evolution that's
17 considered a fact because it's been
18 accepted by the scientific community
19 with no counterevidence, and then
20 there's the theoretical portion which
21 concerns the how. So, again, I'm not
22 a scientist, but this is what the
23 scientific community reports.
24 Q. So you have no position on

0113
that?
MR. WALCZAK: I'm sorry; position on what?
MR. WHITE: Position on -- he was saying that there is different ways of looking at the theory.
THE WITNESS: I think both positions are almost synonymous. They state that evolution occurred and that there has to be explanations concerning that, and there are very good explanations. The particulars of how all the mechanisms come into play is still being discussed.
BY MR. WHITE:
Q. But when you combine the two, the occurrence of evolution and the how of evolution, that is part and parcel of Darwin's theory. Correct?
A. One can say that evolution -- the occurrence of evolution was brought about before Darwin's time.
0114
Q. So then is Darwin's theory just the mechanism of evolution?
A. Darwin did many things, and one of the things he did was establish evidence for the occurrence of evolution, and, most importantly, one of the hows, natural selection.
Q. So are there aspects of the theory, Darwin's theory, for which there is no evidence to support it?
A. Every theory, every scientific theory, cannot explain all parts of what it's attempting to explain.
Q. So that would include Darwin's theory?
A. I'm still trying to answer the question.
Q. I'm sorry.
A. There is no counterevidence to the occurrence of evolution. More evidence can always be supplied to any theory, scientific theory.
Q. So then there are aspects

0115
of Darwin's theory that lack evidence?
A. Again, the occurrence of evolution has been supported by overwhelming evidence and there is no counterevidence that evolution has occurred. As far as the how of evolution, there are discussions concerning how the mechanisms work to run evolution.
Q. I will ask the question again, because you are not answering it.
A. I'm sorry. I'm trying.
Q. What I'm asking you is that in your opinion, are there aspects of Darwin's theory that lack evidence?
MR. WALCZAK: Darwin had a bunch of theories. What theory are you asking about?
BY MR. WHITE:
Q. Well, let me ask you. Explain --
MR. WALCZAK: Well, now --
0116
THE WITNESS: There's -- there's --
MR. WHITE: I'm asking the professor. He is the one that you guys are proffering as an expert in science education, so I'm trying to figure out --
MR. WALCZAK: But your questions have to be clear.
MR. WHITE: Well.
THE WITNESS: Darwin put forth evidence that evolution occurred. To my knowledge, there is no counterevidence to that. There's overwhelming evidence for it. Any theory can use more evidence. That's a hallmark of science.
That's a hallmark of science that we accept new evidence, supporting, countersupporting, whatever it may be, to something and take it into consideration. So in that context we will accept any evidence, counterevidence, to the

0117
occurrence of evolution that comes in. But reported from the scientific community, there is none.

Now, to the other area of Darwin's theory, as you call it, the how of Darwin's theory, this is where because there's discussion, because there's different interpretations of evidence, that I imagine that some evidence concerning certain theoretical aspects still might be wanting.

BY MR. WHITE:

Q. When you say "I imagine," why did you phrase it that way?

A. I'm not a scientist. I'm not a research biologist in evolutionary biology.

Q. Well, what is your background with regard to evolution?

A. I've taken courses in evolution. I've read books in evolution. I've studied, to a certain extent, how students learn

0118
evolution.

Q. And what courses have you taken in regard to evolution?

A. Evolution course, population genetics, sat in on a course at Harvard, I can't recall the title of it, but it had to do with evolution.

Q. And these are what level courses?

A. Undergraduate.

MR. WALCZAK: Can we take a two-minute break?

MR. WHITE: Sure.

(Recess taken.)

(The court reporter read back the following:

"Q. And what courses have you taken in regard to evolution?

"A. Evolution course, population genetics, sat in on a course at Harvard, I can't recall the title of it, but it had to do with evolution.

0119
"Q. And these are what level courses?
"A. Undergraduate.")
BY MR. WHITE:
Q. Now, you said to a certain extent, you studied how students learn about evolution?
A. Yes.
Q. Describe this extent that you studied.
A. I've done quantitative and qualitative studies concerning how students come to understand various aspects in evolution.
Q. Where have you done these studies?
A. Primarily at McGill.
Q. How recently have you done these studies?
A. We have studies going on currently.
Q. Tell me about this quantitative knowledge you have acquired in this subject.
0120
A. It's varied and long, and I'd have to review a lot of documents to come back to you with valid answers. I can give you some generalities.
Q. Sure.
A. That we find that students with a religious background in various areas, particularly evangelical Christians, tend to have more opposition to learning evolution than those who are not evangelical Christians or particularly have a high religiosity index, for example.
Q. What about the qualitative aspect of your research?
A. Well, we've interviewed, and my people, doctoral students and post doctoral students, have interviewed many, many, many teachers and students concerning evolution, how they feel about it, how they learn about it, how they balance their religious beliefs with the

0121
teaching of evolution in the science classrooms.
I've interviewed over 1,000 students concerning their feelings about evolution, their ideas, problems they have with evolution.
Q. And how does this research help the study of evolution?
A. I don't understand the question; I'm sorry.
Q. Well, you are doing this research for a purpose. Correct?
A. Yes.
Q. And what's the purpose?
A. To better teach evolution and to have students not be so fearful of its teaching, confused due to its teaching, and a feeling that somehow it comes in conflict with their religious beliefs.
Q. Have you published this research?
A. Some.
Q. What?
0122
A. I'm sorry?
Q. What have you published with regard to this research?
A. It would be in my vitae.
Q. We will go over that.
How does your research, then, help science teachers in high schools to teach biology?
A. I think teachers if they understand the various creationists' point of view and understand some of the misconceptions students bring in about science in general and evolution in particular is helpful. I think teachers understanding their students' fears, understanding their students' concerns is helpful for teachers.
Q. How will teachers learn about your research?
A. I think probably the -- one source I would recommend for teachers is "Defending Evolution," the book.
Q. The book you had referred

0123
to earlier today?
A. Yes.
Q. Go ahead.
A. I just wanted to add that it's not just Christianity, just not evangelical Christianity that we studied; we are also studying Islam and Muslims' concerns concerning evolution.
Q. As a researcher in this area, why would you care if a Muslim or an evangelical Christian comes into a public school biology classroom with certain concepts in his mind with regard to evolution?
A. I think generally what happens is they conflate scientific ways of knowing from nonscientific ways of knowing, and many times this creates problems with the students, with the students' parents, sometimes with students' administration.
Q. For example, what would be some of these problems that are
0124
caused?
A. That evolution posits that God doesn't exist.
Q. Does evolution posit that?
A. No.
Q. What, if anything, does evolution have to say about the existence of God?
A. Nothing.
Q. You can go back to the "Of Pandas And People" book. The last you had talked about was I believe on Page 153, the note to the teachers. Is there anything else you have to say about that note?
A. Not that particular note, no.
Q. Are there any other sections you reviewed?
A. I'm still reviewing the A Note To Teachers section, but on another page.
On Page 154, the final sentence before the new section, the

0125
1 sentence states: "As students learn
2 to weigh and sort competing views and
3 become active participants in the
4 clash of ideas, you may be surprised
5 at the level of motivation and
6 achievement displayed by your
7 students."
8 My concern here is that in
9 a pedagogical sense I would say that
10 most of the motivation could be
11 caused by the students feeling that
12 their religious point of view is
13 being attacked, that intelligent
14 design is being set up as the
15 God-friendly point of view, or as
16 evolution, because it does not
17 mention God, as we had just
18 mentioned, is somehow Godless.
19 And here it states that by
20 comparing the two, that the teacher
21 may be surprised at the level of
22 motivation, implying motivation will
23 go up. I agree it might go up, but I
24 think for the wrong reasons.
0126
1 Q. And, again, this is just
2 your speculations and your opinions
3 based upon the text of that book?
4 A. It's my opinion based on
5 interviewing over a thousand students
6 concerning various types of
7 creationism and evolution, reading
8 creationists' materials, reading
9 other people's studies.
10 Q. Anything else in that book
11 that you reviewed, "Of Pandas And
12 People"?
13 A. As I stated previously, I
14 read the Conclusion section, also.
15 The last sentence states that:
16 "However, without exaggeration, there
17 is impressive and consistent evidence
18 from each area we have studied for
19 the view that living things are the
20 product of intelligent design."
21 I think this is misleading
22 to students because this so-called
23 impressive and consistent evidence
24 has been rejected by the scientific

0127
community. It directly says that there is impressive and consistent evidence for intelligent design.

I don't disagree that the authors of this textbook may think that's the case, and there may be some scientists who think that's the case, but the leading organizations have said there is no scientific evidence in support of intelligent design, and there is no body of literature supporting that view in the relevant scientific journals.

Q. If I can direct you back to Exhibit 2, that's the press release there.

A. Yes.

Q. You have it.

The statement regarding the biology curriculum on Page 1. It's the --

A. What paragraph?

Q. It's the first indented paragraph.

0128
How do you read that statement? Read that statement and tell me what it means to you.

A. Okay. I read it. What do you mean what it means to me?

Q. Tell me what that statement means to you. What is it supposed to accomplish?

A. Well, I don't know the intent of the authors, but when I read it, I see that students are being told to look at some gaps, but yet they are not disclosed, and some problems, but yet are not disclosed, and Darwin's theory, not evolution in particular, and that evolution is being singled out concerning gaps and problems in its theory, as opposed to all theories and science, a general statement.

Therefore, to me, it says that somehow evolution or at least Darwin's theory is somehow inferior science.

0129
Q. Could you also read that statement where it says: "Students will be made aware of gaps, problems in Darwin's theory and of other theories of evolution." Did that also mean they will be made aware of gaps and problems in these other theories of evolution?
A. I don't know other theories of evolution.
Q. But can you read it where it says "be made aware of gaps, problems in Darwin's theory and of other theories of evolution including but not limited to intelligent design," that they will be made aware of any gaps and problems in, for example, intelligent design?
A. What's the question?
Q. Can you read this statement that way, as well?
MR. WALCZAK: Didn't you just read it?
BY MR. WHITE:
0130
Q. I said read it. Sorry. Can you interpret it that way, construe it that way, where the gaps, problems doesn't just apply to Darwin's theory, but it applies to any of these other theories?
A. Yes. Then, when I read that, what it means to me is that it is conflating a scientific theory with a nonscientific idea, a nonscientific idea that has been rejected by all major scientific organizations in the United States.
Q. But that there might be gaps and problems with these other theories that the students would be made aware of as well?
A. I have very little knowledge of gaps and problems in nonscientific ideas that pretend to be scientific theories.
Q. You are working under the assumption that these other theories are not scientific. Correct?

0131
A. The leading scientific organizations and science education organizations in the United States have stated that intelligent design is not science.
Q. So that's what you are basing your assumptions on and your opinions?
A. I'm basing my opinions on all the reputable scientific organizations that I'm aware of, the leading ones in the United States.
Q. So the answer would be yes, then?
A. Yes.
Q. Now, as far as you know, Dover School District is teaching high school biology pursuant to the Pennsylvania Standards for Science and Technology?
A. That's what I had read.
Q. And the Dover School District is not teaching intelligent design in its high school biology
0132
courses?
A. I think they are.
Q. You think they are teaching intelligent design?
A. Yes.
Q. Based upon what?
A. The statement that is read to the students.
Q. So reading this four-paragraph statement to the students is teaching intelligent design?
A. It's teaching about intelligent design.
Q. How is that?
A. Paragraph 3 states, quote --
Q. Paragraph 3 of what?
A. The statement that is read to the students.
Q. Okay. Exhibit No. 2, okay.
A. Sorry. The third paragraph: "Intelligent design is an explanation of the origin of life

0133
that differs from Darwin's view."
Q. Is --
A. Prior to the -- prior --
Q. Well, let me ask you that.
Is intelligent design --
A. I haven't finished my --
MR. WALCZAK: Yes, let him
finish the question.
THE WITNESS: -- my answer.
Prior to that, students
maybe haven't heard the word
"intelligent design," and now they
have learned that intelligent design
is an explanation of the origin of
life that differs from Darwin's view.
That is a form of teaching that
occurs in the classroom.
BY MR. WHITE:
Q. Is intelligent design an
explanation of the origin of life
that differs from Darwin's view, is
it an explanation?
A. I don't know Darwin's view
on the origin of life. I don't think
0134
he ever touched upon it except for a
private letter to someone.
Q. But is intelligent design
an explanation that may differ from
Darwin?
A. You are asking me to tell
you what I think intelligent design
is?
Q. No. I'm just asking you,
is it an explanation? It says here
it is an explanation on Exhibit 2.
A. It may be a theological or
philosophical position that
masquerades as science and therefore
has a different explanation that is
nonscientific than Darwin's view.
Q. So the reading of the one
sentence, then, "Intelligent design
is an explanation of the origin of
life that differs from Darwin's
view," that's teaching students
intelligent design, in your opinion?
A. When teachers put up a
picture of a microscope and they say

0135
"This is a microscope," that is teaching.
Q. So my question, then, is, reading a statement that just says "Intelligent design is an explanation of the origin of life that differs from Darwin's view," that's teaching intelligent design in a biology classroom?
A. It's teaching about intelligent design. Prior to that, many students in the class probably had no idea of what the words "intelligent design" meant or was, and now they may be aware that it's an explanation of the origin of life that differs from Darwin's view, according to this.
Q. So teaching could just be one statement in the classroom?
A. Teaching is facilitating learning. The students learned something about intelligent design when they heard this sentence read.
0136
Q. If the teacher says "It's raining outside today," is she teaching them about atmospheric changes?
A. He or she is making the students aware that precipitation is coming down outside, and that is facilitating some form of learning. I'm not saying it's good teaching, but it's teaching.
Q. So teaching could be any statement made by a teacher, then, in a classroom?
A. It comes back to the definition of what teaching is. There are many definitions of teaching. I like the one that teaching facilitates learning.
So if the teacher in the act of teaching, in the role of teaching or within the classroom is trying to facilitate the learning of a student and in this example trying to facilitate what intelligent design

0137
is, not only bringing up the name intelligent design, but then explaining what it is, is teaching.
Q. In that statement on Exhibit 2, how is intelligent design explained?
A. It states that intelligent design is an explanation, is. What is intelligent design? It is an explanation of the origin of life that differs from Darwin's view.
One, the students learn that it's about origin of life. Two, they learn that it differs from Darwin's view; whether right or wrong, that's another story.
Q. When you say "facilitate learning," what do you mean by "facilitate"?
A. Some statements could be made that would not facilitate a student learning. If there's not an increase in understanding, then some would contend teaching has not
0138
occurred. If this statement is not intended to increase students' understanding, then why is it being read to them?
It is being read to them to increase their understanding about intelligent design; therefore, it has increased the student's understanding on the subject in particular.
Q. In your expert report, Exhibit 1, do you discuss the concepts of teaching?
A. I don't believe so.
Q. In your expert report do you give any definitions of teaching?
A. No.
Q. In your expert report, Exhibit 1, do you give a definition of what is good pedagogy?
A. I state that engendering needless misconceptions is something that virtually all science educators trained in secular institutions would probably agree with and certainly the

0139
leadership in science education in the United States would agree with.
Q. That's needless misconceptions?
A. Correct.
Q. Can a teacher engender a misconception and still be teaching with good pedagogy?
A. Sometimes misconceptions are engendered to help the student understand something, and then at the next level -- we find at a more sophisticated level that the previous conception that was taught wasn't exactly accurate. So in that extent it was a misconception that was engendered for reasons of good pedagogy, to learn something more advanced.
Q. And that is up to the teacher to make that determination?
A. Again, you are back to legal aspects and contractual aspects with teachers, but I would say in
0140
general, not knowing the legalities and so forth, teachers have a lot of latitude concerning how they feel their students learn best in their community.
Q. I'm not talking legally. I'm talking about teaching, good teaching pedagogy. Making these determinations of how to best teach a student falls on the shoulder of the individual teacher. Correct?
A. Most of the time, yes.
Q. And does it also fall on the shoulder of the school district?
A. School district -- to my knowledge -- and I have very little knowledge of this -- school districts don't usually tell teachers particular aspects of how they should go about teaching. It is more the curriculum is, here is what needs to be taught.
Here is maybe the type of way we would like you to teach it, a

0141
lecture or a lab, maybe the number of days. Beyond that, the teacher has a lot of latitude to use their expertise.
Q. So the school district says to the teacher "Here is the curriculum," and then the teacher determines how best to teach the curriculum for the students?
A. To my knowledge, most of the time that is the way I understand it occurs, yes.
Q. Now, in the Dover School District are students required to review "Of Pandas And People"?
A. From my reading of this, no.
Q. When you say "this," you're talking about Exhibit 2?
A. The -- Exhibit 2, yes.
Q. And you had mentioned earlier that your understanding was that there was an opt-out provision for students when this statement on
0142
Exhibit 2 is read?
A. I read that in the letter to the superintendent from, I believe, some teachers.
Q. So you are aware that there is an opt-out provision?
A. From my recollection. I don't have the material in front of me, but I believe the letter suggested that the students had an opt-out proviso.
Q. And so Dover students are not required to learn about intelligent design?
A. If the students are allowed to leave the classroom during that time of teaching intelligent design in the classroom, then obviously they are not learning about intelligent design; however, there may be peer pressure from other students to remain in the classroom during that time even though individual students may wish to leave for whatever

0143
reasons.
Q. Do you know in general how opt-out provisions work in public schools?
A. No.
Q. Do you know how any opt-out provision would work in the Dover School District?
A. No.
Q. Do you have any research you have conducted regarding peer pressure on students as it relates to opt-out provisions in public schools?
A. No.
Q. As far as you know, are Dover students in any way rewarded or punished academically by reviewing "Of Pandas And People"?
A. No.
Q. If a student reads a newspaper, any newspaper, the New York Times, for example, and reads an article about intelligent design, okay, has the newspaper taught the
0144
student about intelligent design?
A. The student certainly may have learned from reading from the newspaper, but whether the act of teaching has occurred -- under most definitions of teaching that I'm familiar with, the act of teaching requires an actor, meaning the teacher, to help facilitate the student to learn, so in that case, no.
Q. So a student reading is not teaching -- reading a statement is not -- he is not being taught anything?
A. If somebody is reading that statement to him, yes.
It would be the same as if a teacher memorized the statement and came in and said it, there wouldn't be a difference, but the student reading it in and of themselves, the student may certainly still be learning, of course we hope so; but

0145
the act of teaching, under most definitions that I'm familiar with, I would not call that teaching.
Q. So I understand, then, so if a teacher reads a one-sentence statement to a student, that's teaching, but if a student on his own reads the same statement in a newspaper, that's not teaching?
A. Correct. It is also the context. One is reading a newspaper and one is hearing the words from their teacher in school.
Q. In the Dover School District a student on his own initiative can go into the library and look at "Of Pandas And People." Correct?
A. I don't know the policy at Dover, but I would imagine that any student can go in and look at any book in Dover's library.
Q. I want to show you your CV. I had received this separately from
0146
your report, so I don't know if it was originally attached to your report.
MR. WHITE: If you can mark that, please.
(Alters Exhibit 3 was marked for identification.)
BY MR. WHITE:
Q. The Curriculum Vitae, is that currently accurate, that you have as Exhibit 3?
A. I received another funding source in the last month or so.
Q. And what is that funding source?
A. The federal government in Canada.
Q. To do what?
A. Study evolution education among Islamic students.
Q. Does that relate to the studies you were talking about previously?
A. Yes.

