UNITED STATES
INTERNATIONAL TRADE COMMISSION

In the Matter of:	**) Investigation No.:**
CERTAIN MICROFLUIDIC SYSTEMS AND	**) 337-TA-1100**
COMPONENTS THEREOF AND PRODUCTS	**)**
CONTAINING SAME	**)**

OPEN SESSIONS

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UNITED STATES OF AMERICA

BEFORE THE

INTERNATIONAL TRADE COMMISSION

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CERTAIN MICROFLUIDIC SYSTEMS AND : 337-TA-1100

COMPONENTS THEREOF AND PRODUCTS :

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HEARING

Thursday, March 28, 2019

Courtroom A

U.S. International Trade Commission

500 E Street, SW

Washington, DC

The Hearing commenced, pursuant to notice of the Judge, at 9:36 a.m., before the Honorable Dee Lord, Administrative Law Judge for the United States International Trade Commission.

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P R O C E E D I N G S

MR. NATHAN: Good morning, your Honor.

JUDGE LORD: Good morning. We're on the record.

MR. NATHAN: May I do one housekeeping item?

JUDGE LORD: Sure.

MR. NATHAN: There are two exhibits from the examination of Dr. Greiner yesterday that I believe are to be admitted without objection. May I read those into the record?

JUDGE LORD: Yes.

MR. NATHAN: These are Exhibit CX-1977C and CX-1978C.

JUDGE LORD: All right. CX-1977C and CX-1978C are admitted into the record without objection.

(Exhibits CX-1977C and CX-1978C received.)

MR. NATHAN: Thank you, your Honor.

JUDGE LORD: Good morning, Dr. Metzker. You're still under oath.

THE WITNESS: I understand, your Honor.

Whereupon,

MICHAEL L. METZKER

was recalled as a witness and, having previously been duly sworn, was examined and testified further as follows:

CROSS-EXAMINATION

BY MS. BHATTACHARYYA:

Q Good morning, Dr. Metzker.

A Good morning.

Q We're going to be on the public record.

Dr. Metzker, between the end of your testimony yesterday and now, have you spoken to anybody about this -- about this case?

A I have not.

Q I'd like to start by asking you some questions about the Church reference.

A Okay.

Q Do you remember talking about the Church reference with 10X's counsel yesterday?

A I do.

Q And that is one of the references you're relying upon for your invalidity opinions?

A That is correct.

Q Now, with respect to your analysis of Church, you rely on -- or you focus on two embodiments in the reference, one of them involving beads and one of them not involving beads; is that correct?

A I think that's correct, yes.

Q And for the disclosure regarding beads and barcoding on beads, you agree that the barcoding takes place on the bead and there's no detachment from the bead?

A In the example that Church provides, that is

true.

Q And with respect to the other disclosure that you discuss, that one involves barcodes that are cleaved from a DNA strand and released into solution?

A That's correct. So the barcodes are created by rolling circle amplification, and then there's a restriction enzyme cite that is used to cleave and create oligonucleotide barcodes that go into solution.

Q All right. So in your witness statement, you say that one of ordinary skill in the art would have readily envisioned that the oligonucleotide barcode molecules could be released from the beads in Church based on reading the embodiment where barcoding occurs in solution?

A That's correct. Can you point me to which Q&A we're talking about?

Q Yes. We can go to question and answer 224, and that's RX-664C, page 54. And maybe we can put that up on the screen. Let's focus on the first paragraph that's not redacted under question 224.

In the first sentence you say that "One of ordinary skill in the art would have readily envisioned that the oligonucleotide barcode molecules could be released from the porous gel beads in Church upon having read the other embodiment where the barcodes were released

into solution in the droplet."

Do you see that?

A I do see that.

Q And you further say that one of ordinary skill in the art would have been motivated to remove barcodes from the bead because reactions occur faster in solution.

A That is correct.

Q And why don't we put up a little more of the answer to question and answer 224 that occurs on the next page. Just the top paragraph.

So there you're providing us with what you believe is a motivation to one of skill in the art to alter Church; correct?

A That is correct.

Q So you want to alter the beads disclosure in Church so that instead of reactions taking place on the bead, they're going to take place off the bead?

A Right. The use of beads in the Church example, to make a change where the oligonucleotides can be released into solution.

Q And the reason you give for making that change is that -- is that it was well known in the art that reactions are more efficient in solution; correct?

A In this paragraph, that's correct. I mean, there's other motivations as well.

Q When you talk about that motivation, the only support you cite is the deposition testimony of Paul Hardenbol; correct?

A Well, with respect to the improved kinetics, yes, that's true.

Q And you do not cite anything in the Church reference itself that suggests anything about reaction kinetics; correct?

A Yeah, I don't think the Church reference explicitly described that.

Q And you don't cite any other document or publication regarding reaction kinetics being more efficient in solution?

A No, I -- in addition to this testimony, I've just relied on my own experience over 30 years in this area.

Q But with respect to what you actually cite in the opinion regarding reaction kinetics, you're solely relying on the deposition testimony of Paul Hardenbol; correct?

A In this paragraph, that's what is cited.

Q And you're using his deposition testimony to support what you believe is common knowledge in the field; correct?

A It is support for what I believe is common

knowledge in the field.

Q But despite the fact that you believe that one of skill in the art would have readily envisioned the alteration you're suggesting and despite the fact that you believe it was common knowledge in the field that reactions occur more efficiently in solution, the embodiment that Church actually describes and actually chose to describe is the embodiment where reactions occur on the beads?

A Correct. As I stated before, in the example Church provides using beads, the barcoding occurs on bead.

Q Now, you also indicate in your witness statement that there may be reasons to have barcodes occur on beads?

A Can you point me to that Q&A, please?

Q Well, let's look at question/answer 226 on pages 55 through 56.

A Okay. I'm there.

Q And starting at the bottom of page 45, you say, "Unless there is a particular reason to keep the material (barcode) attached to the support, such as the need to segregate it, one of skill in the art would have been motivated to try removing the barcode from the bead to have it react with the target nucleic acid analyte in solution given the knowledge that the reaction kinetics would be faster."

A That's correct.

Q Correct? That's your opinion?
A Yes.
Q And so in your opinion, you're indicating that there may -- there may be particular reasons to keep material on the bead?
A I think there can be reasons, yeah, absolutely.
Q And in your witness statement, you provide one example of a reason to keep material on the bead, and that example is the need to segregate it?
A Yes.
Q Your witness statement does not -- beyond that one example, your witness statement does not discuss the range of reasons why one of skill in the art might have reactions occur on beads?
A Well, I gave one and that's all I gave, yes.
Q All you gave. And your witness statement does not discuss whether any of those reasons other than the one you gave might apply to the situation in Church?
A I'm sorry, I'm not following that question.
Q Well, your witness statement, other than the reason of wanting to keep the material -- of the need to segregate material, you didn't discuss any of the other reasons that one of -- that might lead one of ordinary skill in the art to keep material on beads?
A Right. I only gave one reason, yeah.

Q Okay. And so with respect to those other reasons, you didn't provide any explanation as to whether those might apply to the situation in Church?

A I only gave one reason, so that's all that's there.

Q And you didn't discuss why any of those reasons might explain why Church decided to describe an embodiment where reactions occur on the beads?

A That's right, yeah. Church is trying to do it on bead and he's using PCR to remove it from the beads. And that's one way to do it.

Q Now I want to talk about another reference, the Saxonov reference.

A Okay.

Q And we'll be focusing on the paragraph that deals with the antibody-specific barcodes, as well as the adapters, and that is JX-31, column 36.

A I don't remember which -- it's in binder 1.

Q I think it's in the first binder.

A Yeah, I have it. Yes, I'm there.

Q And can we blow up the last portion beginning with "protein expression and nucleic acid information."

So Dr. Metzker, this is a paragraph that you discuss in the context of explaining your anticipation and obviousness opinions for Saxonov; correct?

A That's correct. We discussed that quite extensively yesterday.

Q And this portion of Saxonov discusses both cell-specific barcodes as well as antibody-specific barcodes; is that correct?

A That is correct.

Q And the cell-specific barcodes are called out in lines 65 through 66 of this paragraph; correct? Where the paragraph refers to droplet/cell-specific barcode adapters?

A Yes, I see that.

Q And with respect to antibody-specific barcodes, this paragraph has two disclosures; correct?

A Correct.

Q So if we look at lines 59 through 60, we see a disclosure of "antibodies that can be linked to beads coated with short DNA fragments with a unique barcode"?

A That's one.

Q And then you also have the sentence that reads, "The antibodies could also be linked to droplets containing DNA fragments, which can be burst as appropriate."

A That's correct.

Q All right. Now I want to start with the antibody -- the antibody-specific barcodes.

A Okay.

Q Now, your opinion in your witness statement is

that the fact you have a description of antibody-specific barcodes released from droplets that are burst means that the barcodes on the beads disclosure must be released from the beads; is that correct?

A I think that's correct. Can you point me to that Q&A in my witness statement?

Q Yes. So that's Q/A 184, CX-664C, page 39.

A Yes, I'm there.

Q And let's focus on the first paragraph under question 184. All right. And highlight starting with "the only way for the barcodes."

So do you see in the middle of the paragraph, you have a sentence that starts "The only way for the barcodes"? What you say is "The only way for the barcodes in the inner droplet to function is by having them released from the inner droplet. One of ordinary skill in the art would have therefore recognized that the barcodes on beads would be functioning in the same way, they would be released from the bead."

Do you see that?

A I do.

Q And that's your opinion?

A It is my opinion.

Q So it's your opinion that because you have one embodiment where reaction is occurring in solution, one of

ordinary skill in the art would know that we're supposed to release the barcodes from beads if you're using the beads embodiment?

A In the Saxonov specification, that is absolutely correct.

Q But the text here does not state that you released barcodes from the beads with these antibody-specific barcodes, does it?

A Not in this paragraph. It doesn't explicitly say that. But as I testified before, they're using the beads in the droplets as analogous delivery reagent systems. And throughout the entire specification, Saxonov is teaching doing barcoding in solution.

Q All right. But with respect to the antibody-specific barcodes linked to droplets, they tell you what's happening, they tell you we have them linked to droplets and we burst the droplets; correct?

A They do say -- they do state that.

Q And with the antibody-specific barcodes on the beads, they tell you you have them. They never say anything about taking them off the beads, do they?

A They don't explicitly say that, but I -- I believe one of ordinary skill in the art reading this would have understood that's what is meant.

Q And we were just talking about the Church

reference a few minutes ago; correct?

A Correct.

Q And in the Church reference, we have an example of a situation where you have two embodiments, one on beads, one in solution, but in the beads embodiment, you don't take the barcodes off the beads?

A In one embodiment, you don't. But Church also has the other embodiment where it is done in solution. So he is actually at that point giving two different ways of barcoding polynucleotides, either on bead or in solution. And again, the motivation of faster kinetics would lead you to doing it in solution in Church. Saxonov already has you there. He's already telling you, do the barcoding in solution.

Q Okay. But in Saxonov, you're saying I have this embodiment on beads and I just know they're released, because at this other embodiment where barcoding takes place in solution; right?

A I didn't follow.

Q In Saxonov, you're saying, well, I have this reference to beads with barcodes on them, and I just know that the barcodes must be taken off because I have another embodiment where barcoding takes place in solution?

A Well, I don't think it's that simple. I don't -- reading Saxonov, I don't see any disclosure where

Saxonov is telling you to barcode on bead. I mean, he doesn't do that.

He tells you to do everything in solution.

I think what's really important is the way that the droplet and the bead are described in the same paragraph in adjacent sentences, saying you can use them as alternative delivery systems.

So, again, in my opinion, one of ordinary skill in the art looking at this disclosure is going to believe that, well, the barcoding is going to be done in solution, and if it's on bead, I'm going to have to release it from the bead.

Q Okay. I understand that's your opinion. But you'd agree that in Saxonov, there's no text saying that the barcodes come off the beads?

A Well, I actually would probably disagree with that too, because although I would agree it's not explicitly in this paragraph, Saxonov does describe some of the reagents that involve beads, involve modifications and involve cleavable linkers, where you attach the oligo in the correct orientation to the bead.

And some of those are well known as being cleavable sites. That can be released from the bead. So I would say that --

Q Is any of that --

MR. BILSKER: Excuse me, your Honor, can the witness be allowed to finish his answer?

JUDGE LORD: Please don't interrupt.

MS. BHATTACHARYYA: I guess I'm objecting as outside the scope of his witness statement. I feel like he's introducing --

JUDGE LORD: You need to let him finish his answer, then you make the objection and I'll rule on it.

MS. BHATTACHARYYA: Okay. Thank you.

BY MS. BHATTACHARYYA:

Q Please finish, I'm sorry.

A I think I did finish.

Q Okay. Now, in question 184, let's focus on question 184.

A Okay.

Q Question 184 doesn't provide any citations to these other reasons you're suggesting for believing that the barcodes are released from the beads, does it?

A Not in 184. But I believe it's in other parts of my witness statement.

Q And you'd agree that in the Church reference, the embodiment with barcoding on beads does not involve taking the barcodes off the beads; is that correct?

A In the example Church provides, that is correct.

Q Now, I also want to look at -- let's go back to

JX-31, same paragraph. And I want to turn to the cell-specific barcodes. So the reference to the cell-specific barcodes is at the end where we have droplet/cell-specific barcode adapters.

Do you see that?

A I do.

Q And it's also your opinion in your witness statement in paragraph -- in question/answer 184 that the disclosures about the antibody-specific barcodes would lead one of skill in the art to use beads for the cell-specific barcodes and would also lead one of skill in the art to release barcodes from the beads before attaching the barcodes to nucleic acid analytes; is that correct?

A Yes, I believe that's correct.

Q And you'd agree that nothing in this paragraph states that the cell-specific barcodes are on beads?

A That's correct. The beads that are being described are for the antibodies, but as I testified yesterday, there's no difference of using barcodes to identify antibodies versus barcodes to identify polynucleotides. There's really no difference.

Q But in this -- in this -- the paragraph of the '059 patent that we're talking about, there's nothing discussing the cell-specific antibody -- the cell-specific barcodes being attached to beads; correct?

A Again, that's correct. But again, I see no difference between the DNA fragments with unique sequences and the barcode sequences tagging the polynucleotides.

Q And, therefore, there's nothing in that passage stating that cell-specific barcodes are released from beads; correct?

A Well, I mean, explicitly, yes. But again, reading this, I don't believe that. I believe that there's enough information there that one of ordinary skill in the art would have understood that you could use the cell-specific adapters attached to beads that can be released.

Q And there's also nothing in the passage that states that cell-specific barcodes that are released from beads do that releasing before attaching to nucleic acid analytes; correct?

A Again, not in that paragraph, but in the context of the entire specification, I believe those disclosures are there. And it would be understood by a person of ordinary skill in the art.

Q The final topic I want to cover has to do with the meaning of gel.

A Okay.

Q And it's your -- it's your view that -- that the definition of gel is that it's cross-linked; is that

correct?

A Yeah, I believe that would -- that definition would be understood in the art as well. But yes, there's a degree of cross-linking that makes a material a gel.

Q All right. But you also believe that there may be exceptions to the -- to your definition that cross-linking is the defining characteristics -- characteristic of a gel; is that correct?

A I think I may have said that at deposition.

Q And, for example, you would agree that agarose gel is definitely a gel, but you do not know whether it's cross-linked?

A I didn't know at the time. I actually did go ahead and look it up, and the strands, when you heat it up and cool it down, do actually intermesh and create a form of cross-linking, although it's not covalent bonds.

Q And the term "gel" was not a term presented for the Markman process; is that right?

A That's what I understand.

Q And your witness statement does not include any technical references that define the term "gel" by reference to cross-linking; is that correct?

A I believe that's correct as well. Again, it's just my experience in the field and just what I believe the knowledge of a person of ordinary skill in the art would

know.

MS. BHATTACHARYYA: Thank you, Dr. Metzker.

THE WITNESS: You're welcome.

MR. BILSKER: Some redirect, your Honor.

JUDGE LORD: Yes.

REDIRECT EXAMINATION

BY MR. BILSKER:

Q Dr. Metzker, you were just talking with Staff about cross-linking. You have a flip chart up behind you and you have some markers on the table right there. Can you show the Court what cross-linking actually is?

A Yes, I'd be happy to.

So I'm going to draw this as a pretty basic cartoon, but I hope you'll understand. So you may have molecules, and I'm just drawing them as Xs for examples. And these would be called monomers. And during the chemical reaction, there are covalent bonds that are connected between some of the monomers.

And the polymer we're talking about is called polyacrylamide, so these would be acrylamide monomers that are now becoming poly, so there's more than one.

But then you have another agent in there called a cross-linker that can actually cross-link between these two strands of monomers, and now they create more of a three-dimensional matrix. And these create some of the

voids in the porous regions that give the increased surface area to these porous gel beads.

Q How, if at all, does the ability to have something cross-linked relate to the volume and the amount of barcodes that would be in a burstable droplet?

A Repeat that question, please.

Q Sure. If you had a burstable droplet with volume available for barcodes, how, if at all, would that relate to, say, something that's cross-linked?

A Sure.

MR. BILSKER: So can we mark that one as RDX-0003.

