

1 UNITED STATES PATENT AND TRADEMARK OFFICE
2 BEFORE THE PATENT TRIAL AND APPEAL BOARD

3 -----

4 10X GENOMICS, INC.

5 Petitioner,

6 v

7 BIO-RAD LABORATORIES,

8 Patent Owner,

9 -----

10 Case IPR2020-00086

U.S. Patent No. 9,562,837

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12
13 (Captions for related cases on following
14 pages.)

15
16 REMOTE VIDEOTAPED DEPOSITION OF RICHARD B. FAIR
17 July 23, 2020

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24 Reported By: LYNNE M. LEDANOIS, CSR 6811

25 Job No. 4184981

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10 Case IPR2020-00087

U.S. Patent No. 9,562,837

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10 Case IPR2020-00088

U.S. Patent No. 9,896,722

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10 Case IPR2020-00089

U.S. Patent No. 9,896,722

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14 REMOTE VIDEOTAPED DEPOSITION OF RICHARD B. FAIR

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Remote videotaped deposition of
RICHARD FAIR, taken in Durham, North
Carolina, commencing at 7:04 a.m., EST, on
Thursday, July 23, 2020 before Lynne
Ledanois, Certified Shorthand Reporter No.
6811

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APPEARANCES

ALSO PRESENT:

David West, Videographer

Randy Wu, In-house counsel 10X Genomics

Krista Carter, In-house counsel 10X Genomics

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I N D E X O F E X A M I N A T I O N

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INDEX OF EXHIBITS

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Thursday, July 23, 2018

10:04 a.m. EST

VIDEOGRAPHER: Good morning. We're on
the record. The time is 10:04 a.m. The 07:04
date today is July 23rd, 2020.

Please note that the microphones are
sensitive and may pick up whispering and
private conversations. Audio and video
recording will continue to take place unless 07:04
all parties agree to go off the record.

This is Media Unit 1 of the
video-recorded deposition of Richard B.
Fair, Ph.D., taken by counsel for respondent
in the matter of 10X Genomics, Inc. versus 07:04
Bio-Rad Laboratories, Inc., filed in the
United States Patent and Trademark Office
before the Patent Trial and Appeal Board.

Case Numbers IPR2020-0086,
IPR2020-00087, IPR2020-00088 and 07:05
IPR2020-00089.

The deposition is being conducted
using Remote Counsel technology and all
participants are attending remotely.

My name is David West. I am the 07:05

1 videographer. The court reporter is Lynne 07:05
2 Ledanois and we represent Veritext Legal
3 Solutions.
4 I'm not related to any party in this
5 action nor am I financially interested in 07:05
6 the outcome.
7 Counsel will now state their
8 appearances and affiliations for the record.
9 If there are any objections to proceeding,
10 please state them at the time of your 07:05
11 appearance beginning with the noticing
12 attorney.
13 MR. BAKER: James Baker with Quinn
14 Emanuel for Bio-Rad.
15 MS. JAMESON: Samantha Jameson of 07:05
16 Tensegrity Law Group here on behalf of
17 10X Genomics. And with me is Robert Gerrity
18 also of Tensegrity Law Group and Krista
19 Carter of 10X Genomics.
20 RICHARD B. FAIR, PH.D., 07:06
21 Having been first duly sworn, testified as
22 follows:
23 EXAMINATION
24 BY MR. BAKER:
25 Q Good morning, Dr. Fair. 07:06

Page 11

1 And do you see the case caption is 07:09
2 10X v. Bio-Rad case IPR2020-00086?
3 A I see that.
4 Q This is an amended notice of
5 deposition of Richard B. Fair, Ph.D. 07:09
6 Do you have that in front of you?
7 A I do.
8 Q And you understand that you're here
9 today to testify pursuant to this notice in
10 IPR2020-00086; right? 07:10
11 A Correct.
12 Q Okay. I'm going to go through the
13 other three as well unless --
14 MR. BAKER: Samantha, do you want to
15 stipulate that he's here pursuant to the 07:10
16 other notices in 87, 88 and 89 as well?
17 MS. JAMESON: Yes, he's here pursuant
18 to all four notices.
19 MR. BAKER: Great.
20 Q So in these IPRs, Dr. Fair, you have 07:10
21 submitted a declaration in each one of these
22 IPRs; right?
23 A Yes.
24 Q And you are giving the board your
25 opinions about the invalidity, alleged 07:10

1 invalidity of two patents; right? 07:10

2 A Yes.

3 Q And one of those patents is Patent
4 Number 9,562,837; correct?

5 A Correct. 07:11

6 Q And one of those is 9,896,722; right?

7 A Correct.

8 Q Okay. We'll mark those if we need to.
9 I'm going to refer to those as the '873 patent
10 and the '722 patent today if that's okay with 07:11
11 you?

12 A Okay.

13 Q All right. Or maybe -- you'll see the
14 inventor on those patents is Darren Link; right?

15 A Right. 07:11

16 Q So I might call them the Link patents
17 as well; is that okay?

18 A That's fine.

19 Q Okay. Do you know Darren Link, by the
20 way? 07:11

21 A I don't.

22 Q And so in your declarations in these
23 four IPRs, you've given the board your opinions
24 about the alleged invalidity of the Link
25 patents; correct? 07:11

1 A Correct. 07:12

2 Q I want to talk about your opinions
3 today in some detail.

4 But first, can you just give me
5 your -- briefly what your educational background 07:12
6 and work experience has been?

7 A Okay. I have bachelor of science
8 degree in electrical engineering from Duke. I
9 have a master of science degree in electrical
10 engineering from Penn State University and a 07:12
11 Ph.D. from Duke in the field of electrical
12 engineering.

13 Spent 12 years at Bell Laboratories.
14 After 12 years I came back to Duke as a full
15 professor and immediately joined the 07:12
16 Microelectronics Center of North Carolina where
17 I was an officer of the company. Stayed there
18 for 13 years maintaining a joint appointment
19 with Duke.

20 In '94 I came back to Duke full-time 07:13
21 and I currently am the Lord-Chandran
22 distinguished professor of electrical
23 engineering.

24 Q And when did you start at Bell Labs?

25 A 1969. 07:13

1 Q What did you do at Bell Labs, just 07:13
2 generally?

3 A I was mostly responsible for
4 developing new semiconductor devices, the
5 processes that go into fabricating those devices 07:13
6 and testing the devices.

7 I also developed a specialty in
8 process simulation using -- writing software to
9 simulate the technologies going into building
10 integrated circuits, including diffusion, ion 07:13
11 implantation, oxidation, all the steps that are
12 required.

13 So that was actually the first
14 simulator. Now there are numerous ones.

15 And eventually got into sample-data 07:14
16 analog CMOS and developed advanced devices for
17 use in the Bell system.

18 Q And that was -- you started at Bell in
19 1969?

20 A Right. 07:14

21 Q And you were there for 12 years?

22 A Yes.

23 Q So if I'm doing my math right, you
24 were at Bell until about 1981?

25 A That's right. 07:14

1 Q And then you went to Duke after that? 07:14
2 A Correct.
3 Q And you were a full professor at Duke?
4 A Correct.
5 Q And then you said while you were a 07:14
6 full professor at Duke, you were also working at
7 another company; is that right?
8 A Yes. MCNC. That was a nonprofit
9 research institute funded by the State of North
10 Carolina to develop advanced technologies for 07:15
11 use in semiconductor technology, integrated
12 circuit design, testing, analytical methods and
13 material science.
14 Q And how long were you at MCNC?
15 A I left in 1994. 07:15
16 Q At that time did you continue in your
17 role as professor at Duke?
18 A I did. I went back to Duke full-time.
19 Q You've been at Duke ever since?
20 A Correct. 07:15
21 Q Have you been involved with any other
22 companies? I mean as an employee, not a
23 consultant.
24 A No.
25 Q Okay. Have you consulted for other 07:15

Page 18

1 companies? 07:16

2 A Yes.

3 Q How many companies over the course of

4 the last, let's say, 25 years have you consulted

5 with? 07:16

6 A Well, I've been on advisory boards for

7 half a dozen companies. Most of the consulting

8 I do for patents is on behalf of companies or

9 clients through the law firms that are

10 responsible for litigation. 07:16

11 Q What are the advisory boards that

12 you've been on?

13 A One was Thunderbird Technologies and

14 then there was a company up in Massachusetts

15 whose name I forget. You know, I just don't 07:16

16 remember the names of those others. It's been

17 at least ten or 15 years.

18 Q Now, when you were at Bell Labs, did

19 you do any work in microfluidics?

20 A No. 07:17

21 Q And what about at MCNC, any work there

22 with microfluidics?

23 A Yes. I did to the extent I was -- I

24 started a MEMS system, microelectromechanical

25 systems, looking for applications. We 07:17

1 experimented with microfluidic systems, but I 07:17
2 didn't really jump into microfluidic systems
3 until after leaving MCNC, which would have been
4 about 1998.

5 Q So the first time you started working 07:18
6 with microfluidics was in 1998?

7 A That's the first time I was -- I
8 received funding from a federal agency. In
9 fact, that was DARPA.

10 But I did do some work in 07:18
11 microfluidics using microelectromechanical
12 systems between 1992 and 1998. But those were
13 mostly exploratory. They didn't get into a full
14 R&D program.

15 Q What were you doing, what was the R&D 07:18
16 focused on with respect to your work between
17 1992 and 1998 in microfluidics?

18 A It was medical applications. I spent
19 a year walking the halls of the Duke Medical
20 Center talking with physicians, finding out what 07:19
21 the hardest problems they had to solve and so it
22 was building a background in medical
23 applications of micro devices.

24 Q When you say that you a spent a year
25 walking the halls talking to doctors about the 07:19

1 hardest problems that they had to solve, I mean, 07:19
2 how did that come up? Is that something you
3 decided to do or did they ask, did they say,
4 we've got some problems, we need your help?

5 A Well, it was a little bit of both. 07:19
6 Physicians mostly are just looking for turnkey
7 systems and that's so that's not too satisfying
8 for a researcher.

9 You know, I get up and do grand
10 rounds. I was asked to do grand rounds early in 07:20
11 the morning and I talked to the senior medical
12 faculty and -- but I really got most of my
13 interaction with the younger faculty who were
14 really enthusiastic about innovation and doing
15 new things. 07:20

16 So it was a mixture of being invited
17 and also pursuing contacts.

18 Q I guess what I'm asking is the first
19 federal funding that you got from microfluidics
20 work was not until 1998 you said? 07:20

21 A Correct.

22 Q And that was from DARPA?

23 A Yes.

24 Q But you started -- you got involved in
25 microfluidics at some point before that; right? 07:20

1 A Well, I did. I had a student who was 07:20
2 funded by one of Duke's internal grants to build
3 a micro pump. And he was successful in
4 completing that task.

5 So that was just -- at that time, 07:21
6 microfluidics was really trying to put
7 components on a platform, so they wanted to put
8 pumps, they wanted to integrate valves and
9 channels. And so we were funded to do a program
10 on micro pumps. 07:21

11 Q When you say "at that time," what
12 time -- you're talking the time period from '92
13 to '98?

14 A Yes.

15 Q When you say that microfluidics was 07:21
16 focused on putting components on a platform,
17 what do you mean by "platform"?

18 A On a printed circuit board or a
19 ceramic substrate or a glass substrate. It's a
20 hybrid approach where you're trying to build a 07:22
21 pump and then assemble it with valves and
22 channels on to a glass substrate.

23 Q Okay. Were people using polymer
24 substrates or just glass substrates?

25 A Mostly silicon or glass. 07:22

1 Q And the components that you're talking 07:22
2 about were things like I think you said
3 channels; right?

4 A Right, channels and valves and pumps,
5 although they were all pretty big and clunky. 07:22
6 So you build -- it was really hard to build a
7 microsystem. By assembling the components on to
8 a substrate, it was really -- miniaturization
9 was really hard to come by.

10 Q How did you do it? 07:23

11 A We invented a new technology of moving
12 droplets on a surface.

13 Q So you mentioned droplets. That's the
14 first mention of droplets that I've heard.

15 Were droplets -- the generation of 07:23
16 droplets and the movement of droplets on these
17 substrates, was that the focus from the very
18 beginning or were you just moving other fluids?

19 A We were doing continuous flow up to
20 about 1998. DARPA tasked us with coming up with 07:24
21 an architecture that built on the success of
22 VLSI electronics. In other words, they wanted
23 to put microfluidics into systems.

24 We tried coming up with continuous
25 flow architectures. But we did not have the 07:24

1 valves, we did not have the ability to control 07:24
2 flow.

3 And so we said let's abandon what most
4 people are doing and go in a different
5 direction. 07:24

6 Q And that was in 1998 as part of your
7 DARPA work?

8 A Yes.

9 Q And the direction that most people
10 were going in was continuous flow? 07:25

11 A Correct.

12 Q And by continuous flow, what exactly
13 is it that you mean?

14 A Well, this was continuous flow either
15 by pressure, electroosmosis, electrokinetic 07:25
16 flow, capillary electrophoresis, all of which
17 had big drawbacks.

18 Q And were you using -- were droplets
19 being generated in your work before 1998?

20 A Well, there were. There was a -- 07:25
21 there was a group at University of Michigan who
22 were doing -- I would call them boluses of
23 liquid spaced by air gaps. So they would push
24 plugs of liquid spaced apart through channels.

25 But there was also -- after 1998, 07:26

1 there were efforts at the University of Chicago 07:26
2 and Cal Tech also to do continuous flow droplets
3 of -- flow of droplets in immiscible fluids.