0147
Q. Is there anything else that's changed?
A. I believe I've been put on another McGill committee membership, but I can't recall what it's about, but it certainly has nothing to do, in my mind, with evolution education.
Q. Have you ever taught -- I'm sorry; go ahead.
A. I think other than that, I don't see any updates that have occurred since this was sent.
Q. Have you ever taught biology in a public high school?
A. No.
Q. For your Ph.D. in education, what courses did you take to teach you how to teach high school teachers how to teach science?
A. I won't recall most of them, but courses like teaching methods, philosophy of education, philosophy of science and science education, a philosophy of science
0148
course, a couple statistics courses, qualitative research course. There are a few others, but I can't recall at this moment.
Q. What's the Evolution Education Research Center that's noted on Page 1 of Exhibit 3?
A. In 2001 McGill University opened a center, which a center is a term of art within the university, meaning a recognized status of a group of people deciding to do some work together, and it was professors from Harvard and professors from McGill with various expertise that's mentioned here on the CV.
Should I bring up things that are on the CV or is that --
Q. Sure. If you can just tell me who the four professors are from Harvard and McGill.
A. When we opened, it was the late Stephen J. Gould, Israel Scheffler, Howard Gardner, Philip

0149
Sadler.
Over to the McGill side?
Q. That was the Harvard side?
A. That was the Harvard side.
Q. The McGill side, the other side of the border.
A. Yes. I covered the deep South first.
You have myself, Joyce Benenson, Mario Bunge, spelled B-U-N-G-E, Graham Bell, Robert Caroll, Bruce Trigger. That's it.
Q. And what's the mission of the Evolution Education Research Center?
A. Well, as it states here, to advance the teaching and learning of biological evolution through research.
Q. When you say "through research," what do you mean by "research"?
A. Scholarly activities that we hope will inform the
0150
practitioners, teachers, of ideas that we have that may help them teach evolution better.
Q. Now, is part of your research to confirm theories about teaching?
A. I don't think we've done any studies to confirm any particular theories about teaching. We've used things such as constructivism, but I don't think we did it for the purpose of confirming or disconfirming constructivism, for example.
Q. Is part of your research to come up with any new methods of teaching besides constructivism?
A. No.
Q. So is constructivism as a theory, teaching science education, is that an untouchable theory?
A. I don't think it's untouchable. In fact, I have read some criticism in the past of it. However, I still -- from what I read,

0151
it is still fairly universally accepted as the basic theory upon which we derive our methods.
Q. Do you recall some of this criticism, who has criticized constructivism?
A. Not at the moment; I'm sorry. But if it comes to me in the remaining time of the deposition, I will bring up the names.
Q. Sure.
Is part of the Evolution Education Research Center to defend the teaching of evolution in the high school?
A. That's a very interesting question. I think by our very existence some of the things we talk about, some of the things we do performs that activity. It's not the mission of the center, but it certainly can be thought of as a side issue from what we do, yes.
Q. Does the center, does it
0152
release any -- does it have its own publication?
A. No.
Q. So how is what you have learned through your research, how is that communicated to people in the science-teaching community?
A. Through lectures of various places from myself and others. Sometimes writings of others will be critiqued by us maybe to make it more helpful, more understandable to particular students. Occasionally we review things for textbooks, for example, or other books. Occasionally things are sent to us to review for publication in other journals.
The people at the center were helpful to me in helping in some of the books concerning evolution, teaching evolution, teaching biology, teaching evolution in higher education.

0153
Occasionally teachers will call directly to the center and ask questions, point to references, sources that might be helpful for their particular question.
Q. Would there be a competing center to the center of Evolution Education Research Center? I mean, in the academic community do you all have competitors of these various think tanks?
A. So if I understand you correctly, that would be sort of a center for antievolution?
Q. No, no. I'm just saying if there was a need for a center, okay, is there anything that your particular center is responding to besides, you know, any of these fears you may have with regard to teaching evolution?
A. Okay, I understand now. I believe there's some small centers like ours around. I've heard of some
0154
starting up. I'm not sure if they have completely started up.
I was contacted six, eight, nine months ago concerning a center, I believe, that was going to be started out of some university in Michigan, and they wanted to make sure there wasn't too much overlap and so forth. I don't recall who it was. It was a short conversation of maybe 20 minutes.
To a certain extent, the National Center for Science Education certainly produces and does activities that help teachers understand how to teach evolution hopefully better. I wouldn't say we are in competition. I would say we are in mutual support to the education community.
Q. Now, are there any centers or groups that would be opposed to the advancement in the teaching and learning of evolution?

0155
A. Certainly.
Q. Such as?
A. Institute for Creation Research, Answers in Genesis Organization.
Q. Any others that you can think of?
A. There are others, but those are the two major ones. The smaller ones don't come to mind at the moment.
Q. From your Curriculum Vitae, do you have any training and experience in the preparation of high school science curriculum?
A. Not within my Vitae, no. I took a course somewhere along the line on curriculum studies, and I've been asked to review curriculum over the years, probably not in the last couple years, but --
Q. And what specific training and experience do you have, if any, with regard to the Pennsylvania
0156
standards of teaching science?
A. None.
Q. What does "peer review" mean?
A. That other people will -- in your area will read your work, decide whether some changes need to be made, constructive comments, sometimes negative comments, and then that is generally sent back to some form of editor to make a decision on whether to publish or publish with revision, et cetera.
Q. Now, is all peer review the same, the same level of scrutiny?
A. Not to my knowledge, no.
Q. So is there such a thing as like better peer review than other peer review?
A. I wouldn't know how to judge that. There are journals, I hear -- in the scientific community, I hear some journals are very difficult to get into as an author.

0157
The probability is such that it is something like 7 percent of all submissions submitted are actually going to print.
Now, I don't know if that makes the peer review better or not. I have no way of knowing that, but -- so I understand some might have a more rigorous peer review just on the acceptance rate, but I'm not sure if there is a connection between acceptance rate and quality of peer review.
Q. In your area of expertise of science education, what publications do you have listed here on your Curriculum Vitae have been subjected to peer review, if you can direct me to the page?
A. My -- sorry; Page 3.
Q. Page 3? And we're on -- and is this now -- is that Exhibit 3?
A. Okay. Under books, "Biology: Understanding Life."
0158
Q. Okay. That was subjected to peer review?
A. Yes.
Q. What was the process with that peer review?
A. I believe the publisher sent it out to close to maybe 200 reviewers.
Q. 200, did you say?
A. Yes.
Q. Because it's such a big book, 800 pages, so, what, people would just review different sections of it?
A. Sometimes I was privy to the reviews, other times I was not privy to the reviews.
Q. And what is this book about?
A. It is a textbook, college level biology.
Q. College level biology textbook?
A. Correct.

0159
Q. How does a college level biology textbook differ from, say, a high school level biology textbook, just in general?
A. If you were to open the pages randomly, you would find that the text would be denser, meaning that there is more material within the book. The concepts would probably be explained in general at a more sophisticated level. Most likely there would be more concepts covered in the textbook than the high school textbook.
The university level textbook would put more responsibility to the student on certain concepts to figure out more about it on their own rather than a high school book tends to do more of the explaining work than the college textbook does. The college text --
Q. Excuse me; it doesn't have as many pictures?
0160
A. College textbooks sometimes may have more pictures in the form of graphs and charts, possibly, than the high school does. The print may be smaller.
Q. Well, I understand.
What other peer-review publications?
A. Teaching --
Q. And -- excuse me -- so this "Biology: Understanding Life," this is a biology textbook or a textbook on how to teach biology?
A. A textbook on biology.
Q. Who is the other Alters?
A. Sandra Alters.
Q. Who is that?
A. My wife.
Q. Now, your Ph.D. is in education?
A. Correct.
Q. What is her background for this book?
A. She also has a Ph.D. in

0161
education.
Q. Two Ph.D.s in education writing a book on the study of biology?
A. Correct.
Q. So this is a biology textbook, not a book on how to teach?
A. Correct.
Q. All right. What other books do you have?
A. "Teaching Biology In Higher Education."
Q. That's also peer reviewed?
A. Yes. Publishers -- in my experience, publishers don't publish my books, except for one, I believe, without some form of peer review, although that one may be, also.
The third book, "Teaching Evolution In Higher Education: Methodological Religious and Nonreligious Issues." The same thing.
Here's the questionable
0162
one, "Project Collaboration: One Large Experiment." I'm not sure if the publisher sent this one out for review or not. I edited this; I did not author this, so I can't recall the exact process.
The next one, "Defending Evolution In The Classroom." That was sent out for review and was reviewed in various other places, also.
Q. Now, "Defending Evolution In The Classroom," is that geared towards which classroom?
A. High school and college.
Q. Now, are there any articles that you've written on the teaching of science education that are also peer reviewed? First, is that what you mean by "refereed articles"?
A. Yes.
Q. So we don't need to go through that.
But all the ones that are

0163
listed under there would have been subjected to peer review by whichever publishing company published it?
A. Correct. Correct.
Q. Do you have any books or publications that deal with what is good pedagogy in high school biology classes?
A. "Defending Evolution" touches on that. It is not the point of the entire book, but it does speak to that issue briefly.
Q. What do you mean "briefly"? What do you mean by that?
A. I don't have the book memorized, but there are aspects about teaching. I believe it's Chapter 10.
Q. Anything else?
A. In the books?
Q. Yes. The books or your refereed articles.
A. Specifically high school level was the question?
0164
Q. Uh-huh. Yes.
A. Well, many of them touch on the issue. I'm trying to locate ones that probably the majority would be about it from the article. What is creationism. It helps teachers understand various types of creationism for -- that they might encounter when students ask questions about it.
Possibly students' religious beliefs in conflict with science teaching. Possibly "Evolution/Creationism: Students' religious beliefs in conflict with science teaching." Well, definitely "Review of the creation controversy and the science classroom."
Q. And we're still in the section of the Refereed Articles?
A. Yes. Oh, did we move on?
Q. No, no, no. No, I was just making sure I'm following you.
A. Probably a small amount in

0165
concerns with teaching biological evolution and theology in the United States. "Reading stealth antievolutionary delivery systems: Possible effects on student science learning." "Should student belief of evolution be a goal?"

I can't recall about "Hearts and minds in the science classroom: The education of a confirmed evolutionist revisited." I can't recall what I wrote on that at the moment.

Probably "Batty Misconceptions," has some things about learning about bats. "Logarithmic paper and misconceptions: A hidden linear relationship." Maybe a little bit on "Counseling physics students: A research basis."

A position statement, that touches on teaching. It's titled "National Association of Biology

0166
Teachers Position on Teaching Evolution." "Modeling modes of evolution: Comparing phyletic gradualism and punctuated equilibrium." And "Punctuated Equilibrium: The missing link in evolution education."

Should I continue on to the --

Q. No. No. No. Thank you.

Have you written anything about intelligent design or the teaching of it?

A. I haven't written anything for the teaching of intelligent design.

Q. About the teaching?

A. About the teaching of intelligent design. I've probably touched on it in "Defending Evolution In The Classroom." In fact, I know I mentioned it in the book in a few places.

Q. Have you done any research?

0167
MR. WALCZAK: Wait. He's still looking.
THE WITNESS: I'm still looking.
MR. WHITE: I'm sorry.
THE WITNESS: I may have mentioned it in "Teaching Biology In Higher Education" and "Teaching Evolution In Higher Education." At this moment, that's all I remember.
BY MR. WHITE:
Q. Have you published any articles or any publication regarding learning abilities of high school students with regard to science?
A. No.
Q. The article you wrote -- excuse me -- yes, the article, on Page 3 of your CV, "Should student belief of evolution be a goal?," as a report from the National Center of Science Education. Tell me about that article.
A. The article's, to my

0168
memory, which is, I think, fairly good on the article, I was arguing that belief as it's used in just everyday language is the same as accept or have a high level of confidence in. Like, I believe we will have lunch in a half an hour from now. It is not a religious statement; it is just how we use the language, by and large.
So primarily the article was about students should have good reason to accept, to have a high level of confidence in, to believe, whichever word you want to use, that evolution is the most accepted, for good reasons, scientific explanation of the diversity of life.
Q. So then the question you pose there, "should student belief of evolution be a goal," the answer would be yes?
A. Yes.
Q. The next article on Page 4

0169
of Exhibit 3, "Hearts and minds in the science classroom: The education of a confirmed evolutionist revisited"?
A. Yes.
Q. Well, first off, who is the confirmed evolutionist?
A. That was a review of an article where I was writing about somebody else's work, and I don't recall it. If you have it with you, I would be happy to look at it or something. I don't recall enough to comment.
Q. Do you recall anything about the article?
A. It was probably written nine years ago. Not at the moment.
Q. Okay. If you could turn to Page 6 of your Exhibit 3 there. About two-thirds of the way down, you gave a presentation, and this is -- I will count -- one, two, three, four, five up from the bottom. Sorry; from
0170
the bottom.
A. Yes.
Q. "Evolution, Catholicism, and Protestantism," Riverside Catholic Centre, Opus Dei, Montreal.
A. Yes. Yes.
Q. What is Opus Dei?
A. From my recollection, I was invited to give a talk on evolution and Catholicism, what the Catholic position -- the Pope's position, the Vatican's position, is on evolution.
Q. Who is Opus Dei, O-P-U-S, D-E-I? Is that the group that invited you?
A. Yes.
Q. What is the Catholic position with regard to evolution?
A. Well, I'm not pretending to be a Catholic scholar here. I'm not sure it is the Catholic position universal, but the Pope wrote an encyclical that I read for this presentation, and had read before

0171
being invited to this presentation, on faith and reason.
And the gist of the article, if I may be so bold as to paraphrase the Pope, was that evolution has a lot of evidence and that the Catholic church is not taking a stand against it.
MR. WHITE: Want to break for lunch now?
MR. WALCZAK: It's your deposition.
MR. WHITE: Why don't we do that.
MR. WALCZAK: That's fine.
(Thereupon, at 12:11 p.m. a luncheon recess was taken until 1:10 p.m., at which time the following proceedings were had:)
BY MR. WHITE:
Q. From your understanding, are all evolutionary processes fully understood?
A. No.
0172
Q. When it comes to education, science education, what is critical thinking?
A. I've seen many different definitions of critical thinking, but from my perspective, it's being able to take a proposition, a concept, an idea, and being able to look at it from different points of view that would be appropriate within that particular domain that that concept lies.
Q. Does it include a process of logic?
A. Yes.
Q. Does it include inferences?
A. Yes.
Q. Analysis?
A. Yes.
Q. Observation?
A. Yes.
Q. Problem solving?
A. Yes.
Q. Does it often lead to

0173
recognition of new ideas?
A. Are we talking about new ideas being realized within the science classroom in a high school? I need the context.
Q. Okay. First off, generally, critical thinking, does it lead to recognition of new ideas?
A. Well, this would be outside of my area of expertise if we are just talking in general life, but I suppose so.
Q. Okay. What about in a science classroom?
A. I'm sure students come up with a lot of ideas, many of which may be misconceptions, yes.
Q. Sometimes they are not misconceptions, though. Correct?
A. I haven't heard of personally a student coming up with a new form of scientific insight that then a scientist takes and publishes significantly in scientific journals.
0174
Q. But can it happen?
A. In principle, I imagine the student would come up with the idea and then go to the relevant scientist, tell them about his or her idea.
Then I imagine they would go through their process, whatever it may be in their particular subdiscipline, and then I would imagine they would put it forward to the scientific community in the form of journals and conferences and so forth, and then I guess it would -- if it was appropriate for them, to gain general agreement.
Q. But besides going through all of those steps, can a student through critical thinking just come up with a recognition of a new concept or a new idea?
A. I suppose so.
Q. Does critical thinking also lead to recognition of new problems

0175
in the science classroom?
A. Possibly.
Q. Is a part of critical thinking to question fundamental theories?
A. I think critical thinking can be applied to all areas of science.
Q. Does that include questioning fundamental theories in science?
A. Yes.
Q. As a person with expertise in the area of science education, what is the purpose of science education in a high school?
A. I think you'd get different answers depending on who you ask, but, in general, my --
Q. I'm asking you.
A. In general, my opinion would be to increase knowledge and understanding of the process of science. I think that's sufficient.
0176
Q. And what is the process of science?
A. How various areas of science go about doing their work. I think most immediately of something we refer to as methodological naturalism.
Q. What is that?
A. It means that a scientist looks for natural causes of natural phenomena in his or her work.
Q. And that's the purpose of science education in a high school?
A. No. That's one of the processes of science, if you will, or one of the characteristics of science that would be appropriate to teach in high school.
Q. Are there any goals in the teaching of science in high school that differ from the purpose of teaching science in high school?
A. I'm sorry; I don't understand.