(Exhibit RDX-0003 identified.)

MR. EHRLICH: Objection, your Honor. This is beyond the scope of the witness's statement, particularly this next question.

JUDGE LORD: Well, let's hear the question first and then I'll take up your objection.

MR. BILSKER: Can you reread the question.

(The reporter read the record as requested as follows: "Q: If you had a burstable droplet with volume available for barcodes, how, if at all, would that relate to, say, something that's cross-linked?")

JUDGE LORD: Are you objecting to this question,

Counsel?

MR. EHRLICH: Yes, this is beyond the scope of the witness's statement. There's no testimony about burstable droplets and cross-linking in his witness statement.

MR. BILSKER: Your Honor, there's extensive testimony about burstable droplets and about cross-linked beads.

JUDGE LORD: Do you want to just refer me to some of that testimony so I can have a basis for judging?

MR. BILSKER: Well, the question and answer that Staff was just referring to, where he compared burstable droplets to the bead embodiment and said they were interchangeable, which was, I think, question and answer 184, which was what the Staff was questioning him about, the interchangeability of the bead embodiment and the burstable droplet embodiment.

MR. EHRLICH: May I be heard, your Honor?

JUDGE LORD: Yes.

MR. EHRLICH: There's nothing in that answer about the makeup of the bead, whether it has cross-linking, whether the burstability of the droplet means anything for cross-linking. And this witness is trying to add testimony about the components of the bead, in addition to making a comparison in the materials that isn't there in this

answer.

MR. BILSKER: Well, that's also not correct, because extensively throughout his witness statement, he says that one of the reasons that you would choose a porous bead is because it has much surface area available to it, which would allow you to put in the large number of barcodes that Saxonov talks about.

JUDGE LORD: All right. Staff, do you have a view?

MS. BHATTACHARYYA: Your Honor, my cross had to do with what his opinion was in question/answer 184 and potentially what specific disclosures there were within the '059 patent. I don't think that opened the door for him to introduce new expert opinions that were not in his witness statement or --

JUDGE LORD: It's your view that this opinion is new?

MS. BHATTACHARYYA: I mean, I --

JUDGE LORD: I'm asking. You don't have to say.

MS. BHATTACHARYYA: I believe so, unless they can point to something on this.

MR. BILSKER: It's certainly not new. If we look at question and answer 330, he talks about the surface area of beads being large, porous beads being large, to allow lots of barcodes in. That's just one example, and I

know he discusses that throughout his opinion.

JUDGE LORD: Can we look at 330? Can somebody pull that up?

MR. BILSKER: Let's go to 170, since it's closer. I don't know how you want me to -- do you want to look at it yourself, your Honor, or --

JUDGE LORD: Yeah, let me look at it for a minute.

MR. BILSKER: Okay.

JUDGE LORD: So what I'm seeing, Counsel, is a statement, "It is well known that porosity increases surface area, which allows many more molecules to be attached to the bead." And then he says, "I will get into this a little more when I talk about the number of oligonucleotides to attach to the beads in the next element."

Does that not then dismiss --

MR. BILSKER: Which then wraps up on 176.

JUDGE LORD: Let me just deal with this one first. Does that not indicate that the subject matter that Counsel is now exploring with the witness is within the scope of his witness statement?

MS. BHATTACHARYYA: Well, the topic I was exploring was question and answer 184, and he talked about interchangeability. This doesn't talk about

interchangeability, and neither does 176.

JUDGE LORD: So your objection is not that this is not within the scope of his witness statement but that it exceeds the scope of your cross-examination; is that right?

MS. BHATTACHARYYA: Yes, your Honor.

JUDGE LORD: All right. But Mr. Ehrlich's objection is something different.

MR. EHRLICH: I would object on both grounds, but on the subject of whether it exceeds his opinions in his witness statement, the question referred to, question 170, is about a specific feature of porous gel beads. But what the testimony that is attempting to be elicited is a comparison and a comparison that is then meant to be tied to a particular passage in one reference. And there is no opinion in this witness statement that there is anything cross-linked compared to a burstable droplet in that passage of Saxonov.

There is testimony that -- there's a feature of porous gel beads, there are testimony in other places about droplets, and there is nothing linking the two with a discussion of cross-linking. That is a new opinion.

The other question that counsel referred to is about a combination of different references, the Hinz reference and Saxonov. And that also does not relate to

burstable droplets.

MR. BILSKER: May I respond?

JUDGE LORD: Let me deal with this one first. So I overrule the objection based on the objection that this is not within the scope of the cross.

Now, we still have the objection with respect to whether this opinion is within the scope of the witness's statement. And counsel for Staff, do you join in that objection?

MS. BHATTACHARYYA: Your Honor, based on the material that we've seen, I do join in the objection.

JUDGE LORD: Okay.

MR. BILSKER: So if we go to question number 176, that even gets more specific about this. He talks about calculating the number of barcodes that are in burstable droplets, and then he concludes in 176 that with that high number of barcodes that one calculates from burstable droplets, it would lead one to porous gel beads because those are the ones that you need to get that large number in.

JUDGE LORD: Yeah. But I'm looking for some reference to the cross-linking.

MR. BILSKER: Well, I can tie that in with one question, if we need to.

JUDGE LORD: All right, go ahead.

BY MR. BILSKER:

Q How does cross-linking relate to a porous bead, if at all? You were asked by Staff about that.

A Right. By definition, a porous gel bead is due to cross-linking of the monomers. As I've just illustrated on the figure behind me.

MR. BILSKER: And I think I'll move on, your Honor.

JUDGE LORD: All right.

BY MR. BILSKER:

Q Dr. Metzker, if we turn in JX-31, which is the Saxonov '059 patent, back to column 36. Staff was asking you whether there were any explicit statements relating to taking the barcodes off the beads that are discussed in that paragraph.

Do you recall those questions?

A Yes.

Q Now, when you read Saxonov as a whole, and I want to point you to -- and I don't want to lead you, but I want to ask you on column 36, line 66, where it says "library prep can ensue as described herein," how, if at all, does that relate to taking the barcodes off the beads?

MR. EHRLICH: Objection; leading.

MR. BILSKER: How if at all does that. It's not a leading question, your Honor.

JUDGE LORD: Well, I think it is leading. I think you could have laid some foundation and gotten to the same place, so why don't you do that.

BY MR. BILSKER:

Q What does this convey to you, this library prep can ensue as described herein with respect to --

JUDGE LORD: Well, let's back up for a minute. I think first you want to tie this to the cross-examination.

BY MR. BILSKER:

Q Okay. In the cross-examination, Staff asked you whether there was anything -- whether there were literal words that said take the barcodes off the beads.

Do you recall that?

A I do.

Q What, if anything, does the statement about library prep being --

JUDGE LORD: Well, see there you are again.

MR. BILSKER: All right. Let me withdraw that.

JUDGE LORD: Okay. Thank you.

BY MR. BILSKER:

Q What, if anything else in the specification teaches you to take barcodes off of beads?

JUDGE LORD: Okay. Now he's seen it, but we'll --

MR. BILSKER: I understand, your Honor. I'm sorry.

THE WITNESS: Well, the scope of this -- of this patent is creating -- is sample preparation for next generation sequencing library -- for sequencing applications and the sample preparation is making libraries. That's what we call them.

And it's quite explicit and extensive throughout the specification of how you would make those libraries. And you would do it by using oligonucleotide barcodes in solution for tagging polynucleotides.

Q What other places, if any, are there in the specification that relate to taking barcodes off of beads? And I'm not going to point you to anything. You see if you can find something else yourself.

A Yeah. So I would go to column 11 and 12, and I would start at the bottom of column 11 around line 59. And this is a section titled "Modifications."

And I think I alluded to this earlier in my testimony today. These are 5' modifications that can occur on the adapter sequence, and there's quite extensive discussion of what an adapter is. It's an oligonucleotide that comprises a barcode. It has a primer function and other things.

But in this section here, it's talking about

attaching oligonucleotides to beads. For example, CPG stands for control pore glass. That is a well known porous glass bead that's used in DNA synthesis.

MR. EHRLICH: Objection. This is beyond the scope of the witness statement, this description of CPG and what it means.

MR. BILSKER: Your Honor, he extensively cited to this column in his witness statement. I don't want to lead him in any way, so I think this is -- it directly responds to cross-examination, and it's a nonleading question. So the witness is free to answer the way that he wants.

JUDGE LORD: Overruled.

MR. EHRLICH: May I be heard briefly, your Honor? He cited to text but never once offered an opinion or discussed CPG in the witness statement.

JUDGE LORD: Right. This was -- I think this was explored on cross so that --

MR. EHRLICH: My objection isn't that it's beyond the scope of cross. It's beyond the scope of his opinion in the case.

JUDGE LORD: I understand that. And you should sit down now. There's a rule on arguing with me after I've ruled.

THE WITNESS: May I continue?

JUDGE LORD: Yes.

THE WITNESS: And then at line 6 on column 12, it has this statement "3' inverted linkage (with 5' OH attached to support and 3' OH available for chain extension)."

So this is a very explicit description of the correct orientation of the oligonucleotide attached to a bead.

And then if we go down further, it talks about the different types of 5' modifications that can be linked between the oligonucleotide and the solid support that include, for example, on line 12 a 5' thiol.

If we continue down this list of different modifications, I'll just look here, I can probably direct you.

If we go down to line 33, it talks about a PC photo cleavable spacer. That is a labile linker that can release the oligonucleotide from a solid support.

And if we continue down even further to around line 49, it says the "adapter can comprise A-phosphorothioate, C-phosphorothioate, G-phosphorothioate and T-phosphorothioate."

These are modifications to the backbone of DNA itself replacing a sulfur atom for the oxygen atom. These are well known cleavable sites that require just the

addition of silver ion to release an oligonucleotide from a solid support.

Q Thank you, Dr. Metzker.

Yesterday, Mr. Ehrlich during his cross-examination discussed with you the Abate Agresti paper.

Do you recall that?

A I do.

Q About beating Poisson, close packing beating Poisson. Do you remember that?

A I do.

Q How many of the claims in the patents in suit call for close packing and beating Poisson?

A None. That phrase is not required in any of the claims.

MR. BILSKER: Thank you, your Honor.

MR. EHRLICH: I have no recross, your Honor.

MS. BHATTACHARYYA: Nothing further, your Honor.

JUDGE LORD: Okay. All right. Thank you, Dr. Metzker. You may be excused.

THE WITNESS: Thank you.

(Witness excused.)

MR. POWERS: Your Honor, 10X calls as its next witness Dr. Serge Saxonov.

JUDGE LORD: Good morning, Dr. Saxonov.

THE WITNESS: Good morning.

JUDGE LORD: Sir, when you come to testify at a proceeding like this, you understand that you are obligated to tell the truth and nothing but the truth? Do you understand that?

THE WITNESS: I do.

JUDGE LORD: And you have a good understanding of what the truth is, and I don't have to explain that to you; right?

THE WITNESS: I do.

JUDGE LORD: All right. Do you have any objection to taking an oath to tell the truth?

THE WITNESS: No.

Whereupon,

SERGE SAXONOV

was called as a witness and, having first been duly sworn, was examined and testified as follows:

JUDGE LORD: Thank you. Please proceed.

MR. POWERS: Thank you, your Honor.

DIRECT EXAMINATION

BY MR. POWERS:

Q Dr. Saxonov, please state your full name for the record.

A My name is Serge Saxonov.

Q What is your position at 10X?

A I am the CEO of the company.
Q Could you look at this thin binder in front of you, and there should be an exhibit numbered 1829C.
Do you see that?
A Yes.
Q Is that your witness statement in this case?
A Yes.
Q If you go to the very last page of 1829C, it's page number 9. Is that your signature on that page?
A Yes.
Q If you go to the immediately preceding page, do you see there's a blank signature page?
A Yes.
Q Do you understand that the only difference between this version that you signed and the current version is the replacement of exhibit numbers that have changed?
A That's my understanding.
Q Are the answers that you gave in this witness statement to counsel's questions true and correct to the best of your knowledge and belief?
A They are.
MR. POWERS: Your Honor, we offer CX-1829C, his witness statement, into evidence.
MR. JOHNSON: No objection.

JUDGE LORD: Then CX-1829C is admitted into the record -- into evidence without objection.

(Exhibit CX-1829C received.)

MR. POWERS: Thank you, your Honor. And we'll pass the witness.

CROSS-EXAMINATION

BY MR. JOHNSON:

Q Good morning, Dr. Saxonov.

A Good morning.

Q There are a couple of cross binders in front of you I believe at the top, they have got the green sheets. There are two volumes. I'll try to -- from time to time, I'll refer you to some documents that are included in the binders.

A Okay.

Q And I'll try -- there are two volumes and it should say volume 1 and volume 2.

A Yes.

Q And I'll try to direct you to the right volume.

A Yep.

Q Sir, in addition to being the CEO of 10X, you're also a cofounder of 10X; right?

A That is correct.

Q And you founded 10X with Dr. Hindson; correct?

A Initially, yes.

Q And before you founded 10X, you worked at Bio-Rad; right?

A Not immediately before, but yes, I worked at Bio-Rad before then.

Q That was your immediate job before founding 10X after taking some time off; is that right?

A I worked at Bio-Rad, I took -- I left it, took some time off and then I founded 10X.

Q Okay. And the reason -- you were at Bio-Rad because Bio-Rad acquired a company called QuantaLife; right?

A That's right.

Q And you joined QuantaLife in the spring of 2010; correct?

A That's right.

Q And at QuantaLife, you were the vice president of application development; right?

A Yes.

Q You were in charge of applications for QuantaLife's droplet digital PCR system; right?

A Yes.

Q And you were motivated to start 10X, in part, because you were acutely aware of the kind of information, such as phasing information, that was being lost by next generation sequencing devices that processed short reads;

is that right?

A That was one of the motivating problems that was --

Q I'm sorry, that was one of --

A Motivating problems for starting 10X.

Q Okay. And before you started 10X, you knew of no technology or idea that could successfully barcode partitions and preserve phasing or cell level information; right?

A Well, there's certainly technologies that existed. The question is what kind of scale one would need.

Q So is it true that you knew at the time of founding 10X, you knew of no technology or idea that could successfully barcode partitions and preserve phasing or cell-level information?

A That's not -- I don't think that's quite true, because you could use conventional plates and approaches to do that.

Q Okay. Let's take a look at your witness statement that you just referred to. And I will draw your attention, this is CX-1829C. And I'll draw your attention to question 34 and the answer that you gave and we'll put it up.

Do you see.

"Question: What was your motivation in founding 10X?" In the early part of your answer and the part I want to draw your attention to, you said, "I knew of no technology or idea that could successfully barcode partitions and preserve phasing or cell level information."

You just said a minute ago you didn't think that was correct. Do you want to clarify for us what you meant?

A It's -- the question is of scale. So you could use small -- you could use approaches that exist, conventional molecular biology approaches, to do this at the very small scale, but there was nothing that existed to do this at a substantial scale.

Q And, in fact, you identified this same problem, namely the idea of sample partitioning and barcode tagging for sequencing, you identified that when you were at QuantaLife; right?

A It was a problem that existed in the general -- in the field. Back then it was clear to a lot of people at that time, and yeah, this is one of the problems that I thought about for a bit at QuantaLife.

Q Okay. Let's take a look at RX-288C. This is in volume 1. And I'll ask you, this is -- you recognize this as an e-mail that you prepared on April 14 while at QuantaLife; right?

A Yeah, it appears to be.

Q And this is an e-mail that you sent to Jon Petersen. Do you know, what was Mr. Petersen's position at QuantaLife at this time?

A So Jon had two positions. He was an engineer, and he also was a manager of IP, intellectual property.

Q Okay. And this -- and you also copied Mr. Hindson on this as well; right?

A Yes, I did.

Q And you also had an attachment to this e-mail as well that was titled "Droplet Tagging for Sequencing," and that was a Word document; right?

A Yes.

Q And again, the subject of this April 14 e-mail is "Idea for Sample Partitioning and Barcode Tagging for Sequencing." Right?

A That's what it says, yeah.

Q And if we turn to the attachment, the title of the attachment is "Sample Partitioning and Barcode Tagging for Sequencing," and it's dated April 12, 2011, and it lists your name; right?

A Yes.

Q And, again, you prepared these materials while you were at QuantaLife; right?

A Yeah.

Q Let's go to the section titled "Applications."

And it refers to long reads and phasing. And, sir, you identify the problem that "short read sequencers, such as those made by Illumina or ABI, suffer from being unable to provide phasing information."

You wrote that; right?

A Yes.

Q And, in fact, sir, while at QuantaLife, you had already come up with a solution to solve this problem; right?

A No.

Q Well, let's look at what you wrote on the third page of the attachment. In the second full paragraph, you wrote, "our partition barcoding scheme can be used to effectively reconstruct much longer reads, help with long range assembly and supply phasing information while making use of existing sequencing approaches."

You wrote that; right?

A Yes.

Q And while at QuantaLife, you also came up with the solution to preserve single-cell transcriptome resolution; right?

A Well, no. So what it says here and what it says, you know, about the cell-specific transcriptome information as well, this is an idea for how I can try to go about to try to solve this problem.

