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

TAMMY KITZMILLER, et al	:	
	:	CASE NO.
v.	:	4:04-CR-002688
	:	
DOVER AREA SCHOOL DISTRICT, et al	:	

TRANSCRIPT OF PROCEEDINGS
BENCH TRIAL

MORNING SESSION

BEFORE: HON. JOHN E. JONES, III

DATE : October 19, 2005
8:55 a.m.

PLACE : Courtroom No. 2, 9th Floor
Federal Building
Harrisburg, Pennsylvania

BY : Wendy C. Yinger, RPR
U.S. Official Court Reporter

APPEARANCES:

ERIC J. ROTHSCHILD, ESQUIRE
WITOLD J. WALCZAK, ESQUIRE
STEPHEN G. HARVEY, ESQUIRE
RICHARD B. KATSKEE, ESQUIRE
THOMAS SCHMIDT, ESQUIRE
For the Plaintiffs

PATRICK T. GILLEN, ESQUIRE
RICHARD THOMPSON, ESQUIRE
ROBERT J. MUISE, ESQUIRE
For the Defendants

I N D E X T O W I T N E S S E S

(Whereupon, the following discussion was held in chambers:)

THE COURT: All right. What are -- we have an issue?

MR. SCHMIDT: Your Honor, we wanted to alert the Court before we used it in cross examination of a document that we plan to use that Your Honor may regard as covered by the confidentiality order having to do with the draft of the successor to Pandas. It's a page out of that draft.

It's the page that's analogous to the old page 25 that dealt with sudden -- intelligent design as it holds the various forms of life began with distinctive features already intact.

THE COURT: Is this the latest version --

MR. SCHMIDT: This is the --

THE COURT: As yet unpublished --

MR. SCHMIDT: Correct.

THE COURT: -- of Pandas. And you'll have to refresh my recollection. I didn't have a chance, after Liz alerted me, to look in the file, but did we have a confidentiality order in the midst of determining FTE's motion. Is that what it was for? You'll have to help me out, because I don't recall.

MR. SCHMIDT: It originally came up because

we subpoenaed it from William Dembski --

THE COURT: I recall that.

MR. SCHMIDT: -- who was the author. And FTE participated in that.

THE COURT: I recall that it was subpoenaed. I recall that FTE moved to block --

MR. SCHMIDT: For a protective order.

THE COURT: -- the subpoena. And, of course, I know that, we all know that Mr. Dembski is not testifying, and we all know that FTE was not permitted to intervene. What I don't remember is sequentially when the protective order came to being in exactly -- I understand why it came into play, but apparently it was not self-extinguishing as it related to the litigation. Is that a fair statement?

MR. SCHMIDT: Yes. In fact, it had a provision in it that said it would continue past the trial even until publication of the text.

THE COURT: So why do you think you're entitled to open it up?

MR. SCHMIDT: Because nothing in the protective order says that we couldn't use it. It said, if we did use it, it would be under seal, preserving the confidentiality of it.

So if there is reference to this, as there

will be, I wanted the Court to know that we intended to do that, so that the courtroom could be cleared, and so that this part of the record could be under seal to the extent that it's quoting from it.

MR. ROTHSCHILD: Your Honor, I would just add that, I would actually interpret the protective order a little more liberally. It certainly doesn't allow us to publish this widely, and it required any filings with briefs to be under seal, and any depositions that they used it as an exhibit to be under seal.

I think this is why we're alerting to you, that it does not necessarily mean that once we're in public trial, that it would preclude its use in public, but we're also amenable to it being done with a closed courtroom, if that's --

THE COURT: Well, do we have -- was a protective order entered -- and again, you'll have to refresh my recollection -- pursuant to a stipulation?

MR. SCHMIDT: Yes, it was.

THE COURT: And the stipulation, who were the parties to the stipulation? Was FTE a party?

MR. SCHMIDT: The Plaintiffs and FTE.

MR. GILLEN: Well, actually, weren't we, Chuck, as well?

MR. SCHMIDT: You were as well.

MR. GILLEN: Yeah, we were as well.

MR. WALCZAK: Your Honor, I think Eric's interpretation that this may not apply if it's being used in open court was largely validated when we had that hearing on FTE's intervention motion.

THE COURT: Does somebody have the stipulation?

LAW CLERK: I can get it.

THE COURT: Why don't you pull it off.

MR. WALCZAK: And while I don't believe we used design of life there, the other documents had been produced under seal including, I believe, and Chuck will correct me if I'm wrong, the FTE, some of the FTE statements and writings that they had. And some of those were introduced in court, put into the record.

FTE was there, and they had no objection, and did not seem to differ from our understanding of the protective order as not extending to things that happened in open court.

THE COURT: Are you seeking to actually admit a document in -- you're shaking your head no. You're going to simply question from the text of the manuscript?

MR. SCHMIDT: And read it to them, yes.

THE COURT: What's your position?

MR. GILLEN: A couple things. Actually, I'm grateful to you guys for bringing it to my attention. My recollection is that, it did cover litigation, that there was some discussion of that. I think what they're suggesting though, a short passage, so it can be kept confidential, does what I thought you had in mind, Judge, which is to protect their property interests. And I can see that being a way to get rid of the problems, so to speak.

THE COURT: Well, my recollection is that, FTE's concern was that they obviously had an intellectual property interest, and they were concerned that a wholesale release of the manuscript would subject it to pre-publication criticism, if I recall, that Mr. Buell was particularly, and justifiably, I thought, alarmed about.

I really wonder, under the circumstances, if it's a short passage, how much that's going to interfere with the intellectual property rights. I suppose you could argue that, that would allow focus and criticism of that particular passage, but I'm not so sure that that's really what his concern was. I thought his concern was a wholesale release of the entire manuscript, which is really what was threatened when Mr.

Dembski testified.

MR. GILLEN: And, Judge, I don't represent FTE.

THE COURT: I understand that.

MR. GILLEN: So I can't speak.

THE COURT: But as a signatory to the stipulation, I suppose you have Atillaed the hunt.

MR. GILLEN: We had an expert at that time who asked me to move to protect the intellectual property right because of his fiduciary duty. I made that motion, and I want -- I do want to preserve what I can by way of protection of their work product rights.

MR. SCHMIDT: As the draftsman of the stipulation, I must say that I had in mind the far broader text. The concern that was expressed was that this would give the NCSE's people, Scott and others, an opportunity to poison the well before publication.

THE COURT: Let me see the passages.

MR. SCHMIDT: It's the second paragraph.

MR. ROTHSCHILD: We would probably use one other page to just correlate some other charts.

MR. SCHMIDT: In my own mind, I see this as kind of analogous to the fair use exception and copyright law. You can take a snippet and use it without harming the copyright interests.

MR. ROTHSCHILD: I do think there's one other consideration, Judge, for your --

THE COURT: Go ahead.

MR. ROTHSCHILD: That it may -- the FTE has counsel in this area, and it may make sense, before using it, to alert them. I mean, we do intend to use it today for purposes of impeachment with Professor Behe.

THE COURT: That's exactly what I was going to suggest. Who's counsel?

MR. ROTHSCHILD: Leonard Brown, that group.

THE COURT: Yeah. Why don't you do this. Why don't you take time now to, before we get started, you know, we've been moving at a pretty good pace, and we haven't had these things happen, and they do happen in trials. So why don't you take some time and contact FTE's counsel. I think you want to do it for your own protection.

Obviously, once I rule, I suppose that you're protected, but you entered into a stipulation, and I would have some concern --

MR. ROTHSCHILD: I think it's just fair.

THE COURT: -- about that, and I think you want to at least give them notice. If we have to reconvene and get them on at least a conference call and let them be heard, and that might be better than having

you, you know --

MR. GILLEN: Me speak for them.

THE COURT: Sure. That puts you in a difficult position. You're signatory as parties, but you really don't want to put yourself in the position to speaking for FTE. And then we can hear out FTE. I'm not sure, you know, given this brief passage, that it violates the sense of the stipulation to allow questioning, even in open court.

I'm somewhat reluctant to clear the courtroom for these brief passages because, again, I'll read the stipulation and the order because they're not -- I don't recall them instantly. But I thought the thrust, and you seem to agree with this, is that the manuscript, as a whole, would be protected. And I understand. I think we all understood the purpose for that at the time.

MR. ROTHSCHILD: Your Honor, should we suggest a time -- I mean, do you want to do that at a lunch break or find out --

THE COURT: How much more cross do you have?

MR. ROTHSCHILD: It will be inversely proportional to mentions of the Big Bang, I think.

THE COURT: So you're going to go all day.

MR. ROTHSCHILD: It could be quite a while.

THE COURT: All right. Well, why don't you get started. Take some time now. Why don't you contact them. Why don't you see what their availability is. I mean, I recognize we're catching them flatfooted. See if they've got somebody that they can get on the phone, you know, as soon as possible. I just as soon get started.

If you give me a time later this morning, we'll just recess. If they say, you know, we're available at 11, or whatever the case may be, then we can at least get started; 10:30, 11. I'm not suggesting a time. Just find a time or we can do it as we break for lunch, if that is more convenient for them. Hard to believe they wouldn't have somebody that they could get at some point involved in a phone conversation.

Then you can reserve your cross on this issue until we hear them out at that point. Now if they tell you they don't care, which I'd be surprised, but if they tell you that, then we'll take that up at that time. I suppose they're going to have to likely contact FTE and find out what.

MR. GILLEN: That's what I can foresee. By the time they get in touch with FTE which, I think, is in Texas. You guys know better than I do.

THE COURT: And there's a time delay.

MR. SCHMIDT: One hour.

MR. GILLEN: It's just one hour, but Mr. Buell is rather difficult to reach.

MR. SCHMIDT: When he chooses.

THE COURT: Well, you know, if they can't reach him, I'll rule, if I have to, in the absence of that. But I think at least fair notice to their counsel, if they can connect with the mothership, and we'll take it up at that time.

(Whereupon, the discussion held in chambers concluded at 9:05 a.m. and proceedings reconvened in open court at 9:18 a.m.)

THE COURT: All right. Good morning to all. I apologize for the somewhat late start. We had a slight issue that we had to handle in chambers with counsel. And that rapidly resolved, so that we can commence this morning's session. We will do so. We will continue cross examination of the witness by Mr. Rothschild.

(Whereupon, MICHAEL BEHE, Ph.D., resumed the stand, and testimony continued.)

CROSS EXAMINATION (CONTINUED)

BY MR. ROTHSCHILD:

Q. Good morning, Professor Behe.

A. Good morning, Mr. Rothschild.

Q. How are you?
A. Fine, thanks.
Q. After the Court adjourned yesterday, did you talk to anybody about your testimony?
A. I did not.
Q. I'm going to see if we can reach an agreement on something here. You agree that this is a case about biology curriculum?
A. Yes, I do.
Q. Not about physics, a physics curriculum?
A. It's not about a physics curriculum, but from my understanding, many issues that are being discussed here are particularly relevant to other issues that have come up in other disciplines of science.
Q. This is a case about what's being taught in biology class not physics class?
A. As I said, I agree that it is, but one more time, I think many things in the history of science are relevant to this, and they've happened in other disciplines as well.
Q. You've already testified you're not an expert in physics or astrophysics?
A. That's correct.
Q. And you might not know this about me, but I'm not either.

A. I'm surprised.

Q. So I'm going to propose an agreement. I won't ask you any questions about the Big Bang, and you won't answer any questions about the Big Bang. Can we agree to that, Professor Behe?

MR. MUISE: Objection, Your Honor. He's trying to limit the testimony of the witness by some sort of agreement. He's obviously testified and explained why the relationship of the Big Bang is so important. He just answered his questions to try to proffer some prior agreement to the witness that he can't reference factors of prior testimony in cross examination. That just seems inappropriate, Your Honor.

THE COURT: What's your answer?

THE WITNESS: No. , I think references to the Big Bang are extremely appropriate to making clear why I think these -- making clear my views on these issues.

BY MR. ROTHSCHILD:

Q. Fair to say, Professor --

THE COURT: There you go, Mr. Muise.

BY MR. ROTHSCHILD:

Q. Fair to say, Professor Behe, that over the last two days of testimony, you've told us everything you know about the Big Bang that's relevant to the issue of

intelligent design and biology?

A. Well, I'm not sure. I would have to reserve judgment.

Q. You might have some more?

A. Perhaps.

Q. Let the record state, I tried.

MR. ROTHSCHILD: May I approach the witness, Your Honor?

THE COURT: You may.

BY MR. ROTHSCHILD:

Q. Professor Behe, I've showed you what we marked as Plaintiffs' Exhibit 726, and that's an article that was published in Christianity Today?

A. That is correct, yes.

Q. It's titled Tulips and Dandelions?

A. Yes.

Q. And it actually indicates that there was a debate, and there's actually a back and forth between you and another writer named Rebecca, I'm sure I'll butcher this, but Fleastra (phonetic)?

A. Fleastra (phonetic). She's a professor of biology (inaudible) College in California, yes, that's correct.

Q. This is an article you wrote on or about September or October 1998?

A. Yes, that's correct.

Q. And if you could turn to the second -- this is an argument that discusses intelligent design?

A. I think it does, but to be perfectly honest, I have not read this article since it was published seven years ago. So I am not entirely clear exactly what I said in here. But it certainly is likely to do so.

Q. Do you need to review it for a moment to confirm that?

A. That would be great. Thank you.

THE COURT: Take all the time you need to read it.

THE WITNESS: Thank you. Yes, thank you. Yes, that's correct.