0177
Q. Well, you said the purpose of teaching science in high school --
MR. WALCZAK: You asked the purpose, so he was answering the purpose.
MR. WHITE: Right. No, no. He had just said that it was increased knowledge and understanding in science. Correct?
MR. WALCZAK: And I'm saying --
BY MR. WHITE:
Q. Now, what I'm asking you, is there anything that would be a goal in science education in high school that might be different from a purpose in science education?
A. Well, I think in all areas of education, high school education, including science, there are various goals to improve students' logic, critical thinking, ability to discuss, write about. I think there would be a long list.
0178
Q. Is one of the purposes, from the perspective of a teacher and the perspective of a school district that wants to educate students in high school, purpose in science education to make the science class more interesting for the students?
A. I would hope so.
Q. More compelling for students?
A. I would hope so.
Q. Is it a place in the science classroom to discuss current ideas as it relates to science?
A. I would hope so, as long as they're appropriate.
Q. You were going to continue? Okay.
Should education in the science classroom in a public high school encourage critical thinking?
A. Yes.
Q. Is the providing of information in a classroom, in a high

0179
1 school science classroom, is the
2 providing of information the same as
3 teaching?
4 A. It is a part of teaching.
5 Q. Explain that, please.
6 A. The microscope itself isn't
7 teaching, but handing it to the
8 students is a part of being able to
9 teach how to use a microscope and
10 what to see through the microscope.
11 Part of teaching is referring
12 students to the proper pages,
13 chapter, et cetera, that may help
14 them in learning when the teacher is
15 doing the action of teaching.
16 Q. So when you say handing
17 them a microscope, so a teacher hands
18 a microscope to a student, just hands
19 it to him, is that teaching?
20 A. It's a part of teaching.
21 It would be tough to continue the
22 teaching to say "Look at this slide"
23 without first having provided the
24 microscope and how to use the
0180
1 microscope to the student.
2 Q. So besides handing the
3 microscope to the student, the
4 teacher would have to explain how to
5 use the microscope for it to be
6 teaching?
7 A. It would be difficult for
8 the teacher to explain how to use the
9 microscope as well without handing
10 the microscope to the student first.
11 Q. But the teacher would have
12 to explain how to use the microscope
13 to the student. Correct?
14 A. Yes. Generally, the
15 teacher might say "Rotate this knob
16 down to the lowest part. Don't go
17 through the slide. Notice that the
18 lens could possibly go through the
19 slide; don't allow that. Now move it
20 back the other way until it becomes
21 in focus with the glass level," et
22 cetera.
23 Q. So to do that, the teacher
24 has to do more than just hand the

0181
1 microscope to the student. Correct?
2 A. What's "that"?
3 Q. To explain all these
4 functions of the microscope and how
5 to use it, it requires more action by
6 the teacher than just simply handing
7 the microscope to the student.
8 A. It's a part of teaching.
9 Without handing the microscope to the
10 students, they couldn't continue with
11 that next portion.
12 Q. But my point being is that
13 to fully teach the student, the
14 teacher has to explain how to use the
15 microscope?
16 MR. WALCZAK: You just
17 changed definitions. You started to
18 ask whether it's teach and now you
19 are saying "fully teach."
20 BY MR. WHITE:
21 Q. Answer the question.
22 A. Can you repeat it one more
23 time?
24 Q. To teach the student, the
0182
1 teacher has to hand the microscope to
2 the student and also explain how to
3 use the microscope. Correct?
4 A. If one hands a microscope
5 to a student, that, in part, is a
6 part of teaching. The student now
7 realizes how heavy the microscope is,
8 how it feels. It's a kinesthetic
9 type of teaching experience at that
10 moment.
11 Q. Well, my question was, to
12 teach the student so the student
13 understands how to use the
14 microscope, you would have to hand
15 the microscope to the student and
16 then explain to the student how to
17 use the microscope. Correct?
18 A. Yes. The simple act of
19 handing the microscope to the student
20 is not instruction on how to use the
21 microscope, correct.
22 Q. Well, how is teaching
23 different from instruction?
24 A. I don't generally separate

0183
the two.
Q. Do other people with your expertise in science education separate the two?
A. Many do.
Q. And why would they separate the two?
A. Some claim that instruction is simply saying what they should do next, such as put so many milliliters of this chemical into that beaker, whereas I think there are still things to be learned, even when one is being instructed in that setting, from it, but I still consider that to be teaching, but others disagree with me on that.
Q. So that's why you combined the two, teaching and instruction?
A. I think that action of so-called instruction is still facilitating learning. It is part of what's facilitating learning during that class session.
0184
Q. Now, would you say your view on teaching, is that the predominant view of teaching in the academic community of science educators?
A. Which view is that?
Q. Your view that it is just a simple facilitation of knowledge.
A. A facilitation of learning. I would think there is a far and wide amount of definitions for teaching.
Q. So, in other words, yours is or is not the predominant view?
A. I don't know whether it is or isn't, but my educated guess would be that facilitating learning would be part of virtually everyone's definition.
Q. And besides an educated guess, would that be your opinion?
A. To the best of my knowledge, yes.
Q. So if I understand, then, so for someone to teach, they just

0185
have to facilitate learning?
A. I don't know if it would apply to all areas. I haven't tried that. I'm not an expert in that area. But within the realm of a high school science classroom, when a teacher facilitates learning, that's generally considered teaching, in my book.
Q. So, in other words, in a science high school classroom, anything that a teacher does to facilitate learning is teaching?
A. Yes.
Q. In a science high school classroom, how are students taught to think critically?
A. I imagine there are thousands of ways.
Q. Well, which ones do you recommend as the best ways?
A. I'm not an expert on critical thinking; however, what I have read from people who do research
0186
in critical thinking is to compare equivalent ideas, scientific ideas, compare them with the evidence, compare misconceptions sometimes with the evidence.
Q. But if you are an expert in the area of science education, wouldn't you also need to have expertise in critical thinking, how to teach critical thinking?
A. To a certain extent I have some expertise in how to teach critical thinking.
Q. Isn't one of the hallmarks of a good scientist the ability to think critically?
A. I'm not an expert on what a hallmark of a leading scientist or a good scientist would be, but I do understand that is an attribute which scientists report as being good.
Q. Okay. Is it the good hallmark of a teacher in a science classroom in a high school to teach

0187
his or her students how to think critically?
A. Yes.
Q. Is the purpose of science education in a high school to train future scientists?
A. Not specifically, no.
Q. What is a fact in science, if you know?
A. According to the National Academy of Science, a fact is an observation, and something can also be factual in its overwhelming acceptance within the scientific community.
Q. Is that your definition of a fact in science?
A. I don't have my own definition.
Q. What is a hypothesis in science?
A. Hypothesis is generally considered some form of testable idea in science.
0188
Q. Can you give me an example in science of a hypothesis?
A. Dinosaurs and humans coexisted.
Q. And what would be a scientific fact, as an example?
A. Two spheres, same size, different weight, fall at the same rate on earth.
Q. Would a scientific fact be the same as what you were talking about earlier today, a scientific law?
A. No. There can be factual theories and there can be factual laws.
Q. An example of a scientific law would be gravity?
A. Okay.
Q. Is that correct? That's what you said earlier.
A. Gravity is a theory and a law. There is the law part of gravity that is the description of

0189
how gravity works, and then there is the theoretical part, which is how does that work.
Q. Now, in science, what is a theory?
A. A theory is an explanation of a natural phenomenon.
Q. Would a scientific theory be a scientific explanation of well-established observations?
A. Could you repeat that, please?
Q. Would a theory be a scientific explanation of well-established observations?
A. It could be, yes.
Q. Could a theory also be defined as a well-tested explanation that unifies a broad range of observations?
A. I hate to ask, but could you repeat it?
Q. Sure. A well-tested explanation that unifies a broad
0190
range of observations?
A. I don't see a problem with that.
Q. So that could be a definition of it, of theory?
A. I think it could be part of a definition. I wouldn't accept that to be the entire definition of theory.
Q. What more would be needed for the definition to satisfy you?
A. Natural phenomena.
Q. In science, can a theory be modified?
A. Sure.
Q. Can it be expanded?
A. Yes.
Q. Generalized?
A. I think so.
Q. Can it be discarded?
A. Yes.
Q. Disaffirmed?
A. I don't know with that language. I haven't heard it -- that

0191
1 language used concerning theories.
2 Maybe.
3 Q. Can it be incorporated into
4 a broader theory?
5 A. I believe so.
6 Q. In learning about theories,
7 should students in high school keep
8 an open mind, in science classes?
9 A. Students should always keep
10 an open mind in high school science
11 classes, and I'm not quite sure what
12 the term means, "open mind," but I
13 can guess.
14 Q. Well, what do you think the
15 word or term "open mind" means?
16 A. I wouldn't use the term
17 "open mind"; but if I had to take a
18 guess on what you mean by it, I would
19 think that if they heard something at
20 home or in other areas, came into the
21 classroom, and then they hear
22 something different, that they would
23 look at the evidence and keep an open
24 mind to what they previously thought
0192
1 was accurate compared to what they
2 are learning now, and examine what
3 they are learning now compared to
4 other experiences.
5 Q. But when a student is
6 studying a theory in science class,
7 should the student accept that
8 theory?
9 A. I think the action is on
10 the teacher to show the evidence for
11 the theory so that the student will
12 understand why that particular theory
13 is accepted in the scientific
14 community.
15 Q. Is it the responsibility of
16 a teacher in a public high school
17 science class to teach a student to
18 accept a theory in science?
19 A. I think if a student at the
20 end of a course thinks that when you
21 drop a sphere of metal it goes up
22 into the air and doesn't follow the
23 law of gravity, that there is more
24 work for the teacher to do.

0193

The teacher will probably modify their teaching such that the student will begin to understand how the law of gravity works for the objects and expunge the misconception.

Q. But in teaching theories in a public high school science classroom, should a teacher encourage a student or students to view a scientific theory critically?

A. I think all things in science should be looked at critically.

Q. Now, when a student is taught a theory in science, how far does the teacher or should a teacher go in helping that student understand the theory and to then later criticize the theory?

A. It's probably, in reality, a function of the amount of time the teacher has, the level of the students in that particular class at

0194

that particular time, whether the teacher wants all students in the class to understand at what particular level versus just maybe the quicker students in regard to this particular subject that happened to be learning quicker, while others may just, for whatever reasons, in this particular subject in this particular time be learning less quickly.

So it's a judgment call on the individual instructor.

Q. In teaching science, in learning about science in a public high school science room, should ideas be taught or scientific theories be taught in a manner in which a student learns all sides of the theory?

A. I don't understand what "all sides of the theory" means.

Q. Well, competing ideas with regard to a theory in science.

0195
A. It's my opinion that given the amount of time in a high school classroom, that certain scientific theories should be presented; for example, punctuated equilibrium versus phyletic gradualism -- with a P -- are two scientific theories that often compete with one another.

Both are generally presented to the students. Some teachers find that they don't have time to go into that detail for those particular competing theories. Other teachers find that they do have the time to go into those competing scientific theories.

Whether one would use a nonscientific theory to compete with a scientific theory in the classroom would be inappropriate.

Q. If a student or if a teacher, since earlier you said it's the teacher who decides about misconceptions or conceptions as a

0196
teaching tool, what would be wrong with a teacher comparing a, as you say, nonscientific theory with a scientific theory as a teaching tool?

A. It's a science classroom and it has the high probability of engendering the misconception that the nonscientific theory is science. We don't use as a foil demon possession when we teach germ theory.

Q. In science are new ideas generally -- new ideas that challenge the status quo generally met with acceptance?

A. I'm not in the scientific community, but from what I read, generally not. Generally new ideas have a rough road to go in the world of science.

Q. Because you had mentioned the germ theory of disease. When that theory was first raised by Robert Koch, K-O-C-H, how was that accepted by the mainline science

0197
community?
A. It was not accepted immediately with open arms, no.
Q. When the germ theory of disease came out, would you say that it ran contrary to the mainline science community?
A. I don't know that to be the case. I just don't know.
Q. In the teaching, as a person who has expertise in teaching science, would the introduction, going back, you know, many years when the germ theory disease came out, would the introduction of that theory in a science classroom be good or bad pedagogy?
MR. WALCZAK: At what time are we talking about?
MR. WHITE: Back when the idea first arose. He understood.
THE WITNESS: If the teachers had the capability back then in the 1800s to examine the
0198
scientific establishment and see that it was being debated in the scientific journals, and the leading scientific organization said, yes, this has some validity, it is still being argued, of course, in the scientific community, and if the teachers had the time and they felt it was pedagogically advantageous, then yes.
BY MR. WHITE:
Q. Going back in time, a school board required a teacher to read at the beginning of class that there is this theory called germ theory disease which is contrary to the established theory, if you want to go in the library, go look at a book, would that be good or bad pedagogy?
A. If the leading academies of science at the time and the large academies of science at the time, and the journals, scientific journals of

0199
the time, and the scientific conferences of the time felt that it was science and it was credible and it was important, then I don't see a negative for it to be done, as you said for it to be done, provided the teacher has enough time to fit it in with all the other mainline science that they are expected to teach.

Q. I'm just saying, reading the one sentence, that there is this alternative called a germ theory disease, and if you want, go look at Robert Koch's book in the library.

A. Provided all of my "if" concerning the national academies, the national science organizations, the journals, the conferences said it is science, it's appropriate, we are still arguing it, then I see no harm in doing what you suggest.

Q. So before a teacher can mention anything in a science classroom, it has to be approved by

0200
all these science conventions and associations?

A. Science teachers are not scientists. They don't have research labs, they don't have doctoral degrees in science, most of them, anyway, they don't publish in scientific research journals, they don't go to scientific conferences, they aren't funded by state and federal organizations to promote their scientific research.

So if they do find something in the newspaper or a popular magazine that mentions something about science, I think a responsible science teacher would check either their educational science associations or the scientific associations to see if it's credible before they introduce possible misconceptions into the classroom.

Q. So, in other words, a

0201
1 science teacher can't think for
2 themselves?
3 A. Oh, that's very much
4 thinking for themselves. They are
5 thinking that I'm not sure this
6 reporter in this popular magazine is
7 reporting this accurately, maybe I
8 will go to the original source, maybe
9 I will check with the scientific
10 community and see if this is proper.
11 It is very much thinking for
12 themselves.
13 In fact, they are thinking
14 critically about what they are
15 reading before they pass on this
16 information to their students.
17 Q. Is there any difference in
18 science between just a general theory
19 and a scientific theory?
20 A. I don't understand.
21 Q. I mean, is there a
22 difference between a scientific
23 theory and then a theory?
24 A. The general public, through
0202
1 no expertise in my background but
2 just hearing the word used through
3 many decades, theory in the media,
4 theory in movies, theory in
5 literature, theory on the streets is
6 just some idea, anything from I had a
7 theory of why my coffee tastes bad
8 this morning to theories used and
9 bounced around on X Files series and
10 so forth, whereas a scientific theory
11 is something generally that has been
12 extensively tested and is an
13 explanation of a natural phenomenon.
14 I think there is much
15 confusion among students between the
16 lay public's understanding of the
17 word "theory" that we just used when
18 we are speaking generally versus when
19 we use it in particular in science.
20 Q. As it relates to biology,
21 what is evolution?
22 A. Evolution is generally
23 considered descent with modification.
24 Q. Is evolution a theory in

0203
1 science?
2 A. Evolution is a theory and
3 fact.
4 Q. How is it a theory?
5 A. It's a theory because it
6 explains the diversity of life on the
7 planet.
8 Q. Any other way it's a
9 theory?
10 A. Well, it has theoretical
11 parts. There are the mechanisms that
12 we referred to earlier that
13 scientists are still arguing, and
14 those are explanations and -- but
15 they are various explanations
16 concerning various parts of
17 evolution. There are many theories
18 or subtheories concerning evolution
19 that I'm not familiar with but that I
20 know are present.
21 Q. Well, the theory as you
22 describe it as evolution explains the
23 diversity of life on the planet,
24 that's the main reason it's a theory?
0204
1 A. It's an explanation, and it
2 explains something that we see, yes.
3 Q. Now, as it relates to the
4 explanation of diversity of life on
5 the planet, is there evidence to
6 support all the explanations of that
7 theory?
8 A. Could you phrase that
9 another way? I don't understand it
10 that way.
11 Q. You say that fear of
12 evolution explains diversity of life
13 on the planet. Is there evidence to
14 support all of the explanations of
15 why there is diversity of life on the
16 planet?
17 A. I've never heard of any
18 counterevidence. In fact, I've read
19 that there is no counterevidence to
20 evolution, the occurrence of
21 evolution, and that occurrence of
22 evolution is the explanation for the
23 diversity of life on the planet.
24 Q. Now, the mechanisms, that's