As far as actually figuring out how to do this idea, how to build something that could do this, we didn't even -- I mean, there was no -- we didn't start working it, we didn't even start trying to implement it.

Q Let's look -- let's look at the section "Single Cell Transcriptome Sequencing."

Do you see that?

A Yes.

Q And you wrote that section in this attachment, didn't you?

A Yes.

Q And while at QuantaLife, sir, you also had the idea that read data can be analyzed to determine which transcripts came from the same cell; right?

A Sorry, what --

Q I'll ask it again. While at QuantaLife, sir, you also had the idea that read data can be analyzed to determine which transcripts came from the same cell; right?

A Well, I had this -- I had an idea that one would want to do this, just like, you know, lots of other people had the same goal, the same idea, the same desire.

Q And at QuantaLife, the massive capacity of next-gen sequencing could be applied to large collections of cells while preserving single cell resolution; right?

A Well, I don't know what you mean by QuantaLife.

But if one were to make this idea work, specifically this goal, then the consequence of that would be that you could apply, you know, the capacity next-gen sequencing to large collections of cells while preserving single cell resolution.

Q Sir, while you were at QuantaLife, you wrote that, "this way the massive capacity of next-gen sequencing can be applied to large collections of cells while preserving single cell resolution." Right?

A I wrote this sentence when I was there.

MR. JOHNSON: Your Honor, at this point, we need to go on the Bio-Rad confidential record, please.

(Confidential session follows.)

OPEN SESSION CONTINUED

JUDGE LORD: We're on the public record.

Good afternoon, Dr. Dear. Dr. Dear, you understand that when you come to testify in this forum, you need to tell the truth; correct?

THE WITNESS: I do.

JUDGE LORD: And you have no doubt about what the truth is; right?

THE WITNESS: That's right, your Honor.

JUDGE LORD: Okay. Do you have any objection to taking an oath to tell the truth?

THE WITNESS: No.

Whereupon,

PAUL DEAR

was called as a witness and, having first been duly sworn, was examined and testified as follows:

JUDGE LORD: Please be seated.

MR. NATHAN: Your Honor, I believe that binders, including Dr. Dear's witness statement and his demonstratives, have been distributed.

DIRECT EXAMINATION

BY MR. NATHAN:

Q Good afternoon, Dr. Dear.

A Good afternoon.

Q Could you please state your full name for the

record?

A My name is Paul Dear, D-e-a-r.

Q Did you submit a curriculum vitae in this investigation?

A Yes, I did.

Q Is there a copy of that that's been distributed in a separate folder?

A One moment. Can you tell me which --

Q It's perhaps on top of the first binder.

A Yes.

Q Is that CX-29?

A Yep, CX-0029.

Q Could you please take a look at it.

A Yes, I've looked at it.

Q Is that document the CV that you submitted?

A Yes, it is.

Q Could you please summarize your educational background for the Judge?

A Yes. My first degree was a BA from Cambridge specializing in biochemistry. That was in 1984. And I then did a Dphil in Oxford, a Dphil is Oxford's term for a PhD. And that was in 1989, I received my Dphil.

JUDGE LORD: Dr. Dear, I'll need you to speak up. Thank you.

THE WITNESS: If I'm close to the microphone, is

that better?

JUDGE LORD: That's better.

THE WITNESS: Thank you.

BY MR. NATHAN:

Q And, Dr. Dear, you should feel free to bring the base of the microphone closer to yourself, if that allows you to sit more comfortably.

A Is this okay like this?

Q You'll want to speak a little bit closer to it, I think.

A Okay.

Q Thank you. You obtained a Dphil?

A Yes, that's correct. That's Oxford's term for a PhD.

Q What was the title of your thesis when obtaining that PhD?

A It was techniques for manipulating large DNA molecules.

Q Where are you currently employed, Dr. Dear?

A I'm currently the founder and CEO of a biotech company called Mote Research in Cambridge.

Q When was that founded?

A That was 2015 I founded that.

Q What do you do at Mote Research, Dr. Dear?

A So I'm developing technologies for genome

editing, that is technologies for -- for editing DNA, primarily for human therapeutic úses, things like cancer, genetic disorders like cystic fibrosis and retroviral diseases like HIV.

Q Where did you work prior to Mote research?

A So prior to Mote Research, I was with a Cambridge biotech company called Base4 Innovation, and I was there because we were developing a sequencing technology that I previously devised in my previous employment. So I was with Base4 for a while to get that technology established there.

Q What attracted you there?

A To Base4?

Q Yes.

A The opportunity to develop this technology. They were a small company when I joined them. They have since grown to about 35, 40 people, and I wanted a good place to develop this sequencing technology.

Q Have you done any other professional work, Dr. Dear?

A Yes, certainly. So in chronological order, after my first degree and before I started my Dphil, I spent one year at the MRC's Laboratory of Molecular Biology in Cambridge. I was working there with Dr. Greg Winter, he is now Sir Greg Winter, and he is a Nobel laureate as of

last year.

And I was -- while I was there, I built the first humanized antibody gene. Humanized antibodies are a class of therapeutic that are now quite widely used.

So then I went to Oxford, did my Dphil. At the end of my Dphil, I also did a post-doc in Oxford. That would have been 1989 to 1992.

And then I went back to the MRC Laboratory of Molecular Biology. Initially under Dr. Greg Winter. I was then a junior group leader, group leader, senior scientist and tenured group head. And I was there until 2015.

Q Dr. Dear, in connection with your professional activities, have you published any of your work?

A Yes, I've published about 50 papers or a few more and a number of book chapters and books.

Q Any of those been cited anywhere?

A So I think my papers have around 7,000 citations or thereabouts.

Q Have you been named as an inventor on any patents in connection with your professional work?

A Yes, a number of patents.

Q In the course of your academic and professional career, have you received any awards or honors?

A Yes. As an undergraduate, I was an exhibitioner. That's an academic award given by the

university.

During my time with the MRC, I won the Max Perutz Open Prize. That's a single prize awarded annually, sponsored and at that time presented by Dr. Max Perutz, who is a Nobel laureate at the lab.

And also I received and continue to receive a number of MRC inventors awards that recognize financial -- financial success from products that I've been involved with.

Q What areas have those products included?

A Most of the inventors awards relate to humanized antibodies, many drugs stem from that technology or if pharmaceuticals, like Herceptin, Humira, drugs used to treat cancer, rheumatoid arthritis, things of that nature.

Q Could you please describe the areas of research you have experience with throughout your career?

A Throughout my career, yes. Molecular biology, molecular genetics, genomics and sequencing, single molecule analysis and single molecule work, microfluidics.

Also instrumentation and digital PCR. And I also have some experience in robotics and instrument building and programming.

Q Do you have any experience in molecular diagnostics?

A Molecular diagnostics, yes. That stemmed

largely from my work on single molecule analysis. If you can detect single molecule, you can detect a single pathogen. So, for instance, at the moment I have a system that's being trialed in neonatal units in the U.K. for the very rapid diagnosis of bacterial meningitis in newborns.

Q Do you have any experience with synthetic biology?

A Yes, I use synthetic biology and I use that at present in Mote.

Q Do you have experience in addition to what you've described already in developing new technology?

A So the general thrust of my interest has always been in developing new technology.

Q Have you previously been certified as and have you testified as an expert witness in any other proceeding?

A Yes, I have.

Q Do you consider yourself to be an expert in the field of genomic sequencing solutions?

A Yes, I do.

MR. NATHAN: Your Honor, 10X would offer Dr. Dear as an expert witness in the field of genomic sequencing solutions.

MR. BILSKER: No objection.

JUDGE LORD: All right then. Dr. Dear's testimony will be accepted into evidence as that of an

expert in genomic sequencing solutions.

BY MR. NATHAN:

Q Dr. Dear, do you see two binders in front of you with Exhibit Number CX-1827C and Demonstrative Exhibit Number CDX-11C?

A The second of those, yes. Sorry, what was the first number?

Q First number is 1827C, CX-1827C. They may be right on top of one another to your right, Dr. Dear.

A Sorry. There were two binders stacked.

Q If you could open it up and take a look at the document in there and see if it has the exhibit number I mentioned.

A Yes, CX-1827C. Yes.

Q What are the documents in the binders that have been placed in front of you?

A So CX-1827C is my rebuttal witness statement, and the other one, CX-11C, that's -- sorry, that binder contains copies of some slides that I prepared.

Q Dr. Dear, could you please quickly scan through the pages of your rebuttal witness statement and confirm that it contains your answers to the questions that were posed to you by counsel?

A Yes, it does.

Q Could you please look at the very last page of

CX-1827C, your witness statement, and let me know if that has a signature?

A Yes, the very final page does.

Q Is that your own signature, Dr. Dear?

A That is my signature.

Q Could you please look at page CX-1827C.00295.

A I'm sorry, do you mean page 295 of the same folder?

Q Yes. Well, it should have -- in the exhibit number, there is embedded a page number, which is a secondary number after the period that follows the letter C.

A I'm sorry, yes, 295. Yes, I'm on that page.

Q What does that page appear to be?

A That's a signature page but without my signature.

Q Is it your understanding that you had provided a witness statement and since then the exhibit numbering in your witness statement has changed to allow for JX numbered exhibits to be introduced into your statement?

A Yes, that's my understanding.

Q Is it your understanding also that certain portions of your witness statement were redacted because they were responsive to Dr. Metzker's opinions that the Judge in this investigation has excluded or that were

withdrawn?

A Yes.

Q Apart from these changes, is it true that there were no changes to your witness statement?

A That's true, yes.

Q Does this witness statement contain your own answers to the questions that were posed by counsel?

A Yes, it does.

Q And, Dr. Dear, are your answers to these questions in your witness statement true and correct to the best of your knowledge, your information and your belief?

A Yes, they are.

Q Dr. Dear, would you please take a look at the Exhibit CDX-0011.

A Yes, I have that.

Q Can you confirm whether these are, indeed, the slides you've prepared to assist with your testimony today?

A Yes, they are.

Q Is it also your understanding that certain portions of your slides were withdrawn because they were responsive to Dr. Metzker's opinions that the Judge excluded or that were withdrawn?

A Yes, I understand that.

MR. NATHAN: Your Honor, I would like to offer into evidence CX-1827C and Dr. Dear's CV, CX-0029, and to

make both part of the record and to be entered into evidence.

I would also like to make part of the record his demonstrative exhibits.

MR. BILSKER: No objection as to the witness statement and the CV, but I do object to the demonstratives becoming part of the record.

JUDGE LORD: Well, the demonstratives will be part of the record. They will not be in evidence.

MR. BILSKER: Understood, your Honor.

JUDGE LORD: All right. Then I will admit into evidence CX-1827C and the witness's CV at CX-0029C.

(Exhibits CX-1827C and CX-0029C received.)

MR. NATHAN: Your Honor, we have also distributed at the front of Dr. Dear's binder a list of exhibits that are offered into evidence with his witness statement that I understand are not subject to objection, subject to counsel's confirmation of course. And with that confirmation, 10X would respectively move those in as well.

JUDGE LORD: Counsel, any objection?

MR. BILSKER: I think we need to reserve that because we have not looked through that yet.

JUDGE LORD: All right. Then we'll just handle that later.

MR. NATHAN: Your Honor, I pass the witness.

MR. BILSKER: Your Honor, is it okay if I approach the witness and move some of that stuff away from his table there?

JUDGE LORD: What's the stuff?

MR. BILSKER: There's a bunch of binders that I don't think are relevant. I think those were left over.

JUDGE LORD: I think someone -- yeah. Please proceed.

CROSS-EXAMINATION

BY MR. BILSKER:

Q Good afternoon, Dr. Dear.

A Good afternoon.

Q And I had a little trouble hearing you from just on the table there, so if you can try to speak up.

A Certainly, yeah. My apologies, please feel free to remind me.

Q All right. Now, a lot of this case is about barcodes; correct?

A Yes, it is.

Q And about taking barcodes off supports; correct?

A That's one of the points at issue.

Q And about properties of gels; right?

A Yes, in certain respects.

Q And about droplets?

A Yes.

Q And about tagging RNA transcripts by hybridization?

A Yes, not just RNA transcripts, but yes.

Q Now, that doesn't match up very well with your experience, does it?

A I'm not quite clear what you mean.

Q Well, at the time of your deposition, you couldn't recall if you'd ever heard the term "barcode" used before this case; correct?

A I'm not sure I said that. You might be able to point me to my testimony. I probably couldn't pinpoint a particular instance when I'd heard it, when I first heard it.

Q The question is, at the time of your deposition, you could not recall if you'd ever heard the term "barcode" used before this case; correct?

A I can't remember exactly what I said. Can you point me to that?

Q Let's turn to your deposition, it should be in volume 3, I believe. JX-161C. Let's take a look at page 16, lines 7 to 10. Are you there?

A I see it on the screen. I'm not there in the binder.

Q Feel free to use whichever one you want. Sometimes it's easier to use it on the screen but --

A Okay. Can you remind me which page?

Q So we're looking at page 16 of your deposition, starting at line -- well -- starting at line 6 and going through line 9.

A This is the deposition transcripts, 161C?

Q Yes. So this was your deposition.

A Yes, yes.

Q Taken -- I actually don't see the date on here, I'm sorry. Taken November 6, 2018 at 9:43 we started.

Do you recall that, here in D.C.?

A I do, yes. Yes, I do.

Q Back at page 16, you were asked the question:

"Have you used the term barcode before you got involved in this case?

"Answer: I can't recall. Barcodes have come up in this case."

That was truthful testimony?

A It was truthful testimony. I couldn't recall at that moment where I might come across barcodes.

JUDGE LORD: You know, Counsel, whether or not your opponent objects, I have a commitment to conducting a full and fair proceeding. The question that I believe you asked him, correct me if I'm wrong, is he had never heard the term "barcode" before?

MR. BILSKER: Whether he had ever used.

JUDGE LORD: That was the question you asked him?

MR. BILSKER: That's what I have written on my sheet. I may have asked a different question.

JUDGE LORD: Is that the question?

Could you read the question back.

MR. BILSKER: I can ask it again if that would help your Honor.

JUDGE LORD: If I made a mistake, I made a mistake. I don't mind making mistakes. I try not to, but it happens.

(Record read by the court reporter.)

MR. BILSKER: I read it wrong from my sheet and I'll ask it again.

JUDGE LORD: But that's not the question you asked him at deposition, so you can't impeach him with his deposition testimony when that's not the question you asked him. Why don't you just move on from this question and we'll strike the testimony in response to the question isn't it true that you had never heard the term "barcode" used.

BY MR. BILSKER:

Q Now, when you had your deposition, you didn't recall if you had ever barcoded material in a droplet; correct?

A I can't remember if I remembered at that time, so I may have said I can't remember a particular instance.

Q You'd never used the OmniScript reverse transcription product from Qiagen; correct?

A No, I've never used that particular product.

Q And you never used either the 10X system nor the Bio-Rad system that's at issue in this case; correct?

A Yes, that's correct.

Q And you never attached an oligonucleotide to a support in a way that it could be removed; correct?

A I'd certainly never removed an oligonucleotide from a, sorry, did you say support?

Q Yes.

A I can't recall an instance where I'd removed an oligonucleotide from a support, no.

Q And you had no experience with sepharose at the bottom end of the range; correct?

A I'm sorry, what do you mean by the bottom end of the range?

Q The low polymer, low cross-link.

A I can't recall if I'd experienced stuff at the bottom end of the range. Sepharose covers quite a number of materials. I didn't really think of them as being a top and a bottom.

Q You'd never encountered cellulose as a gel, you

had no experience with it; correct?

A In my experience, cellulose is hard.

Q But you'd not encountered cellulose as a gel, you had no experience with it; correct?

A I can't recall if that's what I said. I mean, that is my experience. If you point me to a part of my testimony.

Q I'm just asking you whether you had experience with it.

A Okay. I've never come across cellulose as a gel. I've only come across cellulose as a hard material.

Q And you were not sure if you could make porous -- a porous polyacrylamide polymer; correct?

A That sounds unlikely. Can you point me to my testimony?

Q So you think you were sure that you could make a porous polyacrylamide polymer?

A I'm saying I can't recall what my testimony was. If you could point me to it, perhaps it will clarify.

Q We can turn to page 281, line 12 to 15. I'll let you see if you can refresh your recollection.

A Yeah, thank you. Yes. So just above there, if you can scroll up slightly towards line 1. So this was a discussion about acrylic polymers, and I think acrylic polymers have been mentioned as one of the hard bead

materials in Church. And my opinion was that acrylic is generally -- it's a hard plastic. It's like we call it Perspex, I think you call it Plexiglas. But acrylic generally connotes that kind of hard plastic.

Now, polyacrylamide is a different -- polyacrylamide is a gel, whether it's classified as an acrylic polymer or not I can't be absolutely sure. I don't think I was sure at the time of my deposition. But if Church had meant polyacrylamide, he'd have said polyacrylamide, you because that's much more familiar to a person in that field.

Q I'm sorry, the question was can you make a porous polyacrylamide polymer? Is that possible?

A Can you? Yes, certainly you can. I'm just trying to see -- are you quoting from my testimony?