4 Q You said that the work at the
5 University of Michigan, you would call it 07:26
6 boluses of liquids. Is that different than
7 droplets?

8 MS. JAMESON: Objection to form.

9 THE WITNESS: The work at the
10 University of Michigan which resulted in 07:26
11 some patents I think was -- I don't recall
12 whether they used the word "bolus," but you
13 could call those droplets. They were
14 discrete volumes.

15 So they called it more of a discrete 07:27
16 flow as opposed to continuous flow.

17 BY MR. BAKER:

18 Q Is that how you define droplet, a
19 discrete volume?

20 MS. JAMESON: Objection to form. 07:27

21 THE WITNESS: Well, droplets are
22 characterized by their volume, which would
23 be -- the first requirement would be that
24 they have a specific volume that the
25 droplets are within 1 or 2 percent of each 07:27

1 other in their volume. I would call that a 07:27
2 discrete flow process.

3 BY MR. BAKER:

4 Q When you say that the droplets have to
5 be within 1 to 2 percent of each other, you mean 07:28
6 to be considered a droplet, they have to be
7 within 1 to 2 percent of other droplets? What
8 do you mean?

9 MS. JAMESON: Objection to form.

10 THE WITNESS: What I mean is that for 07:28
11 performing many applications, you need to
12 have droplets of the same size or plus or
13 minus 1 percent.

```

14         That's all I mean, a droplet is a
15         droplet if it's characterized by a discrete    07:28
16         volume.

```

17 BY MR. BAKER:

| | | | |
|----|---|--|-------|
| 18 | Q | And you say that for many | |
| 19 | | applications, you need to have droplets of the | |
| 20 | | same size. | 07:28 |

| | |
|----|--|
| 21 | What applications do you have in mind? |
|----|--|

22 MS. JAMESON: Objection to form.

23 THE WITNESS: Well, one of the
24 applications we did first was PCR. And the
25 other applications included enzymatic 07:29

1 reactions using to detect glucose, urea and 07:29
2 other clinical analytes. So you needed to
3 control volume if you're going to control
4 the detection process.

5 BY MR. BAKER: 07:29

6 Q Why is that?

7 A We were controlling volumes because we
8 were doing absorptance measurements based upon a
9 dynamic reading. And that dynamic reading was
10 dependent upon a certain dilution of the analyte 07:30
11 in our droplet. And so we needed to control the
12 volume to get consistent results.

13 Q What do you mean by "dynamic reading"?

14 A So with absorbents you can wait a
15 couple of minutes for the reaction to complete 07:30
16 and then do a measurement. Or you can measure
17 the rate of the reaction as the reaction is
18 occurring and get your answer in seconds.

19 Q How does that relate to dynamic
20 reading? 07:31

21 A That is the dynamic reading where
22 you're measuring the change in absorption as a
23 function of time and the slope of that reaction
24 curve is related to the concentration.

25 Q Dynamic reading is -- the second thing 07:31

1 that you mentioned that you're not waiting, 07:31
2 you're reading it as the reaction happens?

3 A Correct.

4 Q Got it. At the beginning you were
5 talking about -- you were talking about the 07:31
6 University of Michigan. The reason I was asking
7 about droplets is because you had mentioned
8 droplets and then the work at Michigan you had
9 described as boluses of liquid other than
10 droplets. 07:31

11 So I just wanted to see if there was a
12 difference there and why you made that
13 distinction.

14 But just to be clear, your definition
15 of a droplet is just a discrete volume? 07:32

16 MS. JAMESON: Objection to form,
17 mischaracterizes.

18 BY MR. BAKER:

19 Q I don't want to put words in your
20 mouth. I think you said that a couple of times. 07:32
21 I just want to know if that's --

22 A It's a discrete volume of liquid and
23 it has to be small enough on the micron scale or
24 so in order to be considered to be a
25 microfluidic entity. 07:32

1 So we're looking at an upper limit on 07:32
2 the size, but it is discrete volume of liquid
3 suitable for use in a microfluidic system.

4 Q Now, before -- so we've talked a
5 little bit about some of the microfluidics work 07:33
6 that was going on at the University of Michigan,
7 maybe Cal Tech.

8 Before your work with DARPA that began
9 in 1998, were you personally working with
10 microfluidics? 07:33

11 A Well, I think I've already answered
12 that. I had a Ph.D. student who was building a
13 micro pump. And the deal there was you had to
14 get a pump that provided sufficient pressure and
15 that did not leak. 07:33

16 So that's what we did in a program.
17 Part of it was internally funded, the other part
18 was NSF.

19 Q Right. Okay. I apologize, I'm not
20 trying to get you to repeat testimony. I just 07:34
21 want to make sure that I understand sort of the
22 history of your involvement with microfluidics.

23 So that student who was funded, when
24 was that, about?

25 A That was about 1995, 1997. 07:34

1 Q And the work that you were doing at -- 07:34
2 I think you said it was a hospital affiliated
3 with Duke; is that right?

4 A Right.

5 Q Did you start that work at that 07:34
6 hospital with the idea of using microfluidics or
7 doing research and development with the doctors
8 on microfluidics, or is that something that came
9 up when doctors, you know, maybe presented
10 problems to you or something? 07:34

11 A In the '94 to '95 time frame where I
12 was doing my vetting of the field, most of that
13 was gathering information. So I had spent a
14 good part of my career in semiconductors and I
15 was looking to transition to a new area. 07:35

16 And so I took what I knew, the
17 technologies I knew at that time, which were
18 MEMS, and looked for applications. The problem
19 was the doctors looked at that technology and
20 they said, could you make it 100 times bigger? 07:35

21 And so that was kind of a discouraging
22 comment and so we moved on from there. We got
23 involved in microfluidics to build components
24 using technologies that we could get access to.

25 Q And during that time frame, you said 07:36

1 that your work was focused on figuring out how 07:36
2 to put various components on silicon or glass
3 substrates; is that right?

4 A Right.

5 Q And I think that you said that you 07:36
6 invented new technology of moving droplets on
7 these surfaces?

8 A Well, not these surfaces, it was on
9 hydrophobic surfaces. So we figured out a way
10 to generate droplets and move them on substrates 07:36
11 that had fluoropolymer coatings on them under
12 the -- over electrodes that we could actuate by
13 applying voltage.

14 Q How did you generate the droplets at
15 that time? 07:37

16 A Well, we generated them via
17 electrowetting. So we had a tool kit of
18 components on chip all integrated together. We
19 had reservoirs from which we could generate
20 droplets by using the properties of surface 07:37
21 tension and changes in surface energy of the
22 droplet when you apply a voltage.

23 So we could extract five droplets a
24 second from a reservoir just by applying
25 voltages and extending the droplet out of the 07:37

1 reservoir until it snapped into a discrete body. 07:37

2 Q Did you say until it snapped into a

3 discrete body?

4 A Into a discrete volume.

5 Q Into a discrete volume. In other 07:38

6 words, until it formed a droplet?

7 A Right.

8 Q And what happened to the droplet after

9 that? Did it stay in the reservoir?

10 A No, it comes out of the reservoir and 07:38

11 then we move it. We move it away from the

12 reservoir to whatever location we want it to be.

13 Q How did you move it?

14 A By electrowetting.

15 Q What is electrowetting? 07:38

16 A Okay. Electrowetting is the droplet

17 sits on a hydrophobic surface that covers an

18 electrode. As I apply voltage to the electrode,

19 I can change the contact angle of the droplet.

20 So the droplet may be beaded up with a 07:38

21 contact angle of 140 degrees. When I apply

22 voltage, it wets the surface. So I'm changing

23 the surface energy and then I put another

24 electrode next to it, so I turn this one off,

25 turn this one on and the droplet says, I want to 07:39

1 be over here where it's a wetting condition. 07:39

2 So it's -- an electrical control gives
3 you complete versatility in moving droplets in
4 XY and in any direction in two dimensions.

5 Finally, when you're finished, you can 07:39
6 move it back to a waste reservoir or collect it
7 in another reservoir.

8 Q You were doing that at the time -- at
9 this time in the '90s, you were moving these
10 droplets to waste reservoirs? 07:39

11 A Yes, this would have been -- the first
12 demonstration was 1999 and we published that
13 demonstration in September of 2000. And yes,
14 that was the time frame.

15 Q Okay. You also mentioned collection 07:40
16 reservoirs; right?

17 A Right.

18 Q You were using collection reservoirs
19 at this time as well?

20 A Well, yes. It depended upon what your 07:40
21 application was. If it was a sample in, answer
22 out, all you needed to do was move to a location
23 where you could do some kind of interrogation
24 with a sensor.

25 If you were finished with the sample, 07:41

1 you could just move it to a collection or waste 07:41
2 reservoir and let it be taken out of the active
3 process of being manipulated.

4 Q So you would either analyze the
5 droplet while it was on the chip or move it to a 07:41
6 waste reservoir?

7 MS. JAMESON: Objection to form.

8 THE WITNESS: Well, the waste
9 reservoir was also on the chip.

10 BY MR. BAKER: 07:41

11 Q Okay.

12 A So, you know, this is more of a planar
13 technology, so everything is -- all of the
14 electrodes and the waste reservoir was simply a
15 large collection of electrode where you would 07:41
16 just hold the droplet you wanted to put to waste
17 and it would stay there as long as you had your
18 voltage applied to the reservoir.

19 Q So what is the -- when was a
20 collection well used or collection reservoir 07:42
21 used?

22 A Well, I'm saying that if, in fact, you
23 wanted to -- you can operate an electrowetting
24 system with virtually thousands of droplets if
25 you have enough electrodes. 07:42

1 When you make your measurement and you 07:42
2 want to put something to waste, you just move it
3 to a collection reservoir and it stays there and
4 it's -- you've got 1,000 minus one droplets now
5 that you're manipulating. 07:42

6 You're done with that droplet and so
7 it moves to waste.

8 Q So are you using the terms "collection
9 reservoir" and "waste reservoir" the same then?

10 I'm trying to figure out are those two 07:43
11 different things in your mind or are they the
12 same?

13 MS. JAMESON: Objection to form.

14 THE WITNESS: Within the context of an
15 electrowetting system, the waste reservoir 07:43
16 was used to collect wasted droplets that you
17 didn't need anymore.

18 So I'm considering -- I may have used
19 those terms interchangeably in the context
20 of an electrowetting system. 07:43

21 BY MR. BAKER:

22 Q Is it different outside of the context
23 of an electrowetting system?

24 A Well, I mean that's pretty vague.
25 This is just the terminology we developed -- 07:43

1 since we were the first ones doing all this, 07:43
2 this was suitable for our purposes. And how
3 that applies to other systems, I didn't -- I
4 haven't given that consideration.

5 Q So other than moving the droplets to a 07:44
6 reservoir that was holding waste, were you doing
7 anything else with the droplets at that time?

8 A Well, yes. I mean, we were doing
9 assays, we were doing PCR. And so we were doing
10 chemical processing of multiple droplets, 07:44
11 merging them, causing them to react, the
12 contents to react, and then detecting the
13 product of that reaction. That would have been
14 a typical application.

15 Mostly we were just exploring what is 07:45
16 the scope of this technology, can we break it,
17 can we use it in ways that it's not intended.
18 We wanted to know what the boundaries of this
19 technology were. So we used it in lots of ways
20 to see what it could do. 07:45

21 Q That work, was that all on-chip work
22 or were you doing that off chip?

23 A It was all on chip.

24 Q So at that time you were not
25 collecting the droplets and moving them to some 07:45

1 other location off chip; is that right? 07:45

2 MS. JAMESON: Objection to form.

3 THE WITNESS: Typically the

4 applications we were performing did not

5 require that we go off chip to do analysis 07:46

6 because we had on-chip sensors, we could do

7 absorption measurements on chip.

8 So everything we were doing was just

9 detecting on chip and then once we were

10 finished, the chip was discarded. 07:46

11 So we did not collect off chip at that

12 time.

13 BY MR. BAKER:

14 Q So at that time you were generating

15 and tacting droplets on chip? 07:46

16 A Correct.

17 Q When is the first time that you

18 collected droplets and moved them off chip?

19 A That would have been in the early

20 2000s. 07:47

21 Q And do you remember what was that in

22 the context of? Tell me more about that work,

23 if you don't mind.

24 A Well, since we were dealing with

25 aqueous droplets in a silicone oil, we knew we 07:48

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1 needed to go off chip. And at that time the 07:48
2 ideas were already known how to do that. But I
3 don't recall that -- by then my students had
4 left, had graduated had gone off to form the
5 company Advanced Liquid Logic. 07:48

6 And I don't know whether that was ever
7 reduced to practice, but we knew how to do that
8 because it was known in the art at the time.

9 Q Okay. You said that was in the early
10 2000s? 07:49

11 A Yes. Up to 2004.

12 Q And how did that work begin? What was
13 the impetus for that work?

14 A I think the impetus of that work
15 was -- had a genomic aspect to it. We were 07:49
16 taking raw samples and extracting DNA through --
17 into droplets through a phase separation
18 technology.

19 Then we wanted to do PCR and we had to
20 get the sample off the chip and do -- dilute the 07:50
21 sample and then do PCR. We were looking to do
22 PCR on standard machine and we also did PCR for
23 comparison on chip.

24 So what we were trying to do is get
25 the sample off chip so we could do standard PCR 07:50

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1 | measurements.                                07:50
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2 Q Were you doing that work for a
3 company? Was it something that one of your
4 students decided to do for their thesis? How
5 did it come about? 07:50

6 A Well, one of my students did it for a
7 thesis. We were also working with a company to
8 try and do protein extraction where you would
9 take droplets to then vertically actuate them
10 off the chip to a MALDI plate. So you could do 07:51
11 protein analysis by mass spectrometry.