0205
what we talked about before where they are not -- I believe you had said -- let me get it exactly -- you had said that not all of the evolutionary processes are fully understood. So the processes are the mechanisms that you are talking about?
A. Yes. That comment was particularly towards the mechanisms and not towards the occurrence of evolution.
Q. Now, what's the fact of evolution?
A. The fact of evolution is that it occurred and is occurring. It's observable in the field, it's observable in the laboratory, it's observable in the fossil record, and there are inferential ways in which it is observed.
So the factual nature of it has come about not simply as an observable fact in and of itself, it
0206
is that it has become so accepted in the scientific community that the theory is still considered a theory, an explanation, but is considered factual.
No one, to my knowledge and my reading of the leading societies, is any longer testing, seriously testing, whether evolution has occurred.
Q. But they are testing the mechanisms for evolution?
A. That's my understanding.
Q. Now, define Darwinism for me.
A. I've seen so many definitions, and I don't know if I could recall any at this moment. I've seen Darwinism used as meaning Darwin's ideas about evolution.
Q. Well, Darwin's theory, then, what is that?
A. Darwin's theory basically was that evolution occurred, that

0207
there has been a change in life over the 3 million plus years of life on the -- 3 billion -- excuse me -- years of life on the planet, that there's common ancestry, and that the forces that are observable to us today are enough to explain that change.
Q. Does Darwin's theory differ from neoDarwinism?
A. I don't recognize one definition of neoDarwinism. I've seen various definitions, none that I can recall accurately at the moment.
Generally -- and this is very vaguely -- I see it referred to often as neoDarwinism, that Darwin in his time knew very little about genetics, and so as modern biology and genetics came in, there was a synthesis of evidence pointing towards Darwin's ideas, and some people referred to that as neoDarwinism.
0208
Q. NeoDarwinism would just be a modification of Darwinism?
A. That's my understanding. I'm not an expert in this area, and I've seen various definitions on that.
Q. On this whole area of evolutionists, Darwinism, neoDarwinism, where would you fall in this? Do you have any view on this?
A. Within the scientific?
Q. Yes. I mean, are you an evolutionist? Are you a Darwinist?
A. I accept that evolution is the theory, the accepted scientific theory, of the diversity of life I see around us, yes.
Q. Then that and then in light of your expertise in science education, if a school, public school, is teaching evolution, then they would be properly instructing students in the area of biology? I mean, if evolution is fully taught in

0209
a public high school, that is something you would have no problem with. Correct?
A. Evolution being taught in a public high school?
Q. Uh-huh.
A. I think that's wonderful.
Q. Do you know what the evolutionary tree of life is?
A. Vaguely.
Q. Have you ever heard of the Cambrian Explosion?
A. Yes.
Q. What is that?
A. The -- this is not my area of expertise, so you are going to get a nonexpert answer, and I have not taught evolution at the university level, so here we go.
The Cambrian Explosion is a point in time in which vertebrates appear. We have hard-shell animals appearing. It's the first time we have notocord, a backbone, in
0210
organisms -- it's in the fossil record -- and this is the first appearance of them. That's generally what's known as the Cambrian Explosion.
Q. Would that mean that these vertebrates just abruptly appeared?
A. I'm not a paleontologist; I don't have expertise in this area. My understanding is that abruptly, in a geological sense, not necessarily that one minute in one day they abruptly appeared, but in a geological sense, there was an occurrence in which these organisms came into existence.
Q. What are the strengths in the theory of evolution that should be taught to students in a science classroom in high school?
A. Fossil record is always good. Geographic distribution that organisms -- various places around the planet that have selective

0211
pressures on them result in structures that are often similar to other places with similar selective pressures. There's so many things. This is often up to the teacher, but I will give you some more standard ones.

Common ancestry. Sometimes used as a foil is Lamarckianism versus Darwin's ideas. A structural similarity in embryology. If you look at a rat, a turtle, and a chicken, they have similar structures, they look almost identical in their embryonic state, but yet they grow up to be completely different-looking organisms.

There's embryonic homology in which organisms look somewhat the same in the embryonic state, but when the tissue develops, it develops into different type of forms in various animals; for example, you have a bunch of vertebrates, and the hand in

0212
one organism would look similar to the lobe-fin in another, and it would look somewhat similar if you go to a different type -- to an arm in another type of organism, maybe a bird or something like that, but they all came from the same tissue, but yet developed into somewhat similar but different functions and forms in the organisms.

I would teach students about, as I mentioned previously, punctuated equilibrium and phyletic gradualism. I think that helps them understand the tempo and mode of evolution. I would teach students many more things about evolution, but it is always a constraint of time.

High school biology teachers have generally thick books, and it doesn't necessarily mean that drives the curriculum -- hopefully it doesn't, but between what the curriculum says and the amount of

0213
material in a textbook, often what comes into play for teachers is how much time do they have.

Often teachers devote explicitly time to evolution, and other times they will just use it here and there throughout their course. Again, it comes back to the individual instructor.

Q. What weaknesses in the theory of evolution should a high school science class learn about?

A. I think one of the good weaknesses probably to teach would be, as should be taught in all scientific theories, not every scientific theory the scientists tell us has it weaknesses, in evolution it would be some of the hows, again, we were talking about, some of the mechanisms.

Most evolutionary biologists that I read have strong opinions concerning natural selection

0214
thinking it is a very strong mechanism within evolution, but then they debate how strong that is and what other mechanisms come into play, as we have discussed repeatedly throughout this time together.

So a weakness would be that we don't have confirmed ideas yet that are absolute within the scientific community. We don't have overwhelming consensus yet on the mechanisms for evolution and how they interplay together and so forth.

Q. So in teaching weaknesses of a theory in a science high school classroom, is that indicating that there are problems in the theory?

A. If it's taught properly, I don't think it would create that. It is stating, just like any other scientific theory, there are some unanswered questions concerning it, we don't quite understand all the mechanisms of evolution, and that's

0215
part of science, that's part of saying it doesn't explain everything.
Q. So, in other words, the theory, then, should not be accepted as a truth?
A. I don't like the word "truth" used anywhere in science except maybe on true or false exams.
Q. Okay. As an absolute?
A. I don't know if the word "absolute" is ever used in science, so I don't quite know how to answer that.
Q. Okay. Then used that it's a fact?
A. As I explained before, evolution is a theory and fact, but the students have to understand what it means to be factual in science. Stating something is a fact in science does not mean that it will be always that way.
Science is always open to new evidence. All of our theories,
0216
all of our facts, all of our observations are tentative. And that means that as new information comes in, in principle, we should accept that new information and, if necessary, modify our theories' laws.
Q. So, in other words, keeping an open mind about the theory?
A. That's your words, not mine, but if that's what you want to think of as an open mind, then that's fine with me.
Q. What is creationism?
A. Creationism. There's so many different types of creationisms it would be difficult to answer, but I will do my best. Briefly, it's a supernatural power that created.
Q. Is creationism, under that definition, then, a theory?
A. It's not a scientific theory.
Q. Why wouldn't it be a scientific theory?

0217
A. Science operates -- what -- one of the areas of science operates or ground rules of science, as it's often called, is methodological naturalism, and methodological naturalism is basically that we do research on -- by trying to find natural causes for natural phenomena.
Q. And what's creation science?
A. Creation science, in my view, is an oxymoron and was created, as far as my understanding of the history of it, by young earth creationists, a particular type of creationists, who tried to -- and apparently still are trying -- to say that creationism can be a form of science.
Q. Explain that more for me.
A. I think maybe a specific example might be good. The Institute for Creation Research in El Cajon, California.
0218
Q. Excuse me; what did you say?
A. In El Cajon, California, is probably, I believe, the largest research creationist institute on the planet. And they believe that they are using scientific methodology to show that evolution doesn't work, that evolution is wrong, and that people should recognize supernatural causes within science.
Q. Would creation science depend on a Biblical view when it comes to evolution?
A. In this -- this particular institute parses out two types of scientific creationism.
They say there is scientific creationism that is Biblical, that is truly a theological point of view, a religious point of view, and then they also say -- and this is the more important point, probably -- is that there is a

0219
scientific creationism that they believe it's -- it could be examined regardless of one's religious points of view and that it has scientific merit.
Q. And what's intelligent design as it is related to biology and science?
A. To me, intelligent design is a theological and philosophical idea attempting to masquerade as science in schools.
Q. How is it a theological idea?
A. Well, it has the word -- every time I've read about intelligent design somewhere from intelligent design authors or in "Of Pandas And People," the word "supernatural" is there somewhere; but when I open science textbooks and I open science journals and I go to science conferences, I don't hear supernatural as a possible cause in
0220
the scientific world.
Q. How is it a philosophical idea?
A. When I read intelligent design materials, I often recognize things that I consider to be sort of the basis of science, they are more the philosophical arguments of demarcation between science and nonscience, which scientists typically don't appear to argue, but philosophers of science apparently have discussed over the decades this matter.
Q. What intelligent design materials have you read?
A. I will never recall them all here at this moment, but --
Q. Just give me the main ones.
A. Okay. "Darwin's Black Box," Behe. "Darwin On Trial," Phillip Johnson. "Defeating Darwinism," Johnson. I read

0221
something by Meyer. I read something by Demski. Of course "Of Pandas And People." There are others, but at the moment I can't recall.
Q. Now, on some of these books you have listed here, "Of Pandas And People," am I correct you say that that's not a scientific book?
A. It is not scientific because -- well, there may be multiple reasons, but one of the fundamental reasons, since we are talking about it right now, is the ground rule of methodological naturalism, and when I open up "Of Pandas And People," I see a possible supernatural cause.
Q. Because of the air blower I didn't hear the last part of your sentence.
MR. WHITE: Can you please repeat that? I'm sorry.
(The court reporter read back the following:
0222
"A. It is not scientific because -- well, there may be multiple reasons, but one of the fundamental reasons, since we are talking about it right now, is the ground rule of methodological naturalism, and when I open up "Of Pandas And People," I see a possible supernatural cause.")
BY MR. WHITE:
Q. What about the book -- you mentioned "Darwin's Black Box." Is that a scientific book?
A. I don't consider it a scientific book.
Q. Why is that?
A. Again, in the book it brings up the possibility of supernatural causation.
Q. Now, can intelligent design be considered that biological organisms owe their origin to a preexisting intelligence, not a supernatural intelligence, just a

0223
preexisting intelligence?
A. From what I read is there is no explanation that exists in the natural world that it is appealing to something that we do not understand to be natural, something that is so far afield to the natural world that in essence it is supernatural.
Q. And that's just your interpretation of the reading?
A. That particular reading, and the National Academy of Sciences, and the AAAS, both contend that intelligent design is not science.
Q. Is intelligent design dependent on the Bible to reach its conclusions?
A. I don't believe so.
Q. Is it dependent on any sacred scripture?
A. I don't believe so.
Q. Does the theory of intelligent design depend on any religious faith?
0224
A. I don't think so.
Q. Does intelligent design say who the designer was?
A. From what I have read, no.
Q. Does intelligent design depend on any religious experience or tradition?
A. Only the tradition of accepting nonnaturalistic causes for natural phenomena.
Q. Does the theory of intelligent design lead one to believe that the designer is a God?
A. I have no idea about the general public; however, I would contend that if 15-year-old children in 9th grade were to juxtapose evolution that doesn't mention a supernatural possibility to intelligent design that explicitly mentions a supernatural possibility, that the students will associate intelligent design to meaning God or God-friendly, at least, or

0225
1 religion-friendly and evolution to be
2 not religious-friendly.
3 Q. In the book "Of Pandas And
4 People," does it make a reference
5 that the designer is a supernatural
6 being, from your review of the
7 sections that you said you had
8 reviewed prior to --
9 A. May I look at my sections
10 that I had looked at earlier?
11 Q. Sure.
12 A. On Page 100, the last
13 sentence in the first paragraph
14 states: "This alternative suggests
15 that a reasonable natural cause
16 explanation for origins may never be
17 found and that intelligent design
18 best fits the data."
19 Q. But that is not saying that
20 it's a supernatural being, is it?
21 A. It is stating that it is
22 nonnatural, and the only nonnatural
23 I'm aware of is the supernatural.
24 Q. Read that sentence one more
0226
1 time for me, please.
2 A. "This alternative suggests
3 that a reasonable natural cause
4 explanation for origins may never be
5 found and that intelligent design
6 best fits the data."
7 Q. Let me see that book,
8 please.
9 In a science classroom, is
10 a science classroom in a public
11 school a forum for inquiry?
12 A. Yes.
13 Q. Is a science classroom in a
14 public high school a forum for
15 critical discussions?
16 A. Appropriate critical
17 discussions, yes.
18 Q. And in a science classroom
19 should there be an opportunity for
20 open critical discussions to take
21 place?
22 A. I don't know what you mean
23 by "open."
24 Q. Well, where people can

0227
freely debate and discuss matters in a critical fashion.
A. I think it would be completely inappropriate in a high school -- public high school science classroom to debate whether evolution disproves the existence of God or not, for example.
Q. But other than that?
A. I think it would be completely inappropriate to bring up a causal activity to natural phenomena and explain that causation to be supernatural.
(Alters Exhibit 4 was marked for identification.)
BY MR. WHITE:
Q. I would like to show you -- I don't know if this is Exhibit 4.
THE COURT REPORTER: Yes.
BY MR. WHITE:
Q. This is just -- I can give you the actual photocopy of Miller, Levine.

0228
MR. WALCZAK: Do you know which edition this is?
MR. WHITE: Yes. Exhibit 4 is the 2004 edition of Miller and Levine, "Biology," with the dragonfly on the front.
MR. WALCZAK: It's known as the dragonfly edition. Yes. Thank you.
BY MR. WHITE:
Q. Now, you said you were familiar with this "Biology" textbook, but you had reviewed it -- a much earlier version of it about ten years ago, I believe you said?
A. I don't remember which edition, but it was late '80s, so probably five, six, seven, eight years ago, and --
MR. WALCZAK: Late '80s or '90s?
THE WITNESS: Late '90s. Did I say '80s?
MR. WALCZAK: You said

0229
'80s.
THE WITNESS: Sorry.
Late '90s. Six, seven, eight years ago, probably, and, no, I'm not that familiar from that long ago. I don't even recall which section I reviewed.
BY MR. WHITE:
Q. If you can turn to the third page of that photocopy, which is Page 386 of Chapter 15 of the textbook.
A. Yes.
Q. In the bottom text section or the section of the text Strengths and Weaknesses of Evolutionary Theory?
A. Yes.
Q. If you can read that out loud for the record, please.
A. "Scientific advances in many fields of biology, along with geology and physics, have confirmed and expanded most of Darwin's
0230
hypotheses. Today evolutionary theory offers vital insights to all biological and biomedical sciences from infectious disease research to ecology. In fact, evolution is often called the 'grand unifying theory of the life sciences.'"
Do you want me to continue?
Q. Please.
A. "Like any scientific theory, evolutionary theory continues to change as new data are gathered and new ways of thinking arise. As you will see shortly, researchers still debate such important questions as precisely how new species arise and why species become extinct. These are also -- there is also uncertainty about how life began."
Q. Now, the part of this textbook where it says "researchers still debate such important questions as precisely how new species arise and why species become extinct," is

0231
that the mechanism of the theory you were talking about before?
A. Yes.
Q. And then regarding the uncertainty about how life begins, is that also the mechanism of the theory?
A. Yes. We have great discussions still continuing on how life originated.
Q. Now, this current debate that's laid out in this paragraph we are looking at, how is that not a gap in the theory of evolution?
A. It's not a gap concerning whether evolution occurred; it's an area in which discussion is still going on, as it does in almost all areas of science, concerning the mechanism of evolution. I don't particularly like the word "gap."
It sounds like something is missing that naturally should be there. Science is appropriately
0232
discussing and refining the hows of evolution.
Q. When you are saying whether evolution occurred, I thought that was a fact, whether evolution occurred?
A. It's a fact and theory. It's an explanation of -- to explain the diversity of life we see on the planet, and it's a fact because it's universally accepted among the scientific community that they no longer even test whether it occurred or not. It's considered factual.
Q. How is the debate and uncertainty about how life began, how was that not a problem in the theory of evolution?
A. I don't understand what you mean by "a problem."
Q. Well, what do you interpret -- when someone says there's a problem with the theory of evolution, what does that mean to

0233
you?
A. I generally don't hear that. I hear that the science is alive and well and they are debating various areas and investigating and studying and doing what science does, trying to find an explanation of the origin of life. They have been trying this for a long time now.
Q. And when someone says there's a gap in the theory of evolution, does that mean anything to you?
A. I generally ask -- it doesn't happen often, but I generally ask what they mean by "gap."
Q. Well, what do you think the word "gap" means?
A. They generally bring up gaps in the fossil record, that there is a gap in knowledge concerning the occurrence of evolution, that scientists have such missing aspects of the occurrence of evolution that
0234
they are seriously questioning whether evolution occurred. That's generally the response I get from people.
Q. Now, the school district who uses this Miller and Levine "Biology" textbook in its science classes, are students being presented with a good source to learn biology and evolution?
A. I haven't reviewed this edition of the book, and even the last edition I haven't, but I have skimmed this page very quickly and it looks good to me.
MR. WHITE: Want to take a break?
(Recess taken.)
(Alters Exhibit 5 was marked for identification.)
BY MR. WHITE:
Q. I will show you Exhibit 5, Appendix B of the Academic Standards for Science and Technology from the