BY MR. ROTHSCHILD:

Q. Matt, could you turn to the second page of this document? And Professor Behe, if you would flip to that page as well. It will be on your screen as well. And, Matt, if you could highlight the question on the bottom left-hand column, the last paragraph beginning with the word, what. And you asked the question in this article, what does this all mean for a Christian, correct?

A. Yes.

Q. And you said, On the one hand, not much, right?

A. That's correct.

Q. And, Matt, if you could go to the second column, and the second full paragraph, second full paragraph -- next paragraph. Thank you. Actually highlight those two. You say, On the other hand, scientific evidence of design means a lot for Christians for a couple of reasons. Correct? That's what you wrote?

A. That's correct, yes.

Q. Going down to the next paragraph, one of the reasons you give is, Christians live in the world with non-Christians. We want to share the Good News with those who have not yet grasped it and to defend the faith against attacks.

Materialism is both a weapon that many antagonists use against Christianity and a stumbling block to some who would otherwise enter the church. To the extent that the credibility of materialism is blunted, the task of showing the reasonableness of the faith is made easier, although Christianity can live with a world where physical evidence of God's action is hard to discern, materialism has a tough time with a universe that reeks of design. That's what you wrote, correct?

A. Yes, that's exactly what I wrote.

Q. And that concept of materialism, that's actually also mentioned in the section on the Wedge strategy that

we looked at yesterday, correct?

A. I think so, yes.

Q. And when you refer to the Good News there, that was not just the Yankees winning the world series around this time, correct?

A. That's correct. No, that is intended to mean the Christian gospel. So here, I was explaining, and I was speaking as a Christian in a magazine that is a Christian publication. And assuming the assumptions that Christians have from non-scientific -- from non-scientific areas, that is historical, theological, and philosophical principles, why I think, how I think this impacts Christian concerns.

And I emphasize that first paragraph that you read from, What does all this mean for a Christian? On the one hand, not much. The faith of Christians rests on the historical reality of events recorded in the gospels rather than on the next theory coming out of the laboratory.

By definition, Christians already believe in design because they believe in a designer. So by that -- I'm sorry. But just let me make one more point. So by that paragraph, I was trying to say that, in fact, design, apparent design in the world is not necessary for Christian belief.

Q. On one hand, it's not -- it doesn't mean a lot. On the other hand, it means quite a bit?

A. On the one hand, it's not necessary. But on the other hand, it can offer support to a Christian world view. And if I might refer back to the Big Bang, the Big Bang was taken by a number of people as evidence for a theological world view, and Christians have used that to argue for the plausibility of Christian views.

Nonetheless, simply because the Big Bang is compatible with Christianity, and because it makes some theistic views seem more plausible, that does not mean that the Big Bang itself is not a scientific theory.

And in the same sense, just because intelligent design is compatible with Christian views, or because it makes such views or other theistic views seem more plausible does not mean that intelligent design itself is not a scientific theory.

Q. I'd like to return to Darwin's Black Box. And that is where you're making your scientific argument, correct, Professor Behe?

A. That's correct.

Q. If you could turn to page 185 of that book. I'd actually like you to read -- we'll take turns here -- from the last paragraph on 185 beginning, molecular evolution, and go to the end of the chapter, which is

one more paragraph.

A. Molecular evolution is not based on scientific authority. There is no publication in the scientific literature, in prestigious journals, specialty journals, or books that describes how molecular evolution of any real, complex, biochemical system either did occur or even might have occurred.

There are assertions that such evolution occurred, but absolutely none are supported by pertinent experiments or calculations. Since no one knows molecular evolution by direct experience, and since there is no authority on which to base claims of knowledge, it can truly be said that, like the contention that the Eagles will win the Super Bowl this year, the assertion of Darwinian molecular evolution is merely bluster.

Publish or perish is a proverb that academicians take seriously. If you do not publish your work for the rest of the community to evaluate, then you have no business in academia. And if you don't already have tenure, you will be banished.

But the saying can be applied to theories as well. If a theory claims to be able to explain some phenomenon, but does not generate even an attempt at an explanation, then it should be banished. Despite

comparing sequences and mathematical modeling, molecular evolution has never addressed the question of how complex structures came to be.

In effect, the theory of Darwinian molecular evolution, has not published, and so it should perish.

Q. That was your view in 1996?

A. Yes, that's correct.

Q. That is still your view today?

A. Yes, it is. And if I may elaborate on that?

Q. Professor Behe, the answer was yes?

A. Well, I want to tell you what my view was.

Q. Professor Behe, you understand that your counsel will have an opportunity to ask follow-up questions after I'm done with my cross examination?

A. Is that correct?

Q. That is. Unless the judge rules otherwise, he will have that chance, so the answer to my question is yes? That's still your view today?

MR. MUISE: Dr. Behe is trying to completely answer his question. And counsel is attempting to prevent him from doing so.

THE COURT: Well, he's asking him a yes/no question.

MR. MUISE: I don't think it's a question that can be answered yes no. He has built in assertions

that can't just be answered yes or no.

THE COURT: If he says he can't answer it yes or no, then Mr. Rothschild is stuck with that answer. So you can answer the question as you see fit.

THE WITNESS: No, that's not a completely accurate view.

BY MR. ROTHSCHILD:

Q. What's changed, Professor Behe?

A. That does not go into sufficient detail to describe my view.

Q. I hesitate to ask whether this will involve the Big Bang, but give us a little more detail.

A. The detail is actually simply this, that by these publications, I mean detailed rigorous accounts for complex molecular machines, not just either hypothetical accounts or sequence comparisons or such things.

Q. And so with that qualification, that is your view?

A. Yes.

Q. Now you have never argued for intelligent design in a peer reviewed scientific journal, correct?

A. No, I argued for it in my book.

Q. Not in a peer reviewed scientific journal?

A. That's correct.

Q. And, in fact, there are no peer reviewed articles

by anyone advocating for intelligent design supported by pertinent experiments or calculations which provide detailed rigorous accounts of how intelligent design of any biological system occurred, is that correct?

A. That is correct, yes.

Q. And it is, in fact, the case that in Darwin's Black Box, you didn't report any new data or original research?

A. I did not do so, but I did generate an attempt at an explanation.

Q. Now you have written for peer reviewed scientific journals on subjects other than intelligent design, correct?

A. Yes.

Q. And in those articles, you did report original research and data, at least in many of them, correct?

A. Yes.

Q. You would agree that there are some journals that are more difficult than others to get one's research published in?

A. Yes, that's correct.

Q. Proceedings of the National Academy of Science?

A. Yes.

Q. Nature?

A. That's correct.

Q. Science?
A. Yes.
Q. Journal of Molecular Biology?
A. That's easier than the other ones, but, yes.
Q. Still pretty good?
A. Yeah. I would take it, sure.
Q. In fact, you have taken that for some of these publications in your non-intelligent design work?
A. That's correct.
Q. And you've also served as a peer reviewer, correct?
A. Yes.
Q. And when you do that, you get a submission from a scientist, correct? You receive the submission from the editor?
A. From the editor, yes.
Q. And you review those submissions carefully?
A. Yes, I do.
Q. There are some sort of professional expectations about how peer reviewers do their task?
A. Yes, you're supposed to read the manuscripts carefully and see if you can make suggestions and criticisms.
Q. You look at the experimental results?
A. Sure.

Q. You look -- you try to make a determination whether the techniques were proper?

A. That's correct.

Q. Try to make an assessment about whether conclusions follow from the data?

A. That's correct.

Q. You analyze whether there are gaps and problems in the experiment?

A. Yes, that's right.

Q. And on occasions, you've communicated false in articles that you were peer reviewing, correct?

A. That's correct.

Q. That's happened to you as well?

A. Sure.

Q. All part of the scientific process, right?

A. Yes, that's correct.

Q. Okay. Now you stated on Monday that Darwin's Black Box was also peer reviewed, right?

A. That's correct.

Q. You would agree that peer review for a book published in the Trade Press is not as rigorous as the peer review process for the leading scientific journals, would you?

A. No, I would not agree with that. The review process that the book went through is analogous to peer

review in the literature, because the manuscript was sent out to scientists for their careful reading.

Furthermore, the book was sent out to more scientists than typically review a manuscript. In the typical case, a manuscript that's going to -- that is submitted for a publication in a scientific journal is reviewed just by two reviewers. My book was sent out to five reviewers.

Furthermore, they read it more carefully than most scientists read typical manuscripts that they get to review because they realized that this was a controversial topic. So I think, in fact, my book received much more scrutiny and much more review before publication than the great majority of scientific journal articles.

Q. Now you selected some of your peer reviewers?

A. No, I did not. I gave my editor at the Free Press suggested names, and he contacted them. Some of them agreed to review. Some did not.

Q. And one of the peer reviewers you mentioned yesterday was a gentleman named Michael Atchison?

A. Yes, I think that's correct.

Q. I think you described him as a biochemist at the Veterinary School at the University of Pennsylvania?

A. I believe so, yes.

Q. He was not one of the names you suggested, correct?
A. That is correct.
Q. In fact, he was selected because he was an instructor of your editor's wife?
A. That's correct. My editor knew one biochemistry professor, so he asked, through his wife, and so he asked him to take a look at it as well.
Q. And you found out his name later, correct?
A. That's right, yes.
Q. From your editor?
A. No. I think actually Professor Atchison himself contacted me later after the book came out.
MR. ROTHSCHILD: May I approach the witness?
THE COURT: You may.
BY MR. ROTHSCHILD:
Q. Professor Behe, I've shown you an exhibit marked P-754, and that's an article titled -- or a writing titled Mustard Seeds by Dr. Michael Atchison?
A. Yes.
Q. That is a picture of him, correct?
A. I think so. I haven't seen him in a few years.
Q. It certainly identifies him as the head of biochemistry in the department of animal biology at the University of Pennsylvania?

A. Yes, he's the department chair in the vet school.

Q. Professor Behe, I'd like you to look at the first -- I'm sorry, the last paragraph on the first page, and I'm going to read this for the record. This is what Professor Atchison wrote. While I was identifying myself as a Christian --

MR. MUISE: Objection, Your Honor. This is hearsay, and there's been no foundation he even knows this thing exists. He's reading into the record a document that he apparently got from somewhere that we don't have any foundation for. What he's reading into the record is absolutely hearsay.

MR. ROTHSCHILD: I'm not proposing to introduce this into evidence at this point, although I'll reserve that right. But this is for purposes of impeachment. I think it's highly relevant.

MR. MUISE: He hasn't even shown Dr. Behe even knows anything about this article or where it's from or any basis for it.

MR. ROTHSCHILD: I'm going to ask him about the facts that are stated in this article.

THE COURT: Why isn't it fair for impeachment purposes?

MR. MUISE: It's -- again, Your Honor, I guess you have to see how this is going to go. I was

objecting because he's going to read into the record a portion of this document that he hasn't even established that Dr. Behe has any knowledge about.

THE COURT: Well, it's not a transcript.

MR. MUISE: That's true. It's a document that was produced out of court.

THE COURT: I understand. But to read it into the record, as you might not with a transcript, that's not reason alone to not permit it in the proceedings. I think, given the witness's answer, it's fair impeachment. Now --

MR. MUISE: I mean, impeachment in what regard? That he doesn't know this guy? He does know this guy? This guy is a biochemist. What's the impeachment? My looking at this, it appears that he's just try to make an attack against Professor Atchison because he apparently has some religious views, which apparently is a theme throughout this case.

MR. ROTHSCHILD: That is absolutely not the case, Your Honor. And I think that will become clear as we go through the document.

THE COURT: All right. Inasmuch as this is a bench trial, I'm going to give Mr. Rothschild some latitude. I'll overrule the objection.

BY MR. ROTHSCHILD:

Q. While I was identifying myself as a Christian in Philadelphia, a biochemist named Michael Behe at Lehigh University was writing a book on evolution. As a biochemist, Behe found the evidence far Darwinian evolution to be very thin.

In fact, when he looked at the cell from a biochemical perspective, he believed there was evidence of intelligent design. Behe sent his completed manuscript to the Free Press publishers for consideration. That is your publisher of Darwin's Black Box, correct?

A. That's right.

Q. The editor was not certain that this manuscript was a good risk for publication. There were clearly theological issues at hand, and he was under the impression that these issues would be poorly received by the scientific community.

If the tenets of Darwinian evolution were completely accepted by science, who would be interested in buying the book? The next paragraph says, The editor shared his concerns with his wife. His wife was a student in my class. Again, this is consistent with your understanding of Mr. Atchison's -- Dr. Atchison's involvement?

A. Yes. As I said, I think the editor, his wife was

in vet school and knew that she was taking biochemistry and so asked the professor in that class.

Q. She advised her husband to give me a call. So unaware of all this, I received a phone call from the publisher in New York. We spent approximately ten minutes on the phone. After hearing a description of the work, I suggested that the editor should seriously consider publishing the manuscript.

I told him that the origin of life issue was still up in the air. It sounded like this Behe fellow might have some good ideas, although I could not be certain since I had never seen the manuscript. We hung up, and I never thought about it again, at least until two years later.

And then in the next session titled A Blessing Years Later, Dr. Atchison writes, After some time, Behe's book, Darwin's Black Box, the Free Press, 1996, was published. It became an instant best seller and was widely acclaimed in the news media.

It is currently in its 15th printing and over 40,000 copies have been sold. I heard about it, but could not remember if this was the same book that I received the call about from the publisher. Could it be?

In November 1998, I finally met Michael Behe when

he visited Penn for a faculty outreach talk. He told me that, yes, indeed, it was his book that the publisher called me about. In fact, he said my comments were the deciding factor in convincing the publisher to go ahead with the book. Interesting, I thought.