Q But you weren't sure at the time of your deposition whether --

A No, I was very sure. If I inadvertently used the word "polyacrylamide" when we were talking about polyacrylic, then that's in error. But I think it's quite clear that I'm arguing that on the whole of that page, acrylic polymers, which is what begins that page, are hard plastics. Polyacrylamide is a gel. I mean I class it every day as a gel.

Q You didn't know what the relationship between

acrylic polymers and polyacrylamide was at the time of your deposition; correct?

A Correct. I don't know if polyacrylamide is -- falls within the class of acrylic polymer under any particular definition. I do know that polyacrylamide -- you would say -- if you were talking about polyacrylamide, you wouldn't say acrylic polymer, especially if you're talking to biologists, because they know polyacrylamide.

Q Are you -- have you completed your answer?

A Yes, I have.

Q Now, you know what the person of ordinary skill in the art has been defined by in this case; correct?

A Yes, I do.

Q And is that a person with a PhD in molecular biology, molecular genetics, chemistry, engineering or the equivalent with two years of experience, including library preparation methods, microfluidic technology and bead attachment chemistries? Does that sound right?

A It sounds right. I can't vouch for the exact wording unless you want to point me to that in my testimony.

Q You've worked with such people, haven't you?

A Yes.

Q And I take it that those people are not automatons? Do you know what that word means?

A I understand what that word means. No, of course they're not automatons.

Q They exhibit rather high levels of creativity; correct?

A It varies from person to person.

Q But if we're taking the average this hypothetical person, you would say that that person has a rather high level of creativity and problem solving abilities; correct?

A I think if we're talking about an average person, I would hesitate to say that the average person has a high level of creativity and problem solving skills.

Q So you don't think the average person of ordinary skill in the art, these people with a PhD in molecular biology, molecular genetics and those other fields that we talked about, have high levels of creativity?

A As I said, I think it varies. I think the person of skill is quite clearly defined as to what they would have studied and how long they would have been in the field.

Q But you understand that when you were looking at the material in this case, you were looking at it through the eyes of a person of ordinary skill in the art?

A Yes, that's correct.

Q So what level of creativity did you assign to these people of ordinary skill in the art?

A I don't know how to put a number on a level of creativity.

Q But you --

A They're not automatons.

Q So they're not robotic?

A No, of course not.

Q So they have some level of creativity and problem solving ability?

A They have some level. I wouldn't know how to quantify what that level is.

Q Can we put up JX-31 on the screen. And that should be in your binder, I believe volume number 1. JX-31 is the '059 Saxonov patent. And you let me know when you're ready.

A Sure. Sorry, can you give me the JX number again?

Q JX-31.

A 31. Yeah, I'm there.

Q So the '059 patent, would you agree that a significant portion of that patent is about barcoding?

A Yes.

Q For example, if we looked at column number 1, lines 16 to 18, that talks about barcoding; correct?

A Yes, that's correct.

Q And then again at line -- at column 1, line 29 to 31, it talks about barcoding there again; correct?

A Yes, it does.

Q In fact, about using -- about how to use adapter barcodes to solve the problem of tagging material in a cell?

A That's the general field. I don't think it says those words exactly.

Q And when you look at the figures in the patent, two of those three figures specifically mention adapter barcodes; correct?

A Yeah, there are three figures, two of them mention adapter barcodes or barcoded adapters.

Q So adapters can comprise barcodes in the terminology of the '059 patent; correct?

A Yes.

Q Now, a barcode in this case, would you agree, is a label that may be attached to an analyte to convey information, identifying information, about the analyte?

A Yes.

Q Now, the physical material that we're talking about as far as barcodes in this case, those are pieces of DNA; correct?

A In Saxonov, yes.

Q Well, and in the patents in suit; correct?

A In the patents in suit generally, yes.

Q And we just -- you and I need to watch out and try to make sure we don't talk over each other, because it's very hard for the court reporter to write down when we're both talking at the same time. So I'll try not to interrupt you, but let's see if you can let me finish my question, okay?

Now, in the patents in suit, cells are potential analytes; correct?

A So in the patents in suit, I think in three of the patents, the analyte is specified as a nucleic acid of one sort or another. I think in the fourth patent in suit, I think it's the '204, I think it's in the '204, that's not stipulated.

Q But in the discussions in the patents, the patent discussions in the specification do talk about cells being analytes; correct?

A I talk about cells -- I'm sorry, did you say they do talk about cells being analytes? I can't recall.

Q Let's take a look at JX-0003, which is the '024 patent. And again, let me know when you're ready.

A Sorry, can you tell me which binder that's in?

Q It should be in the first binder again.

A Okay. And that was 0003?

Q Correct.
A Yeah, I have it.
Q Could you turn to column 23, line 24 to 30. Are you there?
A I am there, yes.
Q Do you see the sentence that says "in some cases the analyte is a cell or population of cells"?
A Yes, I do.
Q So does that refresh your memory that the patents in suit discuss the possibility of cells being analytes?
A Yes, in this patent, a cell can be an analyte.
Q Now, switching back, I'm sorry, to the '059 patent, JX-31. Let's go back to that.
A Yes.
Q And you let me know when you're ready.
A I have that patent.
Q Now, one of the ways that the '059 patent teaches to deliver a barcode into a droplet is by placing the barcodes into interburstable droplets; correct?
A Yes, the bulk of that patent is about delivering barcodes in droplets.
Q And there is a difference between delivering the barcode into a droplet and releasing the barcode into the droplet; correct?

A I'm not quite sure what you mean.
Q Well, there's -- those are two different acts. One is delivering the barcode into the droplet such that you've got a barcode in the droplet, and then there's the act of releasing it from whatever the delivery vehicle was to place it in solution in the droplet; right?
A Well, if you have a droplet that contains barcodes, then at some point, you have to burst that droplet to get the barcodes out.
Q So there's two different acts. One is delivering a barcode into the large droplet and the other one is releasing it into the large droplet; correct?
A As I say, you would talk about a droplet delivering barcodes by bursting.
Q I'm sorry, maybe I'm not being clear.
There are two different acts that are available with respect to the barcodes and the droplets. One is the act of delivering the barcode into the larger droplet, that's one possibility; correct?
A You can deliver droplets, yeah.
Q Into a droplet?
A Into a droplet, yes.
Q And then you can also release the barcodes into the droplet; correct?
A If the barcodes were on a bead. We know that in

the asserted patents, they can be released from the bead.

Q Well, and when they're in burstable droplets, they can also be released into the outer droplet; correct?

A In a general usage of that word, possibly. But we're talking particularly about the context where they're released from a porous gel bead, for example.

Q Right. But I'm sorry, maybe I'm not being clear with the question. When you have a burstable droplet that delivers barcodes, one of the things it does first is it puts the barcodes into an outer droplet within a burstable droplet. You would agree with that; right?

A There's not always an inner and an outer droplet. There's always a merging of droplets.

Q I'm sorry.

A I beg your pardon.

Q Are you done?

In the '059 patent, there's a description of putting barcodes into a large droplet or an outer droplet within a burstable droplet that's smaller than the outer droplet; correct?

A Yes, there is.

Q And then there's also a disclosure of delivering those barcodes into the outer droplet by bursting the inner droplet; correct?

A Can you point me to the description?

Q That would be column number 4. Column number 4 at line 30 -- we can start at line 30. And I can read it to you, if that will help out.

A That's okay, I can read it. Yes, it says "the adapter filled droplets can be burst" and then there's a phrase in parentheses, "to release reaction components that can be used for library preparation." Sorry, there is another phrase in parentheses and I skipped over that, but yes.

Q Now, I want to concentrate just on the delivery part for right now. I want to ask you questions about that.

A Sure.

Q Can we put up on the screen JX-31, column 36, lines 55 to 67.

Dr. Dear, I take it you're familiar with the sentence in this section, this paragraph, that talks about antibodies being linked to droplets containing DNA fragments which can be burst as appropriate; correct?

A Yes, I'm familiar with this part of Saxonov.

Q And you're also familiar with the sentence above that in Saxonov, the two sentences above that where it says, "antibodies can be linked to beads coated with short DNA fragments with a unique barcode"?

A Yes, I am familiar with that sentence.

Q Those short DNA fragments that Saxonov calls a unique barcode, those would be in the larger droplet; correct?

A Saxonov refers to them as barcodes. They're not barcodes as we construe them. But yes, he says the short DNA fragments that -- in a droplet, sorry, they will be -- I'm sorry, can you repeat the question, please?

Q Sure. Those short DNA fragments that Saxonov called barcodes, those are the same material as the barcodes that we're talking about in the asserted patents; correct?

A They're not the same material. They are -- they're DNA fragments, but they're not barcodes as we construed them.

Q I'm talking about the physical material itself. They're both DNA fragments?

A Sure, they're two different things you can make from DNA.

Q Now, you would agree that those short DNA fragments that Saxonov calls barcodes attached to beads, those are delivered into a droplet in a controlled fashion; correct?

A He doesn't specify controlled, but they -- can I just take a moment to reread the paragraph?

Q Excuse me?

A May I just take a moment to reread the paragraph?

Q Absolutely.

A He doesn't actually specify there that they are delivered into droplets, I mean in terms of what he actually says, that's not there.

Q Well, he says that they're captured in larger droplets along with cell-specific barcodes; correct?

A So Saxonov is explaining that you have cells in bulk solution and you have these antibody linked beads covered with short DNA fragments. And in the bulk solution, you allow those beads to bind to cells by virtue of the antibodies on the beads binding presumably to cell surface features.

Q I'm sorry, so maybe my question wasn't clear.

A Sure.

Q And I'll ask it a different way.

Isn't it true that those barcodes attached to the beads which have antibodies which capture cells, aren't those delivered one cell, antibody, bead, barcode complex into a droplet?

A Oh, definitely not.

Q So you think there's multiple cells inside of a droplet?

A No, there may well be one cell but there will be

multiple beads. The purpose of this is to find out which cell surface -- which proteins are on the surface of the cell, so you coat the cell with these beads. And the ones that have antibodies that match up will stick. So there will be multiple antibody beads.

Q But there's one cell that goes in there; correct?

A He doesn't specify it here, but there might be one cell.

Q Now, another way that the '059 patent talks about delivering the antibody barcodes into a droplet is within a droplet that can be burst as appropriate; correct?

A Yes. Are you referring to the middle of the yellow highlighting there, that sentence?

Q Yes.

A Yes. Saxonov mentions that as a -- as a different embodiment. As it stands, it's not -- it's not an operable embodiment, but he does mention it.

Q So you think that Dr. Saxonov, the founder of 10X, created a patent with inoperable embodiments?

A Not embodiments. This particular embodiment, nobody has explained to me how it could work, and as far as I can see, if you burst the -- these droplets to get the antibodies out, you will so lose the association between the antibodies and the short DNA fragments. So in that

sense, it wouldn't be operable. But he does -- he does list it as an embodiment.

Q So have you told Dr. Saxonov that you've read his patent and you believe that one of -- one of the descriptions he has in there is not operable?

A I haven't had occasion to or reason to, no.

Q Now, whenever Dr. Saxonov in the '059 patent, JX-31, talks about barcoding, he always is talking about barcoding in solution; correct?

A Yes, I believe so.

Q I'm sorry, I didn't hear you.

A Sorry. Yes, I believe so.

Q He never talks about barcoding on a solid support; correct?

A Yeah, that's correct. His barcodes -- his barcodes are delivered in droplets and they operate in solution.

Q Now, when you deliver the barcode adapters into outer droplets, into the outer droplet with a burstable droplet, you don't need to have any releasing mechanism on the adapter; correct?

A It's not attached to anything, so no.

Q Right. It kind of wouldn't make sense to have a releasing mechanism on the adapter when you're releasing the barcode adapter from a burstable droplet; right?

A If it's not attached to anything, it wouldn't -- you wouldn't require a release -- a releasable mechanism to release it from something that it's not attached to.

Q But the '059 patent, JX-31, does talk about releasing mechanisms on the adapter; correct?

A Could you point me to that?

Q Are you not aware of it discussing anything like that?

A Not of releasing things from beads in droplets.

Q Well, it has to be releasing from something; right? Because there's not going to be any release when you deliver it in a burstable droplet; right?

A Well, perhaps if you could point me to a bit of the '059, that will clear it up.

Q Let's take a look at column 12.

A Yeah, I'm on column 12.

Q So in column 12 at line number 6, he's talking about CPG3' inverted linkage.

Do you see that?

A Yes, I see that.

Q And then in parentheses, "with a 5'-OH attached to support and 3'-OH available for chain extension."

You see that?

A Yes, I see that it's attached to supports, yes.

Q So the 5' end is the end that's attached to the

solid support; correct?

A That's what he says there.

Q And that's of the adapter barcode; correct?

A Can I just read back and get the context? Yeah.

Q And then one of the releasing mechanisms that he talks about is at line 33, he talks about a linker being a photo cleavable spacer.

Do you see that?

A Yes, in that paragraph he lists a bunch of linkers, and one of them is a photo cleavable spacer.

Q Which is not something you would ever need if you were just releasing from a burstable droplet an adapter -- excuse me.

Which is not something that you would need if you were just releasing an adapter barcode from a burstable droplet; correct?

A He doesn't say what the use of this would be. He's listed a large number of possible modifications. I get the impression that he's trying to cover all options.

Q I'm sorry, that wasn't the question, Dr. Dear. Let me see if I can be a little clearer.

A I beg your pardon.

Q There would be no reason to have a photo cleavable linker on your adapter barcode if all you were doing was releasing it from a burstable droplet; correct?

A There might be a reason. I don't know what his reason would be. I don't know -- I don't know what was in his mind or why he included that. He certainly doesn't -- there's nothing else where in the patent for example to say that you're using this photo cleavable linker or most of the other features that he lists there.

Q But you just testified a moment ago that if you -- if you're releasing from a burstable droplet, there's no reason to have a releasing mechanism on the adapter barcode itself; correct?

A You don't need a releasing mechanism if there's nothing to release from. He hasn't said that he is releasing. He may want this in there for any other reason. I don't know.

Q Now, you would agree that the '059 patent actually does teach releasable attachments of barcodes; correct?

A No, certainly not from gel beads, no.

Q Did you -- well, let's put aside the gel beads that you put in. You certainly would agree that the '059 patent teaches releasable attachments of adapter barcodes; correct?

A He cites one of many possible modifications as being a photo cleavable spacer. He doesn't say that he's going to use that for release. He doesn't say what he's

going to use it for.

Q Did you read the claim construction order in this case?

A I did. I can't recall it word for word at the moment.

Q Was there anything that you recall disagreeing with in that claim construction order?

A No.

Q Take a look in your binder at RX-720, which I think is in binder number 2.

A Yep, I have RX-720 open.

Q Can you turn to page 29 of that order?

A I'm on page 29.

Q Do you see the sentence that begins, "The examiner found that the reversible immobilization limitation was satisfied"?

A I -- I do see that sentence on the screen, yes.

MR. NATHAN: Your Honor, 10X objects to the extent that this line of questioning goes beyond testimony that relates specifically to your Honor's construction. This discussion in the Markman order, your Honor will recall, relates to a 074 application that your Honor excluded for all other purposes.

MR. BILSKER: Your Honor, we're simply pointing out what the examiner said in the file history relating to

whether the '059 patent taught reversible attachment.

MR. NATHAN: And, your Honor, that is a direct admission that Mr. Bilsker is using this for the content of the prior art document that was excluded.

MR. BILSKER: I'm not using -- this is a primary piece of prior art. We're discussing what this primary piece of prior art discloses. I'm asking this witness if he looked at the file history, saw what the examiner said about reversible attachments.

JUDGE LORD: Is it your contention, Mr. Nathan, that this excerpt from the file history relates to a different patent?

MR. NATHAN: A discussion of the '074 application that came up in the prosecution of the '024 patent, your Honor. I'd be happy to recite exactly what that was and how it came up. There was an argument related to that regarding claim construction.

The '074 application is a publication of the application that led to the '059 patent. It was evidence in claim construction. It was not evidence for other purposes. And your Honor excluded it for other purposes while being very specific that Bio-Rad did have the right to use it for purposes of claim construction only.

JUDGE LORD: And where was that ruling?

MR. NATHAN: That's I believe the order on

motion in limine number 4, your Honor.

JUDGE LORD: Do you know the order number?

MR. NATHAN: Yes, your Honor. It's Order Number 43, your Honor. We're getting you a page, your Honor. That's page 5, your Honor.

JUDGE LORD: Can you read me the portion of the order that you believe is relevant, Mr. Nathan?

MR. NATHAN: Yes, your Honor. With respect to the April 2012 published patent application, which was then RX-0659. '074, Bio-Rad may rely on this document for arguments regarding the scope of the claims, that is the claims of the asserted patents, but not to support a contention that Dr. Saxonov conceived of releasably attached barcodes at QuantaLife. And of course what's being discussed here is the scope of that conception as reflected and evidenced according to Bio-Rad by Dr. Saxonov's own patent.

This is exactly substantive argument about the scope of events that were conceived prior to this time, that was excluded by your Honor's order.

MR. BILSKER: May I respond?

JUDGE LORD: Yes.