0235
Commonwealth of Pennsylvania, the January 5th, 2002 edition.
Prior to your involvement in this case, did you have any familiarity with the Academic Standards for Science and Technology in Pennsylvania?
A. No.
Q. How did you acquire your familiarity with those standards?
A. I believe I went online to take a look at them.
Q. What's the purpose of academic standards from a state?
A. Well, my understanding -- all states are not exactly the same, but that it is suggestions, that it is a standard that schools might want to consider for various parts. They can adhere to some parts and maybe not adhere as closely to other parts.
Q. Do you know what the rule is in Pennsylvania?
A. No.
0236
Q. Do you know what a school board's obligation is regarding standards in Pennsylvania?
A. No.
Q. Do you know in Pennsylvania how the school board would comply with the standards as set forth by the State of Pennsylvania?
A. No.
Q. What's the role of a teacher with regard to the application of teaching standards in Pennsylvania?
A. Their legal role, their contractual role?
Q. Just their role as a teacher.
A. I would hope that they were admonished in their university classes to take a look at their state standards.
Q. Now if you could turn, please, to Page 10 of Exhibit 5. The page numbers are marked on the bottom

0237
1 right-hand corner.
2 A. Yes.
3 Q. The third column over from
4 the left which says 3.2.10, Grade 10.
5 A. Yes.
6 Q. It's your understanding
7 that in Pennsylvania by the grade 10,
8 students should be able to acquire
9 the knowledge and the skills needed
10 to fulfill the items that are set
11 forth in that column?
12 A. If that's what you are
13 telling me.
14 Q. Well, what does it say at
15 the top of the page there,
16 "Pennsylvania's public schools shall
17 teach" --
18 A. "Pennsylvania's public
19 schools shall teach, challenge and
20 support every student to realize his
21 or her maximum potential and to
22 acquire the knowledge and skills
23 needed to."
24 Q. And then A under 3.2.10
0238
1 says what --
2 A. Yep.
3 Q. -- "Apply knowledge" --
4 A. Yes.
5 Q. -- "and understanding about
6 the nature of scientific and
7 technological knowledge"?
8 A. Yes.
9 Q. "Compare and contrast
10 scientific theories and beliefs"?
11 A. Yes.
12 Q. Then "Integrate new
13 information into existing theories
14 and explain implied results"?
15 A. Yes.
16 Q. How is the four-paragraph
17 statement that is read to students --
18 Exhibit 2, I believe -- how is that
19 not integrating new information into
20 existing theories and explaining
21 implied results?
22 A. I think the assumption here
23 is integrating scientific
24 information. The information in the

0239
statement is concerning something that is not scientific.
Q. Now, if you look to the fourth column on Page 10 of Exhibit 5, it says, "By Grade 12 to evaluate the nature of scientific and technological knowledge," and then the second paragraph down says, "Critically evaluate the status of existing theories; for example, germ theory of disease, wave theory of light, classification of subatomic particles, theory of evolution, and epidemiology of aids."
Now, "critically evaluate the status of existing theories," theory of evolution." So you don't have any problem with the theory of evolution being critically evaluated in the classroom of a public high school, do you?
A. I have a problem with it being singled out as a theory to be evaluated. The sentence states "for
0240
example." It does not state this is the total list. So germ theory of diseases, wave theory of light, classification of subatomic particles, theory of evolution, epidemiology of aids is just some examples of the many things that students may be encouraged to critically evaluate.
Q. But a school could choose just to critically evaluate the germ theory of disease?
A. I imagine the school could choose just to do one thing in these entire standards. I'm not saying that would be good.
Q. But if there's a listing there "for example," that doesn't mean that the entire listing has to be critically evaluated, does it?
A. I don't know what the criteria for the State of Pennsylvania is, but, again, having a list and critically evaluating

0241
existing theories is fine, and evolution is one of these as examples, and we can probably list many, many more.
Q. If you can turn to Pages 13 and 14. Excuse me; it starts on Page 12. So this academic standards is for biological sciences. Correct?
A. Yes.
Q. Then on Page 13, the third column, Section D.
A. Yes.
Q. These are the areas in which students need to acquire knowledge and skills by the 10th grade. Correct?
A. Correct.
Q. And as far as you know, the students in Dover are being taught in these areas in their science classrooms by 9th grade?
A. I saw a lot of similarities between their curriculum and these standards, but I did not go word for
0242
word.
Q. Now, does the reading of the four-paragraph statement the one time at the start of the biology course prevent students from acquiring the knowledge and skills needed to accomplish what's set forth in Subparagraph D, as in dog?
A. Yes.
Q. How?
A. It states here in the four-paragraph statement that's read to the students that intelligent design is an explanation. That could very possibly lead students to think that supernatural causation is a possible factor in explaining the mechanisms of the theory of evolution.
The fourth bullet down says "Describe the factors." I would not be surprised at all if a student said intelligent design.
Q. Now, aren't there some

0243
scientists out there -- I believe it was Krick who said that you constantly have to remind yourself that these were not designed, the things that you are looking at in nature are not designed? Are you familiar with that?
A. I'm familiar with the statement. I don't believe it was attributed to Krick, but I'm familiar with the statement, yes.
Q. Well, how do you make the leap from the one four-paragraph statement to these conclusions that students are going to have a lesser view of the theory of evolution to cause these great misconceptions?
A. The students have an unusual occurrence happen during their class day. Somebody different walks into their classroom, apparently there is some opting out allowed because this is so special.
Somebody they probably

0244
don't recognize, the assistant superintendent, reads a special four-paragraph statement concerning intelligent design. This will probably get more attention from the students than if the teacher had read it, by far.
Not only that, it's something that is in addition to what the textbook probably says is the major unifying theory of all of biology.
It's very probable, in my opinion, that students will remember this. And it -- for many of them, it allows the interjection of supernatural causes into their classroom biology activities. It's a way that has informed them this is okay. This is part of science.
This is a major misconception. It is something that good science teachers will probably have to undo.

0245

Q. How does a student come to this conclusion about supernatural causes just by the reading of this statement in Exhibit 2?

A. "Intelligent design" -- it's the third paragraph of the Dover statement -- "Intelligent design is an explanation of the origin of life that differs from Darwin's view. The reference book 'Of Pandas And People' is available for students who might be interested in gaining an understanding of what intelligent design actually involves."

So now we have brought up intelligent design, we have told them that it differs from the view that they are learning in the classroom, we told them it concerns the -- an explanation about the origin of life, and then we have directly spelled out the book that they can go and get further information from.

"Of Pandas And People," as

0246

we discussed just previously, brings up nonnatural causes that intelligent design is about.

Q. But how just from reading -- being read that statement, to students, and not going to get the "Of Pandas And People," how do they come to the conclusion that there's supernatural consequences involved here?

A. Two ways. One, they may have heard of intelligent design. In the thousands of students I've interviewed, approximately 10 to 11 percent of them have heard about intelligent design by name. They generally learned about it in their churches or church-related activities. They associate it very closely to God and their religion.

Second, students talk to other students. A student can lean over and say "What's this intelligent design stuff?"

0247
Another student can say "It means God did it."
"Oh."
So there are two ways. I understand that you are saying -- or questioning whether this statement says directly "supernatural causes." No, it doesn't. But in a reasonable classroom it is not unreasonable to believe that many students will associate it with supernatural causes.
Q. But those many students you are talking about who have learned about intelligent design maybe through their churches or through the popular media, wouldn't they already know about intelligent design before they hear this statement read to them?
A. They may recognize that it's a point of view that's connected with their particular religion. There may be a whole continuum from
0248
people who barely recognize they have heard the term before all the way over to students who possibly know a lot about intelligent design, maybe had Bible classes in church about intelligent design, maybe have had intelligent design authors come and speak at their church possibly concerning intelligent design.
So I would assume that there would be a continuum of students from knowing very little about intelligent design all the way over to knowing a lot about intelligent design.
Q. But this concern you have that maybe students would lean over and start talking to each other about intelligent design, that can happen whether or not they hear this statement. Correct?
A. Absolutely true. However, this is being read by a guest to the biology classroom, somebody that is

0249
unusual, an event that, to my knowledge, doesn't occur in other biology class -- public school biology classrooms across the nation.
A subject comes up, a stranger walks in and reads four paragraphs about other idea or ideas besides what you are learning in this class, tells you about a book located somewhere, I assume, at the school, and then walks out of the classroom. This is a big event for the day for students compared to the -- just the teacher going on as usual.
Q. But it is the teachers who chose not to read this statement; that's why this guest is coming in, correct, from your understanding?
A. My understanding is that the science teachers decided not to read this unscientific statement in their science classrooms, yes.
Q. And then for a student to come to this supernatural causes
0250
conclusion, it would be from looking at "Of Pandas And People," that one sentence on Page 100 you referred to earlier?
A. There may be many other places in the text, but that is the one I referred to earlier.
Q. And for you to reach the conclusion that Page 100 of "Of Pandas And People" is stating that it's a supernatural cause, that was your extrapolation from the text here. Correct?
A. I don't know anything that's not natural; by default I think it's supernatural. I would think that's probably what most 15-year-old children would think. And I think an average child would probably ask, intelligent design, is that -- who is doing the intelligent designing?
Q. Wouldn't a student who is just learning the theory of evolution

0251
in a public school, the average 15-year-old, ask that same question when learning about evolution, where did we come from?
A. It's very possible. In fact, I have heard many times that exact thing reported, and generally good science teachers say that's a question that can't be answered by science, the -- whether evolution is directed by a supreme being or not or some unnatural forces is not a question that we can entertain in science because we have this ground rule of just looking for natural causes.
Q. Your opinion is that intelligent design is saying that you have to have a supernatural designer?
A. No, I didn't say that. I have seen in intelligent design writings where they often say a possibly supernatural or extraterrestrial agency. They don't
0252
explain exactly what the extraterrestrial could be.
I think most 15-year-olds might chalk it up to maybe UFOs coming down, some nonnatural explanation that we have, that have some super powers that we don't have. That's part of -- not our natural way we go about explaining things in science.
When we don't understand something or don't know anything, we don't say, oh, there's this UFO that probably came down and zapped it into its existence.
Now, the supernatural causes may be true and may certainly be real, but we just don't entertain them as ground rules within science, and since they don't in science, we also don't entertain them within the science classrooms.
Q. Is the Dover School District teaching religion in its

0253
high school biology classes?
A. I'm not an expert on religion, and I don't know if I could even define religion for you.
Q. So, in other words, you don't know?
A. I don't know.
Q. So by reading that four-paragraph statement you don't have an opinion whether Dover High School is teaching religion?
A. I can't formulate an opinion from this.
Q. By reading that four-paragraph statement on Exhibit 2 -- is that correct, 2?
A. Yes.
Q. -- is Dover High School presenting religious beliefs in its high school biology classes?
A. Again, not being an expert on defining what religion is, I can't tell, and from my personal opinion of these four paragraphs, I can't make a
0254
conclusive opinion.
Q. From reading those four paragraphs stating -- or -- excuse me -- by reading that four-paragraph statement to the students is Dover School District teaching creationism in its high school biology classes?
A. Indirectly, yes.
Q. How is that?
A. Again, we go back to the third paragraph, first sentence: "Intelligent design is an explanation of the origin of life that differs from Darwin's view."
Now, I'm not saying that sentence is accurate concerning Darwin's view or not or whether it should say evolution, but the point is is when I read this, I see that intelligent design is an explanation of something that differs from the scientific point of view.
And that something that's different, when the child follows on

0255
to the resource, finds out it is something that I would categorize as creationism.
Q. There's a lot of assumptions, though, you have to make to get to your conclusion. Correct?
A. It states in the sentence that something differs from Darwin's view, and this something has been discredited by the scientific community, by the science education community, and it is in this paragraph, "The science community and the science education community leading organizations have said that intelligent design is a form of creationism."
So it states that intelligent design, creationism, is an explanation of the origin of life that differs from the scientific view.
Q. So, in your opinion, then, a 15-year-old student hearing the
0256
one-sentence "Intelligent design is an explanation of the origin of life that differs from Darwin's view," which is the statement read to them, would hear intelligent design, creationism?
A. Some yes, some no. Some who are familiar with intelligent design or have heard the word, yes. Some who have never heard the words "intelligent design," possibly not. But it begs the question of who is the intelligent designer?
Q. And, in your view, intelligent design is just a masquerade of creationism?
A. I don't know if I would use the derogatory word "masquerading," but I believe it's a form of creationism. As I stated previously, I think intelligent design and creationism are somewhat synonymous and intelligent design is a form of creationism.

0257
Q. You had said that you thought intelligent design was masking itself as science. Correct?
A. Attempting to masquerade as science in the public schools.
Q. And your view of intelligent design is creationism?
MR. WALCZAK: You just asked him and he just answered.
MR. WHITE: Well, I want to hear the answer again.
THE WITNESS: I consider intelligent design to be a form of creationism.
BY MR. WHITE:
Q. So then in your view, then, the reading of this four-paragraph statement to students in the Dover High School is teaching creationism in that high school classroom?
A. It's a form of teaching creationism. It may not be the best way to teach something, but it is a form of teaching, yes.
0258
Q. But a form of teaching creationism?
A. Yes.
Q. Does the professional association for teachers and like groups, are they the ones who decide what's taught in a public high school science classroom?
A. No.
Q. It's the school board that decides what's taught, as far as the curriculum goes. Correct?
A. My understanding is in most states local school boards make the decision of what is taught in their schools.
Q. And the Dover School District is required, as far as you know, to follow the Pennsylvania standards that we were looking at previously?
A. I do not know that they are required to follow the state standards.

0259
Q. Do you know whether they are following the state standards?
A. When I did a quick examination of the state standards concerning evolution and the Dover curriculum concerning evolution, I can see some similarity between the two.
Q. Do you see anything that would differ between the two?
A. I did. I can't recall at the moment, but nothing extraordinarily devastating.
Q. So from your review, though, the Dover School District curriculum seems to be in compliance with the state academic standards as far as evolution goes. Correct?
A. Roughly, yes.
Q. Have you made any public statements about this lawsuit? Not to your wife. I'm talking about have you given any speeches or any presentations?
0260
A. No.
Q. What religion are you, if you have a religion?
A. Wow. I'm not an atheist.
Q. Are you anything?
A. Is that relevant to this case?
Q. Uh-huh.
MR. WALCZAK: It's fair.
THE WITNESS: I'm an agnostic.
BY MR. WHITE:
Q. What does that mean?
A. That when I die and there is a God, I will be very happy, I hope. If there isn't a God, I guess I won't know if there's not an afterlife. And -- so I hope there is, but I don't know at this point. But I'm open for evidence. I'm keeping an open mind, as you would say.
Q. Apparently you just said it, too.

0261
1 Were you raised to be an
2 agnostic?
3 A. No.
4 Q. How were you raised as far
5 as a church tradition?
6 A. Evangelical Christian.
7 Q. When did you become an
8 agnostic?
9 A. I don't think it was on a
10 particular day. I think --
11 Q. Was it when you were 2
12 years old, 21, 30? You don't look
13 like you are over 30, so...
14 A. That's a tough one. I have
15 to think about this for a few
16 minutes. I know I know the answer, I
17 just need some time.
18 Early 20s.
19 Q. What caused you to become
20 an agnostic, having been raised as an
21 Evangelical Christian?
22 A. Oh, probably hundreds of
23 factors.
24 Q. Just give me a couple.
0262
1 A. I think it was a slow
2 realization that many of the things I
3 believed in at one time I no longer
4 had as much faith in.
5 Q. That being a faith in God
6 as one of them?
7 A. Well, again, as I state, I
8 hope there's a God, I hope there's an
9 afterlife, but I don't have the high
10 level of confidence I once did when I
11 was younger.
12 Q. Was there any major thing
13 that caused you to no longer have
14 that high level of confidence?
15 A. No one thing, no.
16 Q. How does being an agnostic
17 affect your world view?
18 A. It does.
19 Q. How? How do you look at
20 things differently now?
21 A. I used to look at
22 everything through the lens of what I
23 believed to be God's word. I used to
24 judge virtually everything I saw and

0263
did through what I perceived to be evangelicals' world view. It was a standard by which I attempted to live a large part of my life by.
Q. How does being an agnostic affect the expertise you bring to this case?
A. That's a good question. In a way I think my agnosticism is more in keeping with science education in public schools where we would say to students our class doesn't entertain the possibility of supernatural causes or not; whereas, if I were still the type of Christian I used to be, I would probably feel some need to explain more that many Christians are scientists and many Christians have no problem accepting evolution and the Bible, both.
Being an agnostic now, I have less of a feeling or a need to do that. I want the students to be able to realize that, but I have less
0264
of an evangelical calling for that.
Q. Would you say that you have any rebellion from your evangelical upbringing?
A. No. If anything, I spend a lot of my time talking to fellow evolution advocates about the sincerity of the Christians and their classes, the sincerity of the people on the side of the creationists and that many of them aren't bad people, we just disagree with their ideas. I think a lot of times their convictions are maligned.
Q. But also you think the sincerity of those Christian views, though, could be considered in the science community as misconceptions that need to be corrected?
A. No. That in itself is a misconception.
If a child in a 9th grade biology classroom in Dover learns that dinosaurs and humans did not

0265
coexist, that nothing even remotely close to a human didn't come on the scene until about 65 million years after dinosaurs, that's the science, and the child says, "I understand the science and I accept that it's the best scientific explanation, I understand the logic, I understand the ground rules, and given those constraints, I would conclude the same thing."

But then the child says, maybe outside the classroom, "I still don't believe it. I believe for religious reasons that they did coexist." Then I -- and I would hope that every public school biology teacher would say "I respect that."