You did meet Dr. Atchison, correct?

A. Yes, later, I did, yes.

Q. And is this your understanding of the kind of peer review Dr. Atchison did of your book?

A. No, it wasn't. I thought he had received a copy of the manuscript and went through it. So -- but -- so, yes, I was under a different impression.

Q. So he didn't review your manuscript carefully, he didn't review it at all, correct, Dr. Behe?

MR. MUISE: Objection, Your Honor. He has no personal knowledge. Again, he's using this document to assert the truth of the document, and Dr. Behe can only testify as to what his knowledge is.

THE COURT: I think that's a fair objection. You'll have to rephrase. The objection is sustained.

BY MR. ROTHSCHILD:

Q. You have no basis by which to dispute this account in this document, correct, Professor Behe?

A. My understanding is different from what is given in this account.

Q. And you did see some comments from some of your other reviewers, is that right?

A. That's correct.

Q. And they confirmed that you hadn't made any errors in the biochemistry, correct?

A. Yes.

Q. You were describing the bacterial flagellum correctly, its function, its appearance?

A. Yes.

Q. But they were reluctant or disagreed about intelligent design, correct?

A. Several were, yes, uh-huh.

Q. You also explained that, why you don't expect intelligent design at scientific conferences, correct?

A. Yes, that's because I consider it to be a poor forum for communicating such ideas.

Q. That's because typically you would present in the sort of poster sessions?

A. That's correct, yes.

Q. That doesn't really provide the opportunity to discuss it in detail to the audience?

A. That's correct, yes.

Q. It's difficult to impart understanding to your fellow scientists in that abbreviated form?

A. Yes. And not many come by. A few people wander

by, yes.

Q. It's not really an amenable way to present it?

A. That's right. It's usually brief conversations.

Q. You need to really present it in more detail for scientists to understand it?

A. That's why I discuss it in seminars and so on before scientific audiences, yes.

Q. Fair to say that, that rule probably makes even more sense with high school students, Professor Behe?

A. I'm sorry, what rule is that?

Q. The rule that you can't just present intelligent design in an abbreviated fashion?

A. Well, you certainly will not get a full understanding of intelligent design in a brief session. However, I think, if we're talking about high school students, such as you mentioned, it certainly might be a good thing to mention topics to them that they might consider pursuing in-depth outside the classroom.

Q. But an abbreviated statement is not going to give them a good understanding anymore than it would your fellow scientists, is that right?

A. A brief statement of any complex subject certainly will not give a person a complete understanding of it.

Q. Speaking of the students, you went through a

number of statements regarding evolution that you described as philosophical and religious, correct?

A. You mean, during my testimony yesterday?

Q. I think it was Monday, or maybe it was yesterday. It's hard to keep track. But some statements by Professor Miller, by Dr. Dawkins, by Peter Singer?

A. Yes, I did.

Q. And you would characterize those as non-scientific statements, rather philosophical or religious or political statements?

A. That's correct.

Q. Should they be taught to students in a high school biology class?

A. Well, that's an interesting idea. Since a high school biology class, in my opinion, is not, should not simply be focused on producing scientists for the next generation, since most students won't go on to become scientists, but rather it's for their liberal education, understanding science, and also understanding science's role in the world, I think, in fact, it might be appropriate not to teach this in a sense of saying, here are things that are true, but to discuss the comments that have been made about scientific theories that they are learning in their class to show the students that science is not something that is confined to the

library, but the ideas generated by science have far reaching ramifications in the opinion of many learned people, and that, here are some of them. And I think that's actually an excellent idea for a science classroom.

Q. In biology class?

A. In biology class, in physics class, and other science classes as well.

Q. And you definitely agree that students should be taught that some biochemical systems are intelligently designed, correct?

A. I'm sorry. Could you restate --

Q. Your testimony over the last two days stands for the proposition that students should be told that biological life has been intelligently designed?

A. I'm afraid I don't think I said that. And if I did, I'm not quite -- well, I'm not sure that I said that. I didn't say, students should be told that some biochemical systems are intelligently designed. If I said that -- it's a good idea to give students a couple different frameworks where some data has been interpreted, so that they can see the difference between fact and theory, fact and interpretation, and so on.

I think intelligent design is, in fact, a good way to do that, yes.

Q. Fair to say that, what you're saying is that, one valid scientific interpretation that should be taught to students, along with other theories, is that some aspects of biological life were intelligently designed?

A. I'm saying that, in their discussion of these issues, students can be told that some scientists have proposed this idea, and here are the reasons that they propose. Here are the data that they point to. Here is what other scientists have proposed.

They have proposed a different theory. Here is the data that they point to. Here are the explanations they give. Here are the responses that they gave to that first group. Here are the responses that the first group gave back. The point -- I'm sorry. The point is to -- is not to instruct students that this view is correct, as we've heard many times here.

We know that theories can be wrong, that no theory is guaranteed to be true. So the point is to get them to discuss data from different points of view.

Q. So students should be told that one scientific theory is that some aspects of biological life were intelligently designed?

A. I think it would be good pedagogy to discuss the fact that some scientists do think that some aspects of life were intelligently designed, yes.

Q. By an intelligent designer?

A. Well, intelligently designed, yes, it implies a designer, yes.

Q. So students should be told that there is a scientific theory or that scientists contend that some aspects of biological life were intelligently designed by an intelligent designer, good pedagogy?

A. Again, I think you have to look at the context. There is a tendency for people to think that when you say, you're going to teach something in the classroom, that means you're going to present it to students and tell them that is true.

Q. I'm not suggesting that, Professor Behe. My question was, you think it's good pedagogy --

MR. MUISE: Objection, Your Honor. He's attempting to answer the question.

MR. ROTHSCHILD: He's attempting to evade the question, Your Honor. I'm being very clear. He helped me correct it, and I corrected it.

THE COURT: Let's let him finish the answer. Finish the answer.

THE WITNESS: It's just that -- I'm just saying that students should be presented different views for discussion, not in the sense of saying, this is either valid or not valid, this is true or not true, but

just to give different points of view.
BY MR. ROTHSCHILD:
Q. I understand that. So what you're saying is, it's good pedagogy to tell students that one scientific theory about biological life is that some aspects of biological life were designed by an intelligent designer?
A. I would phrase it differently. I would say, it's good pedagogy to tell some students that some people think that this is the case.
Q. Fair enough. Is it also good pedagogy to tell students in biology class, some scientists argue that there is no intelligent designer?
A. I think it would be good pedagogy to point out that, in fact, the majority view of science is that random mutation and natural selection without any apparent design is responsible for what we find in biology.
Q. And included in that statement, it would be good pedagogy to tell students, those scientists contend there is no intelligent designer? Is that good pedagogy, to tell students that scientists think there is no intelligent designer?
A. No, it would not be good pedagogy, because there are many different ideas tangled together in your

statement. Many scientists who think that, for example, Darwinian processes are correct, nonetheless do think that there is a designer in a different sense.

One is using the word designer here in several different senses; designer of laws of nature versus designer of specific aspects of nature, and so on. So I think your question is a bit ambiguous.

Q. Fair to say that my statement, that telling students there is no intelligent designer, has religious and philosophical baggage as well as scientific?

A. I'm sorry. Would you say that again?

Q. Fair to say that the statement I propose, telling students there is no intelligent designer in science class, has religious and philosophical aspects?

A. Yes. Like many theories, it does.

Q. Are there gaps and problems with the theory of intelligent design?

A. Yes.

Q. Should students, high stool students being made aware of intelligent design be made aware that there are gaps and problems in the theory of intelligent design?

A. Absolutely.

Q. If they are being made aware of intelligent design, but are not being told there are gaps and problems in intelligent design, are they being misled,

Professor Behe?

A. Well, again, they're not receiving full instruction then in intelligent design. And so you could, if you had more time, you could certainly go into those, and I would certainly recommend that you do so.

MR. ROTHSCHILD: May I approach the witness?

THE COURT: You may.

BY MR. ROTHSCHILD:

Q. Professor Behe, what I've showed you is Plaintiffs' Exhibit 721. Do you recognize that as the article you wrote with David Snoke entitled Simulating Evolution by Gene Duplication of Protein Feature that Requires Multiple Amino Acid Residues?

A. Yes.

Q. And you discussed that over the last couple days?

A. Yes.

Q. Now in this, you described this as a theoretical paper?

A. Yes.

Q. You didn't culture organisms?

A. No.

Q. Or isolate proteins?

A. No, this was a computer study.

Q. Okay. Like what you criticized Dr. Pennock for doing?

A. I didn't criticize him for doing computer studies. I criticized his particular model because I thought it was not -- it had dissimilarities or it had assumptions built into it that I thought were inappropriate.

Q. It didn't represent what actually happens in biological life, that's your --

A. That's correct, yes.

Q. It didn't represent what is actually understood to happen in the theory of evolution?

A. Well, some aspects of it were sort of like what has happened in evolution, but it was -- it went a little bit too far afield, in my opinion, for it to be a useful model.

Q. And this study, this computer simulation was based on gene sequences that were published by other laboratories or other researchers?

A. No, not really, no. It was a -- based essentially on simply what we know about protein structure, was not a sequence study.

Q. When you say, what we know about protein, that was based on the work of other researchers?

A. Yes, uh-huh.

Q. And you studied a particular type of mutation, a point mutation?

A. That's correct.

Q. And let me just ask you a few questions, and you tell me if I'm fairly summarizing the results of your computer simulation. What you're asking is, how long will it take to get -- and please follow with me, I'm trying to do this slowly and methodically -- two or more specific mutations, in specific locations, in a specific gene, in a specific population, if the function is not able to be acted on by natural selection until all the mutations are in place, if the only form of mutation is point mutation, and the population of organisms is asexual?

A. I would have to look at that statement closely because there are so many different aspects to it that I don't trust myself to sit here and listen to you say that and form a correct judgment.

Q. Anything I said about that sound incorrect?

A. If you repeat it again, I'll try.

Q. I'd be happy to. Two or more specific mutations?

A. Actually, this dealt with one or more.

Q. One or more mutations?

A. Yes. If you notice, in figure -- if you notice in figure 3, you look at the x axis, you notice that there are data points there that start at one. So we considered models where there were one, two, and more

mutations.

Q. Fair enough. In specific locations?

A. No, that's not correct. We assumed that there were several locations in the gene that could undergo these selectable mutations, but we did not designate where they were.

Q. In the specific gene?

A. We were considering one gene, yes.

Q. In a specific population?

A. Yes.

Q. Okay. If the function is not able to be acted on by natural selection until all mutations are in place?

A. Yes, that's what's meant by multiple amino acid residue, multi-residue feature, yes.

Q. If the only form of mutation is point mutation?

A. Yes, that's a very common type of mutation, which is probably half or more of the mutations that occur in an organism.

Q. And if the population of organisms is asexual?

A. Yes, we did not -- actually, we did not confine it just to asexuals, but we did not consider recombination.

Q. Are prokaryotes an example of the kind of organism that you were studying there?

A. Again, we weren't studying organisms, but, yeah,

they're a good example of what such a model has in mind.

Q. And to say this very colloquially, you conclude that it will take a large population a long time to evolve a particular function at disulfide bond, right?

A. A multi-residue feature. That's correct, that's correct.

Q. And specifically --

A. I'm sorry.

Q. Go ahead.

A. Let me just finish. Depending on -- as we emphasize in the paper, it depends on the population size. And, of course, prokaryotes can oftentimes grow to very large population sizes.

Q. And here the conclusion, the calculations you concluded was that, if you had a population of 10 to the 9th power, that's a population of 1 billion?

A. That's correct.

Q. To produce a novel protein feature through the kind of multiple point mutations you're talking about, it would take 10 to the 8th generations, that's what it says in the abstract, correct?

A. If, in fact, it was -- if, in fact, the intermediate states were not selectable.

Q. Okay.

A. And if this is by gene duplication as well.

Q. Okay. So 10 to the 8th generation, that's 100 million generations?

A. That's correct.

Q. And yesterday, you explained about bacteria, that 10,000 generations would take about two years in the laboratory, correct?

A. Yes.

Q. So 100 million generations, that would take about 20,000 years?

A. I'm sorry?

Q. 100 million generations, which is what you calculated here, that would take about 20,000 years?

A. Okay, yes.

Q. And those are numbers based on your probability calculations in this model, correct?

A. Yes.

Q. Now it would be true that, if you waited a little longer, say, instead of 10 to 9th generations, 10 to the 10th generations, then it would mean that you wouldn't need as big a population to get the function that you are studying?

A. That's right. The more chances you have, the more likely you are to develop a feature. And the chances are affected by the number of organisms. So if you have a smaller population time, and more

generations, that could be essentially equal to a larger population size and fewer generations.

Q. So, as you said, so if we get more time, we need less population to get to the same point, and if we had more population, less time?

A. That's correct, yes.

Q. Now would you agree that this model has some limitations?

A. Sure.

Q. And you, in fact, were quite candid in indicating that in the paper?

A. That's correct.

Q. And if we could turn to, what I believe is, page 8 of the document. And if you look in the paragraph that's actually continued from the previous page that says, we strongly emphasize. And if you could --

A. I'm sorry. What page number is that?

Q. It's page 8 in the document. And it's up on the screen as well.

A. Yes, okay. I've got it.

Q. Could you read into the record the text to the end of the paragraph beginning with, we strongly emphasize?

A. We strongly emphasize that results bearing on the efficiency of this one pathway as a conduit for

Darwinian evolution say little or nothing about the efficiency of other possible pathways. Thus, for example, the present study that examines the evolution of MR protein features by point mutation in duplicate genes does not indicate whether evolution of such features by other processes, such as recombination or insertion/deletion mutations, would be more or less efficient.