12 Q What do you mean by "vertically

13 actuate"?

14 A We actually had top plates. So the
15 electrowetting system has a bottom plate with 07:51
16 the electrodes, the hydrophobic coating. And
17 then there is a top plate to confine the droplet
18 and to provide a ground connection to the
19 droplet and then you put a hole in the top
20 plate. 07:51

21 You move the droplet to the hole and
22 you apply a vertical field and you can actually
23 accelerate the droplet out of the chip on to the
24 receiving plate.

| | | | |
|----|---|--|-------|
| 25 | Q | When you say "apply a vertical field," | 07:52 |
|----|---|--|-------|

1 aqueous droplets in silicon oil? 07:54

2 A Yes.

3 Q And because you were using aqueous

4 droplets in silicon oil, you knew that you

5 needed to go off chip? 07:54

6 A Well, in certain applications we did.

7 Others we didn't. When we were doing a

8 diagnostic assay, all we needed to do was an

9 on-chip measurement.

10 If we were doing -- populating a MALDI 07:54

11 plate, we needed to come off. If we were

12 collecting the contents of droplets, we would

13 have to separate the liquid from the oil and

14 then draw that off with a thumb/knees.

15 Q You said for the MALDI plates that you 07:54

16 used vertical actuation because you wanted to

17 populate the MALDI plate all at once?

18 A Yes.

19 Q Rather than using a robot to pipette

20 one droplet at a time; is that right? 07:55

21 A Yes.

22 Q Why is that?

23 A Well, because there was a company that

24 was interested in doing that. It saves a lot of

25 time. 07:55

1 Q How does it save time? 07:55

2 A Any parallel process would outperform

3 a serial process. So instead of doing -- if you

4 have a 96-well plate, you're -- you want to get

5 the liquid out of your wells, you do it one 07:55

6 pipette at a time.

7 You have a way of getting all the

8 contents of those wells on the plate at once,

9 then you've saved all of the time that was

10 required. 07:56

11 So you take one extraction and you

12 populate versus 96 extractions.

13 Q And you were -- at this time you were

14 doing both ways yourself; is that right?

15 A We were developing a way to do the 07:56

16 vertical actuation. So we were figuring out how

17 to get the vertical actuation and we were

18 working with a company to do that. But we were

19 not -- at that time we were not trying to use

20 any other means except vertical actuation. 07:56

21 Q You were not using pipettes to remove

22 the droplets at that time?

23 A No, but that was a standard industry

24 way to -- starting with a macroscopic 96-well

25 plate, put the pipe at tip in a well, move it to 07:57

1 the MALDI plate, go back, put another pipette 07:57
2 tip, put it back in and then move it to another
3 location. That's the serial process and it
4 takes time because robots are relatively slow.

5 Q But you were not doing it that way 07:57
6 yourself; right?

7 A I was not doing that. That was a
8 commercial process at the time.

9 Q When is the first time you used a
10 pipette to remove a droplet from a chip and move 07:57
11 it off chip?

12 A I don't think I've done that.

13 Q You've never done that?

14 A Not on electrowetting chips, no.

15 Q On any other chips? 07:58
16 A Not that I can recall.

17 MR. BAKER: We've been going about an
18 hour. Why don't we take a break? How long
19 do -- Samantha, how long do you guys want to
20 take? Or Dr. Fair, it's really up to you. 07:58

21 MS. JAMESON: Dr. Fair, what would you
22 like? Ten minutes?

23 THE WITNESS: Sounds good.

24 MR. BAKER: Let's take 15.

25 MS. JAMESON: Okay. 07:58

1 MR. BAKER: Be back here in 15. 07:58
2 VIDEOGRAPHER: We're off the record.
3 The time is 10:58 a.m.
4 (Recess taken.)
5 VIDEOGRAPHER: We are back on the 08:18
6 record. The time is 11:18 a.m.
7 BY MR. BAKER:
8 Q Okay. Dr. Fair, before the break, we
9 were talking about some work that you did back
10 in the '90s with -- I think it was a hospital 08:18
11 affiliated with Duke; is that right?
12 A Yes.
13 Q You mentioned that sometimes the
14 doctors there would come to you with problems
15 that they were encountering; is that right? 08:19
16 A Well, it was my due diligence that
17 sought them out and we would talk and they would
18 present their problems.
19 They didn't necessarily come to me.
20 We would do conferences and talk about what 08:19
21 issues they had and how we could do it better.
22 Q Okay. And so it wasn't the case --
23 you know, I just want to talk a minute about
24 sort of generally how science works, I guess.
25 It was not the case that they would 08:19

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1 come to you and say, I have a problem. It was 08:19
2 more discussions and you would recognize
3 problems that they had and suggest solutions?

4 MS. JAMESON: Objection to form.

5 THE WITNESS: Well, one of the -- not 08:20
6 necessarily. It was -- one of my roles
7 there was to introduce MEMS technology to
8 them and determine whether or not -- the way
9 you got their attention generally was let's
10 write a proposal together. So if you could 08:20
11 entice them with the opportunity to get
12 funded, then they were all ears and they
13 were interested in what you had to do.

14 Otherwise they just said, can you fix
15 my XYZ machine because you are an engineer? 08:20
16 That's not really too satisfying.

17 But the interaction was mostly my
18 introducing the technology to them and then
19 brainstorming how would you use it to solve
20 one of your problems. 08:21

21 BY MR. BAKER:

22 Q And in your experience -- when did you
23 graduate with a Ph.D.?

24 A 1969.

25 Q In your almost 50 years of experience, 08:21

1 is that generally the way science progresses, 08:21
2 that you identify a problem and then you look to
3 solve it?

4 MS. JAMESON: Objection to form.

5 THE WITNESS: I guess science 08:21
6 progresses in lots of ways. And if you're
7 problem driven, then that's fine. If you
8 are basic science driven, you're just
9 interested in uncovering details and writing
10 a paper on mechanisms or basic issues 08:22
11 without even addressing what problem you're
12 trying to solve.

13 So there are lots of ways. Mine is
14 more of an applied research approach.

15 Here's a technology, how do we use it. 08:22

16 BY MR. BAKER:

17 Q Well, the -- Dr. Link, the inventor of
18 '837 and '722 patents was Dr. Link; right?

19 A Yes.

20 Q And you would agree with me that in 08:22
21 the '837 and '722 patents, he was addressing a
22 problem that he had identified; right?

23 MS. JAMESON: Objection to form,
24 foundation.

25 THE WITNESS: Well, I would agree that 08:23

1 there is -- that those patents are directed 08:23
2 to a specific problem.

3 BY MR. BAKER:

4 Q And what is the problem that those
5 patents are directed to in your opinion? 08:23

6 MS. JAMESON: Objection, form.

7 THE WITNESS: So the '837 and '722
8 patents are directed to designing
9 microfluidic assemblies for performing
10 applications involving samples with the idea 08:23
11 that you want to minimize sample loss and
12 you want to minimize sample contamination.

13 BY MR. BAKER:

14 Q Okay. And it's your opinion that a
15 person of ordinary skill would have recognized 08:24
16 those problems at the time of the invention; is
17 that right?

18 MS. JAMESON: Objection to form,
19 mischaracterizes.

20 THE WITNESS: I would agree that one 08:24
21 of ordinary skill in the art would have been
22 well aware of problems of sample
23 contamination and sample loss.

24 BY MR. BAKER:

25 Q And is that something that you 08:25

1 considered as part of your analysis in these 08:25
2 cases?

3 A Well, focusing on sample loss and
4 sample contamination was kind of the heading,
5 but my analysis was to understand whether the 08:25
6 claims asserted in those two patents were
7 invalid in view of the prior art.

8 Q As part of your obviousness analysis,
9 though, did you consider whether a person of
10 ordinary skill would have recognized the 08:25
11 contamination problem?

12 A Well, contamination was -- is not a
13 limitation in the '837 patent in Claim 1, for
14 example. Although in the '722 patent, I think
15 the preamble talks about the method of reducing 08:26
16 contamination doing the limitations that are
17 described in Claim 1.

18 So there is no limitation on
19 contamination or sample loss in Claim 1 of the
20 '837 as I recall. 08:26

21 Q My question is slightly different, I
22 think.

23 I'm just asking you as part of your
24 obviousness analysis, did you consider whether a
25 person of ordinary skill would have recognized 08:27

1 that there was a problem with contamination? 08:27

2 A With respect to certain limitations, I
3 did consider that.

4 Q Sorry, did you say with respect to
5 certain limitations, I did consider that? 08:27

6 A Yes. Let me clarify that. That means
7 within certain Claim 1 limitations, I did
8 consider whether a method or a -- a method was
9 described in terms of sample loss and sample
10 contamination in the prior art. 08:28

11 Q So again, I think my question is
12 slightly different. I'm not asking whether you
13 looked for the limitations in the claim in the
14 prior art.

15 My question is simply as part of your 08:28
16 obviousness analysis, did you consider whether a
17 person of ordinary skill would have recognized a
18 problem with contamination?

19 MS. JAMESON: Objection, form.

20 THE WITNESS: So I'm going to look at 08:29
21 my 086 IPR declaration just to refresh my
22 memory on what I did consider.

23 BY MR. BAKER:

24 Q Just for the record, you have your
25 expert declaration in front of you? 08:30


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1 |         occur within them.                                08:31
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2 That is a broad enough statement to
3 cover a person who would have had full
4 knowledge of issues within the handling of
5 microfluidic droplets including -- although 08:32
6 not expressly stated, it's implied that
7 there would be knowledge of reducing
8 contamination and sample loss.

9 BY MR. BAKER:

| | | | |
|----|---|---|-------|
| 10 | Q | I think my question is slightly | 08:32 |
| 11 | | different. Let me see if I can put it another | |
| 12 | | way. I guess what I'm considering is two | |
| 13 | | possibilities and you can tell me which one you | |
| 14 | | did. | |

15 One possibility would be that as part 08:32
16 of your obviousness analysis, that you
17 considered whether a person of ordinary skill
18 would have recognized a problem with
19 contamination.

20 The second possibility would be as 08:32
21 part of your obviousness analysis you looked at
22 the limitations of the claims and then saw if
23 they were in the prior art.

| | | |
|----|--|-------|
| 24 | Do you understand the distinction that | |
| 25 | I am drawing? | 08:33 |

1 MS. JAMESON: Objection to form. 08:33

2 THE WITNESS: I understand the

3 distinction. A person of ordinary skill in

4 the art would not necessarily a priori be

5 aware of contamination and sample loss 08:33

6 issues.

7 However, that kind of concern was

8 universal among people working in the field.

9 But I also looked at the claim limitations

10 and did not -- by reading a prior art 08:33

11 reference on to those claim limitations did

12 not insert an additional limitation

13 regarding the reduction of contamination or

14 sample loss except in Claim 1 of the

15 '722 patent where the preamble describes a 08:34

16 method of reducing contamination.

17 BY MR. BAKER:

18 Q Let me try it another way.

19 It's your opinion that the claims of

20 the '837 and the '722 patents are obvious; 08:34

21 right?

22 A Correct.

23 Q Now, as part of your obviousness

24 analysis, did you start with the idea that a

25 person of ordinary skill would have recognized 08:34

1 contamination problem and then solved it or did 08:34
2 you start with the claim language and then
3 analyze the prior art?

4 MS. JAMESON: Objection to form.

5 THE WITNESS: I would have to say I 08:35
6 started with looking at the claim language
7 and I found appropriate references to cite
8 in an invalidity analysis.

9 Sometimes I would use what one of
10 ordinary skill in the art would know about 08:35
11 reducing contamination or loss in order to
12 bolster an opinion.

13 But I didn't do necessarily -- I
14 didn't start with the idea of looking for
15 references that talked about sample loss or 08:36
16 contamination.

17 BY MR. BAKER:

18 Q Okay. And you did not start with the
19 idea that a person of ordinary skill would have
20 been thinking about the problem of sample loss 08:36
21 or contamination?

22 MS. JAMESON: Objection to form.

23 THE WITNESS: Well, to the credit of
24 what I wrote and I recited to you on
25 Paragraph 47, a person of ordinary skill 08:36

1 would have knowledge of lots of things 08:36
2 having to do with methods of scientific
3 literature and handling downstream
4 formation.

5 All of those topics are major 08:36
6 headings, including a number of discrete
7 subheadings which would include
8 contamination and sample loss.

9 BY MR. BAKER:

10 Q Go ahead. 08:37

11 A I mean, you cannot publish a paper on
12 a method using contaminated samples. That's
13 just -- that means the person of ordinary skill
14 would have had knowledge of how you handle your
15 sample. 08:37

16 But that was not -- first and
17 foremost, I was looking for reading the method
18 of the limitations on reading prior art under
19 the methods claims -- claim elements.

20 Q Okay. Now, in your opinions, there 08:37
21 was some discussion of an effective filing date.

22 Do you recall that?

23 A You have to be more specific.

24 Q Well, let me just ask you this way:
25 Did you form an opinion about the effective 08:38

1 filing date of the '837 patent? 08:38

2 A So I'm looking at my 086 report and I

3 discuss an effective filing date of April 2nd,

4 2013, so it's in my report.