MR. BILSKER: We're not talking about conception for purposes of ownership right now. We are talking about what a piece of prior art teaches and what the examiner

said in regard to prosecution of the patents in suit with respect to what the piece of prior art teaches.

This is not going to ownership and conception and joint inventorship. This is what does the piece of prior art teach, what did the examiner say and what did they acquiesce to.

JUDGE LORD: I'm going to overrule the objection.

MR. BILSKER: Your Honor, would it be possible for me to hear the last question back? I don't remember what it was.

JUDGE LORD: Yes.

(Record read by the court reporter.)

BY MR. BILSKER:

Q Dr. Dear, the sentence then goes on to say, "in response to the office action, the applicants did not dispute the examiner's determination that the '074 application disclosed the reversible immobilization limitation. Thus, both the examiner and the applicant understood that reversible immobilization was a form of releasable attachment, encompasses situations wherein a barcode molecule is released from a bead by severing a portion of the barcode molecule."

Do you see that?

A I see that sentence.

Q Does that refresh your memory at all as to whether the examiner found during the prosecution that the '059 patent did disclose reversible attachments?

A I can see what's written there, so yes.

Q And you have to reason to disagree with that; correct?

A I do not disagree with that. I might also add that there's no indication that that's -- a photo cleavable spacer is releasable in the context. I mean, Saxonov gives no context, and there's no indication that it would be operable in that context?

Q And I'm just going to remind you, can you please speak up, because I am having trouble hearing you still.

A My apologies.

Q Dr. Dear, if you'd turn to your witness statement, question 193.

A I'm there. Can I just take a moment to read it?

Q Yeah. And the part that I want to focus you on is the part that starts, "for example," which is approximately in the middle of that answer of yours.

A Okay. Do you mind if I just read the answer to get the context?

Q You may.

A Yes, I've read that answer.

Q Now, your answer, the answer that you gave, was

that the list of partition materials that Saxonov included doesn't include beads or capsules; correct?

A Yes, I believe that's true. If you -- I don't think Saxonov discloses or considers beads or capsules to be partitions. But if you could -- if there's a piece of testimony you can point me to.

Q Well, do you see the last part of that list that you gave, where it says "a partition can be an array surface?"

A Yes, I see that. A partition can be an area on an array surface.

Q And an area on an array surface can be an area on a bead; correct?

A No, you wouldn't think of it that way at all.

Q So a person of ordinary skill in the art would not read an area on an array surface to be a bead? Is that what you're saying?

A They certainly wouldn't read it that way.

Q Certainly would not?

A You would point out if -- if you meant a bead, you would say a bead. If you meant an area -- if you said an area on an array surface, a person of ordinary skill would take that to mean a flat surface or an array. Arrays are well known.

Q Let's take a look at the '059 patent, JX-31, at

column 6, line 19 to 21.

A Sorry, did you say column 6, lines 19 to 21?

Q Yes.

A Yes, I see that sentence.

Q Do you see where it says, "some methods of barcode tagging are described, for example, in U.S. patent application publication number," and then it gives a long number, it starts 2011, ends in 854?

A Yes, I see that sentence.

Q If you turn to RX-736 in your binder, which I believe should be binder number 2.

A I have RX-736 open.

Q Can you confirm for yourself that RX-736 is the same patent application that's described at column 6, line 19 to 21 of the '059 patent, JX-31?

A Yeah, it has the same number, so I believe it's the same.

Q If you can turn to paragraph 410 of RX-36, which should be page 73 of the document, so RX-736.73. It should be paragraph -- excuse me, paragraph 4 -- yeah, turn to 410.

A Paragraph 410, yes, I have that paragraph.

Q And that's entitled -- that section is entitled "Arrays." Is that right?

A The header above it is "Arrays."

Q Let's move to paragraph 424 in that Exhibit 736.

A I'm at 424.

Q Let me read, you can follow along with me if that's okay.

A Yes.

Q "A wide variety of supports may be used with the compositions and methods of the invention to form random arrays. In one aspect, supports are rigid solids that have a surface, preferably a substantially planar surface, so that single molecules to be interrogated are in the same plane. The latter feature permits efficient signal collection by detection optics, for example. In another aspect, the support comprises beads, wherein the surface of the beads comprise reactive functionalities or capture probes that can be used to immobilize polynucleotide molecules."

Do you see that?

MR. NATHAN: Objection, your Honor.

JUDGE LORD: What's the objection?

MR. NATHAN: I'm being informed this document was not, indeed, presented on the exhibit list with which we were served and I'm being told it's in a gap where it's a number that was allocated, but was a gap in the exhibit list with which we were served.

If your Honor likes, I do not wish to interrupt

or delay the examination, but I'd like to meet and confer with counsel and get to the bottom of that before this proceeds, if that is acceptable to your Honor.

JUDGE LORD: That's fine.

MR. BILSKER: This is being offered for impeachment. This gentleman said that beads cannot be array surfaces.

JUDGE LORD: Right.

MR. BILSKER: This is a document that goes to whether that, in fact, is how a person of ordinary skill would interpret it.

JUDGE LORD: So you concede that it's not on an exhibit list?

MR. BILSKER: I don't believe it is, your Honor.

JUDGE LORD: All right. Why can't he use it for impeachment, Counsel?

MR. NATHAN: Your Honor, this is going to the substantive scope of their invalidity contentions. It's a document that if they believed provided evidence as to the meaning of a term in their actual prior art, they should have submitted it. And it isn't a prior statement of Dr. Dear, as far as I understand. And so it doesn't impeach him in that regard.

If it's a question of credibility, your Honor, it nonetheless should have been part of their contentions,

and Dr. Dear should have been afforded a fair opportunity to consider whether it would change his opinion. He wasn't afforded that opportunity.

JUDGE LORD: You're saying this is the same problem we had this morning?

MR. NATHAN: I am saying it is the same problem we had this morning, your Honor, in another guise.

MR. BILSKER: Your Honor, may I respond?

JUDGE LORD: Yes.

MR. BILSKER: So this is not the same issue that we had this morning. This is an expert witness, giving expert opinions. Making a statement in his own witness statement that a portion of the specification only teaches X. This is to show that his statement that it only teaches X is not correct.

We've both agreed, both parties have agreed that impeachment exhibits do not need to be listed. And I don't know where the contention comes from that the only way you can impeach an expert witness is with his own testimony. That has not ever been my practice nor have I ever heard that as the practice of impeachment for an expert.

JUDGE LORD: All right. I'll overrule the objection.

MR. BILSKER: Can I hear the question back again?

THE REPORTER: The paragraph was read and the question was "Do you see that?"

BY MR. BILSKER:

Q So, Dr. Dear, this, in fact, does show that people interpret array surfaces as beads; correct?

A No, it doesn't show that at all. This tells you -- at best he's saying that you can have beads on array. That's an unusual feature. It's certainly not how one would understand an array. People are familiar with arrays, and you would point out if you have this -- if you have beads sitting on an array.

Q An array surface can be a bead; correct?

A The way that -- somebody looking at array, unless it's specifically called out as a bead, would know that it's a planar array. This reference, which I haven't studied in any detail, he seems to be saying that you can have beads on an array.

Q Thank you. So he does say that you can have beads on an array. And can you keep your voice up, please?

A I'm sorry. As far as I can see from this small bit of the document that I've looked at, he's saying that you can put beads on an array, that's a distinct and distinctive thing, and it's specified because it's not normally what you think of as an array.

Q Now, the Saxonov '059 patent, JX-31, does

discuss having adapter barcodes on porous beads; correct?

A I'm sorry, this is the Saxonov '059?

Q Correct, JX-31.

A Sorry, did you say on porous gel beads or porous beads?

Q I said porous beads. Let me withdraw that question and start out with another one.

You think that because the '059 patent says that a bead should be coated with DNA, that means the bead must be solid; right?

A As a general matter, it certainly indicates that the bead is solid if it's coated.

Q But, in fact, the Saxonov '059 patent, JX-31, does disclose attaching barcode adapters to porous beads; correct?

A Can you point me to that?

Q So do you know one way or the other?

A I can't recognize what you're pointing to, so if you could show me that in Saxonov.

Q Sure, turn to column 12 of the '059 patent, JX-31.

A Yeah, I'm on column 12.

Q Do you see the references to CPG?

A At the top of that column, yes, that's control pored glass.

Q That would be a porous bead; correct?
A It is porous. It's like a hard grit. It's been engineered to have pores.
Q Now, in determining what kinds of beads to use, if we go -- can we go back to column 36 of JX-31.
A Yeah, I'm on column 36.
Q And there he is talking about the barcodes attached to beads; correct?
A Which bit are you pointing to?
Q The line 59 to 60.
A Oh, yes, this is the antibodies can be linked to beads.
Q Antibodies and barcodes attached to beads; correct?
A Not barcodes but short DNA fragments and antibodies.
Q Well, Saxonov calls them barcodes; correct?
A Saxonov does call them barcodes. I'm just mentioning that they're not barcodes as we construe them.
Q Saxonov was the barcode guy; right?
A Saxonov is very keen on using barcodes in solution. The short DNA fragments, as I say, they're not -- they're not barcodes as construed. But he certainly does talk about short DNA fragments on beads, yes.
Q Now, in -- for a person of ordinary skill in the

art determining what material to make the bead, it would be reasonable for that person to look to how other situations where a bead was going into a droplet with DNA molecules attached to it, what kinds of beads those were; right?

A Sorry, you're saying if somebody was looking to put beads with DNA into droplets, they would look to other applications that put DNA on beads in droplets?

Q Correct.

A Yes, potentially.

Q That's more reasonable than looking at applications where you're not putting DNA on beads in droplets; right?

A It would depend on the context.

Q Well, in this context, it's reasonable for a person of ordinary skill in the art, trying to determine what kind of bead to use, to look to other applications where somebody put DNA on beads into droplets; right?

A Yeah, it's reasonable. They might have other considerations as well if their application isn't the same. But yes, it's reasonable.

Q Now, the 454 beads, those are sepharose beads; correct?

A You mean the 454 sequencing beads?

Q That's correct.

A Yes, I believe -- at the time 454 was published,

I believe they used sepharose beads. That's the Margulies paper. Whether they did since in their commercial instruments, I don't know. But in the Margulies paper, I believe they are sepharose -- sepharose beads.

Q But you think that sepharose beads are not gels because they're not squishy; is that right?

A Yeah, they're hard. They're rigid. That's one of the selling points of sepharose, is its rigidity. The reason I know that is you can put sepharose in a column and you can run it -- I mean, it's intended to be run up to high pressures, several atmospheres.

So it will take twice the pressure that you put in your car tires, for instance. So for that reason, yes, sepharose isn't squishy. If it were, it wouldn't work for that.

Q You can run a chromatography column just with gravity, can't you?

A You can do. But in general, you don't want to, because typically on a column, you're -- I mean, apart from the fact that you might want to get things done as fast as possible, you're also -- you don't want to leave your whatever it is on the column that you're working with sitting around indefinitely. So --

Q So you -- I'm sorry.

A Sorry, I hadn't quite finished. So the reason

that sepharose is promoted is because it's rigid enough to take very high pressures so that you can run columns quickly.

Q So you've never used a gravity chromatography column before?

A I can't recall whether I have or haven't.

Q I take it you've heard of the Journal of Biological Chemistry?

A Yes, I have.

Q That's a pretty well-known journal in your field; correct?

A Yes, it is.

Q Now, your testimony is that gels cannot be rigid; is that right?

A My testimony is that if you're looking to use gels in a microfluidic application, you look for what are gels in that field.

Q Now --

A In that field, you're looking for something that's going to be soft and squishy. Hard things will block microfluidics or will tend to block microfluidics.

Q None of the claims in the patent in suit have any limitation about microfluidics, do they?

A I believe the '468 has microfluidics. I can't remember the exact limitations.

Q Well, let's take a look. Mr. Jay, can you put JX-9 up on the screen.

I don't think we have it in your witness binder. JX-10, it's going to go up on the screen. Apparently it's JX-0005. Not 9, not 10 but 0005.

A Of course.

Q Can we move to the end of the claims, please.

A I'm sorry, did you say I don't have a copy of this in my binders?

Q You don't. You're going to have to look at it on the screen, I apologize.

A Yeah, that's fine.

MR. NATHAN: Your Honor --

BY MR. BILSKER:

Q Claim 1.

MR. NATHAN: Your Honor, may we request that Dr. Dear be afforded to have a copy of this patent, which is one of the asserted patents in the investigation, if he's going to be asked to read it?

MR. BILSKER: I'm informed that we're grabbing it now. I didn't contemplate him mentioning this.

JUDGE LORD: That's fine. We'll wait.

MR. NATHAN: Thank you.

BY MR. BILSKER:

Q So Dr. Dear, you have a copy, a hard copy now;

is that right?

A Yes, I do. Thank you.

Q Let me withdraw that question and we'll just move on to a different question.

JUDGE LORD: All right.

BY MR. BILSKER:

Q Going back to your -- are you ready to proceed?

A Yes, I am.

Q Going back to your statement, you believe that gels cannot be rigid; right?

A In this field, if you want a gel, you want something squishy, like -- like Abate's polyacrylamide beads, you want something that's easily deformable under the pressures that are relevant.

Q Do you have a number that you can put on this squishiness?

A No, I don't have a number I can put on that squishiness. If somebody wanted to pick a suitable material, as I said, they would look to something like Abate and see what he used. I guess they could measure the squishiness if they wanted to. I don't have that number on the top of my head, no.

Q Nothing in any of the four patents that talks about squishy, is there?

A I do not believe the word "squishy" is used. I

think that came in originally from Bio-Rad testimony. But it's a good word.

Q And there's nothing in the patents that talk about gels needing to be deformable, is there?

A Not that I recall explicitly, but it's clear that they -- that in this context, you want squishy things. Hard things block microfluidic devices.

Q Well, they only block microfluidic devices if they're larger than the channels; correct?

A No, actually, you'd be surprised. I have blocked umpteen microfluidic chips that have channels much wider than rigid beads that I'm trying -- that I was trying to put down them, because beads stack up, they jam side by side. So no, it's not just that the beads have to be narrower than the channels. They still -- it's still a problem.

Q Isn't it true that the only property of a gel bead that the patents mention is that those gel beads must be porous?

A They do mention that they must be porous. I can't recall any other specific parameters that they mention.

Q Now, you would agree that people in the field of microbiology do refer to rigid gels; correct?

A Microbiology or molecular biology, did you say?

Q Microbiology.

A Microbiology, I would normally take that to mean bacteriology.

Q Do people in the field of biology refer to gels as rigid?

A I think that depends on the context. There's -- it's a very, very big field. Can you give me an example?

Q Sure. Let's take a look at RX-731. That should be in binder number 2.

A Yes, I have 731.

Q And this is -- you're there?

A I have that document, yes.

MR. NATHAN: Objection, your Honor. We object to this document being shown. It was not on the exhibit list and it is manifestly going to the scope and content of prior art.

There is a dispute in this case as to what constitutes a gel and what does not constitute a gel as relates to the scope of these claims. This is an issue where Bio-Rad has continually failed to meet its burden of proof on the question of invalidity by presenting evidence that the beads it is pointing to are gel beads.

It is simply not fair for Dr. Dear to be presented with evidence after evidence after evidence at the hearing that he was not given an opportunity to opine

upon, when this is a central dispute in the case that has been known to Bio-Rad from the start.

MR. BILSKER: Your Honor, may I respond?

JUDGE LORD: Yes.

MR. BILSKER: This is direct impeachment evidence. This gentleman said that people in the field would not refer to gels as rigid. This document goes to refuting that directly.

JUDGE LORD: That's not quite the way I heard the testimony. And I am again uncomfortable with the notion that under the rubric of impeachment, you can just pile on document after document that the witness hasn't seen.

I gave you some scope because he is an expert and we do allow expert testimony on matters that experts haven't seen before.

But this does seem to me to come out of left field, particularly since the field of biology is a very broad field, and you could certainly come up with somebody somewhere sometime who used gel in this way.

MR. BILSKER: May I respond still?

JUDGE LORD: Yes.

MR. BILSKER: Your Honor, 10X had a fact witness on the stand, Dr. Agresti, and they actually had him read an article he's never seen before and draw conclusions on

it. I think we're in a different realm with an expert witness who is giving opinions stating that gels have to be squishy. And this goes to whether, in fact, gels, and this is about gel beads, have to be squishy and whether people in the field would refer to gel beads as having to be squishy.

JUDGE LORD: All right. I'm going to let you proceed, but please be very careful with the way you characterize the evidence that you're putting in front of the witness, because the witness hasn't seen it before, and I'll be very sensitive to any effort to mislead the witness about what is being presented.

MS. BHATTACHARYYA: Your Honor?

JUDGE LORD: So on that basis -- yes?

MS. BHATTACHARYYA: May I make a comment as well?

JUDGE LORD: Please.

MS. BHATTACHARYYA: Your Honor, the Staff joins 10X's objection on this issue. There was numerous -- there were numerous objections during the motions in limine phase where your Honor excluded -- new evidence that was untimely was excluded directed to this exact topic. And it seems that that's going to be excluded, and Staff agreed with much of your rulings. Coming up with something at the hearing and arguing that impeachment covers everything

that's a rebuttal case seems --

JUDGE LORD: I know, it's very troubling.