Q. So it doesn't include recombination, it doesn't include insertion/deletion of the mutations?

A. That's correct.

Q. And those are understood as pathways for Darwinian evolution?

A. They are potential pathways, yes.

Q. This study didn't involve transposition?

A. No, this focuses on a single gene.

Q. And transpositions are, they are a kind of mutation, is that right?

A. Yes. They can be, yes.

Q. And so that means, this simulation didn't examine a number of the mechanisms by which evolution actually operates?

A. That is correct, yes.

Q. And this paper, let's be clear here, doesn't say anything about intelligent design?

A. Yes, that's correct. It does imply irreducible complexity but not intelligent design.

Q. But it doesn't say it?

A. That's correct.

Q. And one last other question on your paper. You concluded, it would take a population size of 10 to the 9th, I think we said that was a billion, 10 to the 8th generations to evolve this new disulfide bond, that was your conclusion?

A. That was the calculation based on the assumptions in the paper, yes.

MR. ROTHSCHILD: May I approach the witness, Your Honor?

THE COURT: You may.

BY MR. ROTHSCHILD:

Q. What I've marked as Exhibit P-756 is an article in the journal Science called Exploring Micro--

A. Microbial.

Q. Thank you -- Diversity, A Vast Below by T.P. Curtis and W.T. Sloan?

A. Yes, that seems to be it.

Q. In that first paragraph, he says, There are more than 10 to the 16 prokaryotes in a ton of soil. Is that correct, in that first paragraph?

A. Yes, that's right.

Q. In one ton of soil?
A. That's correct.
Q. And we have a lot more than one ton of soil on Earth, correct?
A. Yes, we do.
Q. And have for some time, correct?
A. That's correct, yes.
Q. And, in fact, he gives us a good way of comparing it. It says, as compared to a mere 10 to the 11th stars in our galaxy?
A. Yes, that's what he writes, uh-huh.
Q. And 10 to the 16th prokaryotes is 7 orders of magnitude higher than the population you included in your calculations, correct?
A. No. We considered a wide range of populations, and we considered a wide range of number of substitutions that would be -- or point mutations that would be necessary. You're focusing on two, but perhaps I can direct your attention again to that figure from the paper -- excuse me. Let me find it.
The best place I think to look is figure 6, which is on page 10 of the document. Up in the upper right-hand corner, that figure there.
Q. Sure.
A. If you look on the bottom, the x axis there, the

bottom of the figure that's labeled lambda, it has the numbers 2, 4, 6, 8, 10, and so on, those are the number of point mutations that we consider perhaps some multi-residue feature might entail. As we said in the paper, forming a new disulfide bond might require as few as two point mutations.

But forming other multi-residue features such as protein, protein binding sites might require more. And so the number on the X axis lambda 2, 4, 6, 8, those are the number of point mutations that we entertained or we calculated numbers for to see how long such things would be expected to take under our model.

And if you look up at the top axis, the top x axis labeled N, at the top of the figure. N stands for population size. Okay. So if you look at the figures there on the left, it's slanted, and it's not enlarged yet, so it's hard to see. It says, 10 to the 6th. That's a million. And then skip a line. These are in every 10 to the 3rd increments of population size. That would be 10 to the 9th.

The next label is 10 to the 12th, which is a trillion. The next label is 10 to the 18th, which is much more. The next label is 10 to the 24th, which is much, much, much more. The next label, 10 to the 30th, which, again, is very much more.

So, in fact, we considered population sizes from 1000 all the way up to 10 to the 30th, and multi-residue features from 2, which might involve disulfide bonds, up to many more, which might be involved in protein, protein binding sites.

Q. 10 to the 30th, that is quite a lot, right?

A. Yes. That's roughly what is calculated to be the bacterial population of the Earth in any one year. And so over the course of the billion year, 4 billion year history of the Earth, there would probably be a total of roughly 10 to the 40th.

Q. And so in the case of prokaryotes, which you said was a good example of what you were studying, 10 to the 16th in one ton of soil?

A. Yes.

Q. So a few tons of soil, and we've gone past that 10 to the 30th?

A. Well, no. In the 10 to the 14th tons of soil. 10 to the 30th is the number that's in the entire world, according to the best estimates, including the ocean as well as soil. So -- but I agree with your point, that there's a lot of bacteria around and certainly more than 10 to the 9th.

Q. So just with the prokaryotes, 10 to the 16th, 7 orders of magnitude higher than what you were

calculating here?

A. That's certainly true, but in our paper, we had our eye not only on prokaryotes, but also on eukaryotes as well, which, if you leave out recombination, one can -- they certainly undergo point mutations. They certainly have genes and so on. So much of this is also applicable to eukaryotes.

And the populations of eukaryotes and certainly larger plants and animals are much, much smaller than populations of bacteria. So we view our results not just as supplying that, but to giving us some feel for what can happen in more complex organisms as well.

Q. Well, you're not talking about more complex organisms here, are you?

A. I think we do. I think at the end, if I'm not mistaken, if I remember correctly -- okay, yes. On page 11, the second full paragraph, on page 11. It begins on the right-hand column, the second full paragraph. It says, The lack of recombination in our model means it is most directly applicable to haploid, asexual organisms. Nonetheless, the results also impinge on the evolution of diploid sexual organisms.

The fact that very large population sizes, 10 to 9th or greater, are required to build even a minimal MR feature requiring two nucleotide alterations within 10

to the 8th generations by the processes described in our model, and that enormous population sizes are required for more complex features or shorter times, seems to indicate that the mechanism of gene duplication and point mutation alone would be ineffective, at least for multicellular diploid species, because few multicellular species reach the required population sizes.

Thus, mechanisms in addition to gene duplication and point mutation may be necessary to explain the development of MR features in multicellular organisms.

So here we were trying to point out that, because of the results of the calculation, it seems that, when we're trying to explain MR features in multicelled organisms, then we're going to have to look to other processes for that.

Q. Okay. So if we exclude some of the processes by which we understand evolution to occur, it's hard to get there for multicellular organisms?

A. I'm sorry.

Q. If we exclude some of the mechanisms by which we understand evolution to occur, like recombination, it's hard to get there?

A. Yes.

Q. And bringing it back to the prokaryotes. We're in agreement here, the number of prokaryotes in 1 ton of

soil are 7 orders of magnitude higher than the population, you said it would take 10 to the 8th generations to produce the disulfide bond?

A. Yeah, certainly. Yeah, the bacteria are -- can grow to very large population sizes.

Q. So the time would be?

A. Much shorter.

Q. Much shorter?

A. Absolutely.

MR. ROTHSCHILD: Your Honor, this would be a good time to take a break.

THE COURT: All right. Why don't we take our morning recess now, and we will return in about 20 minutes. Thank you.

(Whereupon, a recess was taken at 10:16 a.m. and proceedings reconvened at 10:40 a.m.)

THE COURT: All right. We resume with Mr. Rothschild.

MR. ROTHSCHILD: Thank you.

CROSS EXAMINATION (CONTINUED)

BY MR. ROTHSCHILD:

Q. Professor Behe, I'd like to turn our attention now to Darwin's Black Box. What you explain in Darwin's Black Box is that, modern science has been able to explore life at the molecular level in a way that was

not possible with Darwin, is that right?

A. That's right.

Q. Or actually for sometime after?

A. That's correct.

Q. And it's that life at the molecular level that you are referring to when you call it Darwin's Black Box, something he couldn't look into?

A. That's correct.

Q. In fact, in the book, you call it the last black box?

A. Is that right? Could you show me where I do that?

Q. Sure.

A. I'm sorry.

Q. If you could turn to page 13.

A. Yes.

Q. Okay. And if you look at the paragraph, you quote from a ditty from Jonathan Swift?

A. Yes.

Q. And then you say, in the late 20th century, we are in the flood tide of research on life, and the end is in sight. The last remaining black box was the cell, which was opened to reveal molecules, the bedrock of nature, the last black box, correct?

A. I'm sorry. Yes. Okay, the last remaining black

box was the cell, yes.

Q. Okay. And then you conclude at the end of that paragraph, that black box now stands open?

A. Yes.

Q. And I think you've testified, and I think it's apparent in your book that, science has discovered a level of complexity that prior generations of scientists never predicted?

A. That's correct.

Q. And your conclusion is that, that complexity provides an insurmountable obstacle to Darwinian evolution?

A. Well, you always try to avoid words like insurmountable, but it certainly points to severe problems for it, yes.

Q. And you reached the conclusion that certain biochemical systems could not be produced by natural selection because they are irreducibly complex?

A. Again, you've got to be careful about using absolutes like could not, but it certainly seems like they could not.

Q. And these systems also have what you describe as a purposeful arrangement of parts?

A. Yes.

Q. And, therefore, you concluded they were

intelligently designed?

A. Yes.

Q. And in terms of the structure of the systems, you base your conclusions on work on the structure and function of those molecular systems done by other scientists?

A. That's correct.

Q. Many other scientists?

A. That's correct.

Q. And you read a lot of papers that published in peer review journals describing the structure and function of the systems that you discuss in the book?

A. That's correct.

Q. And those scientists in those papers don't argue that their work supports irreducible complexity as you define it?

A. That's correct.

Q. Or intelligent design?

A. That's correct.

Q. And, in fact, a good number of them would have actively opposed that?

A. And still do.

Q. And the -- Matt, if you could pull up page 39, please, and highlight the bottom paragraph there at the bottom. This is the place in Darwin's Black Box where

you explain what you mean by irreducibly complex?

A. Yes.

Q. And as you testified, I believe, on Monday, a scientist named Alan Orr noted an ambiguity in your definition?

A. Yes.

Q. And you responded to that?

A. Yes.

Q. And you tweaked that definition?

A. Right.

Q. Matt, could you pull up the tweaked definition that he created? And I have inserted the words which is necessarily composed to make this paragraph consistent with the tweaking you described you did in response to Alan Orr. And I'm going to read that. And I've called it here the modified definition of irreducible complexity from Darwin's Black Box.

What it says is, By irreducibly complex, I mean a single system which is necessarily composed of several well-matched, interacting parts that contribute to the basic function, wherein the removal of any one of the parts causes the system to effectively cease functioning.

An irreducibly complex system cannot be produced directly, that is by continuously improving the initial

function which continues to work the same mechanisms by slight successive modifications of a pre-cursor system, because any pre-cursor to an irreducibly complex system that is missing a part is, by definition, non-functional.

An irreducibly complex biological system, if there is such a thing, would be a powerful challenge to Darwinian evolution. Since natural selection can only choose systems that are already working, then if a biological system cannot be produced gradually, it would have to arise as an integrated unit in one fell swoop for natural selection to have anything to act on.

So that's the last paragraph on page 39 adding the words that you did in response to Dr. Orr?

A. Yes.

Q. And when you say, it would have to arise as an integrated unit in one fell swoop for natural selection to have anything to act on, what you're saying is, whatever the proposed pre-cursor was, would die because it doesn't have all of its parts?

A. No, that's not correct. Die is not -- the function of a system is not to live, it's to do something particular. You say that the system did not work, it did not do its function. For example, the bacterial flagellum would not work without the necessary

parts.

Q. And, therefore, there would be no successive generation because that flagellum would not move on to the next generation?

A. No, that's not right. A bacterium that is missing a flagellum would certainly go on and continue to grow. It can reproduce and so on. But the flagellum doesn't work. And this is from my article, I believe, in Biology and Philosophy, where I responded to Professor Orr.

And in that article, I specifically said that he had a misconception that irreducible complexity meant that an organism could not live without this, without the system that we were talking about. And that's not what I meant by it.

Q. So the organism with half a flagellum or parts of a flagellum could continue to live in that circumstance, it just wouldn't have an operating flagellum?

A. Sure, yes.

Q. Now could you turn again to Exhibit 718, which is that article, Reply to my Critics, that you just discussed?

A. Yes.

Q. Okay. On -- could you turn to page 695?

A. Yes.

Q. And in the first full paragraph, you repeat some of the text that we just saw from Darwin's Black Box about why irreducible complex systems are obstacles for Darwinian explanations?

A. Yes.

Q. And then you write, However, commentary by Robert Pennock and others has made me realize that there is a weakness in that view of irreducible complexity. The current definition puts the focus on removing a part from an already functioning system.

And then continuing on after footnote 5, you say, The difficult task facing Darwinian evolution, however, would not be to remove parts from sophisticated pre-existing systems, it would be to bring together components to make a new system in the first place.

Thus, there is an asymmetry between my current definition of irreducible complexity and the task facing natural selection. I hope to repair this defect in future work. That's what you wrote, correct?

A. Yes.

Q. You haven't repaired that defect, have you, Professor Behe?

A. No, I did not judge it serious enough to do so yet.

Q. So the defect you identified was, you were

starting with the function and working backwards, removing parts, correct?

A. That's correct, yes.

Q. And natural selection is actually operating in the opposite direction, you start with the pre-cursors and then develop until you get to the system you're studying?

A. Yes, that would be a more difficult task.

Q. That's the asymmetry?

A. Yes.

Q. And that asymmetry has not been repaired?

A. That asymmetry is not really relevant to biological circumstances. In the sentence that you skipped over in that paragraph, I talk about what Professor Pennock discussed in his book in making this point.