5 Q So it's your opinion that the 08:39

6 effective filing date of the '837 patent is

7 April 2nd, 2013?

8 MS. JAMESON: Objection to form.

9 THE WITNESS: Yes.

10 BY MR. BAKER: 08:39

11 Q And it's your opinion that the

12 effective filing date of the '722 is April 2nd,

13 2013?

14 A I'm going to check my 088 declaration.

15 The '722 patent was filed January 25th, 2017 and 08:41

16 so that would be the filing date that I would be

17 aware of.

18 Q And so it's your testimony that the

19 effective filing date of the '722 in your

20 opinion is when? 08:41

21 A January 25th, 2017.

22 Q Okay. And take a look at your

23 declaration in the 86 case.

24 Do you have that in front of you?

25 A I do. 08:42

1 Q Go to Page 20, please. 08:42
2 A Okay.
3 Q Do you see Paragraph 46 at the top?
4 A I do.
5 Q It says, "I understand that 08:42
6 anticipation and obviousness must be analyzed
7 from the perspective of a hypothetical person
8 having ordinary skill in the art at the time of
9 the effective filing date or date of invention."
10 Do you see that? 08:43
11 A I do.
12 Q What was the time that you used in
13 your anticipation and obviousness analysis for
14 the perspective of the hypothetical person of
15 ordinary skill? 08:43
16 MS. JAMESON: Objection to form.
17 THE WITNESS: I used the priority
18 date, which for the '837 is May 11th, 2006.
19 BY MR. BAKER:
20 Q What about for the '722? 08:44
21 MS. JAMESON: Same objection.
22 THE WITNESS: '722 has an earliest
23 possible priority date of May 11th, 2006.
24 So that would have been the date relative to
25 knowledge of one of ordinary skill in the 08:44

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1 art that I would use. 08:44

2 BY MR. BAKER:

3 Q You called those the priority dates;

4 is that right?

5 A Yes. 08:44

6 Q And why did you use the priority date

7 as the date for the perspective of a person of

8 ordinary skill?

9 A That's my understanding of one of

10 ordinary skill at the time of the invention or 08:45

11 the alleged invention and that would have to be

12 the earliest date, which is a priority date.

13 Q Where did you gain that understanding?

14 A From attorneys I've worked with.

15 Q Now, there's also a discussion in your 08:45

16 report about the patent laws under what you call

17 the AIA; is that right?

18 A Yes.

19 Q And did you make a determination about

20 whether the '837 and '722 patents were subject 08:46

21 to the AIA or the pre-AIA laws?

22 A Let me go back to my report.

23 I'm having trouble finding -- except

24 on Paragraph 67. If you can direct me to where

25 I should be looking, then I can answer your 08:49

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1 question. 08:49

2 Q My question is just whether you have

3 an opinion about whether the Link patents are

4 subject to pre-AIA or AIA law?

5 MS. JAMESON: Objection, legal 08:49

6 conclusion.

7 THE WITNESS: That sounds like a legal

8 question.

9 BY MR. BAKER:

10 Q Does that mean you don't have an 08:49

11 opinion about that?

12 A Well, to the extent that I have

13 expressed an opinion and it is contained in my

14 report, that would be my opinion.

15 So pre-AIA is patents with an 08:50

16 effective filing date before March 16th, 2013

17 and AIA would be after on or after March 16th,

18 2013.

19 So I guess my opinion was this is not

20 something that I am going to determine, but to 08:51

21 the extent the AIA is not found to apply, it's

22 my opinion that the same art invalidates the

23 challenged claims based upon my understanding of

24 the pre-AIA provisions for the same reasons

25 identified below. 08:51

1 So it wasn't up to me to make the 08:51
2 determination.

3 Q It wasn't up to you to make the
4 determination about whether the Link patents
5 were subject to AIA or pre-AIA law? 08:51

6 A That's right. That sounds like a
7 legal decision.

8 Q Okay. Just for the record, I see
9 you're looking there at your declaration.
10 Again, which declaration do you have in front of 08:51
11 you?

12 A I'm looking at the 086 declaration.

13 Q Okay. In that 086 declaration, take a
14 look at Page 13.

15 Do you see at the bottom there is a 08:52
16 Section C that's titled "Anticipation"?

17 A Yes.

18 Q Then if you turn the page on Page 14,
19 there is a Section C1 that's titled "Pre-AIA
20 Section 102(e)." 08:52

21 Do you see that?

22 A I do.

23 Q And then on Page 15 there is a
24 Section 2 that's titled "AIA Section 10282."

25 Do you see that? 08:52

1 doubt if I used "inherency" outside the scope of 08:56
2 anticipation.

3 Q So you did apply the principles of
4 inherency to anticipation; right?

5 A Yes. 08:57

6 Q But you did not apply them to your
7 obviousness analysis; is that right?

8 A As I sit here, that's what I recall.

9 MR. BAKER: All right. It's almost
10 12:00. Should we break now for lunch, 08:57
11 Samantha?

12 MS. JAMESON: It's up to you,
13 Dr. Fair.

14 THE WITNESS: Sure, that's fine.

15 MS. JAMESON: All right. 08:57

16 MR. BAKER: All right. How long do
17 you want to take?

18 THE WITNESS: Forty minutes.

19 MR. BAKER: That's fine with me. You
20 want to say 45 minutes? 08:57

21 THE WITNESS: Okay.

22 MR. BAKER: We'll meet back here at --
23 virtually at 12:45.

24 THE WITNESS: Okay.

25 VIDEOGRAPHER: We're going off the 08:58

1 record. The time is 11:58 a.m. 08:58
2 (Recess taken.)
3 VIDEOGRAPHER: We are back on the
4 record. The time is 12:47 p.m.
5 BY MR. BAKER: 09:47
6 Q Okay. Welcome back, Dr. Fair.
7 A Thank you.
8 Q Don't be offended by this. It's
9 something I have to ask.
10 Did you talk to your counsel at the 09:47
11 break?
12 A No, not at all.
13 Q What about this morning's break, did
14 you talk to your counsel then?
15 A I did. 09:47
16 Q And what did you discuss?
17 A Just pleasantries.
18 Q Did you talk about any of your
19 testimony?
20 A No. 09:48
21 Q Okay. Thanks. Now.
22 We talked a lot about your background
23 this morning. You consider yourself to be an
24 expert in the design of microfluidic chips;
25 right? 09:48

1 semester. So I don't think it's onerous, 09:49
2 but you have to already have a technology in
3 mind to do it.

4 BY MR. BAKER:

5 Q You are still inventing microfluidic 09:49
6 chips to this day; right?

7 A No, actually not. I'm looking for
8 applications of the chips.

9 I mean, we did all of the leg work
10 early in 2000. Now it's a matter of what are 09:50
11 you going to do with it. And there are
12 companies where this technology -- our
13 electrowetting technology has been transferred
14 to four companies and they are building
15 products. And so designing is -- has come 09:50
16 complexity to it but it's not onerous.

17 Q What is the last time that you came up
18 with an invention related to the design of
19 microfluidic chips?

20 A Six months ago. 09:51

21 Q And what was that invention?

22 A That invention had to do with
23 integrating a fluorescent sensor into the top
24 plate of the actuator. And that had never been
25 done before. 09:51

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1 Q So you are still inventing things 09:51
2 related to the design of microfluidic chips to
3 this day; right?

4 A Well, the basic microfluidic function
5 we developed long ago. But here was a system 09:51
6 integration. So we wanted to add a new thing
7 into the fluidic system.

8 It had less to do with the
9 microfluidics and more to do with the optics of
10 building a fluorescent sensor. 09:51

11 Q But you still are seeking patents that
12 have claims to things like waste reservoirs;
13 right?

14 MS. JAMESON: Objection to form,
15 relevance. And because this is a public 09:52
16 transcript, I'll just caution you, Dr. Fair,
17 that it is public, so you can reveal public
18 information.

19 MR. BAKER: I mean, I think these are
20 published applications that have been filed 09:52
21 at the patent office.

22 Q Are you aware of any applications on
23 which you're an inventor where you're seeking
24 claims to waste reservoirs?

25 A No. 09:52

1 Q The invention that you just mentioned 09:52
2 that you came up with six months ago, have you
3 filed an application on that or is that just
4 something that you've researched and developed
5 at this point? 09:53

6 A No, a provisional application has been
7 filed.

8 Q Provisional has been filed.
9 So you're not aware of -- other than
10 that application, that provisional, are you 09:53
11 aware of any other applications that have been
12 filed this year on which you are an inventor?

13 A No.

14 Q You don't recall signing any
15 affidavits or declarations earlier in the year 09:53
16 stating that you were an inventor on other
17 applications?

18 MS. JAMESON: Objection, relevance,
19 form.

20 THE WITNESS: No. I mean, there are 09:53
21 37 patents that I am a named inventor on.
22 And I think the ones that are being issued
23 are continuations of earlier patents.

24 But I don't think I've been involved
25 in the filing of a new patent outside of the 09:54

1 A Well, you would have to look at the 09:55
2 starting platform, how the droplets are
3 presented to the output. And you'd have to
4 determine what mechanism you were going to use
5 and we went through this exercise with Vamsee 09:56
6 Pamula and that's one of the patents in this
7 case.

8 And we settled on a vertical system
9 where droplets would separate from oil on the
10 basis of density. 09:56

11 So we identified the platform, which
12 was electrowetting. We identified the
13 presentation of the droplets to the outlet and
14 how we were going to collect them.

15 Q When you say a vertical system, what 09:56
16 do you mean?

17 A Well, you have to create sufficient
18 volume. If you're going to separate by density,
19 you have to have sufficient volume for the
20 phases to move past each other. 09:57

21 So vertical relative to the actuation
22 floor, which is the channel.

23 Q So you're saying you designed a system
24 where the outlet well was vertical to the plane
25 of the channel; is that right? 09:57

| | | | |
|---|---|------|-------|
| 1 | A | Yes. | 09:57 |
|---|---|------|-------|

2 Q Okay. If I asked you to design a
3 system where the outlet well was in the same
4 plane as the channel, could you do that?

5 A You could you do that, but if the 09:57
6 collection well that you're describing has the
7 same height as the channel, then it would be
8 very difficult to do separation of oil and
9 liquid and droplets.

10 So the early waste reservoirs that we 09:58
11 built were, in fact, designed to have the same
12 height as the channels in our devices. And they
13 were just holding -- they just were there to
14 hold the droplets, not to separate from the oil.

| | | | |
|----|---|---|-------|
| 15 | Q | You did not put the outlet wells | 09:58 |
| 16 | | vertical to the channel until you decided you | |
| 17 | | wanted to separate? | |

| | | |
|----|---|-----------------|
| 18 | A | That's correct. |
|----|---|-----------------|

19 Q Now, could you -- if I asked you to
20 design an outlet well that was in the same plane 09:59
21 as the channel where the droplets would separate
22 based on density, could you do that?

23 A So let me understand your question.
24 You're talking about an outlet well that has the
25 same height as the channel? 09:59

1 Q Yes. 09:59

2 A But it has the lateral extent of a

3 typical reservoir that we use on our chip. And

4 so the question is: Could you do separation in

5 that channel, in that reservoir? 10:00

6 Q Yes.

7 A By density?

8 Q Yes.

9 A No.

10 Q What if the channel was really high 10:00

11 and therefore the reservoir was really high?

12 MS. JAMESON: Objection to form.

13 THE WITNESS: Well, I don't know that

14 that makes a difference. In our droplet

15 systems and in cross-flow and flow-focused 10:00

16 systems, the droplets are typically on the

17 order of the size of the channel.

18 And so even though the channel height

19 may be larger, generally the droplets would

20 be accommodated and bound and float in that 10:01

21 channel almost to the extent of the

22 boundaries at the top and the bottom.

23 BY MR. BAKER:

24 Q Right. I guess that's my point.

25 If you had a smaller droplet that was 10:01

1 not as tall as the channel, let's say, those 10:01
2 droplets would float up to the top or sink to
3 the bottom of the channel; right?

4 A Well, what you're relying upon there
5 is field flow fractionation. To be successful, 10:01
6 you would have to have droplets that are 20 to
7 100 times smaller than the dimension of the
8 channel.

9 Q Why is that?

10 A Because field flow fractionation 10:02
11 relies on pressure driven flow. It relies on
12 separation occurring vertically under the
13 influence of gravity and then the particles are
14 separated based upon their position in the
15 parabolic flow stream. 10:02

16 So near the walls the particles are
17 moving slowly. In the center of the channel,
18 they are moving faster, so that's the velocity
19 profile of the liquid.

20 But to get reasonable separation, you 10:02
21 would need a significant vertical space to do
22 flow fractionation, which would be, you know, 20
23 to 100 times larger than the particle you're
24 separating.

25 Q Where is the first time you ever heard 10:03

1 the term "separation chamber"? 10:03

2 A When I was a kid.

3 Q When you were a kid? What was the

4 context?

5 A I grew up on a farm. 10:03

6 Q And you had a separation chamber?

7 A The neighbors had cows and there was

8 the cream, there was the milk, yes.

9 Q So that was a chamber that separated

10 the cream from the milk? 10:03

11 A Yes.

12 Q After that when is the next time you

13 heard the term "separation chamber"?

14 A Well, I honestly don't recall. But I

15 do recall contemplating it with Pamula when we 10:04

16 were looking at ways of collecting droplets and

17 the old milk-and-cream analogy came to mind and

18 we applied it to a microfluidic system.

19 Q And who was the company you just

20 mentioned? 10:04

21 A That was with Vamsee Pamula, who's one

22 of the inventors of the '684 patent.

23 Q I'm just specifically asking about the

24 term itself.