Q. Now, do you have any metaphysical concerns -- you are saying you are an agnostic -- that say God is the designer of life? Does that cause you any problem as far as if you believe that, that you

0266
just don't want to deal with it as a possibility since you have now been working this area of evolution for so long?

A. To the contrary. I hope that there is a God behind evolution and the world we see. I want my life to go on past this. I would like to see my mother and father again.

Q. Have you ever been an expert in any other cases?

A. No.

Q. How do your views as far as being an agnostic affect your opinions about how the theory of evolution should be taught in a science classroom in a public school?

A. I've spent a large part of my professional career promoting sensitivity to teachers with students who -- this may be the most strongly held religious point that they will encounter in their, at least, science career, whether it's just a class in

0267
high school or whether they continue on science, this may be the first moment where they hear about evolution.

Many of the students have heard in church that evolution is bad, it promotes all sorts of terrible things, it's a lie.

And now in the public school classroom the teachers, I believe, need to be sensitive towards students that find that it's not like just teaching phylogenetic organization or just teaching about frogs. All of a sudden when they bring up this subject, it hits a lot of nerves that the other subjects don't hit.

The physics realm hits very few. People don't get too exercised about learning trajectory. In chemistry people don't get too exercised about balancing equations. Here we are over Dover concerning

0268
evolution. It's a lightning bolt for many, for parents, for principals, for teachers, for -- most importantly, for the children that are in the classes.

So I think the subject needs to be dealt with with the most sensitivity out of any science in high school.

Q. Were you given any instructions on how to prepare your expert report?

A. Vic gave me some instructions on how to prepare, yes.

Q. Was that just the format of it?

A. Yes, we went through some drafts and he gave me some suggestions about the form.

Q. Were you told about any certain opinion that you should come up with?

A. No.

Q. If you can go to your

0269
expert report, which is Exhibit 1, at the bottom of the first page that carries over to the second page, you talk about the United States National Science Foundation Program Project.
A. Yes. Yep.
Q. And it says -- and you were supervising practice teaching? You say you are a contract evaluator for various significantly-funded national science education, supervised practice teaching. What is an evaluator?
A. Some national science education grants go to university science educators to run some sort of possible activities for science teachers. Often they run in the millions of dollars.
And the NSF requires or at least would like -- I'm not sure if it's an absolute requirement, but I believe it is -- that some recognized expert in the area come in to write
0270
up an evaluation of how the project went, or formative evaluations also along the way, evaluations of the project in general.
I've done -- I don't remember the exact number -- probably four, five, six large ones.
Q. The Society for the Study of Evolution, as a member of the education committee for that group, what do you do?
A. Many things. One of the things we do is every year we put on an education symposium -- generally it's all day long.
Not always, but generally -- in which we try to help the people at the conference -- maybe we will get a couple hundred into our session, they are typically university biology professors -- and they want to learn some aspects about teaching evolution better, and so we will arrange that, we will bring in

0271
experts from various areas and so forth.
Another thing we do in addition to that every year, some version of that every year, we bring in or arrange for high school teachers, wherever the conference happens to be located -- it is different each year -- and local teachers from the surrounding school districts will come in and learn about teaching evolution and learn some evolution from the scientists themselves in that area.
We do some other things, too, but I think that's primarily what I have been involved in.
Q. Now, the opinions stated on Page 2 in the section Opinion of your report here, can your opinion in this case be tested objectively?
And your opinion here as it's written is that it is -- I'm quoting -- "It is my professional
0272
opinion that the Dover Area School District's policy on biology instruction, as passed in October 2004 and implemented in January of 2005 is detrimental to student scientific literacy." So how can that opinion be tested objectively?
A. Who's doing the testing?
Q. How can anyone test your opinion?
A. I think if you were to ask science educators whether engendering misconceptions in students is good pedagogy, they would probably disagree. If you ask them about disregarding the findings of the scientific community, I think they would think that was bad.
If you ask them about teachers disregarding the recommendations of their national professional teachers associations, I would think they would think that was unwise. If you asked them about

0273
contradicting their teachers' professional preparation or professional development, I would think they would think that was unwise.

And I would think that by teaching students about misconceptions, a la intelligent design, would be improper preparation for post secondary education.

So given those sub-categories, I think objectively, as possible, the evaluators would determine that this is detrimental to student scientific literacy.

Q. So we are clear, then, in your report and what you have been talking about today, when you are talking about the Dover --

MR. WHITE: Excuse me; can we go off the record.

(Discussion off the record.)

BY MR. WHITE:

0274
Q. So if I understand correctly, then, when you are talking about the policy of the Dover School District in your report and during your deposition today, that is the reading of the four-paragraph statement to the class?

A. It's more than that. I refer to the policy as being what I read in the press release explaining the policy and what I read in the Dover curriculum and including the pointing of students to "Of Pandas And People" as a reference in a science class.

Q. So I'm clear, what, then, is the Dover policy, as far as you're concerned, that you are basing all of your opinions on in your report and in your deposition today?

A. The text that's in the curriculum.

Q. Now, if you can -- is that on Page 1 of Exhibit 2, that

0275
two-sentence indent that starts "students will be made aware of"?
A. Well, if I could see the Dover curriculum, then I would know for sure. I haven't memorized the Dover curriculum, so I'm not sure this couple sentences is the same that's in the curriculum. I mean, it says here it is, but I'm not sure that it is.
Q. Well, working under the assumption that this statement that the biology curriculum is updated to include the following preliminary statement and the statement being students would be made aware of gaps, problems in Darwin's theory, et cetera, and the origins of life would not be taught, is that the curriculum you are talking about?
A. Yes. I consider this, yes, to be part of the policy. I consider -- under the curriculum where the resource is "Of Pandas And
0276
People," I consider part of the policy the word "lecture" in the curriculum, I consider part of the policy the four-paragraph statement and what I read in the press release and what I've read in "Of Pandas And People."
Q. So all of those factors you just laid out, that's, in your view, the policy of the school district, as far as you forming an opinion in this case?
A. Yes. And the reason for that is because I don't think, to my knowledge, any of this existed before the policy came -- or the decision to do this came into effect.
Q. What is it about the press release that's a part of the policy that you find detrimental to the scientific literacy of students? And that being Exhibit 2.
A. Well, it tells me that the statement will be read to all

0277
students. I don't care for the part that the school board has noted that there are opinions other than Darwin's on the origin of life. Again, I find that to be confusing because Darwin did not postulate virtually anything on the origin of life other than a letter.
Q. And where is that on paper?
A. I'm sorry; it's the last paragraph, a couple sentences up from the bottom.
Q. On Page 2?
A. Yes.
Q. Okay.
A. I think that's it for this document. However, also is the communication that Vic gave me that's in my report concerning that I believe it was the superintendent had instructed teachers not to answer questions.
I state in my report that "The Dover teachers are instructed by
0278
school administration not to answer student queries about intelligent design."
Q. What are the teachers supposed to do if students have questions?
A. Are you asking what they are supposed to do in Dover?
Q. Uh-huh. As far as you know.
A. Well, if the students can't get answers from the teachers, because apparently according to -- from what's been communicated to me, they can't, then I don't know what the school is directing them to get those answers to.
Q. This statement, Exhibit 2, also says that teachers are not -- on paragraph -- the last paragraph that you had pointed to on Page 2 of Exhibit 2 also says that "No teacher will teach intelligent design, creationism, or present his or her or

0279
the board's religious beliefs."
So how does that factor in
with your understanding of how this
policy is detrimental to the
scientific literacy of students?
A. I'm glad to see that
there's no further teaching of
intelligent design going on.
Q. Further, besides the
reading of the one sentence,
"Intelligent design is an explanation
of the origin of life that differs
from Darwin's view" at the top of
Page 2 on Exhibit 2?
A. If you are referring to the
one sentence that brings up
intelligent design, a nonscientific
discredited theory, in a science
classroom and says that it differs
from the scientific view and that if
students want to know more about this
nonscientific view that they're
learning about in the science
classroom, they should go and seek
0280
out a nonscientific textbook about
it, then yes.
Q. But those are all these
assumptions, all this nonscientific
stuff you've been listing out here?
Those are your --
A. Intelligent design has
been --
Q. Those are your assumptions
that you are bringing to this
two-sentence statement at the top of
Page 2 on Exhibit 2. Correct?
A. I don't believe it is an
unreasonable assumption whatsoever to
think that some students will have
never heard the words "intelligent
design" before they hear this. They
will not know that it's an
explanation of the origin of life.
They will not know that it is an
explanation of the origin of life
that differs from Darwin's point of
view.
They learn this after they

0281
hear this sentence. I don't think that's unreasonable at all, and I would be willing to think that the majority of students, that would be news to them.
Q. But as far as all this unscientific gloss you are putting on it, those are the assumptions you, as a Ph.D. and an expert in science education, bring to the reading of the two-sentence statement at the top of Page 2 of Exhibit 2. Correct?
A. Not at all. Intelligent design has been discredited by the major scientific organizations and the major science education organizations. It is not simply me who thinks that intelligent design is a form of creationism.
Q. But the reading, what I'm asking is -- and I'm talking just to you. I'm not talking to all these other scientists running around out there. Okay?
0282
When you just read this statement to me on the top of Page 2, Exhibit 2, and you put in all of this unscientific gloss, okay, that's coming from you and your knowledge, correct, that someone who doesn't have your knowledge may not be able to insert into this two-sentence statement. Am I correct on that?
A. Correct. I think the average 15-year-old in high school would say "I have never heard of intelligent design, but apparently it's an explanation for the origin of life and that differs from Darwin's view."
Q. I like your Darwin tie.
A. Thank you. I wore it in honor of the day. I'm not sure it is Darwin, though, but it might be evolution.
Q. Or evolution tie; sorry.
Now, the reading of the four-paragraph statement as part of

0283
the policy, okay, how is just the simple reading of the four-paragraph statement detrimental to the scientific literacy of a student in the Dover High School?
A. The first paragraph -- if you will allow me to go paragraph by paragraph.
Q. Sure.
A. The first paragraph being read to the student, "The Pennsylvania academic standards require students to learn about Darwin's theory of evolution and eventually to take a standardized test on which evolution is a part."
I don't understand the pedagogical advantage to taking time out of a class to say it's in the Pennsylvania academic standards. I would imagine many things are in the Pennsylvania academic standards throughout that biology class.
Do they read the sentence
0284
concerning areas of physics in the physics courses, about areas of chemistry in the chemistry course, other areas of biology in this biology course? But there it's stated some sort of -- that you are being required, we are teaching this because we are required by the Pennsylvania academic standards.
I don't understand the pedagogical advantage of reading this statement to students and singling out evolution as the one in which they are requiring students to learn.
And, in addition, there's a big misconception there, they are learning more than just about Darwin's theory of evolution, they are learning about evolution in general. A lot of science has come into play since Darwin was around concerning evolution.
Q. So that the reading of that statement is detrimental to their

0285
scientific literacy of these students?
A. I think it signals that something is up about evolution that they have to read this. A person comes into the classroom, they have to read this special document that says something is special about evolution and we require students to learn about Darwin's theory of evolution. There's the misconception that it's just Darwin's theory.
I'm done with Paragraph 1.
Q. Continue.
A. Paragraph 2, "because Darwin's theory is a theory --" well, there's some confusion right there. Darwin's theory is also a fact and it's not brought into play. Because -- the word "because" is attributing something to something else. Because it's a theory is almost implying because it's only a theory "it continues to be tested as
0286
new evidence is discovered."
Well, that's the case for all theories. That's not singling out evolution again, and particularly singling out just Darwin's theory, just Darwin's theory. In fact, any sort of mechanism of evolution since Darwin apparently, according to this, doesn't seem to be tested as new evidence is discovered, or at least it is not mentioned here.
It is Darwin's theory that is singled out as the only theory that is -- that continues to be tested as new evidence is discovered.
It goes on to say that theory is not a fact. That's incorrect. The National Academy of Sciences and the American Association for the Advancement of Science have both come out in print and say Darwin's theory is a theory and fact, evolution is a theory and fact. So that's just dead wrong.

0287

Continuing, "Gaps in the theory exist for which there is no evidence." Well, again, it's confusing, the difference between the occurrence of evolution and the mechanism of evolution.

The last sentence, "A theory is defined as a well-tested explanation that unifies a broad range of observations." I'm not too worried about that. I might question why it's brought up only in relation to evolution.

Is this statement read to physics students before physics classes or chemistry students before chemistry classes? That statement could be anywhere, but it is read only in relation to evolution.

I consider that entire paragraph to be a form of attempt -- theory is mentioned, one, two, three, four, five times in four sentences. I think what they are doing by

0288

reading this is confusing for the child, probably the child's normal assumption of what a theory is versus a scientific definition of what the word "theory" is.

But, again, the major concern I have towards the last sentence is why isn't this said about all areas of science?

Paragraph 3, "Intelligent design is an explanation of the origin of life that differs from Darwin's view." Again, as I have stated previously, Darwin really didn't have a publicized view on the origin of life, that's another misconception.

This paragraph doesn't say anything about -- "Intelligent design, a nonscientific view rejected by the scientific and education communities, is an explanation of the origin of life." It does not say that.

0289
Being that it is read in a science class -- being that it is read in a science class, it's not a great assumption to think that the 15-year-olds might think it's actually part of the science class, meaning science.

If it's not part of the science class, then it should be stated as such. And if it is part of the science class, then a disclaimer should come in here that it's not science, it has been rejected as science.

The next sentence, "The reference book 'Of Pandas And People' is available for students who might be interested in gaining an understanding of what intelligent design actually involves." Again, a reiteration of my same complaint from the sentence previously.

Why are we directing kids to a book that contains so-called

0290
science that's been rejected by the scientific communities? It is being read in a science class to science students during science time, but yet it's been rejected. I think that creates great misconceptions.

The last paragraph, "With respect to any theory, students are encouraged to keep an open mind." There's the famous "open mind." Again, why is evolution singled out?

Why are students only encouraged to keep an open mind when it comes to the theory of evolution? Why isn't this read for all other theories? Why isn't this read in the physics class and the chemistry class?

The next sentence, "The school leaves the discussion of the origin of life to individual students and their families." So, let me get this straight.

We bring up something in a

0291
1 science class to science students who
2 will only cover the subject of
3 evolution for 19 days, according to
4 the Dover curriculum, and then we
5 tell them you can go look at this
6 secret science in this book, we
7 apparently instruct our teachers not
8 to answer questions about it, and
9 then we tell them if you want to
10 discuss this science, don't discuss
11 it with your teachers, go discuss it
12 with individual students and their
13 families.
14 That, to me, is almost
15 unbelievable that that occurs.
16 Q. You are talking about the
17 discussion of the origins of life.
18 Right?
19 A. Yes.
20 Q. Not the theory of
21 intelligent design?
22 A. No. But I think it
23 conflates the two, because the
24 sentence in the paragraph right above
0292
1 says "Intelligent design is an
2 explanation of the origin of life
3 that differs from Darwin's view,"
4 implying that Darwin has a view about
5 the origin of life. I don't think
6 there's a leap there.
7 The next sentence, "The
8 school leaves the discussion of the
9 origins of life to the individual
10 students and their families." I read
11 that.
12 The last sentence states,
13 "As a standards-driven district,
14 class instruction focuses upon
15 preparing students to achieve
16 proficiency on standards-based
17 assessments."
18 Again, I just don't
19 understand why this sentence is
20 singled out to be applied only to
21 evolution and nothing else. Does
22 that mean in the physics and
23 chemistry class that they are not a
24 standards-driven district? Class

0293
instruction does not focus upon preparing students to achieve proficiency on standards-based assessments?
You mean the only place that's relevant to bring this up is concerning the theory of evolution?
Those are some of my problems with those four paragraphs.
Q. Now, you said the curriculum in Dover is 19 days long?
A. The unit for evolution, according to the day count, is 19 days, where they explicitly mention evolution.
Q. So that's 19 days -- how long is a class generally in high school?
A. Generally, they probably cover biology for five hours a week.
If you do a quick sloppy calculation, take out about three months out of the year for vacations, summer vacations and so forth, give
0294
them eight hours of sleep a night, they will spend less than 5 percent of their time in the biology class as a whole, and as far as evolution, a microscopic amount, 19 days over a four-year period for those students who don't go on in biology.
Q. Compared to a 60-second statement read at the start of class?
A. The statement is so unusual that I think it will carry a lot of impact. And it is strange to introduce nonscience directly into a science classroom and in a way that is so unusual and so disruptive to the normal activities of a teacher in a biology classroom.
Q. What is science? Define it for me.
A. It's a way of knowing. It's a way of knowing that uses natural explanations to explain natural phenomena.
Q. Is it accurate to say that

0295
it's a search for understanding the natural world using inquiry and experimentation?
A. I think that's part of it, yes.
Q. How is intelligent design not science?
A. I'm not a philosopher of science. The demarcation issue is primarily philosophy of science; however, from a science education point of view, I can say that one of the things we try to teach students is about the nature of science and one of the ground rules, as I stated previously, is methodological naturalism.
Sometimes it is not taught by those words to 15-year-old children, but the idea is that the only explanations that are allowed in the game of science are natural explanations about the natural world and that there may be supernatural
0296
causes and they certainly may exist, but within the game of science, we don't entertain those possibilities.
By the very nature supernatural means above super, above nature, and biology only looks and science in general only looks to the natural causes of natural phenomena.
Q. And you said you haven't spoken to any of the students who have gone through the biology class at Dover. Correct?
A. No, I have not.
Q. Do you know how any of the students have done on any standardized exams in Dover with regard to biology?
A. No.
(Recess taken.)
BY MR. WHITE:
Q. On Page 3 of your report, Exhibit 1, the second paragraph, you say: "All leading science education associations and scientific

0297
associations do agree that learning about evolution is one of the most important concepts, if not the most important concept, in a biology course and that students cannot obtain a well-rounded background in science without learning about evolution."