If I could just quote from that. He says, Thus, seeking a counterexample to irreducible complexity entower a battle. Pennock writes about a part in a sophisticated chronometer whose origin is simply assumed which breaks to give a system that he posits can nonetheless work in a simpler watch in a less demanding environment.

So I viewed Professor Pennock's objection -- of course, Professor Pennock is a philosopher, and that was

an interesting philosophical turn on my discussion, I thought, but that is not -- that is not -- I did not consider that to be relevant to biology.

Q. Okay. The task facing natural selection, that's not relevant to biology?

A. No, the particular pathway that Professor Pennock had in mind where one assumes that one has a very sophisticated pre-existing system whose origin has been left unexplained and has just postulated, which then goes on to breakdown and give less sophisticated parts, that is the part that I don't think is really relevant to biology.

Q. If you start with the system and then break it down removing parts, that's not relevant to biology?

A. Well, that's not the difficult task facing evolution.

Q. Right. And you're not testing the natural -- the difficult task facing evolution, which starts from the pre-cursors and moves forward to the system you're studying. You're going backwards. Isn't that what irreducible complexity proposes?

A. It does not propose that anything goes backwards. It asks, how do we identify this problem for Darwinian evolution? And if you can remove a part, and a system no longer works, then the system needs those parts to

work.

And so the problem, how you put that together by numerous successive slight modifications, as Charles Darwin thought one had to do, is, I think, illustrated by that.

Q. In any event, you have not repaired this asymmetry?

A. That's correct.

Q. And that article was written four years ago, correct?

A. Yes.

Q. Now you've used the expression, produced directly. I think that's in the definition. Matt, if you could pull that back up. And if I understand what you mean by directly, it means, for example, in the case of the flagellum, that it has to be steps in which there's a rotary motor that continues to become the rotary motor, that is the flagellum?

A. Yes. By direct, I mean that it essentially worked, as the definition says, it works by the same mechanism, has the same number of parts; essentially, it's the same thing.

Q. Same thing. And then if you could turn to page 40 of Darwin's Black Box. Matt, if you could highlight the first paragraph. You acknowledge another

possibility?

A. That's correct.

Q. You say, Even if a system is irreducibly complex and thus could not have been produced directly, however, one cannot definitively rule out the possibility of an indirect, circuitous route, right?

A. Yes.

Q. And by indirect, you mean evolution from a pre-cursor with a different function than the system being studied?

A. Yes, different function, perhaps different number of parts, and so on.

Q. And one example of that is what's discussed in, among evolutionary biologists, as the concept of exaptation, correct?

A. Yeah -- well, before I say, yes, I'd just like to say, the word exaptation is oftentimes used in loose sense, but, yes, that's generally correct.

Q. And that is a concept that people in the field of evolutionary biology consider to be a valid concept, a valid description of the way more and more complex systems get developed?

A. Let me say --

Q. I'm not asking you to agree with it. I'm asking you, is that what an evolutionary biologist proposes?

A. Again, let me make clear what we're talking about here. Some evolutionary biologists certainly think that exaptation is real and that it's important and so on. But simply saying that this part over here was exapted from that part over here does not give an explanation of how random mutation and natural selection could have gotten it from one state to the other.

Q. But it is certainly, exaptation -- for example, a bird wing developing from some kind of feathered structure on a dinosaur that didn't necessarily allow flight, that's what evolutionary biologists propose, and they call it exaptation?

A. That's entirely possible, and that's consistent with intelligent design, because intelligent design only focuses on the mechanism of how such a thing would happen. So the critical point for my argument is, how such things could develop by random mutation and natural selection.

Q. And again, intelligent design doesn't describe how it happened?

A. That's correct, only to say that intelligence was involved somewhere in the process.

Q. Okay. Now you go on in this passage and say, As the complexity of an interacting system increases, though, the likelihood of such an indirect route drops

precipitously, and as the number of unexplained irreducibly complex biological systems increases, our confidence that Darwinian's criterion of failure has been met and skyrockets toward the maximum that science allows?

What you're saying there is, you know, it could happen, I'm not ruling it out, but it's really improbable?

A. Yes, it's improbable.

Q. Okay. And you haven't -- and based on that, you conclude that intelligent design is a much more probable explanation?

A. Not just based on that, based on the purposeful arrangement of parts.

Q. Fair enough. And you haven't actually quantified this, have you?

A. Not explicitly, but as a biochemist who understands what it takes to, for example, for a protein to function, for two proteins to bind specifically to each other, and so on, I rely on my experience of that in arriving at this conclusion.

Q. And you've seen how long it takes for the prokaryotes to bind?

A. 10 to the 16th in one ton of soil, yes, uh-huh.

Q. Now just to be clear -- in this passage, you say,

irreducibly complex biological systems, right?

A. I'm sorry?

Q. In this passage, you say, As the number of unexplained irreducibly complex biological systems increases, right, that's what it says there?

A. Yes. Yes, I do, uh-huh.

Q. But you took pains on Monday to communicate to the Court that when you're talking about irreducible complexity, you're just talking about it at the molecular level?

A. Yes, that should be biochemical instead of biological.

Q. Fair enough. You don't make claims about irreducible complexity at the organ level?

A. That's correct.

Q. Or at the organism level?

A. That's correct.

Q. In fact, you don't have any expertise or training in the organ or organism level?

A. That's correct, yes.

Q. You also have no expertise in paleontology?

A. That's correct.

Q. Or physics?

A. That's correct, too.

Q. Sorry. Couldn't resist. We've gone a long time.

But you agree that intelligent design, as opposed to just Michael Behe, is making an argument for intelligent design far beyond the cellular level, correct?

A. I'm sorry?

Q. Intelligent design, as a scientific proposition and the individuals who advocate for it, are arguing for intelligent design beyond the cellular level?

A. Some people certainly do, based not on my argument but other arguments.

Q. So it's not based on your argument?

A. Yes.

Q. And, for example, in Pandas, that's certainly in play intelligent design of not just biochemical structures but higher level forms?

A. Well, let me just correct myself. They're not basing it on my argument in regard to irreducible complexity, but they are basing it on the purposeful arrangement of parts, which is certainly what I discuss in Darwin's Black Box.

Q. In Darwin's Black Box, you talk about a purposeful arrangement of parts, and you actually say, you know, using that standard, almost anything looks design, right?

A. I don't think I said that.

Q. We'll return to that. In any event, in Pandas,

there are arguments for intelligent design of higher level biological life?

A. Yes, there are.

Q. And we're clear, that's not based on your work?

A. It's not based on any concept of irreducible complexity. It is based on a concept that I discuss in Darwin's Black Box, the purposeful arrangements of parts.

Q. That purposeful arrangement of parts, that's not -- you didn't originate that?

A. No, I didn't.

Q. At least, it goes back to Reverend Paley?

A. Yes, it does. Further back than that.

Q. Now let's start with the bacterial flagellum. You've made a point about how complicated and intricate it is?

A. Yes.

Q. And it really is. I mean, it looks remarkable. But a lot of biological life is pretty remarkable?

A. That makes me very suspicious.

Q. You're suspicious about how remarkable biological life is?

A. No, it makes me suspicious, you know -- that was a joking way to say that I think much of biological life may bespeak design.

Q. Plants and photosynthesis, that's very complicated, right?

A. Sure is, yes.

Q. Just the physical beauty of a flower is amazing?

A. Amazing in a different sense. Of course, when you're talking about physical beauty, now you're thinking more of an aesthetic and philosophical concept, yes.

Q. The features seem to be arranged in a way that gives it great attractiveness?

A. Well, okay, but you're now speaking of something that I was not speaking of. When I talked about the purposeful arrangement of parts, it was for some function of the system, not necessarily to be perceived as pretty.

Q. Fair enough. The entire human body, that's an amazing biological structure?

A. I'm thinking of examples.

Q. Hopefully, not mine.

A. Rest assured. Sure. Yes.

Q. We're stipulated here. Because we can make an agreement about that. The human body, in its entirety, is an amazing biological system?

A. Yes, it's amazing, yes, uh-huh.

Q. And just my hand?

A. Yes.

Q. Muscles and joints and bones and nerves. I can grab things with it. I can point.

A. Yes, that is certainly a very impressive biological system.

Q. Is that a purposeful arrangement of parts?

A. Is it a purposeful arrangement of parts? Yes, I think it is.

Q. And the physical world, too, the stars and planets and gravity, also amazing?

A. They are certainly amazing, yes.

Q. And they function in conjunction with each other to do things, create gravity, light, things like that, that are pretty remarkable?

A. Gravity is remarkable. Light is remarkable. But you're going to have to be very careful about the sorts of conclusions you draw from these things, because -- and simply because you don't want to just become overenthused about the beauty of nature and try to turn that into an argument.

Q. But it actually -- I mean, it functions. Light, I mean, it functions. And gravity, it functions?

A. Yes.

Q. And interaction of different elements on the periodic table combine to make substances in the

chemical world, things we rely upon for our life and all of biological life actually relies on, right?

A. Yes, that's certainly true.

Q. And we don't rule out natural explanation for all of these amazing phenomena, do we?

A. Well, you're going -- I don't rule out natural explanations for anything, including intelligent design. Intelligent design does not rule out natural explanations. However, you're going to have to make some distinctions between how phenomena work and what phenomena strike many people as somehow ordered to, or is necessary for specific purposes such as the existence of life.

Q. It's really a definitional issue?

A. I'm sorry. What is a definitional issue?

Q. You just described it. I mean, you got to be careful about how we're talking about how everything has different functions when we're making assessments about whether the natural explanations are valid?

A. I couldn't --

Q. I'll withdraw that, Professor Behe. You made the claim that scientists who discuss cellular systems are calling them machines, correct?

A. Yes.

Q. And you said, they're not comparing them to

machines, they're calling them machines?

A. Right.

Q. One of the scientists you referred to was Dr. DeRosier?

A. Yes.

Q. And what you said, what you quoted from his article was, More so than other motors, the flagellum resembles a machine designed by a human?

A. Yes.

Q. So he's not saying, the flagellum is a machine, he's saying, it resembles a machine?

A. No, he's saying, it resembles a machine designed by a human. There are other machines in the cell that may not resemble machines designed by humans, but I think, as many people can see when looking at an illustration of the bacterial flagellum, this is a machine that looks like something that a human might have designed.

Q. It looks like it?

A. That's what science has to go on; what we can see, what we can measure, and so on.

Q. It resembles it?

A. Exactly.

Q. Okay. And when you quoted to -- and he's also saying, you know, other cellular systems don't resemble

machines so much, right? More so than other motors, the flagellum resembles a machine designed by a human?

A. He's saying that more other machines in the cell don't so much resemble machines designed by humans, but he is certainly not saying that they are not machines, at least in my reading.

And in that issue -- not -- in a previous issue of Cell, the one that I pointed to earlier, a number of scientists were discussing molecular machines that do not resemble things that do not visually resemble machines that we have in our world.

Q. But here he is saying, resembles a machine designed by a human. That's your point, right?

A. That's what' he said.

Q. It looks like a machine a human would design?

A. It resembles a machine designed by a human, yes.

Q. Now the intelligent designer, when he was forming a bacterial flagellum millions or billions of years ago, you're not suggesting he was actually modeling his design after a manmade rotary motor which didn't exist until the last century?

A. I'm sorry. Could you say that again?

Q. Yeah. You're talking about things that resemble machines designed by humans. You're not suggesting that the intelligent designer, when the -- when he or she or

they designed the first bacterial flagellum millions or billions of years ago, was modeling its design after manmade rotary motors which didn't exist until the last century?

A. I'm not quite sure how exactly to address this question. When you're inferring design, you do not ask yourself whether a designer had some particular, you know, look in mind. You're asking whether, in the structure of this system, you see a purposeful arrangement of parts.

And I think, in the case of the bacteria flagellum, the fact that it does resemble something from our everyday world is due to the fact that its function is similar to some things that we find in our everyday world such as propulsive motors, like outboard motors on boats, and, therefore, the functional engineering requirements would be similar for such a machine in the cell as well as in our everyday world.

Q. Another example you gave was, and just to be clear, Dr. DeRosier is in no way suggesting that his article has anything to do with intelligent design?

A. Not that I know of.

Q. Or irreducible complexity?

A. Not that I know of.

Q. And then you also cited to Bruce Alberts?

A. Yes.

Q. And I think he is or was the head of AAAS?

A. No, he was the head of the National Academy of Sciences.

Q. Better yet. And what you quoted from him was, Why do we call the large protein assembles that underlie cell function protein machines? Precisely because, like machines invented by humans, these protein assemblies contain highly coordinated living parts. He used the expression, like a machine?

A. Yes, he did.

Q. And I think what we all learned in grade schools, when you make a comparison, use like, that's called a simile?

A. It may be, but I think the point that he was trying to convey is that these things work like the machines that we have in our everyday world. And so, in fact, they are.

Q. Do you watch football, Professor Behe?

A. I do on occasion, yes.

Q. I watched the Notre Dame/USC game last weekend. It was quite a game?

MR. MUISE: I might have to interpose an objection here, Your Honor.

MR. ROTHSCHILD: I told Mr. Muise his alma

mater did themselves proud, despite the final result.
BY MR. ROTHSCHILD:
Q. And one of the things the announcer said was about one of the USC offensive linemen is, he's like a mountain?
A. Yes.
Q. Now you don't understand it to say, he was made like a mountain was, not by wind or erosion or physical processes on land mass?
A. No, of course not. People use words like that in loose senses all the time. But in this particular case, Dr. Alberts was making a specific comparison to the physical functioning of these things and liking it to the physical functioning of machines in our everyday world.