25 Other than when you were a kid on the 10:04

1 farm or on your neighbor's farm I guess, when is 10:04
2 the next time that you actually heard the term
3 "separation chamber"?

4 A Well, I think I just explained, it was
5 in early 2000s when -- before Dr. Pamula left 10:04
6 Duke to start his company with three of my other
7 Ph.D. students. And we were talking about
8 separating and collecting and that's where we
9 used the concept of separation chamber.

10 Q I understand that you're saying you 10:05
11 used the concept. You actually used the term as
12 well, you called it a separation chamber?

13 A That I don't recall.

14 Q When is the -- other than the farm,
15 when is the next time that you do recall hearing 10:05
16 the term "separation chamber"?

17 A I certainly heard it in connection
18 with the '837 and '722 patents. When before
19 that I heard it? I have no recollection. I
20 don't -- I wouldn't remember that. 10:05

21 Q And in the context of the Link
22 patents, you have some opinions about the
23 separation chamber recited in those claims;
24 right?

25 A Yes. 10:06

1 Q And you contend that in order for 10:06
2 something to be a separation chamber, you don't
3 have to actually have separation of the
4 droplets; is that right?

5 A I'm just looking at my claim 10:07
6 construction tables. And the construction that
7 I support is the space that's substantially
8 enclosed.

9 So in that regard, the chamber exists
10 regardless of what physically is going on 10:08
11 inside.

12 Q So you would call it a separation
13 chamber even if there was no separation of
14 droplets from the oil?

15 MS. JAMESON: Objection to form. 10:08

16 THE WITNESS: Let me review what I
17 said in my report. I'm looking at 086
18 declaration.

19 BY MR. BAKER:

20 Q Okay. 10:08

21 REPORTER: I need to go off the record
22 and reboot my computer. Could we take five,
23 please?

24 MR. BAKER: Sure.

25 REPORTER: Thanks. 10:09

1 VIDEOGRAPHER: Off the record, 10:09
2 1:09 p.m.
3 (Recess taken.)
4 VIDEOGRAPHER: We are back on the
5 record. The time is 1:15 p.m. 10:15
6 BY MR. BAKER:
7 Q So, Dr. Fair, I'll just restate my
8 question.
9 If water droplets are not separating
10 from the background oil in the chamber that 10:15
11 you're talking about, is it a separation
12 chamber?
13 MS. JAMESON: Objection to form.
14 THE WITNESS: Well, within the context
15 of Claim 1 of the '837 patent, which is an 10:15
16 apparatus claim, describes a downstream
17 separation chamber which would have
18 structure and there is no need for any other
19 description other than the structure of this
20 apparatus element. And that's what claim 10:16
21 construction I recited does.
22 BY MR. BAKER:
23 Q Can you point me to the claim
24 construction that you're talking about?
25 I'll just ask you. I think you said a 10:16

1 minute ago the separation chamber was 10:16
2 substantially closed. Is that what you're
3 referring to?

4 A Yes.

5 Q Okay. So is that the construction 10:16
6 that you based your opinions on?

7 A With my IPR declarations, I offered
8 opinions based upon 10X's construction and also
9 on Bio-Rad's construction.

10 So 10X is the space that is 10:17
11 substantially enclosed. Bio-Rad's was broad
12 enough to encompass an open well.

13 Q Which one do you believe is correct?

14 A I think the 10X construction is the
15 correct one. 10:17

16 Q And that's the one that says that the
17 separation chamber is substantially closed?

18 A It's enclosed.

19 Q Enclosed. Okay.

20 And under that construction, does 10:17
21 Thorsen disclose a separation chamber?

22 A I missed that question.

23 Q You have some opinions about a
24 reference called Thorsen, the author is Thorsen.

25 Do you recall that? 10:17

1 Q I'm just asking is it your opinion 10:19
2 that the outlet well in Thorsen is a separation
3 chamber?

4 You're looking at your declaration
5 now? 10:20

6 A I'm looking at my declaration. I'm
7 looking at Figures 4.1 and 4.2. And two outlet
8 walls are identified at the end of a serpentine
9 channel.

10 Q And you believe those are separation 10:20
11 chambers within the meaning of the Link patents?

12 MS. JAMESON: Objection to form.

13 THE WITNESS: I believe that the
14 outlet wells described in Thorsen 4.1 and
15 4.2 are outlet wells and that's based upon 10:21
16 Thorsen's statement that he collects
17 thousands of droplets.

18 In order to collect thousands of
19 droplets in particular with the sorting of
20 red and green dye, which he describes, one 10:21
21 would have to have a substantial collection
22 volume which would give a separation
23 chamber.

24 BY MR. BAKER:

25 Q Okay. Are the outlet wells that 10:21

1 Thorsen describes in Chapter 4 open or closed on 10:21
2 top?

3 A Let me go to Thorsen where he
4 describes exactly that figure.

5 So in Figure 3.28 that is an enclosed 10:22
6 chamber. In Chapter 4, I will need to review
7 whether those are open or closed.

8 Q So just for the record, you are
9 looking in Thorsen Chapter 4 to refresh your
10 recollection about whether the outlet wells are 10:23
11 open or closed on top; right?

12 A Correct.

13 Q Are you still looking at Thorsen?

14 A Yes, I'm looking at Thorsen as well as
15 my 086 report around Paragraph 110, 111. 10:24

16 All we know is that the droplets
17 accumulated in the wells, you know, the
18 thousands of droplets and I don't recall whether
19 they were open or not.

20 Q Would your answer be the same for the 10:26
21 outlet well in Chapter 3 of Thorsen?

22 A No. The outlet well described in
23 Figure 3.28 is, in fact, enclosed.

24 Q Well, that's an incubation chamber;
25 right? 10:26

1 Are there also outlet wells in 10:26
2 Chapter 3?
3 A Well, the incubation chamber in
4 Thorsen Chapter 3 in Figure 3.28 functions as a
5 separation chamber. And it has outlets that go 10:27
6 to the sorting function on the chip.
7 Q And so apart from the incubation
8 chamber, are there outlet wells in Chapter 3 of
9 Thorsen?
10 Just for the record, what are you 10:27
11 looking at now?
12 A I'm just looking at Claim 1 of the
13 '877.
14 Q Got it.
15 A All you need is a droplet receiving 10:28
16 outlet and a separation chamber. That's what is
17 disclosed in Chapter 3 of Thorsen. There is no
18 requirement for outlet wells.
19 Q Okay. So you don't have any opinions
20 about outlet wells in Chapter 3 of Thorsen? 10:29
21 MS. JAMESON: Objection to form,
22 mischaracterizes.
23 THE WITNESS: What I'm saying is that
24 the incubation chamber serves the function
25 of a separation chamber because it has an 10:29

1 inlet and an outlet and it's enclosed. 10:29
2 So that meets 10X's claim
3 construction.
4 BY MR. BAKER:
5 Q Is there anything else in Chapter 3 of 10:29
6 Thorsen that you believe constitutes a
7 separation chamber?
8 A Still looking at my 086 report going
9 back to the table of contents. So Thorsen
10 Chapter 3 describes a separation chamber that 10:30
11 meets the limitations of the claim, Element 1.6
12 and Element 1.7.
13 With regard to what happens after the
14 sorting, I have not considered that because I'm
15 reading the incubation chamber on separation 10:30
16 chamber.
17 Q Got it. So with respect to Chapter 3,
18 your only opinion is that the incubation chamber
19 is the separation chamber?
20 MS. JAMESON: Objection to form. 10:31
21 THE WITNESS: With regard to
22 Figure 3.28, that is my opinion.
23 BY MR. BAKER:
24 Q Let me ask you this about -- let's
25 talk about the incubation chamber for a minute. 10:32

1 So the incubation chamber in Chapter 3 10:32
2 is kind of like a dome.

3 Do I have that right?

4 A Yes, it's a 500-micron high chamber
5 that is aligned to the channels of the device. 10:32

6 Q Is it flat on the bottom or is it
7 circular on the bottom?

8 A Well, remember, Figure 3.29 is looking
9 inside the dome from the bottom. So the glass
10 coverslip bounds a flat surface and the dome is 10:33
11 below that flat surface. And so you're -- I'm
12 sorry, is above that flat surface because you're
13 looking from the bottom with an inverting
14 microscope.

15 So there is a flat surface, Channel C, 10:33
16 and you can fill that 500-micron high dome with
17 oil and droplets.

18 Q Got it. So the incubation chamber is
19 flat on the bottom; right?

20 A When it's inverted so that you can -- 10:33
21 so that the glass slide is on the bottom and
22 you're looking from the bottom up into the --
23 through the glass slide into the dome.

24 Q It's not the microscope -- let me ask
25 you this way. 10:34

1 The incubation chamber has a flat 10:34
2 surface; right?

3 A Yes.

4 Q And is that the floor or the ceiling
5 in the incubation chamber? 10:34

6 A During visualization, the incubation
7 chamber is being looked at from below and so
8 you're looking from below the floor up into
9 the -- through the glass slide.

10 Q So the flat surface is the floor of 10:34
11 the incubation chamber?

12 A Yes. It's one of the surfaces. The
13 other surface is the dome.

14 Q Right. But all I'm saying is when the
15 incubation chamber is upright and you're working 10:34
16 with it, the floor of the incubation chamber is
17 a flat surface; right?

18 A Correct.

19 Q Okay. And the inlet channel comes in
20 the same level as the floor the flat floor; 10:35
21 right?

22 A Right.

23 Q And then on the other side of the
24 chamber there is an outlet channel that's at the
25 same level as the flat floor; right? 10:35

1 A Yes, at the top of the glass slide. 10:35

2 Q Then the roof of the incubation

3 chamber is like a dome; right?

4 A Yes.

5 Q Now, in Thorsen, and it's your opinion 10:35

6 that in this incubation chamber, the droplets

7 will separate from the oil based on densities?

8 A Yes.

9 Q How do you collect the droplets from

10 the incubation chamber? 10:36

11 A Well, the droplets and the oil flow

12 in. The droplets sediment out and then they are

13 collected through the outlet channel.

14 Q I thought they went to the sorting --

15 to sorting? 10:36

16 A Well, they are. They are sorted by

17 density.

18 Q If you wanted to go in and collect the

19 droplets from the incubation chamber before they

20 went to sorting, how would you do it? 10:36

21 MS. JAMESON: Objection to form.

22 THE WITNESS: Well, there's no

23 requirement that you collect only droplets

24 in this separation chamber. You actually do

25 separation and then you collect both oil and 10:37

1 Q Okay. 10:38

2 A The droplets by sedimentation clump to

3 the bottom down to the glass floor. The oil is

4 lighter. It floats up, but the droplets are

5 surrounded by oil. As they are leaving, you're 10:39

6 drawing both droplets and oil.

7 Q Okay. Now, in Thorsen, he used water

8 droplets and I believe mineral oil; is that

9 right?

10 A Mineral oil. 10:39

11 Q So in the incubation chamber, the

12 water droplets, in your opinion, would sink to

13 the bottom of the incubation channel; correct?

14 A Correct.

15 Q But it's possible to use an oil that 10:39

16 is lighter than water; right?

17 A In what context, in Thorsen's

18 incubation chamber?

19 Q Yes, in Thorsen Chapter 3. He could

20 have used a different oil; right? 10:40

21 MS. JAMESON: Objection to form.

22 THE WITNESS: He wouldn't have

23 collected his droplets if they floated up to

24 the dome level, to the dome surface, then

25 you just draw the oil from the bottom and 10:40

1 you wouldn't touch the droplets. But you 10:40
2 need an exit part at the top.

3 BY MR. BAKER:

4 Q Right. That was going -- that's my
5 only question. 10:40

6 So if you used an oil that was heavier
7 than water, the droplets would rise to the top
8 of the incubation chamber; right?

9 A That's right.

10 MS. JAMESON: Object to the form. 10:40

11 BY MR. BAKER:

12 Q And only oil would leave the chamber
13 through the outlet; right?

14 A With the structure that's depicted in
15 Figure 3.29, that would be correct. 10:41

16 Q Okay. You have the exhibit share
17 open; right?

18 A I do.

19 Q So I put in the marked exhibits folder
20 the '722 patent and the '837 patent. They are 10:41
21 both marked as Exhibit 1001 in their respective
22 petitions. But in the marked exhibits folder I
23 put in parentheses '722 and '837 patent beside
24 their respective PDFs.

25 Do you see that? 10:42

1 A Well, I'm looking at exhibit share and 10:42
2 I have a folder Bio-Rad versus 10X Genomics.

3 Q Yes.

4 A I don't see anything related to --

5 Q So open up that folder and you should 10:42
6 see a subfolder called "Depositions."

7 A I do.

8 Q And then there would be a subfolder
9 under that called "Deposition of Richard Fair."

10 A Got it. Okay. 10:42

11 Q And then there should be a subfolder
12 under that called "Marked Exhibits." It's got
13 two exclamation points in front of it.

14 A I got it. I just didn't refresh my
15 folder. 10:43

16 Q No worries. We're all learning how
17 to -- the first time actually that I have used
18 this exhibit share and should have been doing it
19 my whole career.

20 So in that marked exhibits folder, you 10:43
21 should see a PDF that is labeled 1001,
22 parentheses, '837 patent.

23 Do you see that?

24 A I do.

25 Q Why don't you open that up. 10:43

1 If you have another copy of the '837 10:43
2 patent that you would prefer to look at,
3 Dr. Fair, that's fine with me. We're just going
4 to be looking at the '837 patent.

5 A Okay. 10:43

6 Q Okay. Do you see on the '837 patent
7 it says "Application Number" on the front cover?
8 Do you see the application number?