From your review of the curriculum at Dover, students are being taught about evolution?

A. Yes.

Q. You had mentioned one of the parts of the policy is also the curriculum of the school?

A. Yes.

Q. What aspect of the curriculum is detrimental to the scientific literacy of students?

MR. WALCZAK: Can you -- if you don't have a copy of the curriculum, can you represent to us that what's listed in this press release in Exhibit 2 is in fact

0298
what's in the curriculum; do you know that?

MR. WHITE: That is my understanding, it is.

MR. WALCZAK: Okay. So we're going on the assumption --

MR. WHITE: What is in the quote there that says on Exhibit 2, Page 1, that the curriculum was updated with that following statement, that's my understanding of what is in the curriculum.

MR. WALCZAK: So he will answer on the assumption that this is an accurate reflection of what is in the curriculum since we don't have the actual curriculum.

MR. WHITE: That's fine.

THE WITNESS: After all that, I forgot what the question was; I'm sorry.

BY MR. WHITE:

Q. What I had asked was, you had said that the curriculum is one

0299
of the parts of the policy as you view it when you're forming your opinion, and what part -- what is it about the curriculum that is detrimental to the scientific literacy of students at the Dover High School?
A. Well, it instructs teachers here -- the curriculum is read by teachers. Teachers are --
Q. When you say "read," you mean read to the students?
A. No. No. Generally the students don't see the curriculum. Generally it's the teachers that see the curriculum. And it says: "Students will be made aware of gaps, problems in Darwin's theory and other theories of evolution, including but not limited to intelligent design."
So we come back to all the rationales I brought up previously is, students are going to be made aware of a nonscientific theory in a
0300
science class. That's my primary problem with this sentence.
Secondary problem with this sentence is why are students not being made aware of gaps -- so-called gaps or problems in all theories, laws, all areas of science? Why again is evolution being singled out here for the gap-problem issue? Those are two major concerns.
Q. Now, do you have any knowledge of teachers in the Dover High School making students aware of gaps and problems in Darwin's theory besides whatever is stated in the Miller and Levine "Biology" textbook?
A. No.
Q. Do you have any knowledge of teachers in the Dover School District making students aware of any other theories of evolution?
A. No.
Q. And is it your knowledge that the students are being made

0301
aware of intelligent design is through the four-paragraph statement that was read at the start of the biology course?
A. Explicitly, and implicitly through directing them to an intelligent design book.
Q. When you say "directing them," is that the reference on Page 2 of Exhibit 2 that the reference book "Of Pandas And People" is available for students who might be interested in gaining an understanding of what intelligent design actually involves?
A. Yes, the one that says "gaining an understanding" read to them in a biology classroom. One would assume it's gaining an understanding of science, and they direct them to a nonscience book.
Q. And that's your opinion of "Of Pandas And People," that it is not a science book?
0302
A. I have seen a scientific organization, one of the larger ones -- I can't recall at the moment -- contend that the book is not scientifically accurate. I have heard some individual scientists contend that it is not scientifically accurate.
But what's most important, at least to me, is that again it brings up nonnatural causation in the book, which is a ground rule of science.
Q. You had also said that part of the policy of Dover School District is just that the "Of Pandas And People" is being made available?
A. It's not so much that it's being made available. That's an issue to be taken up, I imagine, with the local school and what they want to carry in their library. The issue is directing students to a nonscience discredited idea that is presented as

0303
a science within that book in the middle of, at the beginning of, or at the end of a science class.
Q. And then you said another part of the policy of the school district, as you understand it, is the inclusion of a lecture? You said something to that effect.
A. We don't have the curriculum, the Dover curriculum, in front of us, but I recall that the method of instruction under the method of instruction column in the Dover curriculum for this is the word "lecture."
Q. And lecture students about what?
A. I don't know. It doesn't state. Over on the far left column is this statement, "Students will be made aware of gaps, problems in Darwin's theory and other theories of evolution, including but not limited to intelligent design. The origins
0304
of life is not taught," and then over to the right it says "lecture."
Q. Do you know whether any faculty members at Dover have lectured students about intelligent design in their biology classes?
A. No.
Q. Now, when you reach your opinions about that this policy is detrimental to scientific literacy, is that it definitely is detrimental or it may be detrimental?
A. I can see it is possible for a student to be directly taught in a biology class that demons cause colds, that the earth -- that the sun goes around the earth, that plate tectonics doesn't move, that whales live in the desert, that shaking hands causes liver disease, that dinosaurs and humans coexisted, that the earth is 10,000 years old.
And it may be possible for a child to come out of that

0305
instruction not having been
detrimentally affected in their
science career, but I think that
would be a rarity.
Q. Now, all these things you
just listed, would just the mere
mention of some of these things you
just listed would be detrimental to
the student?
A. I'll put one into the
phrase of the -- what is read to the
students in Dover. Dinosaur and
human coexistence is an explanation
of the life of dinosaurs and humans
that differs from Darwin's view.
Well, it's wrong concerning Darwin's
view, but we will overlook that for
the moment.
It's telling the students
in a science class about something
that isn't science. But we didn't
tell the students, by the way, this
is wrong. This is not science. For
scientific reasons, dinosaurs and
0306
humans did not coexist, but we read
it to them as if it's accurate.
That's not good.
Q. But wouldn't a student come
to that conclusion just by the fact
that the other 19 days of the biology
curriculum on evolution never
discusses this alternative, that it's
not an equal alternative?
A. I have no way of telling
what the students would necessarily
come away with in that reference.
They can't, according to
what I've learned, ask their teachers
any questions concerning -- for a
clarification, or at least they can
ask the teacher for clarification,
but the teachers have been instructed
not to clarify.
So I don't know what
happens to the, as you say,
open-minded student who asked
questions about intelligent design
since it was brought up in the

0307
1 science class and then the teacher
2 can't respond.
3 Q. But you said you don't know
4 what the teacher is supposed to do
5 when the student asked a question?
6 A. Correct. All I know is
7 what I put in my expert report
8 concerning that I have been informed
9 that the teachers have been
10 instructed not to answer questions on
11 intelligent design. And then I read
12 somewhere else in the press release
13 that intelligent design will not be
14 taught.
15 Q. Where in the Dover policy
16 does it bring into question the
17 scientific consensus of evolution's
18 occurrence?
19 A. I hate to ask, but can you
20 repeat that?
21 Q. Sure.
22 A. I think I heard what you
23 said, but I'm confused.
24 Q. Where in the policy of the
0308
1 Dover School District does it bring
2 into question the scientific
3 consensus that you have stated of
4 evolution's occurrence?
5 A. Paragraph 2, the second
6 sentence, "The theory is not a fact."
7 Q. And this is on Exhibit 2?
8 A. Exhibit 2.
9 MR. WALCZAK: That's
10 Paragraph 2 of the four-paragraph
11 statement.
12 BY MR. WHITE:
13 Q. So Page 1, Exhibit 2, where
14 it says, you said, "The theory is not
15 a fact?"
16 A. Yes.
17 Q. So that brings into
18 question the scientific consensus of
19 evolution's occurrence?
20 A. Yes.
21 Q. I thought you said earlier,
22 though, that the theory is both --
23 has a factual element to it and then
24 a theoretical element?

0309
A. Right, and this does not say that. This says that theory is not a fact.
Q. In common terms when people speak about evolution, it's known as an evolutionary theory. Right?
A. Among people in science they may say plate tectonics, others say plate tectonic theory.
Q. Now, have you reviewed the "Biology" textbook by Professor Miller and Levine --
A. Only --
Q. -- except from a few years ago?
A. No.
Q. Do you know whether in there they refer to evolution as a fact?
A. I haven't read it and I don't recall from ten years ago and I'm sure the text remains the same anyway.
Q. When you reviewed
0310
earlier -- I showed you the one page on -- what exhibit number is that?
A. 4.
Q. 4. On Page 386 of Chapter 15.
A. Yes.
Q. On that page it's referred to as a theory.
A. Yes, that is true. I hope elsewhere in the book he also refers to it in its factual nature, also.
Q. Also on that Page 386 of the textbook is a summary of Darwin's theory at the top?
A. Yes.
Q. Now, just clarify for me, earlier you had said that Darwin didn't have a theory -- was it there's no theory on the origins of life through Darwin?
A. The origin of life itself, first life, Darwin had no publicized theory concerning that. He wrote a letter concerning it.

0311
Q. So Exhibit 2, Page 2 where it talks about intelligent design is an explanation of the origin of life, that differs from Darwin's view; Darwin had no view on the origin of life other than this letter you referenced?
A. He certainly may have had a private view, he certainly had a view within a letter, but he didn't posit a scientific theory concerning the origin of life.
Q. What did he say in this letter, do you recall?
A. I don't know. I'm not a historian of science.
I remember it was something about a warm little pond scenario, but that's about all I remember.
Q. Now, is questioning evolutionary theory in a science classroom in public school bad pedagogy?
A. I think questioning of any
0312
part of science in high school is good.
Q. Now, does this Dover policy, as you understand it to be, cause a belief that there was no such thing as evolution?
A. Exhibit 2, the second paragraph, again, I'm concerned about the sentence that says, "Because Darwin's theory is a theory, it continues to be tested as new evidence is discovered. The theory is not a fact."
It appears that we need to make these points in this paragraph that continue to say evolution is only, it's only, it's only a theory, there are gaps, there are problems, but evolution is singled out again, it's not for all other areas of science.
Q. Now, if you can refer to Exhibit 4, again at Page 386 of Miller and Levine's textbook.

0313
A. Yes.
Q. The last paragraph on that page states: "Like any scientific theory, evolutionary theory continues to change as new data are gathered and new ways of thinking arise." How does that differ from the statement on Exhibit 2 that Darwin's theory is a theory and is not a fact?
A. Because Miller and Levine state, like any scientific theory, the statement in the policy only singles out evolution.
Q. But a student would also be reading Page 386 of Miller and Levine. Correct?
A. Hopefully.
Q. Now, on Page 3 of your expert report, Exhibit 1, you state in the middle of the second full paragraph, about halfway through it says: "Due to the misinformation students learn as a result of the Dover policy, the students may
0314
incorrectly think that the scientific community and the science education community have conflicting views on the matter."
And "on the matter" refers back to the learning of evolution in science classrooms. Is that correct?
A. Yes.
Q. Now, the misinformation the students will learn as a result of the policy, is that your position that intelligent design is not science and reference to "Of Pandas And People" is reference to a nonscientific book?
A. That's part of it.
Q. What's the other part?
A. The other part's when I went through paragraph by paragraph of the four-sentence statement still hold. My criticisms of them are the same.
Q. But now on this statement of your opinion here on Page 3 of

0315
your expert report, you are just saying that students may incorrectly think, so, again, it's not a definite that these concerns you have of the policy may cause them to reach the wrong conclusions?
A. As science teachers across the nation will tell you, we're constantly shocked at what students don't learn in their classes.
Q. So why is that; is it because students don't necessarily pay attention?
A. No. I think changing one's conceptions is difficult and one has to -- research in the area tells us what helps best is having some form of disconfirming information, realization that the data doesn't fit and that their predictions don't work, and that this has to be done multiple times over a period of time for a long change -- a long-term change.
0316
Most teachers teach it for the short term because as in Dover, 19 days, many students revert back to their misconceptions.
They do well on the exam, they remember things and understand to a certain extent short term, and then as the months go by and possibly a year or two go by, students, ourselves, myself often revert back to our prior conceptions that we have.
Q. These, what you would call, misconceptions that a student may bring into a science classroom?
A. Correct.
Q. Now, is there a debate -- when you said there was a -- scientists debate the mechanisms of the theory of evolution?
A. To my understanding, there is still no consensus in the scientific community as to how all the mechanisms come into play

0317
concerning the how of evolution.
Q. Now, you have mentioned a few times today that in your opinion the theory of evolution is being singled out among the various theories in biology. Now, you've said before that you thought that evolution is the main or major unifying concept in science. Okay?
A. In biology.
Q. In biology; sorry. Why wouldn't the main concept be the one that's singled out for critical analysis of all the concepts?
A. Why would it deserve -- well, you ask questions, not me.
There is no reason to single out the major theory to have any more attention paid to it as far as criticism from any other theory. There are many mainline theories that students may critically examine.
Q. So is it that by questioning the theory of evolution,
0318
that students are being harmed with their scientific development?
A. It's that somehow evolution is being presented as an inferior science. We question evolution, but we don't question these other theories.
We tell the students, "Make sure you question evolution," but when we get to other theories, we don't have a special statement with somebody walking into a classroom, we don't have a curriculum line on there that students being made aware of alternate so-called scientific theories, and then say, "By the way, we need to criticize the gaps and problems with this theory, also."
Q. Now, do you know for a fact that Dover School District is not singling out any other theories in its curriculum for its students?
A. I saw in the Dover curriculum the overall that theories

0319
should be critically looked at and then there was the for-example parenthetical in which evolution was one of a short laundry list of theories --

MR. WALCZAK: I'm sorry; are you talking about Dover or the PA standards?

THE WITNESS: The Pennsylvania standards.

MR. WALCZAK: And your question was about Dover. I'm sorry; it's getting late in the day.

THE WITNESS: No. You're right. You're right.

I do not know whether somebody goes around and reads a statement concerning other areas of science at Dover. I suspect that's not the case by the reaction -- by the letter from some of the teachers to the superintendent that that is not the case.

BY MR. WHITE:

0320
Q. So my understanding, then, your position is and your opinion is the reading of the four-paragraph statement to the students, the fact that "Of Pandas And People" is available as a reference tool if a student wants to look at it, this statement on Exhibit 2 that the curriculum was modified to say that people will be -- students will be made aware of this thing, so these factors put together puts in the mind of a student that evolution is an inferior theory?

A. It puts into the mind -- put is a bad word. I don't think children's minds are vessels in which we just simply pour knowledge.

I think it facilitates a misconception that there is something special about evolution, it's a special science, it needs special considerations, we must handle it with care, we must be extra critical

0321
with evolution because it has some problems, it has gaps. We don't mention that with the other sciences. We mention it with evolution.

I think students will notice that. I think students will notice that special treatment in a stranger coming into the class will read it. I think students will notice that there's a special book somewhere on the campus that they are encouraged to go see if they want greater understanding about this alternative view to the cornerstone of modern biology.

I think students will find it extraordinarily strange that their teachers can't talk about this that was just read to them in a science classroom.

Yes, I think this will be a monumental event in the student's day or week in the biology class.

I don't think it happens in

0322
the physics class. I don't think it happens in the biology class. I don't think it happens in the rest of the biology curriculum.

Q. So in your opinion this one-minute statement, and all these other factors that are in the policy, is going to have that much of a detrimental impact on the education of students in the Dover High School classroom?

A. I think it could. I think it's greatly unique. I have no idea why we're pretending that this is science to students, and I have no idea why we would present something as science to students and then instruct our teachers not to talk about it.

I think students will see this unusualness of the normal procedures that are going on with the class. They may even be perceptive enough to see that the teachers

0323
themselves don't like this activity that's going on.
Q. Now, the work that you mentioned before of Professor Behe, Demski with regard to intelligent design, do you view that as scientific work?
A. I don't have the expertise to adjudicate whether all of their work is scientific or not. My understanding of the ground rules of science is that we have methodological naturalism. I read in their books that they do not believe this is the only ground rule and that in certain cases this ground rule isn't necessarily applicable.
Everywhere else in science I see that it is always applicable, in my limited experience in science, having looked at college science textbooks, high school textbooks, read the positions of the scientific associations and the scientific
0324
education organizations.
So in combination with reading what comes from the scientific association saying it is not science, hearing statements that there is no body of literature concerning intelligent design in the relevant scientific literature tells me -- gives me every indication that this should not be taught.
And, in fact, sometimes the major organizations, again the AAAS and the NAS, come out directly and state "It is not science." This is enough of an indication to me that it's not science.
Q. On Page 5 and 6 of Exhibit 1, your report, which dovetails what you were just saying now as far as the scientific community, towards the latter part of Page 5 you give a couple examples, one being the American Association for the Advancement of Science, that the

0325
intelligent design theory lacks scientific warrant?
A. Yes.
Q. Okay. And makes it improper to include as part of a science education. And your position is that the fact that this four-paragraph statement is made to students and that "Of Pandas And People" is available if anyone wants to look at it, that's including intelligent design as part of science education in Dover?
A. Yes.
Q. Now, the next page, Page 6, you then go on with another example of the NAS. And what is the NAS?
A. National Academy of Sciences.
Q. And this is a statement of the current academy president. Who is that, the current academy president you are talking about here?
A. Bruce Alperts.
0326
Q. And in this statement on Pages 5 and 6 of your report say that -- quoting Mr. Alperts -- "Opponents of evolution assert that the scientific justification for evolution is lacking when in fact the occurrence of evolution is supported by overwhelming evidence. Legislators and school boards insert wording into laws, lesson plans and textbooks mandating that evolution be taught as a controversial explanation of life's history, though no such characterization is scientifically warranted."
How does the Dover policy characterize evolution as a controversial explanation of life's history?
A. It -- the book "Of Pandas And People" present it as such.
Q. Just that "Of Pandas And People" is a reference book?
A. It's a reference book that

0327
students are being directed to go look at.
Q. Do you know from your experience and the teaching of science education how many times students will take such suggestions from their teachers and go and look at the "Of Pandas And People" book or any other book that a 9th grade teacher tells them to look at if it's not required?
A. Very few; however, given the extraordinary handling of this particular event, I would think maybe it would be the thing to do. The teacher won't answer questions. The assistant superintendent comes in the room.
We find out it's a theory concerning something about an intelligence in the universe and -- that made all this stuff, and there's a book. And it's pandas, it sounds really nice, too, pandas, and people,
0328
and it's there for us to go look at. I think you might have more students than ever.
If you were referring them to some typical biology book, biology reference book, I think you'd have less students going to that than you will have go to the "Of Pandas And People" book because of the unusual nature of the suggestion.
Q. The "Of Pandas And People" book is about 165 or so pages long. Do you think students will actually go to a reference library and read the book?
A. No.
Q. Now, when you talk on your expert report about faculty members, teachers, it's my reading of it that they are being forced to disregard the recommendations of their professional associations through this policy. Is that an accurate interpretation of your opinion?