MR. BILSKER: Your Honor, I'll keep it narrow.

JUDGE LORD: I think if you keep it narrow, you really can't show him this document, because this document is --

MR. NATHAN: Your Honor, may I have permission to make one additional comment?

JUDGE LORD: Yes.

MR. NATHAN: It is not impeachment if it is not within the same context of Dr. Dear's testimony. And that -- to wit microfluidics, your Honor.

JUDGE LORD: That's a good argument. It's not necessarily a winner. Because there is some scope as to what is impeachment, as I indicated earlier.

Mr. Bilsker, if you want to ask him about this document, I would say maybe one question and then please move on.

BY MR. BILSKER:

Q All right. Dr. Dear, would you be surprised if people in the field of biology refer to gel beads as being rigid?

A It would depend on which field of biology. I mean, it's a huge discipline. Biology is vast.

Q Gel beads used for separation.

A That's different from gel beads used in microfluidics.

Q So you would not be surprised if people refer to gel beads used for separation as being rigid?

A I would -- I would certainly not be surprised if they refer to things differently in different fields.

Q Now, sepharose certainly has pores, doesn't it?

A Yes, sepharose can be porous.

Q And at the end of the day, isn't it really true that a gel bead is a bead that has porousness, fluid can flow in and out, the internal structure is accessible?

A Porosity is one aspect. Because something is porous doesn't make it a gel. I mean, you've earlier brought up control pore glass. That has pores, but it's certainly not a gel, nor would you use it in the same context. It's in a different application.

Q Are you finished?

Do you know who Dr. Michael Schnall-Levin is?

A The name doesn't ring a bell, no.

Q Do you know that he was designated as 10X's corporate designee on the topic of what gels are?

A It's possible. I just don't recall at this moment.

Q Did you read his testimony?

A I can't recall. If you could prompt me with it,

that would help. Can you also remind me of his name?

Q Dr. Michael Schnall-Levin.

A Levin rings a bell. If you could show me his testimony, I'd be happy to look at it.

Q Sure. I believe it should be in your binder number 3, RX-413C.

A You said 413C?

Q Yes.

A Yes, I have that in front of me.

Q Could you turn to page 109, line 23 to 110, line 1.

Can we go on the 10X confidential record, please?

(Confidential session follows.)

OPEN SESSION CONTINUED

JUDGE LORD: All right. We're on the public record.

THE WITNESS: Yes, I've read that paragraph.

BY MR. BILSKER:

Q This paragraph mentions emulsion PCR; correct?

A Yes, it does. That's quite a common way of making a sequencing substrate.

Q And emulsion PCR involves droplets; correct?

A Yes, it does.

Q And the sequencing substrate in this situation would be a bead; correct?

A Yes, the sequencing substrates would -- would be the DNA that they are going to sequence on a bead.

Q What Hinz is talking about is using porous gel beads because those porous gel beads have a lot of surface area and therefore can take a lot of polynucleotide or oligos; correct?

A Broadly, yes. I don't remember if he says because they have a lot of surface area, but he does talk about porous beads as a sequencing substrate.

Q Well, if you look at the abstract, see if that refreshes your recollection as to whether Hinz says that because they have a lot of surface area, very porous gel beads are good for delivering oligonucleotides where you

need a lot of oligonucleotides into a droplet.

A Yeah, he doesn't spell out all the steps in that reasoning, but he does make the point that his porous particles have higher loading capacities.

Q Now, Dr. Dear, you would agree that one of the reasons that -- well, let me withdraw that.

Saxonov is all about barcoding in solution; correct? The Saxonov '059 patent, JX-31?

A Yes, Saxonov is -- he teaches barcoding in solution.

Q And when you barcode in solution, the reaction kinetics are better than when you barcode on a solid substrate; correct?

A Not necessarily.

Q One of the first steps in barcoding would be a hybridization reaction; correct?

A Typically, yes.

Q And that could be rate limiting; correct?

A There are lots of factors that could be rate limiting. Whether -- so a rate limiting step is by definition the slowest thing that's happening. So unless it's the slowest thing that's happening, it's not rate limiting.

Q Well, for example, if I had a situation where I was doing barcoding and I was only able to hybridize my

barcode to 15 percent of the templates, that would then lead to no more than 15 percent of the templates being barcoded; correct?

A If you take that as a hypothetical, if you only barcode 15 percent, then you will only get 15 percent out.

Q If I only hybridized my barcodes to 15 percent of the templates, then I would only be able to barcode 15 percent of the templates; correct?

A Yes, yeah, in general, that's true.

Q And we have to watch each other again, talking over each other, okay? And you know that it's true that hybridization occurring on a solid substrate is only about 15 percent as efficient as hybridization occurring in solution; correct?

A I hadn't come across 15 percent.

Q What number had you come across?

A I don't recall a specific number. If that came up and I've missed it, then please point me to it.

Q Let's take a look -- well, you wouldn't be surprised if hybridization on a solid substrate with a molar ratio of 1-to-1 between the template to be targeted and the targeting DNA, 1-to-1 molar ratio between those two, if doing that with one of them on a solid substrate, you only got 15 percent to 25 percent hybridization, that wouldn't surprise you, would it?

A Yeah, this would surprise me. I'm not sure where the 1-to-1 molar ratio comes from. But off the top of my head, yes, that would surprise me. If it were that low.

Q You know that Dr. Hardenbol testified that reaction kinetics are much faster or are faster in solution than they are when one material is on a solid support; correct?

A I believe he said that all other things -- I can't recall his exact words. If you can point me to it.

Q Do you remember in general him saying that?

A I can't remember his exact words. I do remember him saying something to the effect that all other things being equal, hybridization can be faster when things are in solution.

Q And that's consistent with your experience; correct?

A In the abstracts and all other things being equal.

Q And that would be consistent with the experience of one of ordinary skill in the art as defined in this case; correct?

A As defined in this case, no. As defined in this case, we're dealing with tiny, tiny droplets, which means that things are confined in a very small space. So I don't

think it would be obvious to someone that the kinetics would be bad if something were attached to a bead, and I don't think they would have got that from any of the teachings of Church or Saxonov, for instance. Church I don't think mentions kinetics, and he has -- he has stuff on droplets -- sorry, on beads in droplets and never indicates that the kinetics are a problem.

Q Never mentions one way or the other, it's just to prove a concept; correct?

A Yeah, he never says that it's something that you have to think about or worry about, and I don't think --

Q He never did a measurement of the kinetics, did he?

A No, he didn't show that they are slower because something is bound to a bead, no.

Q If the barcodes in the Church reference were taken off the beads and put into a solution, a person of ordinary skill in the art would have an expectation of success in carrying out the barcoding reaction; correct?

A I'm sorry, can you give me the hypothetical again, if they have --

Q Sure. If one of ordinary skill in the art were to take the barcodes off the beads in Church such that the barcoding was to occur in solution, they would have an expectation of success in doing the barcoding in solution

in the Church embodiment; correct?

A Taking barcodes off the beads, I mean, I don't know why they would want to do that in the first place. They wouldn't expect it to make the kinetics worse. I don't think they would expect it to make the kinetics better either from what Church says.

Q Would they have an expectation of succeeding in doing the barcoding, yes or no?

A All other things being equal, if they had been motivated to do that, quite possibly. But I don't believe that they -- I mean, why would they do that?

Q Well, they would do it because Saxonov teaches them to do it.

A Well, Saxonov says you can barcode in droplets. His -- his barcodes start out in solution, so it's not that he's saying take the barcodes off beads so they work better. He just has them in solution from the beginning.

Q Well, he tells you to release them from a burstable droplet for sure, doesn't he?

A Well, that's because if they're in a burstable droplet, they're just not available. I mean, that's -- that's not releasing them from a bead. You've got to -- you've got to add them to the system, so obviously you have to burst the droplets.

Q If you're doing what Saxonov teaches, you're

going to barcode in solution; correct?

A Yes.

Q Now, Saxonov also teaches the use of two junctions to introduce samples and reagents into a droplet, doesn't he?

A Can you point me to that bit in Saxonov?

Q Sure. So it's JX-31.

A I'm sorry, which binder?

Q JX-31 is in binder number 1.

A Yeah, I have JX-31.

Q And if you would turn to column number 13.

A Yep.

Q Column 13 at -- so let me just read the beginning of column 13, line 6. "The present disclosure includes compositions, methods and kits for manipulating genetic material in droplets e.g. using droplet digital PCR. The droplets described herein can include emulsion compositions or mixtures of two or more admissible fluids described in U.S. patent number 7,662,280 and droplets generated by devices described in international application number WO/2010/036352, first inventor: Colston."

Do you see that?

A Yes, I do.

Q And then if we turn to the Colston reference, which should be RX-473 in your binder, binder number 1.

A Yes, I have Colston open.
Q If you turn to figure 114 of that reference.
A Yes, I see figure 114.
Q Do you see one box that's labeled "sample"?
A Yes, I do.
Q And you see one box that's labeled "reagents"?
A Yes, I can. I can see test reagents.
Q And you see there's separate lines coming together from those two boxes and meeting at a point?
A Yes, there are lines.
Q And then there is another line that emanates from that point of meeting going into a droplet generator.
Do you see that?
A Yep, there's an arrowed line.
Q And I take it you've read the text material that goes along with the description of this figure?
A Yes, I have.
Q And if you turn to paragraph 200 -- excuse me. It should be page 243 at line 18 to 25.
A I'm on page 243.
Q It doesn't seem to match up with what I have here.
I'm sorry. It's page 243 of the actual document, but page -- RX-245. RX-473.000245.
A Yes, okay, that's page -- that's page 243 in the

patent, in the patent's own page numbering.

Q Right.

A Yep, 245.

Q If we start at line number 18, do you see the sentence that begins "Any"?

A I see that sentence. I'll just take a minute to read that bit if you don't mind.

Yeah, he's explaining the schematic that's shown in figure 114.

Q And he says, "Any of the samples and/or reagents may be stored and/or supplied separately and/or may be mixed selectably before they are supplied to a downstream region of the system (e.g. droplet generator 5744," and then it goes on.

Do you see that?

A I see that sentence, yeah.

Q So that's saying that you can supply the sample and the test reagents separately, have them mixed before they get to the droplet generator; correct?

A It doesn't say how they're mixing. He's just saying that you can mix them.

Q Got it. Now, let's turn in your book to RX-475. Should be the same volume. Should be in volume 2, I apologize.

A Yeah, it's in volume 2.

Q RX-475 is a reference by Song; is that right?
A Excuse me. Sorry, RX-475.
Q Correct?
A Yes, that's a reference by Song, first author.
Q And this is the kind of reference that a person working with microfluidics to deliver sample into a droplet might well look to as far as how to design that microfluidic device; correct?
A Yeah, I mean, this is a review article, so it's going to give an overview of the field in different embodiments. They probably -- but they might look at this.
Q Now, if we would take a look at figure number 7, you remember looking at that figure before?
A I think I do, but let me just check. Yes, I remember figure 7.
Q And we have up on the screen RX-701, which was a blowup of that figure.
A Okay.
Q And that figure shows aqueous streams coming together before they get to an intersection with an oil junction; correct?
A They are sort of all coming together at once. I mean, I -- I recall in the deposition you drew this line at some arbitrary point. But --
Q So if we look up on the screen, Dr. Dear.

A Yep, that's the same as the screen I have in front of me, I presume.

Q Right. So this line here, the aqueous streams have come together at this line; correct?

A I think we covered this in my deposition. They haven't really finished coming together.

Q Well, they have been merged together; correct? They have create -- there's been a junction at which the green, the yellow, the red streams have been forced together; correct?

A It's hard to say the exact point at which they come together.

Q Well, you see right here, they are coming together; correct?

A Yeah, as I say, it's hard to define a precise point where they're coming together.

Q And at the line, there has been no oil yet; correct? There's no junction with oil? The oil comes in right here, at the bottom of the page where I've got the pointer?

A That's my understanding.

Q So those are two junctions; correct?

A I think in my deposition, and you might want to point me to the testimony there, but I think I argued that I would consider that to be a single junction. I mean, if

I were making it as a microfluidic device, I would consider that one thing.

Q You'd say it's a single junction, even though the three aqueous things come together before they ever get to the oil?

A I think what I said was that it might be a compound junction. I would personally consider it one entity.

Q Dr. Dear, let's take a look at RX-643C -- excuse me, RX-704C in your binder. It should be binder number 2.

We should be on the 10X confidential record.

(Confidential session follows.)

OPEN SESSION CONTINUED

JUDGE LORD: We're on the public record.

CROSS-EXAMINATION

BY MS. BHATTACHARYYA:

Q Good afternoon, Dr. Dear.

A Good afternoon.

Q Good to see you again.

Dr. Dear, I want to ask you about something you say multiple times in your report, about the conventional wisdom at the time that 10X says it invented the claims of the asserted patents.

A Yes, certainly.

Q And that conventional wisdom that you refer to is the conventional wisdom that beads were used for capture and not for delivery?

A Yes, that's true. At that time, beads -- yeah, beads were used for capture, that was -- that's how, for example, Church uses them. I think that's how people generally thought about them. That's how 454 Sequencing uses them. I'm sorry, that's also how 454 Sequencing uses them, as another example.

Q Right. So can we look at your witness statement, CX-1827C. And let's start at page 30. And let's look at the first full paragraph starting with the word "Second."

A Okay. This is question 108?

Q And it's part of your answer to question 93.

A Oh, I'm sorry. Can you point me to the page again?

Q I'm sorry. So are you looking at your rebuttal witness statement?

A I am looking at my rebuttal witness statement.

Q And it's page CX-1827C.30?

A Oh, I'm sorry. I was looking at the document page number.

Q And can we also put up the question from the previous page?

A Okay, yep. Now we're on the same page. I see that second paragraph beginning "Second," the mention of beads.

Q All right. So the question you were asked is, "Would you give us a brief summary of the main aspects of your reasoning as to why Saxonov does not render the claims of the '024 patent obvious," right?

A Yes.

Q And part of your answer is, "the mention of beads in Saxonov is just one of the many examples of the conventional wisdom at the time of the 10X's claimed inventions that beads were used for capture and not delivery."

Do you see that?

A Yes, I do and yes, that's true.

Q All right. And in that paragraph when you use the term "delivery," what you're referring to is release; is that correct?

A Yes, I'm contrasting the conventional wisdom was that you use beads -- you gather things to beads, you keep things together on beads, you don't put something on a bead just to take it off a bead, which would be delivery in that sentence.

Q Right. And if we look at the last sentence of that paragraph that is basically what you just said, "there was simply no reason one of ordinary skill would attach oligonucleotide barcodes to a gel bead only to release them later."

A Yes. I think in the conventional wisdom, that would be true.

Q Could you turn to page 32 of your witness statement, question and answer 103. And can we again have the question and then the answer that begins with "Third."

So do you see the question you were asked is, "Please give us a brief summary of the main reasons -- of the main aspects of your reasoning as to why Church does not render the claims of the '024 patent obvious?"

A Yes, I see that question.

Q And, again, part of your answer is, "the disclosure of beads in Church is just another example of the conventional wisdom at the time of the inventions that beads were used for capture, and not delivery."

A Yes, that's true.

Q Could you turn to page 44 of your witness statement, question 129.

MR. BILSKER: Your Honor, I object as this not being cross-examination. This is simply having the witness restate what he already has in his questions. Cross-examination would be challenging the accuracy or veracity of the statement, and this is just having him repeat the statements. This is more in the lines of friendly redirect.

MS. BHATTACHARYYA: Your Honor, I am laying a foundation for a cross.

JUDGE LORD: All right.

Go ahead.

BY MS. BHATTACHARYYA:

Q Could you please look at the question 129, and the question is, "What is your opinion on whether one of ordinary skill would have looked to Agresti to make the selection of the kind of beads to use for attaching oligonucleotide barcodes."

Do you see that?

A Yes, I do.

Q And if you look at the third paragraph of your answer, second sentence, you say, "as a system with capture beads, the Agresti reference was part of the conventional wisdom that beads were used for capture, and not release."

A Yes, I think that's true.

Q So you're saying that Agresti also reflects the conventional wisdom that you rely upon in your witness statement?

A Yes. Agresti is the reference that we're also calling Abate. This is the beating Poisson Agresti-Abate.

Q Correct. And you're saying it's part of the conventional wisdom; correct?

A Yes, I think Abate-Agresti talks about functionalizing, but he doesn't talk about releasing.

Q And the subject matter of the Agresti article is a method of droplet loading for chemical and biological assays in microfluidic devices; correct?

A I believe so. I could check the exact text in Agresti.

Q Well, could you turn to page 17 of your witness statement. And let's look at question 52.

Do you see in your summary of Agresti, you say four lines down, "Agresti describes a method of droplet loading for chemical and biological assays in microfluidic

devices"?

A Yes, I do. And that's my understanding of Agresti-Abate.

Q And your opinion in your witness statement is that Agresti has nothing to do with sample preparation for sequencing?

A I don't remember using those exact words. I don't remember saying "nothing to do with," but if you'd like to point me to my testimony.

Q Could you turn to page 44 of your witness statement, question 129. The end of the first paragraph of your answer.