9 A I do.

10 Q And it says 13/855,318. 10:44

11 Do you see that?

12 A Yes.

13 Q Okay. We're going to take a look at
14 that '318 application, all right?

15 A Okay. 10:44

16 Q Just to orient you. So go back to
17 your exhibit share.

18 A Okay.

19 Q Do you see a PDF that is labeled 1060?

20 A I do. 10:44

21 Q That should be the '318 application.
22 Why don't you open that up for me, let me know
23 when you have that in front of you.

24 A Okay.

25 Q You got it? 10:44

1 A I do. 10:46

2 Q Take a look at Claim 6.

3 It says, "The assembly of Claim 5,

4 further comprising an output nozzle in fluid

5 communication with the distal end of the slide." 10:46

6 Do you see that?

7 A Yes.

8 Q Can you explain to me what is -- let

9 me ask it this way: Do you have an

10 understanding of what is meant by the term 10:46

11 "slide"?

12 MS. JAMESON: Objection, form.

13 THE WITNESS: I need to go back into

14 the specification.

15 BY MR. BAKER: 10:47

16 Q For the record, you're looking at the

17 specifications of the '318 application?

18 A Right.

19 Q To see if you can determine what the

20 term "slide" means in Claims 5 and 6; is that 10:48

21 right?

22 A That's correct.

23 Q I'll ask you the question that I

24 wanted to ask, Dr. Fair. If you need to

25 continue looking at parts of the specification 10:50

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1 that you're looking at right now, we can do 10:50
2 that. Would it be okay to proceed that way?

3 A Correct. Yes.

4 Q I just have one question. If you take
5 a look at Paragraph 365 in the '318 application. 10:51
6 Let me know when you're there.

7 A I got it.

8 Q It says, "The present invention
9 provides methods to overcome this limitation.
10 In one embodiment, a Solexa slide can be coated 10:51
11 with any of the compounds commonly used to
12 permit binding and mobilization (e.g.,
13 carboxy-esters, streptavidin, Igg, gold,
14 et cetera."

15 Do you see that? 10:51

16 A I do.

17 Q My only question is: Is the Solexa
18 slide that's referenced in that paragraph an
19 embodiment of the slide that is resided in
20 Claims 5 and 6? 10:52

21 MS. JAMESON: Objection to form.

22 THE WITNESS: I don't think so.

23 BY MR. BAKER:

24 Q Why not?

25 A So Solexa slides could be slides that 10:53

1 describe products from Solexa, so that would be 10:53
2 a visual aid, or it could be a microscope slide.

3 Q Have you ever seen a slide used on a
4 microfluidic device?

5 MS. JAMESON: Objection to form. 10:54

6 THE WITNESS: I can't say that I have.

7 BY MR. BAKER:

8 Q Let me point you to Paragraph 66 of
9 your report. You can look at the 086 report.

10 Are you at Paragraph 66? 10:55

11 A I am.

12 Q Why don't you -- you can read that to
13 yourself. See if we can refresh your
14 recollection here.

15 A Okay. I've read that. 10:56

16 Q Do you see at the end of that
17 paragraph there is a reference to Paragraphs 267
18 and 274?

19 A Okay.

20 Q Of the '138 application, which is 10:56
21 Exhibit 1060. Why don't you take a look at
22 those paragraphs.

23 A Okay.

24 Okay.

25 Q You see in Paragraph 267 it says, "In 10:58

1 certain embodiments, the outlet is connected to 10:58
2 a slide"?

3 A Yes.

4 Q And then it goes on to discuss the
5 slide; right? 10:58

6 A Correct.

7 Q Does that refresh your recollection
8 about what a slide is?

9 A Well, 267 does not tell us what a
10 slide is; it just tells how it's connected and 10:59
11 what its function is.

12 Q It's not talking about a microscope
13 slide, though; right?

14 A Apparently not. Not in this context.

15 Q And it's not talking about a 11:00
16 PowerPoint slide; right?

17 A Right.

18 Q It's talking about a structure that is
19 on the chip; right?

20 A Well, it's talking about a slide. It 11:00
21 doesn't give any details on what its structure
22 is.

23 Q So the droplets travel from the higher
24 positioned proximal end of the slide to the
25 lower distal end where they are collected; 11:00

1 right, the middle of the paragraph? 11:00

2 A Yes, that's what it says. I don't

3 have any details.

4 Q You can correct me if I'm wrong. My

5 understanding is that this is talking about the 11:01

6 droplets leaving an outlet and literally sliding

7 down a little miniature slide, if you will, on

8 the chip and traveling somewhere else on the

9 chip.

10 Is that your understanding or do you 11:01

11 have a different understanding?

12 A It's not my understanding.

13 MS. JAMESON: Objection to form.

14 THE WITNESS: In this application, the

15 slide that you just described, there's a 11:01

16 chance the droplets will never reach the

17 bottom because the slide you described is an

18 open system. And if these are pico-liter

19 droplets, they will evaporate very rapidly,

20 in matters of seconds. 11:02

21 So a slide is a bad idea.

22 BY MR. BAKER:

23 Q Okay.

24 A The slide that you're talking about.

25 Q My only question -- I just pointed you 11:02

1 to this paragraph to try to refresh your 11:02
2 recollection. The only thing that I am trying
3 to find out is if in that Paragraph 365 where it
4 referenced a Solexa slide, I just want to know
5 if you believe that is an example of the type of 11:02
6 slide that is recited in Claims 5 and 6?
7 MS. JAMESON: Objection to form.
8 THE WITNESS: I still don't know what
9 a Solexa side is.
10 BY MR. BAKER: 11:02
11 Q Okay. And looking at Paragraph 267
12 where it discusses slide does not refresh your
13 recollection of what a Solexa slide is?
14 A That's correct.
15 MR. BAKER: Okay. We've been going 11:02
16 about an hour. Let's take a break.
17 THE WITNESS: Okay.
18 MR. BAKER: Do you want to take ten
19 minutes?
20 THE WITNESS: All right. That's good. 11:03
21 MS. JAMESON: Sounds good.
22 MR. BAKER: All right.
23 VIDEOGRAPHER: We are off the record.
24 The time is 2:03 p.m.
25 (Recess taken.) 11:03

1 VIDEOGRAPHER: We're back on the 11:17
2 record. The time is 2:17 p.m.
3 BY MR. BAKER:
4 Q And, Dr. Fair, did you talk with
5 anybody at the break? 11:17
6 A No.
7 Q And by the way, have you been -- you
8 have not been exchanging emails or any other
9 communication with anybody today about your
10 deposition, have you? 11:17
11 A No. I spent this break trying to
12 soothe my bearded colleague because we're having
13 a thunderstorm.
14 Q Right. I figured but just had to ask.
15 All right. You consider yourself to 11:17
16 be an expert in emulsion chemistry; is that
17 right?
18 A Well, I have specialized knowledge of
19 emulsion chemistry through my work with aqueous
20 droplets and oil. 11:18
21 Q Do you consider yourself to be an
22 expert in emulsion chemistry?
23 MS. JAMESON: Objection, form.
24 THE WITNESS: I expect -- I believe
25 myself to be an expert in view of the fact 11:18

1 that I have specialized knowledge in the use 11:18
2 of emulsions.

3 BY MR. BAKER:

4 Q Okay. So you consider yourself to be
5 an expert in emulsion chemistry; is that right? 11:18

6 A That's what I said.

7 Q Okay. And do you consider yourself to
8 be an expert in microemulsions?

9 MS. JAMESON: Objection to form.

10 THE WITNESS: In microemulsions, tell 11:19
11 me more. What do you mean by that?

12 BY MR. BAKER:

13 Q Well, the kind of emulsions that are
14 formed on these chips that we've been talking
15 about. 11:19

16 A Yes, specifically because of my
17 specialized knowledge of emulsions used in
18 microfluidics.

19 Q Okay. What is a floc? Have you ever
20 heard that term, F-L-O-C? 11:19

21 MS. JAMESON: Objection to form.

22 THE WITNESS: Yes. In what context?

23 I'm familiar with flocculation.

24 BY MR. BAKER:

| | | | |
|----|---|---------------|-------|
| 25 | Q | What is that? | 11:19 |
|----|---|---------------|-------|

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1 A Well, that's where you're trying to 11:19
2 create emulsions through a process to sediment
3 out a particular species.

4 Q Okay. And what is a floc?

5 MS. JAMESON: Objection to form. 11:20

6 THE WITNESS: I admit to not knowing
7 that term.

8 BY MR. BAKER:

9 Q Okay. You said flocculation was a
10 process where you're trying to sediment out the 11:20
11 species.

12 What do you mean by that?

13 A Well, you want to collect a species
14 from a solution from wastewater, for example.
15 So it's common to use flocculation to remove 11:20
16 hydrofluoric acid from rinses and etches,
17 thereby collected as a sediment so you can take
18 out the harmful molecules that leave water.

19 Q Is it -- do droplets flocculate? Is
20 that something -- is flocculation a process that 11:21
21 occurs during droplet formation in these chips
22 that we've been discussing today?

23 MS. JAMESON: Objection to form.

24 THE WITNESS: I wouldn't use that term
25 together with microfluidics because the 11:21

1 separation of droplets from oil, for 11:21
2 example, is a density-sorting process which
3 does not involve a chemical reaction for the
4 formation of a product which would then be
5 separated. 11:22
6 So I think there's a difference
7 between sedimentation of basic materials and
8 a reaction to fluoram, a flocculated species
9 that will then sediment.
10 BY MR. BAKER: 11:22
11 Q What about coalescence, have you heard
12 that term?
13 A I have.
14 Q What is coalescence?
15 A So coalescence would be bringing 11:23
16 together. So if you had droplets and you wanted
17 to coalesce them, you could bring them together,
18 collect them.
19 Q Okay. Now, in your opinion, in your
20 reports, you cited a book called "Emulsion 11:23
21 Technology"; is that right?
22 A I did. And let me refer to my 086
23 report.
24 Q My question for you is just have you
25 read that book? 11:24

1 A And the book being described, could 11:24
2 you point me to where that is?

3 Q I can show you, actually. I've loaded
4 it up in the marked exhibits. It's labeled
5 1009. So if you want, you can open that up. 11:24

6 A I've not read this book.

7 Q Have you read any portion of this
8 book?

9 A I've identified supporting information
10 from this book. But I've not read the book from 11:25
11 cover to cover.

12 I found sections that were relevant.

13 Q You found those sections?

14 A In conjunction with attorneys, yes.

15 Q So did you go through the book 11:25
16 yourself?

17 A No, the relevant portions were
18 identified in our writing -- in my writing of
19 this report and I confirmed those sections but I
20 have not -- 11:25

21 Q When you say you confirmed them, what
22 do you mean?

23 A I confirmed their relevance to the
24 points I was trying to make and state of the
25 art. 11:26

1 Q Okay. Have you ever looked, other 11:26
2 than -- well, let me just ask it this way: Have
3 you ever looked at the book "Emulsion
4 Technology" yourself?

5 A Well, to the extent to verify 11:26
6 reference cites, yes, I have.

7 Q You did? You actually opened the book
8 and verified that the quotations in your report
9 were in that book?

10 A Yes, it's in the Duke library. 11:26

11 Q Did you go to the Duke library and
12 look at it?

13 A I go there lots of times, but I have,
14 yes.

15 Q You've gone to the Duke library and 11:26
16 looked at the book "Emulsion Technology"?

17 A Correct.

18 Q When did you do that?

19 A Last fall.

20 Q Last fall? You physically went to the 11:27
21 library and looked at the book "Emulsion
22 Technology"?

23 A Yes, I checked out all the cites in my
24 report.

25 Q Other than cites in your report, did 11:27

1 you look at any other portions of the book? 11:27

2 A No.

3 Q Who decided on the cites to put in
4 your report?

5 MS. JAMESON: I'm going to object to 11:27
6 the extent that that is calling for
7 potentially privileged information about
8 communication with counsel.

9 And to the extent, Dr. Fair, you can
10 answer that without revealing communications 11:27
11 with counsel, you can.

12 THE WITNESS: I'm unable to answer
13 that question without revealing privilege.

14 BY MR. BAKER:

15 Q Let me ask it this way. You know 11:28
16 what, that's fine.

17 "Emulsion Technology," that book, do
18 you agree with the principles that are set forth
19 in that book?

20 MS. JAMESON: Objection to form. 11:28

21 THE WITNESS: I would be unable to
22 answer that question because I've not read
23 the book. I've only looked at the cites
24 that were in my report.

25

1 BY MR. BAKER: 11:28

2 Q Okay. All right. Now, you cited

3 another book called "Emulsion Science." And if

4 you look on exhibit share, I've loaded that up

5 as Exhibit 1001. 11:29

6 Please feel free to open that up if

7 you would like. Do you have that open?

8 A I just lost my window.

9 Q Let me know when you get to -- you're

10 having problems with exhibit share? 11:31

11 A Yes, I logged out and unfortunately

12 I'm having trouble logging back in.

13 Q Why don't we go off the record for a

14 minute and we'll see if we can help you out?

15 A Okay. 11:31

16 VIDEOGRAPHER: Off the record at 2:32.

17 (Recess taken.)

18 VIDEOGRAPHER: We are back on the

19 record at 2:32.

20 BY MR. BAKER: 11:32

21 Q Did you have Exhibit 1012 pulled up

22 now, Dr. Fair?