They require a precise arrangement of parts. They act by transducing energy in order to accomplish some function and so on.
Q. So when the same announcer said, the running back is like a bulldozer, that was closer?
A. No, I think that's silly.
Q. I think it is, too, Professor Behe. And you have never talked to Bruce Alberts about what exactly he meant when he used the expression, like a machine?
A. No, I didn't.

Q. That's your interpretation?
A. Yes, it is.
Q. And that's true for the other articles you cited about whether biochemical systems are machines as opposed to being like machines?
A. Well, again, I think we're getting into a semantical distinction -- or just into semantics. If something acts like a machine, and something has a function, and so on, then it is a machine.
Q. Now you talked at some length on Monday about the issue of whether the type III secretory system might be a pre-cursor to the bacterial flagellum, or the reverse, that it is a descendent of the bacterial flagellum, or they might have been a common ancestor, right? You looked at some articles on that subject?
A. Yes.
Q. The papers that were discussing that, they were all discussing this complicated issue within the framework of evolution, correct?
A. Sure. Evolution understood as common descent, yes.
Q. None were suggesting intelligent design?
A. No, they did not.
Q. They were just scientists trying to figure out whether it was A that evolved into B, or B that evolved

into A, or A and B evolving from C?

A. That's right. They were taking the mechanism of natural selection and random mutation for granted. They were not demonstrating it. They were not making arguments for it. They were taking it as an assumption.

Q. And in terms of what the order is, they have -- they haven't nailed it down yet, right?

A. Not only haven't they nailed it down, but they have proposed completely opposite scenarios whereby one can't tell which arose first or second or even if they arose from each other at all.

Q. And you don't expect the dialogue to stop there, do you?

A. I don't expect it to, but it may.

Q. Okay. But scientists, as they do with many subjects on which there's disagreement, may continue to be making arguments and writing papers and submitting them to peer review journals and doing experiments to see if they can come up with a consensus answer on the subject?

A. Sure. And they may write books to try to come up with an answer, too, as well.

Q. That's how you get the royalties, right?

A. (No response.)

Q. You recently visited the University of Minnesota,

didn't you?

A. Yes.

Q. You spoke with a University Professor named James Kurzinger?

A. Yes, I did.

Q. He actually asked you whether the type III secretory system is a subset of the bacterial flagellum, is that right?

A. I don't think he said exactly that, but I'm not -- we did talk about the flagellum and the type III secretory system, but I'm not prepared to say exactly how the conversation went.

MR. ROTHSCHILD: May I approach the witness, Your Honor?

THE COURT: You may.

BY MR. ROTHSCHILD:

Q. And James Kurzinger is a scientist?

A. He identified himself as such.

Q. And this is -- this Exhibit 724 is an article in the Minnesota Daily. It's an opinion piece. And it says, Intelligent Design 101, Short on Science, Long on Snake Oil. And it goes on to describe --

MR. MUISE: I'm objecting that his use of this document again is hearsay. He doesn't have recollection of this, of this conversation. I'm not

sure if he's going to be using this to try to refresh his recollection.

MR. ROTHSCHILD: It recounts a conversation, and I am going to ask Professor Behe whether that conversation occurred.

MR. MUISE: He's going to ask him the conversation, Your Honor, he can't just read --

THE COURT: Well, to the extent that you're going to try to characterize the -- I think you've appropriately characterized what the exhibit is, Mr. Rothschild. So why don't you move on to your question.

MR. ROTHSCHILD: Okay. He has expressed a vague recollection of what happened, so I'm going to read him the passages in here.

THE COURT: I understand.

MR. ROTHSCHILD: Okay.

THE COURT: I understand. I think the objection went to the fact that you were beginning to read or extensively characterize --

MR. ROTHSCHILD: Fair enough.

THE COURT: -- the exhibit.

BY MR. ROTHSCHILD:

Q. Just for some more foundation. In the first paragraph, it says, Intelligent design's leading scientist, Dr. Behe, a professor of biochemistry,

visited the U, which I understand to be the University of Minnesota, last week as a guest of the McLauren Institute, and that, in fact, did occur?

A. Yes, I visited Minnesota as a guest of the McLauren Institute.

Q. And if you could turn to the third page of the document. And there's some discussion on that third page about the bacterial flagellum and the type III secretory system?

A. Yes.

Q. And Mr. Kurzinger makes his own observation about the type III secretory system being a subset of the bacterial flagellum?

A. I'm sorry. Could you say that again?

Q. In the paragraph that begins, much to Dr. Behe's distress --

MR. MUISE: Objection, Your Honor, that's hearsay. He's pointing to a paragraph for the truth of what's in the statement.

THE COURT: Well, it's sustained to the extent that you're going to read it. He can read it and put it into context.

BY MR. ROTHSCHILD:

Q. Could you read the paragraph that says, much to Dr. Behe's distress?

A. Out loud, or --

Q. Please.

A. Okay. This paragraph says, Much to Dr. Behe's distress, the TTSS is a subset of the bacterial flagellum. That's right, a part of the supposedly irreducible bacterial outboard motor has a biological function.

Q. And I'm not going to ask you about whether you were distressed or not. But the next paragraph then says that he asked you about this at lunch, correct?

A. That's what it says, yes.

Q. And you did have lunch that day?

A. We had lunch, and I recall a conversation about this, but again, I don't recall many details.

Q. Okay. And according to Dr. Kurzinger, you acknowledged that the claim that --

MR. MUISE: Objection, Your Honor. He's referring to an editorial, and he's trying to recount this as an exact conversation. Dr. Behe doesn't have recollection of what occurred. This article has no relevance.

THE COURT: The next paragraph starting with, when I asked Dr. Behe, I think, is where you're going.

MR. ROTHSCHILD: Yes.

THE COURT: Why don't you go right to that, as it's expressed there, instead of trying to paraphrase it.

BY MR. ROTHSCHILD:

Q. It says, When I asked Dr. Behe about this at lunch, he got a bit testy, but acknowledged that the claim is correct. Paren, I have witnesses. He added that the bacterial flagellum is still irreducibly complex in the sense that the subset does not function as a flagellum.

My question here is, is Mr. -- Dr. Kurzinger's account that you agreed that the claim that the TTSS is a subset of the bacterial flagellum, did you agree to that?

A. I don't recall, but I would, if I was going to answer it very carefully, I would make a lot of distinctions before saying so.

Q. Okay. But you don't recall whether you said that or not?

A. No, I don't.

Q. Okay. And then you go on to say that you still think -- well, I'll leave that. Your argument is that, even if the type III secretory system is a pre-cursor to the bacterial flagellum, is a subset, the bacterial flagellum is still irreducibly complex because that

subset does not function as a flagellum?

A. That's correct, yes.

Q. And, therefore, the bacterial flagellum must have been intelligently designed?

A. Well, again, the argument is that, there is -- that when you see a purposeful arrangement of parts, that bespeaks design, so, yes.

Q. And yesterday, you testified that, that doesn't mean the bacterial flagellum was necessarily designed, appeared abruptly in one fell swoop, correct?

A. That's correct.

Q. Could have been designed slowly?

A. That's correct.

Q. So under this scenario, at some period of time, the bacterial flagellum wouldn't have had all of its parts until the design was completed?

A. Could you say that one more time?

Q. Yeah. Under this scenario of slow design -- which was what I experienced with my kitchen -- at some period of time, the bacterial flagellum wouldn't have had all its parts until the design was completed?

A. That's right.

Q. And so without all its parts, it wouldn't be functional?

A. That's right. Not as a flagellum, yes.

Q. So that is a phenomenon in both intelligent design and natural selection?

A. I'm not quite sure what you mean.

Q. In slow design, the bacterial flagellum has some prior existence, it doesn't have all its parts, right?

A. Well, if -- until it has all its parts and it starts functioning, I guess it's problematic to call it a flagellum.

Q. It has some subset?

A. I guess things that will eventually be part of the flagellum would begin to appear, yes.

Q. Just not function like a flagellum?

A. Yes, the system would not yet function as a flagellum.

Q. Just like has been suggested for natural selection?

A. I'm sorry.

Q. Just like has been suggested for natural selection?

A. I'm not quite sure what you mean.

Q. Natural selection also suggests that there was a subset of parts that would eventually comprise the bacterial flagellum, but didn't work as the bacterial flagellum?

A. No. Natural selection, if I remember your

question correctly, natural selection does not suggest that. People see that there is a subset of proteins in the flagellum which share a lot of sequencology with proteins that act as a type III secretory system.

Nobody, nobody has said how natural selection could get you the type III secretory system, the flagellum could get you from the -- even if you had the type III secretory system, nobody has said how you could get from that to the flagellum. Nobody has said how you could get from the flagellum to the type III secretory system.

So this is an example again of conflating different levels of evolution. We see evidence for common descent, evidence for relationship, but we see nothing, nothing that bears on the question of random mutation and natural selection.

Q. Let me see if I've got this right. In natural selection, the argument is that, there was a subset of parts, right, like the type III secretory system, that eventually evolved to become the bacterial flagellum, right? That's the argument?

A. I would want more detail. Are you saying that in --

Q. I'm not asking you to agree with the argument, Professor Behe. I'm just trying to walk us through

this. The argument for the evolution of something like the bacterial flagellum, just to use that as an example, is that, at sometime it had a subset of proteins, maybe looking something like the type III secretory system, and eventually it evolved to become the bacterial flagellum? That's the argument, right?

A. I would have to see the argument written down. As you characterize it, I'm not quite sure what it is.

Q. Okay. But you're not disputing that the theory of evolution says, at some point we had a subset of proteins, then we had eventually all the proteins that make up whatever system we're discussing?

A. That sounds okay.

Q. Good. In slow design, same thing. At some point, we had a subset of the proteins, and eventually, we got to the whole thing?

A. That's right. The crucial question -- the only question is the mechanism.

Q. Okay. So in the case of evolution, there is a mechanism that's been proposed, natural selection?

A. Yes.

Q. And you've agreed that natural selection certainly is a phenomena that operates in the natural world?

A. That is correct.

Q. Including at the biochemical level?
A. That's right.
Q. Then we've got slow design, and there we have no mechanism at all, no description of a mechanism?
A. We have no description of a mechanism. We do infer design though from the purposeful arrangement of parts.
Q. Now yesterday, I asked you some questions about the designer's abilities. And you said, all we know about its abilities is that it was capable of making whatever we have determined is design. That's the only statement we can make about the designer's abilities?
A. Yes.
Q. And in terms of the designer's -- as a scientific statement?
A. That's correct.
Q. And the only thing we know scientifically about the designer's motives or desires or needs is that, according to your argument, the only thing we would know scientifically about that is that it must have wanted to make what we have concluded as design?
A. Yes, that's right.
Q. In fact, the only way we can make the statement scientifically that a designer exists is that it made whatever we conclude was design?

A. Yes, that's right.

Q. I want to ask you exactly, and this question is particularly about how -- about the flagellum design. Was the design limited to the original blueprint for the first bacterial flagellum?

A. I'm not sure what you mean by the blueprint for the flagellum.

Q. The plan?

A. The plan? Did the plan cause the flagellum to occur?

Q. Is that all of intelligent design? The designer planned the bacterial flagellum?

A. Well, no. The designer would also have to somehow cause the plan to, you know, go into effect.

Q. It would have to make the thing?

A. No, it had to -- well, it would have to have processes by which it would be made.

Q. I mean, it's got to actually be constructed. We're not talking about a bacterial flagellum in the mind's eye of the designer. It's actually something we now know physically exists?

A. That's right.

Q. Had to be created?

A. Well, you're using -- in what sense are you using the word created? Created can mean -- can have several

different senses.

Q. You're uncomfortable about that word?

A. Yes, because it's a loaded word in these circumstances.

Q. Okay. Created can mean the same thing as made, right?

A. We use the word create when we refer to things that are made by artists and engineers and so on, yes.

Q. Okay. In that sense, the designer created the bacterial flagellum?

A. I might say that, it might be a very indirect process by which such a thing was made. So when you say that the designer made the flagellum, it is not necessary to think that somehow the protein parts of this were somehow immediately brought together. It might have been a long process.

Q. Did the intelligent designer design each and every protein of the flagellum?

A. That is a difficult question to address, and there's lots and lots of distinctions to make. When you ask whether the parts of the flagellum themselves require design, you have to then focus in on those parts.

As I tried to emphasize earlier in my testimony when we talk about parts, some people have a simple

view, picture in their minds something simple, but each of the parts is itself a very complicated molecular entity. And as my work with David Snoke shows, that even getting small changes in pre-existing proteins, that is parts, is no easy task. So the question --

Q. Unless you have a whole ton of soil?

A. I'm sorry?

Q. Unless you have a whole ton of soil?

A. So that's actually an excellent question. Did those parts themselves also have to be designed? And I think right now, the question is open.

Q. Did the intelligent designer identify -- design every individual flagellum in every bacteria or just the first lucky one?

A. Well, since organisms, biological organisms can reproduce, of course, then if one has the genes and the proteins and information for a flagellum, then by the normal processes of biological reproduction, more copies of the -- of that structure can occur.

Q. So the answer is, just the first one?

A. That's all that would be needed. That's all we can infer, yes.

Q. Now you have this first flagellum, first bacteria that has a flagellum. And that has -- those -- that bacteria with flagellums have had mutations in their

flagellums?

A. Sure. Genes undergo mutations, yes.

Q. And did the designer also design every mutation of the flagellum since its inception?

A. No, you can't -- you certainly can't say that. There is certainly random processes that go on in our world, or for processes, that for all we can tell, certainly appear to be random. So there's no -- nothing that requires us to think that any mutation, any change that subsequently occurs to this structure either was intended or -- was intended.