0329
A. What paragraph are you on?
Q. I'm on Page 6, Paragraph No. 3 that you have.
A. Yes.
Q. You are talking about the policy requires students or -- excuse me -- the policy requires science teachers to disregard recommendations of their professional associations, teacher associations?
A. Yes.
Q. So your view, then, is this policy is compelling faculty to disregard the recommendations of their teacher associations?
A. The policy in the curriculum states students will be made aware of intelligent design.
The four paragraphs bring up intelligent design, and here in the NABT, which stands for the National Association of Biology Teachers, official statement on evolution states that "Explanation's
0330
are ways of knowing that invoke nonnaturalistic or supernatural events or beings, whether creation science, scientific creationism, intelligent design theory, inert theory or similar designations are outside the realm of science and not part of a valid science curriculum."
Q. How many teachers at the Dover High School are members of the National Association of Biology Teachers?
A. I don't know.
Q. Teachers are required to comply with the views of professional science teacher associations?
A. Did you say compelled?
Q. Are they required to follow any recommendations of professional teacher associations?
A. No.
Q. Are teachers required to follow policies of school boards?
A. There are so many school

0331
boards, I couldn't answer that question.
Q. What about here in Dover; do you know if teachers have to follow Dover policy?
A. I do not. I do not.
Q. And your view, then, by pointing to this statement from the National Association of Biology Teachers, is that intelligent design is lumped together with creation science, scientific creationism, young earth theory, they're all basically the same?
A. I believe intelligent design is a type of creationism, yes.
Q. Do you have any publications that you have done with regard to intelligent design?
A. The entire publication?
Q. Yes.
A. No.
Q. Do you have parts of your publication besides that defending
0332
evolution that deals with intelligent design?
A. I may have; I can't recall, but it would be minor.
MR. WALCZAK: I think if you look earlier in the transcript, you will get some answers there. I think he listed two or three others.
BY MR. WHITE:
Q. Later on in this paragraph, again on Page 6 of your report, it's now a quote from the National Science Teachers Association. That's the NSTA?
A. Yes.
Q. Just as a side, are you a member of these groups, the National Association of Biology Teachers and the National Science Teachers Association?
A. I have been members of virtually everything or possibly all of them mentioned in my report at one time or another. I'm not exactly

0333
sure when my membership runs out and when I reup, so there may be some gaps in my membership.
Q. Besides that group you had mentioned out of Berkeley where you are on the board as of this February, March of this year, are you a member of a board of any of these associations that you have listed in your report?
MR. WALCZAK: Are you asking now or ever?
MR. WHITE: Now and then ever.
THE WITNESS: Not currently. I've been members of various committees within these organizations.
BY MR. WHITE:
Q. Are you currently a member of any committee of these organizations?
A. The Society for the Study of Evolution that we mentioned
0334
earlier.
I don't believe so, but I may be wrong. To the best of my recollection at this moment, there's not another committee, but I could be wrong.
Q. Well, later on -- and again the same paragraph we're talking about, Page 6 from the National Science Teachers Association -- it says that "Administrators also should support teachers against pressure to promote nonscientific views or to diminish or eliminate the study of evolution."
Now, in the Dover School District has the study of evolution been eliminated?
A. No.
Q. In the Dover School District has the study of evolution been diminished?
A. In a way.
Q. And is it just because of

0335
this statement that is read to the students, the four-paragraph statement, and the reference to "Of Pandas And People" in the library?
A. I think what I have defined as the policy or you and I have defined as the policy in total diminishes the study of evolution in Dover.
Q. And, in your opinion, the mentioning of intelligent design as part of the policy and having the book in the library "Of Pandas And People," which students can or cannot look at, is promoting nonscientific views?
A. The policy promotes nonscientific views in a science classroom.
Q. So the answer is yes?
A. Yes.
Q. Are you aware of any new scientific idea that when it comes out is not met with controversy?
0336
A. It will be a nonexpert answer since I'm not a scientist.
Q. Well, let's keep it in your expertise. In the teaching of science education.
MR. WALCZAK: I'm sorry; what's the question?
MR. WHITE: The question is, in his area of expertise, are there any new scientific ideas that are not met with controversy?
THE WITNESS: To my recollection, most are met with controversy.
BY MR. WHITE:
Q. From your expertise or just from your reading as a person in the area of evolution, et cetera, when Darwin came out with his theory, how was that received by the governing scientific community?
A. It was received rather well in the scientific community. It was the community at large had much

0337
bigger problems.
Q. When you say "community" --
A. The nonscientific community, the lay public.
Q. Was his theory, though, in competition with any other existing scientific theory at the time?
A. I don't know if it was the major theory of the time, but Lamarck had postulated that life on earth had evolved over time, and Darwin came along and documented that more and then came up with a possible mechanism of natural selection.
Q. It's also your opinion, from what I understand, is that the policy as you've described it to me of the Dover School District is going to cause an improper preparation for post secondary science education for students?
A. Yes.
Q. Okay. Explain your reasoning on this. You have students
0338
who are in, you know, 9th grade, they hear the one-minute statement read to them, if they are in the class, they can or cannot, if they want to, go look at a book, that this is going to be detrimental to them as they move on in their academic career?
A. They learned in high school, or at least the Dover policy apparently wants them to learn in their high school biology class, that there's an alternative theory to evolution, and that's intelligent design. Then they are encouraged to take a look at a book that is located somewhere at the school. Whether or not they go see it is another argument.
Let's assume on the first case that they don't go see it. There is this competing view that is very secretive that the teachers apparently can't respond, and the teacher doesn't teach it in the

0339
1 science class.
2 Now they go on to college.
3 Let's say they are not majoring in
4 science at all, but they take a
5 required science course for some
6 other major. A student starts
7 talking to other students or raises
8 their hand in the class, "What about
9 this alternative theory, you know,
10 this intelligent design?"
11 Everyone in the class says,
12 "What alternative theory? What's
13 this intelligent design? I never
14 heard of it."
15 "Well, it's supposed to be
16 an alternative theory. You are
17 supposed to keep, as you say, an open
18 mind about this alternative theory,"
19 and so forth.
20 The professor in the class,
21 if he or she is a biologist, would
22 ask, "But that's not science. They
23 were really teaching that in a
24 science class at your school; you
0340
1 heard about this in a science class
2 in your school; they directed you to
3 a nonscience textbook about this in
4 your science class in high school?"
5 I think that badly prepares
6 a student when they arrive at college
7 to be stating that something is
8 science when virtually everyone at
9 the college or university, unless
10 it's a nonsecular college or
11 university, will be saying that's not
12 science. I'm assuming we are going
13 to a secular university.
14 If we go to a Christian
15 college or university, then it
16 depends. Some Christian colleges and
17 university accept intelligent design,
18 other ones of them do not.
19 But if it is a secular
20 college or university, they have been
21 ill prepared, and they have also, and
22 most importantly, been given the idea
23 that science entertains possible
24 supernatural causation.

0341
So even if they don't take a biology class, they go into a physics course, a chemistry course, physics for nonmajors, chemistry for nonmajors, and they start saying, "Well, what about supernatural causes here? What about nonnaturalistic causes?" Maybe it is not even related to evolution, just science in general.

The instructors there will have to say "You have a misconception. You have a misconception that you need to get over because that's not accurate science, that's not the ground rules for science."

And now we've got university professors and teaching assistants who go, "Well, we have a student here who has a very significant misconception that needs to be expunged."

Q. And all of that will happen

0342
just from the policy in Dover, in your opinion?

A. The policy in Dover apparently is there for a reason, and from the best I can tell is it is to change the definition of science to the students and introduce a nonscientific way of knowing into a science class, and it's done in a very dramatic, unusual fashion.

I think a lot of students will remember the topic the teachers can't talk about. I think 15-year-olds care more about what they find out the teacher can't talk about than what the teacher can talk about.

Q. Do you have any children?

A. I've been around a lot.

Q. Is that a yes?

A. That's a no.

Q. A no. So you don't have any --

A. Not yet.

0343
Q. You don't have any 15-year-olds to deal with at home?
A. Not yet. I talk to a lot of parents who do.
Q. Now, what is your opinion, then, on Exhibit 2 on Page 2 where after the four-paragraph statement is listed, it states here: "The foregoing statements are developed to provide a balanced view and not to teach or present religious beliefs"?
And then if I can then refer you also to Page 1 of Exhibit 2 and the paragraph that mentions the donation of the 60 books "Of Pandas And People" --
A. Yes.
Q. -- it just says that the book is not required text, but in an effort to present a balanced curriculum, the book is made available to all students who wish to review it and the ideas that are presented in the text.
0344
How does this attempt to provide a balanced view and to present a balanced curriculum play into your opinion regarding the detriment to the scientific education of the students?
A. The balance, the so-called balance, of this policy is a balance between science and religion. It's between a balance between science and nonscience, it's a balance between recognized mainstream science and rejected, discredited science. That's the balance. It would be like balancing, again, germ theory with the demon possession.
I wouldn't want referenced as a balanced approach the King James Bible with the biology textbook, either, to have balanced approaches. If you take a literal reading of Genesis -- if, big if -- the world was basically, and most things we see, created in six days.

0345
That might be a balanced view to teaching evolution, but it's teaching a religious point of view in balance with a scientific point of view and that should not be done within a science classroom. It can certainly be done elsewhere at the school.
Q. And that goes back to your view that intelligent design is teaching religion?
A. I think most 15-year-olds will assume that an intelligent designer -- and you have things abruptly appearing according to Pandas Page 99 and 100 -- is some form of deity, or possibly a UFO supreme being somewhere moving around.
MR. WHITE: Why don't we take a short break, and then we will be wrapping it up.
MR. WALCZAK: Okay.
(Recess taken.)
0346
BY MR. WHITE:
Q. Just to wrap up here, so a lot of the assumptions you make to support your opinion is that intelligent design is not science. Correct?
A. Correct.
Q. And that intelligent design is the equivalent of creation science?
A. I think it's a type of creation science.
Q. Or a type of creation science.
Now, if those assumptions are shown to be incorrect, then your opinion is incorrect?
A. Is that a question?
Q. Yes.
A. If the leading scientific communities and the leading science education communities and there's a body of literature, they report that intelligent design is a science

0347
that's being truly debated seriously within the scientific community, we recommend that you teach this, become a part of mainline science, there's a healthy consensus around it in the scientific community and they start teaching at the universities and colleges and say to the high schools, "By the way, you should start preparing these students ahead of time. Let them know about this intelligent design so that when they get here, you know, they know something," and people who graduate and don't go to college or university will know something about this competing scientific theory, then yes.

Q. So only at that point, though, should intelligent design even be mentioned in a public school?

A. Let me answer it this way: Even if intelligent design were accepted as a science but all the

0348
other parameters about it that exist right now were still in play; for example, no body of literature to speak of in the relevant literature, it is not being taught at the universities and colleges, secular, you don't hear about it when you go to the scientific conferences, there's not federal, state and other sorts of secular funding sources for the research, on and on, then it still shouldn't be taught, because it's such an obscure science.

High schools primarily teach mainline science because there's very limited amount of time, a lot of material to cover, and we are talking about 15-year-old children.

Q. Is it your understanding that intelligent design is being taught in religious high schools?

A. I hear many Christian high schools that talk about various forms

0349
of creationism, and depending on the type of Christian school it is, some would teach young earth creationism only and say that intelligent design is too liberal of a definition of creationism. Others would teach an old earth, et cetera.

Q. Now, those students, when they graduate from their prospective religious high school and move on to colleges, has their scientific education been harmed?

A. Some. Many college professors report that they have students who contend that evolution is bad and contend that, for example, dinosaurs and humans coexisted, that the earth is 10,000 years old, hasn't the professor heard about intelligent design, don't you know about this form of science, and I don't -- I can't say that a student has been deficient directly because of learning an intelligent design.

0350
The only way I would be able to structure a research -- an acceptable research in that sort of area would be to randomly assign, say if we had ten high school students, five of them -- well, I would want large numbers, a couple hundred.

I would randomly assign a hundred of them to learn about intelligent design, the other half do not learn about intelligent design, send them off to college, the same college, of course, the same instructors and all that, and see if there's a difference, statistically significant difference.

But all of that is incapable of doing due to ethical considerations.

Q. But those students who go through the religious schools learn intelligent design, creationism, et cetera, is that education detrimental to their scientific literacy?

0351
A. I would assume, and the ones I have spoken with do feel that science should, and in many cases they believe does, entertain supernatural causes and then they find out when they are in the secular university that that is wrong, it does not, except for possibly a fringe group of people who call themselves intelligent design scientists.
Q. And then what happens with those students once they realize these matters are just raised?
A. I imagine they have to go through some cognitive shift. They probably have some disequilibrium about thinking that this was accurate, I thought this was accurate for many years, teachers taught me about this, and now all of a sudden I don't even hear it at the university, in fact, I hear many things counter to that at the university.
0352
And now we are having -- now they would have the problem of having to reverse what they thought was scientifically accurate to a different view.
If that's what we wanted to do, we should teach -- with all due respect to those who agree with intelligent design, we should teach all sorts of fiction in high school because it really wouldn't matter, they can go on to university or college and be re-trained anyway.
And I'm not stating that intelligent design is fiction, it is just not science.
Q. Now, the students that you are talking about here that go to the religious schools, you are working the assumption that they are not also being taught evolution. Correct?
A. There are many possibilities here. One possibility is they are being taught evolution

0353
and intelligent design and the student decides which one is most accurate, which is very strange because one is a scientific view and one is not a scientific view, but in any case, that's one possibility.
The other possibility is they are being taught both and being shown that evolution is bad and intelligent design is good, that's another possibility. There are other permutations concerning this also, but those are the two most popular.
Q. Now, do you know whether people that believe in the theory of intelligent design also believe in a lot of the concepts of evolution?
A. From what I read, a lot of them do, yes.
Q. So what is the big difference then, in your view, between the theory of intelligent design and the theory of evolution?
A. Nonnaturalistic
0354
explanations.
Q. Just that there is a designer and that designer could be God?
A. In science, if we don't know the answer to something, we keep looking for a naturalistic explanation. It may take 20 years, it may take hundreds of years. Intelligent design posits, from what I can read, that evolution has some problems, ergo we claim nonnaturalistic causation to solve any form of problem, concern, things we don't like about evolution.
Q. And what if intelligent design was simply that these biological organisms are so complex they had to have been designed, it could not have just resulted from random mutation, et cetera?
A. I disagree with how you are setting up the question. You are deciding that they cannot be. I

0355
don't know -- maybe in your laboratory and your research and so forth, but other scientists may disagree with you. And even if they agreed with you, they would say we will keep looking, we will keep working on it because that's how the game of science is played.

Q. But wouldn't just the explanation that these organisms are so complexly designed that there has to be -- we don't know who it is, but there has to be some designer of it, how is that wrong for the scientific --

A. Well, that's not how --

Q. -- for the scientific literacy of students?

A. Because that's not how science operates. You can't open up the scientific journals or go to scientific conferences and hear that explanation.

And there's a more personal

0356
side to all of this that's often forgot. It's the student who says "Yes, that is the case, there is this gap in evolution, this one fossil, or they have found man tracks and dinosaur tracks side by side in the Biloxi River in Texas," and then one day they find out that that's not really the case, that the scientists have said, "Oh, we were wrong on that, they really weren't."

And then all of a sudden they attributed a certain amount of their faith in the supreme being to that particular piece of evidence, and now that particular piece of evidence has been taken away from them.

Q. Did you always work under the assumptions that the designer has to be a supreme being?

A. Well, not many people, necessarily, have such an emotional tie to extraterrestrials.

0357
Q. But the designer could be really anything, so we don't know who the designer was. Right?
A. Could be, but most students I talked to when I talked to them about intelligent design learned about it at church or church-related activities.
Q. Have you ever been convicted of a crime?
A. No.
Q. Have you understood all of my questions I have asked you today?
A. I hope so.
Q. Is there anything that you remember now that you want to add to what you stated previously during the day?
A. There was something. Now I think it was minor. I will say no. I will retract my "There was something."
Q. Is there anything else about your opinion that you have to
0358
bring in this case on behalf of the plaintiffs that you have not told me about today?
MR. WALCZAK: What, that's not in his report?
BY MR. WHITE:
Q. That's not in your report or that you plan on testifying about.
A. No.
MR. WALCZAK: I have no questions.
MR. WHITE: We're done.
MR. WALCZAK: We will not waive signature.
(Thereupon, at 4:39 p.m. the deposition concluded.)

WITNESS CERTIFICATION

I hereby certify that I have read the foregoing transcript of my deposition testimony, and that my answers to the questions propounded, with the attached corrections or changes, if any, are true and correct.

_____ _____
DATE BRIAN ALTERS, Ph.D.

_____
PRINTED NAME