23 A Yes.

24 Q That's the book "Emulsion Science"?

25 A It is indeed. 11:33

1 Q And who decided to use "Emulsion 11:33
2 Science" in your report?

3 MS. JAMESON: I'll give you the same
4 caution, Dr. Fair, to the extent that you
5 can answer without revealing privileged 11:33
6 communications, you can.

7 THE WITNESS: I'm unable to disclose
8 that information based upon privilege.

9 BY MR. BAKER:

10 Q Have you read this book, "Emulsion 11:33
11 Science"?

12 A I've not read it. I also referred to
13 it, to the specific cites in my report and
14 verified those. That's the extent of reading
15 this book. 11:34

16 Q Did you do that by going to the
17 library again?

18 A Yes.

19 Q So these books, "Emulsion Technology"
20 and "Emulsion Science," we will find those in 11:34
21 the Duke library?

22 A Sure.

23 Q And the -- do you see on this one in
24 the upper left corner, there is a sticker. It's
25 like a -- I can't remember what you call these 11:34

1 things. It's from the old school card catalog, 11:34
2 QC1.S797.

3 Do you see that?

4 A I do.

5 Q Is this book literally from the 11:34
6 version you got from Duke?

7 A No.

8 Q Where did this book come from?

9 A I don't remember.

10 Q Okay. And I'll ask you the same 11:34
11 question about this book. Do you agree with the
12 principles set forth in this book?

13 MS. JAMESON: Objection to form.

14 THE WITNESS: I'm sorry, I didn't
15 understand that. 11:35

16 BY MR. BAKER:

17 Q Do you agree with the principles in
18 this book? Is there anything in this book that
19 you think is wrong?

20 A I would be unable to answer that as I 11:35
21 did not read the book.

22 Q Got it. Let me take you to a page in
23 your report. I've been looking at your
24 declaration in the 087 case, so let me find --
25 you have the 086 declaration open; right? 11:36

1 Do you see that? 11:37

2 A I do.

3 Q If a droplet coalesces -- does this

4 sentence mean that if a droplet coalesces with

5 other droplets, then it will not cream or 11:38

6 sediment?

7 MS. JAMESON: Objection to form.

8 THE WITNESS: You have two liquids,

9 they will separate based upon their relative

10 densities. So just because you coalesce 11:39

11 does not mean you can't do separation.

12 BY MR. BAKER:

13 Q Do it ever mean that the droplets

14 would not separate?

15 MS. JAMESON: Objection to form. 11:39

16 MR. BAKER: I'll rephrase.

17 Q Does coalescence ever affect whether

18 droplets will separate from surrounding fluid

19 based on density?

20 MS. JAMESON: Same objection. 11:39

21 THE WITNESS: What it's saying is if

22 you have stable droplets, they will

23 separate, but the principle of separation is

24 based simply on density.

25 So even if you did not have stable 11:40

1 droplets and the density of the contents of 11:40
2 those droplets was less than the oil, then
3 those -- the contents of those droplets
4 would become a fluid that would separate
5 just based on density. 11:40

6 BY MR. BAKER:

7 Q I don't think that answers my
8 question. So I apologize, let me just ask it
9 again.

10 As an expert in emulsion chemistry, I 11:40
11 just want to get your opinion on whether
12 coalescence can ever affect whether droplets
13 will separate from the surrounding fluid?

14 MS. JAMESON: Objection do form.

15 THE WITNESS: Well, when you're 11:41
16 talking about droplet separation, that means
17 they have not coalesced. So I really don't
18 understand your question.

19 BY MR. BAKER:

20 Q Sure. If, let's say -- let's assume 11:41
21 that -- well, let's talk about Thorsen, okay?

22 Thorsen has water droplets in mineral
23 oil; right?

24 A Yes.

25 Q If those droplets coalesce, does that 11:41

1 affect whether they will separate from the 11:41
2 mineral oil?

3 A Not if their density is greater than
4 that of the mineral oil.

5 Q Is there ever a situation where they 11:41
6 coalesce in a certain way such that they would
7 not separate?

8 MS. JAMESON: Objection, form,
9 foundation.

10 THE WITNESS: Could I hear that again, 11:42
11 please?

12 BY MR. BAKER:

13 Q Let me ask it this way. If droplets,
14 for instance -- it's your opinion that the
15 droplets in Thorsen enter the incubation chamber 11:42
16 and they settle to the bottom; right?

17 A Right.

18 Q Because they are heavier than the
19 mineral oil?

20 A Right. 11:42

21 Q We also talked about a situation where
22 you were using an oil that was heavier than
23 water, the droplets might rise to the top of the
24 incubation chamber; right?

25 A Right. 11:43

1 Q So what is an oil, by the way, that 11:43
2 would be heavier than water?

3 A Oh, your fluorinated oils.

4 Q Let's assume you're using Thorsen's
5 setup but instead of mineral oil, you're using a 11:43
6 fluorinated oil; okay?

7 A Okay.

8 Q When your water droplets go into the
9 incubation chamber, they will rise to the top;
10 right? 11:43

11 A Right.

12 Q What happens if the droplets, when
13 they go into the incubation chamber, form
14 aggregates or coalesce, will they still rise to
15 the top? 11:43

16 MS. JAMESON: Objection to form.

17 THE WITNESS: Well, the answer is yes.

18 If their density is less than the oil.

19 BY MR. BAKER:

20 Q Why wouldn't their density be less 11:44
21 than the oil?

22 MS. JAMESON: Objection to form.

23 BY MR. BAKER:

24 Q You're saying "if." I'm just trying
25 to understand if you have something in mind. 11:44

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1 A No, I don't. I'm just giving you the 11:44
2 requirement that density is the determinant in
3 whether things float -- density difference is
4 the determinate in whether things float or
5 don't. 11:44

6 Q Okay. And what about if the droplets
7 go into the incubation chamber and form flocs,
8 will they still rise to the top?

9 MS. JAMESON: Objection to form.

10 THE WITNESS: Depends upon what they 11:44
11 are forming flocs with.

12 BY MR. BAKER:

13 Q What do you mean?

14 A If the floc is heavier, has higher
15 density or weighs more than the oil per unit 11:44
16 volume, then you'll get sinking.

17 Q So it's possible if we were -- again,
18 let's say we're using Thorsen's setup with water
19 and fluorinated oil. A single droplet would go
20 into the incubation chamber and rise to the top; 11:45
21 right?

22 A Right.

23 Q But there are situations where the
24 droplets in the incubation chamber, if they
25 flocculate, they might fall to the bottom? 11:45

1 MS. JAMESON: Objection to form. 11:45

2 THE WITNESS: I really have not

3 offered any opinions in my report on

4 flocculation. I would have to give that

5 some consideration, additional 11:45

6 consideration.

7 BY MR. BAKER:

8 Q You have diagrams in your report that

9 talk about flocculation; right?

10 A Could you point that to me? 11:46

11 Q Sure. In your 087 deck, which is the

12 one that you're in on Page 22.

13 I guess that's why I'm asking because

14 you cut and pasted this image from "Emulsion

15 Technology" and you discuss creaming and you 11:46

16 discuss sedimentation, but "Emulsion Technology"

17 also discusses flocculation.

18 I did not see anything in your report

19 about that.

20 A That's because I've given no opinion 11:46

21 on flocculation.

22 Q Is it possible -- so you don't know

23 whether the droplets in Thorsen or Ismagilov or

24 any of these other references, is it possible

25 that they would flocculate instead of cream or 11:47

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1 sediment? 11:47

2 MS. JAMESON: Objection to form.

3 THE WITNESS: Well, I have not

4 considered that. It's not part of my

5 report. At this point I have no opinion on 11:47

6 it.

7 BY MR. BAKER:

8 Q Well, you put an image in here that

9 says, "Creaming, flocculation and

10 sedimentation"; right? 11:47

11 A That's just an image, it's not an

12 opinion.

13 Q Right. But you did include a

14 discussion about creaming; right?

15 A Right. 11:47

16 Q You included a discussion about

17 sedimentation; right?

18 A Right.

19 Q Why didn't you also discuss

20 flocculation? 11:47

21 A Well, flocculation does not seem

22 relevant to the conditions of -- I mean to the

23 interpretation of the claims. I just offered an

24 opinion on it. So I had no opinion then.

25 Q Why do you believe it's not relevant? 11:48

1 A I would have to consider that further. 11:48
2 I just haven't -- I mean, these are separating
3 chambers that we're talking about with droplets
4 and oil. There is no additional chemicals added
5 which would cause flocculation. So I found it 11:48
6 irrelevant to the discussion and the intent of
7 my declaration.

8 Q I mean, you have some very strong
9 opinions I would say about whether droplets will
10 rise or sink; right? 11:49

11 A Correct.

12 Q But that's not -- there are other
13 thermodynamic processes that can occur; right?

14 MS. JAMESON: Objection to form.

15 THE WITNESS: That may be true, but I 11:49
16 have not offered an opinion on those other
17 processes.

18 BY MR. BAKER:

19 Q And my question is why? Why not?

20 A It was not something that I considered 11:49
21 important.

22 Q And why not? Didn't you want to
23 consider all of the possibilities of what might
24 happen to you -- these droplets?

25 MS. JAMESON: Objection to form. 11:49

1 THE WITNESS: In order to answer your 11:49
2 question, I would need to consider further
3 the references cited in my report, whether
4 any of them teach flocculation and whether
5 it would have been relevant. I haven't 11:50
6 formed those opinions.

7 BY MR. BAKER:

8 Q Well, you have some opinions about
9 inherency; right?

10 A I do. 11:50

11 Q And you have some opinions that
12 droplets will necessarily separate based on
13 their density; right?

14 A Yes.

15 Q And that means in your opinion that 11:50
16 they will either rise to the top or fall to the
17 bottom; right?

18 A Right.

19 Q But you would agree with me that that
20 is not necessarily what happens every time; is 11:50
21 it?

22 A What do you mean "every time"?

23 Q I mean sometimes droplets might
24 flocculate and stay and not rise to the top or
25 settle to the bottom; is that right? 11:51

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1 MS. JAMESON: Objection, form. 11:51

2 THE WITNESS: That would be highly

3 unlikely in a monodispersed droplet system

4 such as being considered in the patents at

5 issue. 11:51

6 And I simply did not consider

7 flocculation as something that would be

8 compatible with monodispersed fluidic

9 systems.

10 BY MR. BAKER: 11:51

11 Q So it's your testimony that

12 flocculation only occurs in monodispersed

13 systems -- sorry, only occurs in polydispersed

14 systems?

15 MS. JAMESON: Objection to form. 11:51

16 THE WITNESS: As I said, I haven't

17 really formed any opinion on flocculation.

18 BY MR. BAKER:

19 Q Okay. All I'm asking is, I guess, you

20 have an opinion that every time that the droplet 11:52

21 goes into the incubation chamber, it's either

22 going to rise or fall. Is that your opinion?

23 A Yes. That's the opinion I'm using

24 considering the extent of what is disclosed in

25 the patents. 11:52

1 Q Understood. Is it possible that the 11:52
2 droplet would enter the incubation chamber and
3 flow in the middle of the chamber?

4 A Well, I imagine you're going to get a
5 distribution in droplets. But it's not required 11:52
6 that all of the droplets separate.

7 Q Can you imagine a scenario where the
8 droplets in Thorsen would enter the incubation
9 chamber and float around in the middle of the
10 chamber instead of rising and falling? 11:53

11 A I have not considered that, no.

12 Q I would like for you to consider that
13 now.

14 Can you imagine such a scenario?

15 MS. JAMESON: Objection to form. 11:53

16 THE WITNESS: I haven't considered
17 that and I have not formed an opinion in my
18 report.

19 BY MR. BAKER:

20 Q I'm simply asking you as an expert in 11:53
21 emulsion chemistry, can you imagine, you know, a
22 set of variables where that might happen?

23 MS. JAMESON: Objection to form.

24 THE WITNESS: I would have to consider
25 that. I would have to think about that. 11:54

1 BY MR. BAKER: 11:54

2 Q Right. That's what I'm asking you to

3 do right now.

4 MS. JAMESON: Objection to form.

5 BY MR. BAKER: 11:54

6 Q Just for the record it looks like

7 you're reading something. Can you tell us what

8 you're looking at, Dr. Fair?

9 A Sure. I'm just looking at the '837

10 patent. 11:55

11 Q And why are you looking at the '837

12 patent?

13 A Because I was focused on limitations

14 introduced by the claims. I'm also looking at

15 the '722 patent. 11:55

16 Q Well, I'm just asking you apart from

17 the patents, all I'm asking you is you read

18 Thorsen; right?

19 A I did.

20 Q And you're familiar with his 11:55

21 incubation chamber setup; right?

22 A Right.

23 Q And you have an opinion that

24 droplets -- the droplets that he used will enter

25 the incubation chamber and remain at the bottom; 11:55

1 right? 11:55

2 A Yes.

3 Q And that's because the water droplets

4 are better than the mineral oil; right?

5 A Right. 11:56

6 Q Can you design a scenario for me where

7 the droplets would enter the chamber and rather

8 than sinking to the bottom, they would rise to

9 the middle of the chamber and float in the

10 middle of the chamber? 11:56

11 MS. JAMESON: Objection to form.

12 THE WITNESS: Well, presumably if

13 there is no difference in density, they

14 would have no tendency to separate.

15 They would disperse perhaps. But I 11:56

16 have no way of causing them to go to the

17 middle of the chamber. I don't know how to

18 do that.

19 BY MR. BAKER:

20 Q Okay. But they would disperse 11:56

21 throughout the chamber?