Q. Is that a no or an I don't know?

A. Can you restate the question?

Q. I asked you the question, did the designer design every mutation of the flagellum since the first one? And I'm asking you whether the answer is no or, better phrase, we don't know?

A. Well, that's -- that's a very tricky question. But the proper answer is that, we don't know.

Q. Is the information necessary to answer that question observable?

A. The question of whether the designer designed every single mutation?

Q. Since that first lucky flagellum?

A. Is it observable? Hum. We can certainly observe

mutations, but unless the mutations and changes and so on further go on to form a purposeful arrangement of parts, then we cannot deduce simply from their occurrence that they were designed.

Q. There could be multiple designers, correct?

A. Yes, I wrote that in Darwin's Black Box.

Q. Could even be competing designers?

A. That's correct.

Q. Are you aware of any irreducibly complex systems that have just come into existence in the last five years?

A. Biological systems or mechanical systems or in our everyday world or other ones?

Q. No, Professor Behe, biological systems?

A. The last five years? You mean, brand new irreducibly complex systems?

Q. Yes.

A. I'm sorry. Brand new ones, not ones that are just --

Q. That are still around, that's right?

A. -- reproduced? Not that I'm aware of, no.

Q. Last 10 years?

A. No.

Q. 50 years?

A. Not that I know of, no.

Q. A hundred years?
A. All of the structures that I wrote about in Darwin's Black Box and have considered are much older than that.
Q. So scientifically, we can't even make -- we can't even state right now that an intelligent designer still exists, correct?
A. That's correct, yes.
Q. Is that what you want taught to high school students?
A. What are you referring to by that?
Q. That scientific -- after teaching them about intelligent design, sign -- and telling them that, that is a scientific proposition, that right now, scientifically, we can't even tell you that an intelligent designer exists? Is that what you want taught to high school students?
A. Well, let's make a couple distinctions. First of all, when I say, when you use the word taught, again, a lot of people have in mind instructing students that this is correct.
Q. That's not what I mean, Professor Behe.
A. Well, I'm sorry. I was unable to figure out exactly what you meant. If you're asking --
Q. Tell them about it, Professor Behe. Make them

aware. Give them information.

A. Make them aware that some people say that, from the purposeful arrangement of parts, we can conclude that something was designed, but many other questions we can't determine, including whether there were multiple designers, whether the designer is natural or not, whether the designer still exist? Yes, I think that would be a terrific thing to point out to students.

It shows the limitations of theories. It shows that some evidence bears on one topic, but does not bear on others. I think that would be terrific pedagogy.

Q. Right. Okay. You've taken the position in this courtroom that intelligent design is open to direct experimental rebuttal, correct?

A. Yes.

Q. And you stated that very clearly in your article Reply to my Critics?

A. Yes.

Q. And the way you said this could be done, and why don't we turn to that document, which is Exhibit 718. If you could turn to page 697. Matt, if you could highlight in the second paragraph the passage that starts, To falsify such a claim, and go to the bottom of the paragraph.

And you're asking the question here, or stating,

intelligent design is open to direct experimental rebuttal, correct?

A. Yes.

Q. And you said, To falsify such a claim, a scientist could go into the laboratory, place a bacterial species lacking a flagellum under some selective pressure, for mobility, say, grow it for 10,000 generations, and see if a flagellum, or any equally complex system, was produced.

If that happened, my claims would be neatly disproven. Now the test you've described, that would falsify the claim, your claim that the bacterial flagellum is irreducibly complex in the way you've described it, and could, in fact, evolve from pre-cursors, right, if that was successful?

A. That would show that my claim that it required design -- required intelligent design was incorrect.

Q. Let's break that down. You have this concept of irreducible complexity, right?

A. Yes.

Q. And you stated that the bacterial flagellum is irreducibly complex, right?

A. That's correct.

Q. And this test would, if it was successful, demonstrate that the bacterial flagellum is not

irreducibly complex. We can, in fact, put a bacterial species lacking a flagellum under some selective pressure, and eventually it's going to get that flagellum, right?

A. Well, just a distinction. It wouldn't demonstrate that it wasn't irreducibly complex. It would demonstrate though that random mutation and natural selection could produce irreducibly complex systems.

Q. Fair enough. It could evolve, and that would falsify your claim that an irreducibly complex system, like a bacterial flagellum, could not evolve through random mutation and natural selection?

A. That's right, yes.

Q. But that claim that an irreducibly complex system cannot evolve through random mutation and natural selection, that's not your whole case for intelligent design, correct?

A. That's right, it's the purposeful arrangement of parts.

Q. And we saw that bacterial flagellum, right? It's -- I say, it looks like a machine. You say, it is a machine. Right?

A. Yes.

Q. And it sure works like one?

A. Yes.

Q. So it's got a purposeful arrangement of parts whether it's irreducibly complex or not?

A. It is irreducibly complex. The question is whether an irreducibly complex system can be put together by random mutation and natural selection.

Q. Okay. So my question is, how would you falsify the claim that a biological system, like the bacterial flagellum, which is clearly a purposeful arrangement of parts, is not intelligently designed?

A. Well, since it's an inductive argument, since the purposeful arrangement of parts is an inductive argument, then in order to falsify an induction, you have to find an exception to the inductive argument.

So if somebody said that, when you see this purposeful arrangement of parts -- and again, the -- as I stress, the argument is quantitative, when there is a certain degree of complexity and so on. If it was shown that that did not always, did not always bespeak design, then the induction would not be reliable, and we would -- so -- and the argument would be, would be defeated.

Q. Now you, in fact, have stated that intelligent design can never be ruled out, correct?

A. Yes, that's right.

Q. Now let's turn to your test here of whether

bacterial flagellum could evolve through random mutation and natural selection. 10,000 generations, that's your proposal, correct?

A. Right.

Q. And it sounds like a lot, but you actually testified that, that would just take a couple of years, right?

A. Right.

Q. And, you know, based on your understanding of normal laboratory procedures, even the best laboratories, how much bacteria would be made a part of that test?

A. Oh, probably at the best, 10 to the 10th, 10 to the 12th, at the outside.

Q. Now you haven't tested intelligent design yourself this way, have you?

A. No, I have not.

Q. And nobody in the intelligent design movement has?

A. That's correct.

Q. And nobody else has?

A. I'm sorry?

Q. And nobody else has, outside the intelligent design movement?

A. Well, I'm not sure -- I don't think I would agree

with that. I think the experiments described by Barry Hall were actually in an attempt to do exactly that. He wanted to see if he could, in his laboratory, re-evolve a lac operon. His first step in that process in the mid 1970's were the experiments that I discussed here yesterday, knocking out the beta galactosidase gene.

His intention was, from things he has written later, was to see how that would evolve and then knock out two steps at a time, and eventually see how he could get really the whole functioning system. But he had such trouble with just getting that one step to go, and since he could not knock out anything else, and get it to re-evolve, he gave up.

And so I would count his efforts as a test of that, and say that the test, you know, that it was, it did not falsify intelligent design thinking.

Q. And I had actually made a blood pact with my co-counsel not to ask you about the lac operon, but now I had to violate it.

A. Too late.

Q. How many years has he done this experiment?

A. I think he was working on it for 20 years or so.

Q. In any event, that's the lac operon. But for bacterial flagellum, you're not aware of that test being done?

A. No.

Q. Certainly not by anybody in the intelligent design movement?

A. No.

Q. Okay. So you can't claim that the proposition that the bacterial flagellum was intelligently designed is a well-tested proposition?

A. Yes, you can, I'm afraid. It's well-tested from the inductive argument. We can, from our inductive understanding of whenever we see something that has a large number of parts, which interacts to fulfill some function, when we see a purposeful arrangement of parts, we have always found that to be design.

And so, an inductive argument relies on the validity of the previous instances of what you're inducing. So I would say that, that is tested.

Q. Professor Behe, you say right here, here is the test, here is the test that science should do, grow the bacterial flagellum in the laboratory. And that hasn't been done, correct?

A. That has not been done. I was advising people who are skeptical of the induction that, if they want to essentially come up with persuasive evidence that, in fact, an alternative process to an intelligent one could produce the flagellum, then that's what they should do.

Q. So all those other scientists should do that, but you're not going to?

A. Well, I think I'm persuaded by the evidence that I cite in my book, that this is a good explanation and that spending a lot of effort in trying to show how random mutation and natural selection could produce complex systems, like Barry Hall tried to do, is likely to result -- is not real likely to be fruitful, as his results were not fruitful. So, no, I don't do that in order to spend my time on other things.

Q. Waste of time for Barry Hall?

A. I'm sorry?

Q. Waste of time for Barrie Hall?

A. No, certainly not a waste of time. It was very interesting. He thought that he would learn things. And he did learn things. But they weren't the things that he started out to learn. He thought that he would be able to see the evolution of a complex system. And he learned how difficult that was.

Q. In any event, you have not undertaken the kind of test you describe here for any of the irreducibly complex systems you have identified?

A. I have not.

Q. And neither has anybody else in the intelligent design movement?

A. That's -- well, actually, I think some people are testing, not the bacterial flagellum, but are testing other things on protein structure, which I would probably count under that.

Q. Count as irreducibly complex systems?

A. Well, I wouldn't really call them irreducibly complex in that sense, but I think bear on the question.

Q. Okay. So in terms of irreducibly complex structures, you haven't done any tests, right?

A. That's right.

Q. You're not planning on any tests --

A. That's right.

Q. -- of the type you described here?

A. Well, I'm doing my theoretical work with David Snoke and hope to continue that, so I think that bears on this question.

Q. Bears on it, but it's not testing an irreducibly complex system in the way you described in this article?

A. That's right.

Q. And nobody else, you're not aware of anybody else in the intelligent design movement doing a test of the type you described here of an irreducibly complex system?

A. No, not yet.

Q. Now you talked about how, you know, your proposal

here would take approximately two years, right?

A. Yes, yes.

Q. I'm sorry. I'm pointing to down here, and that's -- you're not that good a mind reader. Now bacteria had been on the Earth for billions of years, correct?

A. That's right.

Q. And the bacterial population that exists in the world and has ever existed in the world is orders and orders of magnitude greater than ever could be in one laboratory experiment?

A. That's right. It should be about 10 to the 40th or so, I would estimate.

Q. And I think you said, 10 to the -- what was your proposal for the laboratory, 10 to the -- you had said that you had a suggestion for how much we would study in one laboratory?

A. 10 to the 10th and 10 to the 12th, that's correct.

Q. And you talked about selective pressures that the bacterial flagellum could be exposed to, but a laboratory could never recreate all the selective pressures that have existed in the environment for the last three and a half billion years?

A. Well, that's certainly true. But a scientist -- scientists nonetheless try to understand parts of

nature, even though nature is very much bigger than a laboratory. And in many other instances, such as people investigating origin of life and so on, they nonetheless try to understand what the proper environment would be to study, and so they can kind of focus their efforts on what would be the most promising type of environment, and so make it more likely to discover something that was there than just focusing on the whole world.

Q. But it's entirely possible that something that couldn't be produced in the laboratory in two years, or a hundred years, or even in the laboratory that was in operation through all of human existence, could be produced over three and a half billion years? You have to agree with that, Professor Behe?

A. It's entirely possible, but we can only know if that is the case if we have, if we have experiments to back it up or calculations to back it up.

Q. Experiments and inferences, right?

A. That's right.

Q. And so you agree, something we couldn't -- that couldn't happen in two years, much better chance over three and a half billion years?

A. Absolutely.

Q. Okay. And that's why the age of the earth is so important to a scientific theory about biological life,

isn't it, Professor Behe?

A. It's very important.

Q. But intelligent design, that's a who cares, right? It could be -- the universe could be -- or the Earth could be billions of years old or 10,000 years old, and it doesn't matter to intelligent design?

A. Intelligent design is not a person, so it doesn't have feelings like you are describing.

Q. It's a movement, right?

A. Intelligent design is a scientific theory that focuses on a particular question. There are many scientific theories that focus on particular questions that do not have anything to do with other interesting questions. The scientific theory of intelligent design focuses on discerning design, and that's it.

Q. Okay. So it doesn't take a position on the age of the Earth?

A. Theories don't take positions.

Q. Okay. The intelligent design -- you described intelligent design as not making any claims about the age of the Earth, correct?

A. That's correct.

Q. And, of course, the prospects for evolution of a function or a system are also greater if the subject population is greater?

A. That's correct.

Q. And no human laboratory can duplicate the entire population of any kind of organism, correct?

A. That's correct.

Q. Okay. And no human laboratory can duplicate all of the selective pressures that have existed in the billions of years that bacteria have been around?

A. That's correct. So we can't rule out all explanations. We have to investigate to see what are likely.

Q. Professor Behe, the tests you proposed here regarding the bacterial flagellum is like asking Dr. Padian to grow a bird wing in a laboratory, isn't it?

A. The test that is sufficient for a theory is proportional to what the theory claims. I'm no physicist, but in physics, there have been claims, many claims that required enormous amounts of effort by the entire physical community to build large structures, took many years to do so.

And nonetheless, they thought that this effort was worth it, because they wanted to be sure of the answer. In biology, the claim that random mutation and natural selection can produce systems like the flagellum or other molecular machines is a very large claim. And one can't simply say that because it would be hard to

test it, we will just assume it's true.

So if somebody wants to be sure or somebody wants to -- wants to -- wants to respond to a skeptic with evidence that would convince somebody that was not already convinced of the theory, then there is no escaping the fact that you have to show that your theory can do what you claim for it.