A Yes.

Q You say that, "Agresti has nothing to do with sample preparation for sequencing;" correct?

A Yes, I do say that, and I think that's true.

Q All right. So by conventional wisdom, you mean that the common practice was to use beads for capture and not release. Is that -- is that what you're saying?

A Yes, that's fair.

Q Now, could you turn to RX-468 in your binder. I think it's in the first binder. Do you recognize this reference?

MR. NATHAN: Objection, your Honor. Your Honor, the reference that's being presented is the MON forte or

MON forte reference.

JUDGE LORD: I can't hear you.

MR. NATHAN: I apologize, your Honor. This was a reference that our understanding was Staff only intended to cross-examine. There is no testimony regarding MON forte by Dr. Dear. That testimony is withdrawn. It is not part of the record in the case.

MS. BHATTACHARYYA: Your Honor, Dr. Dear is offering the opinion of what conventional wisdom in the art is. If there's art that contradicts his conventional wisdom, then that is relevant and a proper subject for cross.

MR. BILSKER: I join with Staff.

JUDGE LORD: All right. I overrule the objection.

MR. NATHAN: Your Honor, may I add one comment, please? This testimony was withdrawn on representation.

JUDGE LORD: Was withdrawn on?

MR. NATHAN: It was withdrawn on representation that there would only be cross within the scope of his offered testimony, your Honor.

JUDGE LORD: But this is cross.

MS. BHATTACHARYYA: This is cross within -- excuse me, I'm sorry to interrupt.

JUDGE LORD: No, go ahead, Ms. Bhattacharyya.

MS. BHATTACHARYYA: As I stated, which is cross within the scope much his testimony. His testimony is what the conventional wisdom was at the time of the invention, including outside the area of sample preparation. Monforte is a reference that deals with droplets and cells and controverts what he says is the conventional wisdom.

JUDGE LORD: You can cross using this.

BY MS. BHATTACHARYYA:

Q Do you recognize this reference?

A Yes, I do.

Q This is patent application publication 2008/0124726?

A Yes, I see that.

Q And publication date is May 29, 2008.

A Yes, it is. Yeah.

Q And that's a date that's before the date that 10X is asserting that the asserted claims were invented; correct?

A Yes, it is.

Q And the title of the document is "Biochemical Analysis of Partitioned Cells;" correct?

A Yes.

Q Now, if we look at the abstract on the first page, and before I go on, you are familiar with this reference; correct?

A Yes, I am. Could I just reread the abstract?

Q Yes. Yes, you may.

A Thank you. Yes, I have.

Q And you address this reference in your expert report in this investigation; correct?

A I believe so, yes.

Q So in the abstract, you -- the abstract states that "the invention provides methods for single cell biochemical analysis, as well as instrumentation for the single-cell biochemical analysis."

Do you see that?

A Yes, I do.

Q And could you please turn to page 12 of the reference. So page 12. And look at the section entitled "Biochemical Assays and Reagents." Paragraph 138, page 23. 23 of the RX-468.

A Okay. I'm on page 23, and I see the heading "Biochemical Assays and Reagents."

Q Yes. Can we start with the first paragraph. And the first paragraph reads, "In some embodiments of the invention, the aqueous phases contained within the vesicles of the partitioned aqueous reaction volumes in a flow channel comprise at least one cell, and further comprise at least one reagent for assaying (i.e., determining the presence or absence, or quantitating) a biomolecule

associated with the cell."

Do you see that?

A Yes, I do.

Q So this paragraph is telling us that in some embodiments of the invention, you have a cell and you have a reagent in a vesicle or partitioned aqueous reaction volume; isn't that correct?

A Yes, that's what it says.

Q And in the context of this reference, the term "vesicle" can refer to a droplet?

A I believe so. It's not pointed out there. I presume it's pointed out earlier in the reference.

Q Could you turn to figure 1 of the publication, that's RX-468, page 2.

A Yes.

Q If you look at figure 1B.

A Yes.

Q You'll see that to the right, it's described as "aqueous/nonaqueous emulsion comprising vesicles where each vesicle on average comprises one bead and one cell," right?

A Yes.

Q And then if you look in the picture, it says "one bead, one cell per droplet."

A Yes.

Q So you'd agree in this reference the term

"vesicle" is a droplet?

A Yes.

Q Now, if you look further down in that same section, paragraph 141, the reference reads, "the method for introducing the biochemical assay reagents to the aqueous phase, e.g. to the vesicle, or to the partitioned aqueous reaction volumes in the flow channel is not limited." Do you see that?

A Yes, I do see that.

Q So the reference is telling us that the method for introducing a biochemical as a reagent into a droplet is not limited?

A That's what it says.

Q And it's equating an aqueous phase with a vesicle; correct? It's giving vesicle as an example of an aqueous phase?

A Yes, it is.

Q And we already discussed a vesicle in this reference is a droplet?

A Sorry, we already discussed --

Q We've already discussed that a vesicle can be a droplet?

A Yes.

Q Then the paragraph goes on to say that there can be different approaches for introducing reagents to the

aqueous phase. Do you see that, if you read on in that paragraph?

A Yes, I see that text.

Q So one example they give is that "reagents can be incorporated within the initial aqueous solution comprising the cell population, for example, at the time of mixing of the aqueous and nonaqueous phases during formation of an emulsion and reaction vesicles"?

A Yes, I see that.

Q So you can introduce the reagent at the time you're forming the droplet; correct?

A Yes, that's what it says.

Q And another option they give you is "reagents can be added to existing vesicles post formation by the merger of a second population of vesicles that contain the reagents, thereby delivering the reagents to the vesicles comprising the cells."

Do you see that?

A I do see that, yes.

Q Now, if we go down to paragraph 143, would you agree that paragraph gives some examples of the types of reagents we might be dealing with?

JUDGE LORD: Counsel, you represented at the outset that you were going to tie this up into some impeachment, and I'm not there yet. Are we getting there?

MS. BHATTACHARYYA: We will get there, your Honor.

JUDGE LORD: All right.

MS. BHATTACHARYYA: I'll try to speed it up.

JUDGE LORD: Okay. I'm not telling you to hurry, I'm just saying you need to get there.

BY MS. BHATTACHARYYA:

Q And so do you see in paragraph 143 that the types of reagents one might use include amplification primers and universal primers?

A I think so. Sorry, just give me a second. I see amplification primers on line 5, and what was the other one?

Q Universal primers, several lines down from that.

A Yes, I see universal primers.

Q Thank you. All right. Now I'd like you to turn to paragraph 149, which is on page .24. And this portion of the reference describes how reagents can be introduced using a solid phase; correct?

A Yeah. Can I just take a minute to read that paragraph?

Q Yes.

A Thanks.

MR. NATHAN: Your Honor, may I state an objection, please?

JUDGE LORD: Yes.

MR. NATHAN: Staff represented in the prehearing brief, and I'm talking about footnote 28 of the prehearing brief, that the Staff only intended to obtain any testimony regarding Monforte through cross-examination, not through supplemental direct testimony of Dr. Metzker. Dr. Metzker has not offered any opinions regarding Monforte, and as a consequence, Dr. Dear did not offer testimony in rebuttal, testimony that had been proffered but was not provided to your Honor today.

Now, the representation about how this was proper cross was that it was challenging conventional wisdom, but the statement -- this is A, this is well beyond that, and this is actually attempting to make a combination regarding Monforte, as was mentioned in Staff's prehearing brief, according to the limitation that I just read to your Honor.

MS. BHATTACHARYYA: Your Honor, I am trying to cross-examine Dr. Dear on the statement regarding the conventional wisdom. We're at the paragraph now that is going to controvert the conventional wisdom. The remainder of my cross was in order to elicit the context of what I'm about to do now, to show that it's generally in the same field as the other references we've been talking about.

MR. NATHAN: Your Honor, none of the -- I

apologize, your Honor. May I respond?

JUDGE LORD: Yes.

MR. NATHAN: None of the questioning up until this point has been directed to establishing a foundation that this reference provides evidence of conventional wisdom.

JUDGE LORD: Well, that's what I've been wondering too. That's why I asked the question a few minutes ago, is it did not seem to me that it was.

Mr. Bilsker?

MR. BILSKER: Your Honor, I agree with Staff. I do believe this shows conventional wisdom. This is art which is out there in the same exact field we're talking about, placing material into droplets. That's part of the body of knowledge that a person of ordinary skill in the art would have.

This goes directly to contradicting Dr. Dear's statement that the conventional wisdom, which he only relied on -- to show conventional wisdom, he relied on two references. That was it. This is a third reference which shows direct contradiction to that.

I also -- it was also my understanding that Staff served a statement that reserved their right to cross-examine and to put in evidence about this Monforte. This is not like Dr. Dear didn't know about this reference.

He actually described it in his witness statement, extensively. And Staff specifically reserved the right to question on this.

MS. BHATTACHARYYA: Just to correct that, I did -- I did represent that I would not elicit supplemental direct testimony on this reference from Dr. Metzker. My only purpose here is to challenge -- he testified that conventional wisdom is what one of ordinary skill in the art would think about beads. And one of his reasons for arguing validity is that no one would even think of taking oligonucleotides off beads because the conventional wisdom was you always keep them on.

If there's a reference in the art that shows that you take them off, that controverts his testimony.

MR. NATHAN: Your Honor, may I respond briefly?

JUDGE LORD: Yes.

MR. NATHAN: Your Honor, we withdrew an extensive discussion by Dr. Dear in testimonial form, showing why the Monforte reference, it does not invalidate as part of an obviousness combination. That is not in the case at this point.

And one article and a discussion of -- an extensive discussion about that article does not -- does not provide impeachment evidence as to conventional wisdom.

JUDGE LORD: Well, you know, that goes to the

weight, which may be none at all if I agree with you. I just want to make sure that what Ms. Bhattacharyya is doing is within the scope of what she said she would do in her prehearing brief.

MS. BHATTACHARYYA: Your Honor, and --

JUDGE LORD: In other words, I want to make sure this is cross-examination only.

MS. BHATTACHARYYA: Your Honor --

JUDGE LORD: The exhibit -- this is not coming into evidence, so it's -- the only thing you're going to have in the record is this discussion, not the Monforte article.

MS. BHATTACHARYYA: All right.

JUDGE LORD: Go ahead, Ms. Bhattacharyya. No, say it again. Tell me your argument again. This is going to be impeachment, only impeachment on the question of what was the conventional wisdom regarding the role of beads in these microfluidic systems; right?

MS. BHATTACHARYYA: Right.

JUDGE LORD: Okay. So now we're going to go there.

BY MS. BHATTACHARYYA:

Q Okay. So Dr. Dear, looking at paragraph 149, the first sentence says, "in some embodiments, where at least part of the cell-containing aqueous environment is in

contact with the solid phase, biochemical reagents can be added via dissociation, dissolution or desorption from the solid phase into the aqueous phase."

Do you see that?

A I do see that. Has he provided the context for biochemical reagents?

Q Excuse me?

A Has he -- I'm just not sure what he means when he says "biochemical reagents" there but --

Q I want to hurry it along so --

A Sure.

Q -- let's -- let's accept that he says biochemical reagents. And would you agree that this sentence states that biochemical reagents can be added via dissociation from a solid phase?

A Yes, he -- that's what's written there.

Q And the second paragraph says, "in this case, the solid phase can be made out of any number of materials that can readily hold biochemical reagents and release them for use, including porous metals, plastics or glass, polymer matrices, such as polyacrylamide gels, fibers or filters."

Do you see that?

A I see that text, yes.

Q Would you agree that sentence indicates that the

solid phase can be gels?

A He has polyacrylamide there, so yes, potentially.

Q Well, he also says "gels." Correct?

A Yes, I beg your pardon, he does.

Q And then the third sentence reads, "in addition, one or more biochemical reagents can remain bound to or covalently linked to the solid phase. With regards to the structure of the solid phase, the structure can be one where it is a surface in contact with the cell-containing environment, encapsulating or encasing the cell-containing environment, or contained partially or wholly within the cell-containing aqueous environment, such as in the form of a bead."

Correct?

A Yes, I see that text.

Q So in this paragraph, the solid phase that we're talking about can be a bead; correct?

A Yes.

Q And it be a gel; correct?

A He does say that it can be a gel.

Q And you can use the solid phase to dissociate reagents to go into the aqueous phase?

A Yes, this comes back to my question on what he means -- or what the biochemical reagents are. So in all

of his figures, he certainly illustrates that his barcodes are fixed to beads.

Q Well, your opinion about conventional wisdom wasn't limited to barcodes; correct?

A If you can point me to an exact testimony. I mean, I think I said the conventional wisdom was barcoding on beads, having DNA attached to beads.

Q Right. But at the very beginning of our discussion, you represented that the conventional wisdom is that beads are used for capture, not for delivery; correct?

A Yes, I was thinking especially in the context of barcodes and -- yeah, of barcodes.

Q But you also applied that reasoning to Agresti?

A Yes, Agresti has -- he talks about functionalizing his beads with DNA.

Q Does Agresti talk about functionalizing beads with barcodes?

A I don't recall him specifically mentioning barcodes.

Q So wouldn't you agree that at the time of the 10X invention, there was a patent application in the art that specifically talked about releasing reagents from gel beads in droplets?

A I don't think that alters my opinion that the conventional wisdom was that you didn't do that. Monforte

is not -- his actual applications don't involve that. So he doesn't give an application for this -- for that particular combination of elements within Monforte.

Q I'm sorry, could you -- could you -- I didn't hear you that well.

A Oh, I beg your pardon. So this does not alter my opinion that the conventional wisdom was that you keep barcodes on beads. It's not clear to me that Monforte is telling you to release barcodes from beads.

Q Does it alter your opinion that conventional wisdom was that beads are used for capture, not delivery?

A No, it doesn't alter my opinion. I think that was the conventional wisdom, and I think most of the embodiments in Monforte show that.

Q But you would agree that Monforte provides a discussion of ways you can use beads that are not for capture?

A He talks about a series of -- there's a series of steps, and if you step in the right direction in each of them, he's talking about releasing biochemical reagents. But that doesn't alter my opinion that the conventional wisdom, and even Monforte, is leading you to use beads to have barcodes bound to them.

Q Okay. But it does -- perhaps -- would you revise your statement that barcodes are not used for

delivery? Apart from barcodes, just beads in general, would it alter your view that the conventional wisdom is that beads were used for capture and not delivery?

A No, I think it doesn't alter my view. The conventional wisdom I think is beads are used for capture, particularly so in the case of barcodes.

MS. BHATTACHARYYA: Thank you.

THE WITNESS: Thank you.

MR. NATHAN: We have no further questions, your Honor.

JUDGE LORD: All right.

Anything further?

MR. BILSKER: Nothing further, your Honor.

JUDGE LORD: All right. Thank you.

Then Dr. Dear, you may be excused.

THE WITNESS: Thank you, your Honor.

(Witness excused.)

JUDGE LORD: So I think we have some exhibits that need to be admitted at this point.

You're fine.

MR. GLOTH: Yes, your Honor, the parties are still going through all of today's exhibits and we intend to admit them to Ace and we can send them to you at the end of the day. Is that all right?

JUDGE LORD: Yeah, that's fine.

MR. GLOTH: Thank you.

MR. JOHNSON: Your Honor, Bio-Rad calls as its next witness Dr. Metzker again, finally.

JUDGE LORD: Good afternoon, Dr. Metzker. You're still under oath.

THE WITNESS: Thank you.

Whereupon,

MICHAEL LEE METZKER

was recalled as a witness and, having previously been duly sworn, was examined and testified further as follows:

JUDGE LORD: Please proceed.

MR. BILSKER: Your Honor, I assume we can dispense with going through his professional educational background and introduction since it's already been done just once?

JUDGE LORD: That's right.

MR. BILSKER: I'm going to let you deconstruct that.

THE WITNESS: I don't think these are all for me, so yeah, that would be great.

DIRECT EXAMINATION

BY MR. BILSKER:

Q Can you introduce yourself for the record again, please?

A Yes, my name is Michael Lee Metzker.

Q And I take it your employment has not changed since you were last up on the stand?

A Not since this morning.

Q You have in front of you what has been marked as RX-665C.

Do you see that?

A Yes, I do.

Q And is this -- are these questions which were posed to you by counsel?

A Yes.

Q And are those truthful answers that are contained within that witness statement?

A Yes, they are.

Q Are the answers truthful to the best of your ability?

A To the best of my ability, yes.

Q Can you turn to the last page. Is that your signature?

A Yes, it is.

MR. BILSKER: Your Honor, we offer Dr. Metzker again as an expert in the same field as previously and pass the witness.

JUDGE LORD: Any objections?

MR. EHRLICH: No objection.

JUDGE LORD: Then Dr. Metzker's testimony will

be accepted into evidence as that of an expert in the fields that were identified earlier today.

(Exhibit RX-665C received.)

MR. EHRLICH: And, your Honor, we'll be referring to the two binders with Dr. Metzker's prior testimony and expert reports that were distributed yesterday and used again. We didn't reprint copies that we could reuse that material. So does the Court have a copy or would you like another?

JUDGE LORD: I don't need another copy.

CROSS-EXAMINATION

BY MR. EHRLICH:

Q Dr. Metzker, do you have access to your prior testimony?