Q. And so to do that, what scientists advocating for the theory of evolution, including natural selection, have to do is create a laboratory that repeats human life -- that contains all of human life in deep time?

A. I'm sorry. One more time.

Q. In order to validate this big claim that the theory of evolution makes, what you're really saying is, they've got to create a laboratory that includes all of biological life and operates over deep time?

A. No, I didn't say that at all. I said, if it can be demonstrated that random mutation and natural selection can produce complex systems, then intelligent design would be falsified. One doesn't have to, you know, re -- show that something of the complexity of a flagellum would be made.

But if one saw that something somewhat less complex might be made in a reasonable time, then one might be able to extrapolate. You'd have to pay

attention to the details of the system. So it's not, you know -- you don't need a worldwide laboratory and a billion years to test this. You can do things like Barry Hall tried to do.

Q. That can't recreate the opportunities that were there for biological organisms throughout time?

A. There are always opportunities for biological organisms. Biological organisms compete with each other. If one manages to compete more successfully, it will -- it will out grow others. And so there is no reason we can't expect something, like in Barry Hall's experiments, to show us some new interesting structure.

And if that occurred, that would be a real feather in the cap of people who think Darwinian theory is correct.

Q. Let's move onto the blood clotting cascade. Now you showed us some slides yesterday, or the day before, that show that certain organisms maintain a blood clotting function with less than all the parts that mammals have, correct?

A. That's correct.

Q. Okay. But that's not what you said in the blood clotting section in Pandas. You said, all the parts have to be, correct?

A. No, I didn't.

Q. Let's turn to pages 145 -- page 145 in Pandas, P-11. And this is the section on blood clotting?

A. Page 145?

Q. Right.

A. This is part of it.

Q. Right. And if you could turn to page 146.

A. Yes.

Q. And, Matt, if you could highlight that top paragraph, that one that continues over. You say, All of the proteins had to be present simultaneously for the blood clotting system to function, right?

A. That's right, all the proteins I was talking about.

Q. Okay. And then I understand, on Monday, you were distinguishing that there are different parts of the pathway, there are different parts of the pathway?

A. Yes.

Q. And what you said in -- on Monday is that, some of those parts, we have a harder time understanding than other parts?

A. Right.

Q. Okay. And, therefore, you just focus on a subset of the parts, right?

A. Right.

Q. Now you've got this whole cascade. You've got a

diagram in Pandas. You got a diagram in your book, Darwin's Black Box. And you show it as a multi-protein system that includes that -- I think you said, intrinsic part of the pathway?

A. Yes, uh-huh.

Q. So that's the whole blood clotting cascade, correct?

A. That's as it's presented in textbooks, yes.

Q. And you presented it that way in Darwin's Black Box?

A. Yes, I did. I used that figure, yes.

Q. Okay. And you used it that way in Pandas, correct?

A. I used it -- a very similar figure, yes.

Q. And one whole system, one whole blood clotting cascade?

A. These are all the proteins that have been determined to affect blood clotting, yes.

Q. Okay. So -- but your claim in court is that, eh, let's ignore parts of it, some of those parts don't matter, we're just looking at a subset, right?

A. I made proper distinctions about what is required and about what we don't have sufficient information to make claims about that, yes.

Q. But those other parts never suggested are not

part of the blood clotting cascade, right, the intrinsic pathway?

A. Well, I'm afraid I did. I -- well, I quoted a section of my book showing that I was confining my argument to the proteins at the end of the pathway.

Q. Matt, could you go to page 143 in Pandas so that we can have the picture of the system. I understand what you're saying, Professor Behe. You did indeed, in Darwin's Black Box, define the blood clotting system in a particular way, right, meaning --

A. Yes.

Q. And what you called irreducible complex didn't include, I guess, what's sort of in that top left-hand corner of the cascade?

A. That's correct.

Q. But that's not the entire cascade?

A. Well, there are many more proteins that affect blood clotting. But when I was talking about the concept of irreducible complexity, I wanted to make sure that we were talking about ones whose function was as clear as possible, so I limited it to that.

Q. You defined the system down more narrowly?

A. I'm sorry?

Q. You defined the system more narrowly?

A. That's right, yes.

Q. And so I guess what you're saying is, part of the system -- part of the blood clotting system that works in all of our bodies is irreducibly complex, but as it gets more complicated, it's not irreducibly complex?

A. No, I didn't say that. I said that the portion of the blood clotting system that I was focusing on was irreducibly complex. There might be components which affect blood clotting which can or can't be removed and help or not help but not break the system. But I was focusing my argument on irreducible complexity on the proteins I cited in my testimony.

Q. You define the system in whatever way is convenient to the argument?

A. I define the system very carefully to make sure that people understand what I'm talking about. I use the standard figure of the blood clotting cascade from a biochemistry textbook, because that's what is understood as the protein system that affects blood clotting.

Q. Now let me just make sure I understand the argument. What I think you said was, when I looked at -- the subset of the blood clotting cascade included fibrinogen, prothrombin, proaccelerin, and activated Stuart factor. Those are the things you say in Darwin's Black Box constitute the irreducibly complex system?

A. Okay.

Q. Is that correct?
A. Yes.
Q. And could you look on page 145 of Pandas?
A. Yes.
Q. Okay. And, Matt, could you highlight in the middle of the first column where it starts, We may try many smaller sets. You say here, We may try many smaller sets of components to get started; fibrinogen, prothrombin, activate the Stuart factor, and proaccelerin. And then you give some other alternatives. But then you say, death is nearly always the certain result, right?
A. Yes, I did.
Q. Okay. So that's actually saying, those four parts of the system, if that's all you got, not good enough?
A. Excuse me a second. Let me read this, please. Yeah, with those four, the system would not work.
Q. With those four, the system would not work?
A. Yes.
Q. Those are the four you just agreed were enough to make your irreducibly complex system?
A. Well, those are the four that I said that, if you knock them out of the current system, the system would not function.

Q. So here you're saying, just having those four -- you're saying, that's the irreducibly complex system, and the rest of it we can forget, and now we look at that irreducibly complex system, and death would be the certain result?

A. I'm -- I'm not -- I'm not -- I'm not understanding the distinction you're making, sir.

Q. Well, we looked at the puffer fish, right?

A. Yes.

Q. And it was missing some parts of the blood clotting cascade. But you said, from my argument, that doesn't matter, because that's not what I'm talking about, right?

A. Yes.

Q. You said, what I am talking about is these four factors here, right? I won't say them again because I'll just butcher them. Stuart factor and its friends. You said in your testimony on Monday, those four, those you need?

A. Yes.

Q. That's enough. That's irreducibly complex.

A. I didn't say, that's enough. I said that we certainly need those.

Q. And now you're saying here, those four, not enough, they're just -- they're just dead?

A. Well, again, I said that they were necessary. I don't think I said they were sufficient.

Q. You didn't identify any other systems?

A. Again, I was trying to identify parts which were certainly necessary, but I don't think I said that I was describing a minimal system.

Q. Could you turn to page 86 in Darwin's Black Box, and the first continuing paragraph?

A. Yes.

Q. Okay. And this is the chapter where you're talking about how the blood clotting cascade is irreducibly complex?

A. Right.

Q. And you say, The function of the blood clotting system is to form a solid barrier at the right time and place that is able to stop blood flow out of an injured vessel. The components of the system beyond the fork in the pathway -- that's the part we don't know so much about?

A. Yes.

Q. -- are fibrinogen, prothrombin, Stuart factor, and proaccelerin, factors that, by themselves, you die from, right?

A. I'm sorry? The factors --

Q. The factors that -- it says, The components of

the system beyond the fork in the pathway are fibrinogen, prothrombin, Stuart factor, and proaccelerin. And those are the factors that, in Pandas, you say, if that's all you got, you're dead?

A. I -- I -- these are the factors which, if you break them, will cause the clotting system to stop working.

Q. That's the system, right? That's what it says in Darwin's Black Box? Those four components, that's the system?

A. The total system? Does it say that?

Q. It says, the system.

A. I'm sorry. Where are you reading from now?

Q. Page 86, Professor Behe. We know it's not the total system. There's a whole lot that we don't know about, right, and that the puffer fish can do without. But the system you're talking about, the single system that's irreducibly complex, that's those four components, correct?

A. No. Again, I said that we should focus our attention on those, because a lot more is known about them, and if you remove them, the system will certainly be broken.

Q. Right above what we just read, it says, The blood clotting system fits the definition of irreducible

complexity?

A. I'm sorry. Can you tell me exactly where you are?

Q. Yes, the first full sentence on this page.

A. That begins, Leaving aside the system before the fork in the pathway?

Q. Yes. Leaving aside the system before the fork in the pathway, where some details are less well-known, the blood clotting system fits the definition of irreducible complexity. So we're leaving aside that stuff before the fork?

A. Okay.

Q. We're leaving the stuff aside that we know the puffer fish can do without. And you're saying, The blood clotting system fits the definition of irreducible complexity. That is, it is a single system composed of several interacting parts that contribute to the basic function, and where the removal of any one of the parts causing the system effectively to cease functioning.

It talks more about the function. It says, The components of the system beyond the fork in the pathway are fibrinogen, prothrombin, Stuart factor, and proaccelerin. That's your irreducibly complex system, isn't it, Professor Behe?

A. No, it's not. Again, I was confining my

discussion to the point after the fork in the pathway because, as I said in the book, much more is known about that. But the fork in the pathway is essentially two different ways to activate the pathway.

And while you can do without one way to activate the pathway, you can't do without both ways to activate the pathway. Something has to activate it.

Q. So you have to have those four, right?

A. Yes, those four are needed for the system to work. But -- and I confined my discussion to them. But they're not sufficient for a functioning system.

Q. You need the stuff before the pathway, too?

A. You need some of the stuff, yes.

Q. Except for the puffer fish?

A. Well, again, like I said, some of the stuff. The puffer fish itself has the extrinsic pathway, which is one way to trigger the remaining steps. It's missing the intrinsic pathway. But nonetheless, it still has one way to turn the pathway on.

Q. It has those four things?

A. It does, yes.

Q. Which we know, by themselves, cause death?

A. By themselves, they would cause the system to start stop functioning.

Q. Sounds like a bigger mistake than Dr. Doolittle

made, Professor Behe?

A. I'm not sure what you are referring to.

Q. Well, you spent a lot of time trashing Dr. Doolittle and his work, his article in the Boston Review. Your mistake here is quite a bit more substantial than misinterpreting a mice study, isn't it?

A. I'm not even quite sure what you are referring to as my mistake.

Q. I'll withdraw that question, Professor Behe. It's surely not your contention that the mistake you understand Dr. Doolittle to have made basically invalidates the possibility that the blood clotting system could have evolved?

A. No, of course not. The only point I was making with that discussion was that he did not know how Darwinian processes produced it. It was not an argument saying that -- or it was not -- did not go to the point of whether or not that could happen.

Q. Okay. And that was an article, whether right or wrong, that was not in a peer reviewed scientific journal?

A. That's correct.

Q. Dr. Doolittle, as you showed us, has actually written quite a bit on the subject of the blood clotting cascade in peer reviewed scientific journals?

A. He certainly has.
Q. Including what we saw about the puffer fish?
A. That's correct.
Q. And by contrast, how many peer reviewed articles are there explaining the blood clotting -- why the blood clotting cascade cannot evolve because it is irreducibly complex in the way you describe?
A. Well, I'm going to say that the articles which elucidate the structure of the blood clotting pathway are the ones which demonstrate that. I will agree that there certainly are no arguments or directly to that point. But as I tried to show in my book, Darwin's Black Box, that's an implication that can easily be drawn from those studies.
Q. So these are all those other articles based on the research of other scientists that you interpret differently than those scientists do?
A. That's right. I was proposing a newer idea.
Q. Okay. And how many peer reviewed articles are there in scientific journals discussing the intelligent design of the blood clotting cascade?
A. Well, again, since we infer design by the purposeful arrangement of parts, then the peer reviewed articles in science journals that demonstrate that the blood clotting system is indeed a purposeful arrangement

of parts of great complexity and sophistication, there are probably a large number of those.

Q. Again, those are those articles by other scientists based on experimental research, right?

A. They are certainly by other scientists, not by myself, and they are certainly based on experiments.

Q. And none of those articles are arguing that the blood clotting cascade are intelligently designed -- is intelligently designed?

A. That's correct.

Q. And there are no peer reviewed articles arguing that the blood clotting cascade is intelligently designed, right, in scientific journals?

A. I wrote my argument in a book, so, yes, that's correct.

Q. And before we leave the blood clotting system, can you just remind the Court the mechanism by which intelligent design creates the blood clotting system?

A. Well, as I mentioned before, intelligent design does not say, a mechanism, but what it does say is, one important factor in the production of systems, and that is that, at some point in the pathway, intelligence was involved.

MR. ROTHSCHILD: This would be a good time for a break, Your Honor.

THE COURT: All right. Why don't we take our lunch break at this point, and we will be in recess until 1:35 this afternoon. We'll resume cross examination at that time. Thank you.

(Whereupon, a lunch recess was taken at 12:10 p.m.)

CERTIFICATION

I hereby certify that the proceedings and evidence are contained fully and accurately in the notes taken by me on the within proceedings, and that this copy is a correct transcript of the same.

/s/ Wendy C. Yinger
_____
Wendy C. Yinger, RPR
U.S. Official Court Reporter
(717) 440-1535

The foregoing certification of this transcript does not apply to any reproduction by any means unless under the direct control and/or supervision of the certifying reporter.