A I don't, but they may be right here.

Q And there should be two binders.

A Yes. I have them.

MR. EHRLICH: May I proceed, your Honor?

JUDGE LORD: Yes.

BY MR. EHRLICH:

Q Good afternoon, Dr. Metzker.

A Good afternoon.

Q I'd like to start by talking about the process by which Bio-Rad makes beads, so we need to go on the Bio-Rad confidential record.

(Confidential session follows.)

OPEN SESSION CONTINUED

JUDGE LORD: We'll be on the public record.

BY MR. EHRLICH:

Q So it's correct, you submitted a declaration two months ago containing your opinions on the validity of the claims of the '024 patent, among others; correct?

A Well, more on the invalidity of the '024 patent, but yes, they were submitted two years ago -- I mean two months ago, I apologize.

Q Could you turn in your binder to CX-1988.

A Yes, I am there.

Q This is your declaration from an IPR petition filed by Bio-Rad; correct?

A That is correct.

Q In this declaration, you take the opinion that the Saxonov reference renders claim 1 of the '024 patent obvious; correct?

A I believe that's correct.

Q And within that, you offer a number of opinions about the limitation taught by the Saxonov reference?

A Generally, I mean, I haven't read it in two months, but I could probably generally agree with that statement.

Q Let's turn to page 53 of the exhibit, and let's put that on the screen?

MR. BILSKER: Your Honor, I object. This is going to validity. This is also not on the witness list -- or excuse me, on the exhibit list.

MR. EHRLICH: May I be heard, your Honor?

JUDGE LORD: Yes.

MR. EHRLICH: This is not going to validity. This is impeachment on his testimony that he is not of the opinion today that endonuclease cleavage within an oligonucleotide molecule attached to a bead meets this particular limitation of the '024 patent. And he has said something in his declaration that we'd like to show is contrary to that opinion. It is proper impeachment, it is the declaration by this witness two months ago.

JUDGE LORD: Overruled.

BY MR. EHRLICH:

Q Can you see on this page a discussion of limitation 1f, "applying a stimulus to said porous gel bead to release"?

Do you see that?

A Yes, I do.

Q And it's your opinion that Saxonov teaches this limitation; correct?

A Yes.

Q Will you turn to the next page, look at the top, paragraph 98, you say that "Saxonov teaches that specific

stimuli cause the release of barcodes from porous gel beads."

Do you see that?

A I do.

Q And you recall listing a number of stimuli that in your opinion meet this limitation.

Do you recall that?

A I can see those, yes.

Q Now, let's look at paragraph 99.

A Okay. I'm there.

Q You state in your declaration that "Saxonov discloses endonuclease cleavage sites" and that, on the next page, "one of ordinary skill in the art would have understood that these endonuclease cleavage sites (e.g. restriction enzyme binding sites) would release the barcode sequences attached to the porous gel bead in response to a stimulus, namely the introduction of a restriction endonuclease."

Do you see that?

A I do.

Q Now, you were telling the PTAB that this statement in Saxonov of an endonuclease cleavage site, so cleaving within an oligonucleotide, was an example that was within limitation 1f of the '024 patent claim 1, applying a stimulus to the porous gel bead; correct?

A Well, I don't see where I say that the stimulus is applied to the porous gel bead. That -- the paragraph you just read discloses endonuclease cleavage sites, and then I give the example, and then I say "one of ordinary skill in the art would have understood that these endonuclease cleavage sites (e.g. a restriction enzyme binding site) would release the barcode sequences attached to the porous gel bead in response to a stimulus, namely the introduction of a restriction endonuclease."

So I'm not -- I don't see where I say that the endonuclease is the stimulus acting on the bead.

Q All right. This is in a section with the limitation "applying a stimulus to said porous gel bead to release," is it not?

A It is in that section.

Q And you were using that evidence in support of your conclusion that these stimuli that you have started listing are examples of stimuli that are applied to a porous gel bead to release; correct?

A I can agree it's in this section. I don't agree that the restriction endonuclease is acting on the bead. It's going to act on the oligonucleotide sequence. And it's quite clear that those restriction enzyme size are part of the oligonucleotide and they're not part of the bead.

Q Well, I understand that that is the opinion that you gave in your witness statement in front of this body. But then months later, you told the PTAB that endonuclease cleavage was within this limitation. Isn't that fair?

A I would -- I agree that it is in that section. I don't see where I'm actually making an explicit statement that an endonuclease is acting on a bead. I don't -- I mean, I've read it. I mean, it's not there.

Q Nor is a statement from you that this is a part of Saxonov that does not teach the limitation.

A I don't understand that question.

Q You didn't tell the PTAB that this is an example of something that's outside the claim that's in the prior art reference?

A I mean, I read the paragraph. It says what it says.

Q Let's talk about amplification in the context of claim 1.

A Okay.

Q Can we put claim 1 of the '024 patent on the screen, JX-4 at 31. I don't think there's a copy of the patent. You can either look on the screen, I think you're probably familiar with the claim.

A Yeah, the claim is fine -- I mean the screen is fine.

Q So in claim 1, the first step, there is a target nucleic analyte in a droplet; correct?

A Correct.

Q And you remember discussing at deposition an example of walking through this claim where the target nucleic acid analyte and the first step is mRNA in the case of a single-cell sequencing prep product; correct?

A Sorry, remind me where I was when I made that statement, just so I have some reference.

Q Do you recall discussing the flow through this claim in the claim construction process?

A Claim construction. I'm sure I did.

Q And do you remember discussing flowing through this claim starting with target nucleic acid analytes that were mRNA?

A Generally, yes.

Q And you generally remember discussing the creation of a library by the end of the claim; correct?

A If you have some reference that can put a little more -- I mean, claim construction was months ago.

Q Well, let's look specifically at step c. So in step a, you can start with an mRNA target nucleic acid analyte, and then in step c, at the point where you are subjecting said given oligonucleotide molecule attached to said target nucleic acid analyte to nucleic acid

amplification, you yield a barcoded target nucleic acid analyte.

You see that in the claim?

A I do.

Q And you understand that when you get to the end of step c, to yield a barcoded target, there you have amplified cDNA as your output; correct?

A How are you defining cDNA? I mean, you could -- you could probably just have a first strand synthesis hybridized to an mRNA. That could be the product of this -- of this step.

Q And that first strand product is cDNA; correct?

A I think of cDNA as double-stranded, but I would agree it's at least a first strand synthesis.

Q You would agree that in this process of claim 1, that you view both mRNA and cDNA as targets; correct?

A I'm not sure.

Q Do you recall testifying on that subject at your claim construction deposition?

A Again, that was a while ago. And if you refresh my memory, I'm happy -- I'm sure we can clear this up.

Q Well, in a process of claim 1, where you start with mRNA, you would agree that both mRNA and cDNA are targets in that context?

A Well, I think if you're starting with mRNA, that

would be your target. That's the thing you want to sequence. CDNA becomes a copy of that, and then manipulated in such a way that it doesn't really represent the full target anymore.

So I guess that's why I'm asking for a little bit of clarification.

Q Well, you're very familiar with the process of creating a cDNA library from mRNA; correct?

A I am. There's many, many ways you can do that.

Q And that is what you'd usually do. You would isolate mRNA and you would convert it to cDNA, and then you can actually do something with it, including clone it or sequence it; correct?

A That's correct. You can do both of those things.

Q And the only way you can really analyze the mRNA is if you convert it to cDNA and then you analyze the cDNA molecules; isn't that correct?

A Not sure that's the only way. There are methods where you can create the cDNA, which then results in creating mRNA again. It can be used as a detection scheme, where you're not actually detecting the cDNA.

Q Is it fair to say that the only way you really analyze it is converting mRNA into cDNA and then analyzing cDNA molecules?

A Well, I typically do things by a sequencing method. And in a sequencing method, that would be the way I would do it.

Q That's how you would detect the sequence. You'd have to be detecting the sequence of a cDNA molecule; correct?

A Well, I'm detecting -- the cDNA is basically the surrogate of what the mRNA target represented. Because when I'm analyzing the data, I don't really care that it was a cDNA. What I care about is was it an mRNA, I care about where it came from, what cell, how much was present. And I'm going to characterize it as an mRNA transcript. That's the way I would do it.

Q So it's accurate to say that in this context, both mRNA and cDNA are targets?

A No, I think the mRNA is the target, if that's my starting material. And the cDNA is just the manipulation of that target so that I can analyze it, because I'm going to put it back into the context of the mRNA molecule.

Q Okay. Let's go to your claim construction deposition from July, page 171, starting at line 17.

A Is it in one of these binders?

Q It's in your prior testimony binder, volume 2. Line 17 to 7 on the next page.

A Sorry, what's the JX number?

Q This is JX-167C. At a deposition in July, you testified to the question, "so you would view -- in that process, would you view both mRNA and cDNA as target nucleic acid analytes?

"Answer: Generally, yes, because if I'm targeting a tissue and I'm going to isolate that mRNA, I'm going to target something. I'm going to look for a gene of interest and that may have come from that tissue.

"The only way I really analyze it is I convert it to cDNA, and then I analyze cDNA molecules, and I may have a probe where I'm screening for a particular gene. I might want to sequence the entire library and try to figure out what's there. But yes, I would say they're both targets."

And that was truthful and accurate; correct?

A It was. It was. But even in that context, I will go back to the mRNA target, because that's -- that's the starting place of where I isolated the molecule.

Q Can we put up JX-171, page 329. Now, you remember discussing yesterday the declaration by Dr. Andrew Kohlway of Bio-Rad?

A Yes.

Q And this was a declaration in the prosecution of one of Bio-Rad's patent applications; correct?

A That's correct.

Q And in this declaration, you recall Dr. Kohlway performed steps of the ddSEQ protocol and described that to the Patent Office; correct?

A That's my understanding.

Q Let's turn to paragraph 3 on page 328. So as you were saying earlier, at the point in Bio-Rad's system -- and I guess we should go to the Bio-Rad confidential record?

(Confidential session follows.)

OPEN SESSION CONTINUED

MR. JOHNSON: Your Honor, I think that's the last witness on behalf of either party. I think the parties are still working through some of the exhibit issues, and I think the plan is to submit the lists a little bit later after we've finished meeting and conferring on that, if that would be acceptable to your Honor.

JUDGE LORD: Yes. How much time do you need?

MR. POWERS: I probably know the least about that question, your Honor, but I would have a suggestion nonetheless.

JUDGE LORD: Yes.

MR. POWERS: I suspect that the presentation to you on this issue, that the disputes would be more orderly if we do it in writing tomorrow morning after the parties have finished meeting and conferring, because there's really a couple of witnesses that it relates to. And some of it relates to the scope of the two portions of testimony that you struck. And I think that's a little more complicated than some of the exhibit questions.

And my suspicion is that there will -- I don't think that -- I am sure that process has not fully resolved itself, but I think that's more complicated. And I think that if there remain disputes, it will be easier to present

that to you in writing with copies of the transcripts that show which portions parties agree and disagree should be struck according to your orders, rather than doing it orally.

JUDGE LORD: And then you anticipate that I would issue an order making a ruling on the admissibility of the disputed portions, is that how it would work?

MR. POWERS: Yes. It's clear that you struck some portions.

JUDGE LORD: Right.

MR. POWERS: And I think the parties are disputing whether certain lines are or are not included in that.

JUDGE LORD: I understand.

MR. POWERS: I think that would just be presented to your Honor to decide.

MR. JOHNSON: And I generally would agree with Mr. Powers. I mean, from our standpoint, your Honor, I think there's only a dispute as to three or four exhibits that I'm told, and so I'm confident we can work that out, and in particular when we have the transcript in hand and we can refer to specific page numbers and line numbers. We could then submit something jointly or at your convenience, you tell us when you would like to receive it.

JUDGE LORD: Right. I'm just trying to think

mechanically how we then get a completed record to the court reporter and to the Commission ultimately.

MR. JOHNSON: We could close the record subject to this last -- these last remaining issues and either do it in writing or some portion of each team could come back tomorrow and put it on the record, if that's what your Honor would prefer. We're amenable to whatever your Honor prefers.

JUDGE LORD: Yeah, I have in the back of my mind that there is some obligation to amend the record in writing if we close the record and then change it. So that is awkward. I think I would rather come back tomorrow and finish up the whole hearing and be done with it.

MR. POWERS: Understood, your Honor. So to make certain that we're all clear on what you want, we would come back tomorrow, we would present to you in writing what the disputes are and then close the record after you've decided those questions but not close it now.

JUDGE LORD: Not close it now. I think that makes the most sense.

MR. POWERS: Understood, your Honor.

MR. JOHNSON: That's fine from our standpoint, your Honor.

JUDGE LORD: And then if there's anything else that comes up, we can address it then instead of having to

fret about how we're going to address other issues, if they come up.

MR. POWERS: That makes sense.

JUDGE LORD: All right. Then let's adjourn for the evening. We'll come back tomorrow at 9:30. We'll address whatever remaining disputes there are. We'll accept into evidence exhibits at that time.

We'll talk about post-hearing briefs and anything else that the parties need to have addressed.

MR. POWERS: One question, if I may, your Honor. We would propose that after post-hearing briefs occurred, that the parties be allowed to present closing argument to your Honor on all the matters raised by the briefs, if your Honor would find it useful.

JUDGE LORD: Generally we don't have closing arguments, and I don't know that there's any particular reason in this case why we would need closing arguments. So I appreciate the offer, but I think we won't have closing arguments.

MR. POWERS: Understood.

MR. JOHNSON: Your Honor, one final request from my side personally. We will be back here first thing in the morning to address the outstanding issues. I have a preliminary injunction hearing tomorrow in front of Judge Vasquez in the district of New Jersey in Newark, and so

Mr. Bilsker and the rest of the team will be here, but I'm sad to report, unless your Honor would request that I am here, I'm going to plan on covering that hearing.

JUDGE LORD: No, not at all. I'm certain that your colleagues can handle it.

MR. JOHNSON: Thank you very much.

JUDGE LORD: Anything else?

MR. POWERS: Not from Complainant, your Honor.

MR. JOHNSON: Not from Bio-Rad at this point.

MS. BHATTACHARYYA: No, your Honor, nothing from Staff.

JUDGE LORD: All right then, thank you. We'll recess until tomorrow morning at 9:30. We're adjourned for the day.

(Whereupon, at 5:22 p.m., the hearing was adjourned, to be reconvened at 9:30 a.m., on Friday, March 29, 2019.)

C O N T E N T S

-- continued --

E X H I B I T S

EXHIBITS:	IDENTIFIED	RECEIVED
CX-1977C		738
CX-1978C		738
RDX-0003	756	
CX-1829C		770
CX-1827C		832
CX-0029C		832
RX-665C		937

Inv. No. 337-TA-1100, Hearing Day 2 (2019-03-26)

Exhibits Admitted: JX-0032

JX-0067C

JX-0131C

JX-0132

CX-0004C

CX-0024

CX-0487

CX-1965

CX-1967C

RX-0503C

RX-0537

RX-0660

RX-0692

RX-0716

Inv. No. 337-TA-1100, Hearing Day 3 (2019-03-27)

Exhibits Admitted: JX-0018C

JX-0034

JX-0035

JX-0036

JX-0037C

JX-0040

JX-0041

JX-0072C

JX-0074C

JX-0075C

JX-0087C

JX-0089C

JX-0105C

JX-0109C

JX-0117C

JX-0123C

JX-0128C

CX-0013C

CX-0025

CX-0240C

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RX-0214

RX-0502C

RX-0504C

RX-0507C

RX-0608

RX-0664C

RX-0727C

EXHIBITS OFFERED FOR ADMISSION

BY DR. BUTTE

Exhibit No.

JX-0002

JX-0004

JX-0006

JX-0008

JX-0009

JX-0010
JX-0011
JX-0012
JX-0018C
JX-0020
JX-0030
JX-0032
JX-0034
JX-0035
JX-0036
JX-0037C
JX-0038
JX-0040
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CERTIFICATE OF REPORTER

TITLE: In The Matter Of: Certain Microfluidic Systems and Components Thereof and Products Containing the Same

INVESTIGATION NO: 337-TA-1100
HEARING DATE: 03-28-19
LOCATION: Washington, DC
NATURE OF HEARING: Hearing

I hereby certify that the foregoing/attached transcript is a true, correct and complete record of the above-referenced proceeding(s) of the U.S. International Trade Commission.

DATE: 03-28-19

SIGNED: _____
Signature of the Contractor or the Authorized Contractor's Representative

I hereby certify that I am not the Court Reporter and that I have proofread the above-referenced transcript of the proceedings of the U.S. International Trade Commission, against the aforementioned Court Reporter's notes and recordings, for accuracy in transcription in the spelling, hyphenation, punctuation and speaker identification and did not make any changes of a substantive nature. The foregoing/attached transcript is a true, correct and complete transcription of the proceedings.

SIGNED: _____
Signature of Proofreader

I hereby certify that I reported the above-referenced proceedings of the U.S. International Trade Commission and caused to be prepared from my tapes and notes of the proceedings a true, correct and complete verbatim recording of the proceedings.

SIGNED: _____
Signature of Court Reporter