22 A More than likely.

23 Q Okay. So there are scenarios where

24 someone using Thorsen's setup would see the

25 droplets dispersing throughout the chamber 11:57

1 rather than sinking to the bottom or rising all 11:57
2 the way to the top; right?

3 MS. JAMESON: Objection to form.

4 THE WITNESS: Yes, if you have no
5 driving force for separation, then they will 11:57
6 just disperse and be subject to whatever
7 local currents are in the incubation cavity.

8 Given the fact that you're pushing
9 fluid in and taking fluid out, you are
10 creating mixing. 11:57

11 So where they go, they would disperse.
12 I don't know where they would go.

13 BY MR. BAKER:

14 Q By the way, just going back to
15 Thorsen's setup where he uses water and mineral 11:58
16 oil, it's your opinion that the droplets would
17 enter the chamber and stay at the bottom because
18 the mineral oil is lighter than the water;
19 right?

20 A Yes. 11:58

21 Q You just mentioned that fluid is
22 flowing in and I believe you mentioned earlier
23 that fluid is also flowing out of the chamber;
24 right?

25 A Right. 11:58

1 Q Did you consider as part of your 11:58
2 opinions how that fluid flow would affect the
3 placement of the droplets in the incubation
4 chamber?

5 A Well, what you're asking is did I do 11:58
6 any calculations or any analysis as to where the
7 droplets would go. But I know where they go. I
8 mean, the picture is clear, the droplets are
9 sedimented at the bottom of the chambers.

10 Q They are in one layer at the bottom of 11:59
11 the chamber?

12 A Well, to the extent that you can
13 resolve it. I know the lens that they used with
14 that microscope has a depth of focus of about a
15 micron. So what you're looking at is things 11:59
16 clumped within the bottom focal -- the focal
17 length of the lens they are imaging with. And I
18 don't see any droplets outside of that depth of
19 focus.

20 Q Okay. And why do you say that they 11:59
21 are clumped?

22 A Sediment -- well, they clump together
23 because they are being -- undergoing
24 sedimentation.

25 Q Are they in just one layer on the 11:59

1 bottom? 11:59

2 A Well, it depends upon how many

3 droplets are introduced. You would get a

4 clumping, there would be some distribution of

5 droplets because some of them cannot get to the 12:00

6 bottom glass layer.

7 Q Let's take a look at that picture.

8 I'm in your 087 declaration again. Let's see if

9 you can find that picture. There it is,

10 Page 74. 12:00

11 Are you there?

12 A I am.

13 Q Do you see -- inside the incubation

14 chamber, do you see how some of the droplets

15 appear lighter than others? 12:01

16 A Yes.

17 Q Why is that?

18 A Because it doesn't have other droplets

19 sitting on top. There is a main body of that

20 image which shows dark, but the outlying 12:01

21 droplets have nothing sitting on top to block or

22 to shade them dark.

23 Q Right. And that's what I was getting

24 at.

25 So in this image, it's not just a 12:01

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1 single layer of droplets, there are some 12:01
2 droplets that are sitting on top of others;
3 right?

4 A Yes.

5 Q Now, to the left and the right of that 12:01
6 clump of droplets, there's empty space within
7 the incubation chamber; rights?

8 A Yes.

9 Q Why didn't the droplets that are
10 sitting on top just fall off into that empty 12:01
11 space?

12 MS. JAMESON: Objection to form.

13 THE WITNESS: It would be difficult to
14 answer that unless I knew more about the
15 flow patterns of the liquid -- the oil in 12:02
16 that system has a focusing effect so that
17 you've lined up droplets coming in and
18 droplets going out and they are queuing up
19 on the outlet.

20 BY MR. BAKER: 12:02

21 Q But you did not consider the flow
22 patterns; right?

23 A Correct. No need to. I was looking
24 at the image and the image told me what I needed
25 to know in my analysis. 12:03

1 Q Let me ask you about the droplets that 12:03
2 are darker. The ones that are darker, you say
3 that they are darker because they have other
4 droplets stacked on top of them; right?

5 A It's possible, but you can't resolve 12:03
6 that with a 1-micron focal distance.

7 Q I thought that was what you just said.
8 I thought you said that they are darker because
9 they have other droplets that are shading them
10 out because they are sitting on top. 12:03

11 A That's a likely explanation.

12 Q Okay. Are they sitting directly on
13 top?

14 A I don't know what you mean "directly."

15 Q Is it possible that there's oil in 12:04
16 between the droplets in this clump?

17 A It's likely there is oil, correct,
18 surrounding each one of those droplets.

19 Q Okay. And is it possible to know how
20 much oil is in that clump of droplets? 12:04

21 A No.

22 Q Do you have any estimate of what that
23 might be?

24 A No.

25 Q So it's possible that within that 12:04

1 clump of droplets, there is as much oil as there 12:04
2 is droplets, based on this image?

3 A What I would expect would be to have
4 an oil film surrounding each of the droplets but
5 that the droplet would have the bulk of the 12:05
6 volume. And separation has occurred because the
7 droplets look like they have clumped to the
8 bottom of the well.

9 Q I'm asking a slightly different
10 question. 12:05

11 Based on this image, is it possible
12 that there is as much oil as there are droplets
13 in the clump that you see in the image?

14 A I would doubt that. I don't see any
15 reason for that. 12:05

16 Q I'm just asking if it's possible?

17 A No, I don't think it is.

18 Q And why not?

19 A Because in my experience, the droplets
20 achieve an oil film that surrounds a very thin 12:06
21 film and that kind of looks like what's happened
22 here. The bulk of the oil has floated to the
23 top. The bulk of the droplets have sunk to the
24 bottom.

25 Q You can tell that from this image? 12:06

1 Q And you're saying that that is because 12:07
2 there's one droplet that is sitting on top of
3 another?

4 A That's my opinion.

5 Q How do you know that it's not like 12:07
6 this, where you've got a droplet and then some
7 oil in between and another droplet? Wouldn't
8 that also look like a dark circle?

9 A If that's all the information she had,
10 you might envision that scenario. But you'd 12:08
11 also know that there is a density difference.

12 So if you have significant oil between
13 the droplets, the droplet would sink through
14 that oil until it couldn't sink anymore. And
15 that's why you get clumping. Clumping is pretty 12:08
16 evident in this -- this image.

17 Q I understand what you're saying.

18 I'm just asking, though, just based on
19 the image alone, is it possible that the
20 droplets are darker in some areas because there 12:08
21 is a droplet and then there's some oil and then
22 there's another droplet?

23 A Well, that would assume -- I don't
24 think it's possible. That would assume that you
25 have some force that's holding the droplet away 12:08

1 from another droplet so you have a layer of oil. 12:09

2 And naturally, separation will occur
3 if you have a difference in densities. Based on
4 that, I would expect the droplet layers that are
5 sitting on top which sit on top of each other 12:09
6 rather than be separated.

7 Q Isn't it possible that that force that
8 you're talking about could be supplied by the
9 fluid flowing through the chamber?

10 A It doesn't look like the fluid flow 12:09
11 has done anything to disperse the droplets that
12 are in that clump. I don't see any evidence of
13 that whatsoever.

14 Q You said that in order for it to be
15 droplet -- oil droplet, there would have to be 12:09
16 some droplet keeping the top droplet from
17 settling; right?

18 A What I said, it would have to be some
19 force or buoyancy that would keep the droplets
20 from contacting each other. 12:10

21 Q And isn't it possible that the fluid
22 flow could keep that top droplet levitating, if
23 you will, above the clump and it would look dark
24 just like the image?

25 A Well, if that were happening, then all 12:10

1 of those sedimented droplets would be pushed 12:10
2 against the outlet and I don't see -- that's not
3 in the image because the clumping is occurring
4 not just at the outlet channel but all across
5 the image, the top of the image. 12:10

6 Q Isn't it true that the droplets, in
7 fact, are pushed against the outlet? You don't
8 see the outlet in this image; right?

9 A Well, I can see where the outlet is.
10 At the bottom of that clump, you see droplets 12:10
11 leaving the cavity and entering an outlet
12 channel. And they are going one by one.

13 So that means that the flow inside the
14 cavity is quite small. Otherwise, that clump
15 would be pushed up against the outlet channel. 12:11

16 Q So it's your belief that the opening
17 in the incubation chamber that we see in the
18 image is the outlet?

19 A The opening at the bottom of Image A
20 is the outlet channel. 12:11

21 Q Then why did you say in the paragraph
22 above that the droplets entering the incubation
23 chamber through this inlet is shown in
24 Figure 3.29A?

25 A Well, then I say in the next sentence 12:11

1 that droplets exit through this outlet to the 12:12
2 sorting. So we have -- there is a droplet
3 receiving outlet and there is an inlet that I
4 focus on the description of an outlet, droplet
5 receiving outlet as being depicted -- 12:12
6 Q Well, you --
7 A -- the droplets go for the sorting.
8 Q You say that the outlet is in 3.28C,
9 don't you?
10 A In Figure 3.28, they are shown. The 12:12
11 incubation cavity with an inlet and an outlet.
12 The image in Figure 3.29A shows the outlet,
13 which is at the bottom of the dark circle in
14 3.28.
15 Q But that's not what you say in your 12:13
16 report. Right?
17 I mean, the sentence is right there in
18 your report. It says, "The droplets entering
19 the incubation chamber through this inlet is
20 shown in Figure 3.29A." And then in the next 12:13
21 two sentences you're talking about the outlet in
22 3.28C.
23 Maybe we need to clear that up and
24 figure out exactly what your opinion is.
25 A So on Page 73 we talk about 12:14

1 Figure 3.28B shows a cross-flow junction and an 12:14
2 incubation chamber and the droplet receiving
3 chamber inlet, which is the top of the dark
4 circle in 3.28B.

5 And then I refer to the image shows 12:14
6 the inlet from the micro channel to the
7 incubation chamber that is at the top of
8 Figure 3.28B. And then 3.28C shows the droplet
9 receding outlets. That's all pretty clear.

10 But the sentence that droplets 12:15
11 entering the incubation chamber through this
12 inlet is shown in Figure 3.29A.

13 Well, that's true. The droplets that
14 have entered the inlet in the cavity are shown
15 in Figure 3.29A. 12:15

16 You have to look at that previous
17 sentences that talk about where the inlet is and
18 where is the outlet. So Figure 3.29A shows
19 droplets inputted to -- into the cavity and then
20 leaving through the outlet port. 12:15

21 Q So it's your belief on Page 74 of your
22 declaration we see the droplets, there is a
23 clump of droplets; right?

24 A Right.

25 Q And then there is what looks like a 12:16

1 curved part of the incubation chamber; right? 12:16

2 A Right.

3 Q And there is a single line of

4 droplets; right?

5 A Right. 12:16

6 Q And your understanding is that that is

7 showing the outlet of the incubation chamber?

8 A Correct.

9 Q And that's what your opinion is based

10 on? 12:16

11 A Correct.

12 Q Got it. Okay. And that's what

13 you're -- is the basis for your opinion that

14 there is a droplet receding outlet as recited by

15 the claims? 12:16

16 A Yes.

17 MR. BAKER: I don't know how long

18 we've been going now. Is it time for a

19 break now or can we keep going?

20 THE REPORTER: Can we take a short 12:17

21 break?

22 MR. BAKER: Sure.

23 VIDEOGRAPHER: We're off the record at

24 3:17 p.m.

25 (Recess taken.) 12:17

1 VIDEOGRAPHER: We're back on the 12:33
2 record. The time is 3:33 p.m.
3 BY MR. BAKER:
4 Q All right. Dr. Fair, did you talk
5 with anybody at the break? 12:33
6 A No, just pleasantries.
7 Q Okay. Take a look at -- I'm in your
8 087 declaration again. Take a look at Page --
9 actually, before we do that, let me just ask
10 you. 12:33
11 Have you heard the phrase "secondary
12 considerations" before?
13 A I have.
14 Q Do you have an understanding of what
15 those are? 12:33
16 A I do.
17 Q And can you give me that
18 understanding, please?
19 A There are certain considerations of
20 nonobviousness, such as commercial success, long 12:34
21 filled but unmet need, failure of others, praise
22 in the industry and unexpectedly superior
23 results.
24 Q You're looking in your 087 report?
25 A I am at Page 107. 12:34

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1 Q Okay. Now, in Paragraph 190 you say 12:34
2 that you are not aware of any secondary
3 considerations that might support the
4 patentability of the challenged claims.

5 Do you see that? 12:34

6 A Yes.

7 Q And you said a little earlier I think
8 that you worked with 10X's counsel to prepare
9 your declaration; right?

10 A Yes. 12:34

11 Q Are you aware that Bio-Rad has
12 submitted evidence of secondary considerations
13 in the parallel Delaware case?

14 A Well, only to the extent that I read
15 the PTAB reports and they discussed secondary 12:35
16 considerations. But I have no direct knowledge
17 or have never seen those, so -- correspondences.

18 Q Did you ask 10X's counsel whether they
19 were in possession of any of Bio-Rad's alleged
20 evidence of secondary considerations? 12:35

21 MS. JAMESON: I object based on
22 privilege. I'm going to instruct you not to
23 answer to the extent that would reveal
24 privileged information and communications
25 with counsel. 12:35

1 THE WITNESS: Yes, I can't answer that 12:35
2 based on privilege.

3 MR. BAKER: Okay. I mean, I'm not
4 sure why that's privileged. I don't think
5 it has anything to do with the drafting of 12:36
6 his declaration, Samantha. So I just ask
7 you to reconsider that instruction.

8 MS. JAMESON: I think your question
9 was did you ask 10X's counsel?

10 MR. BAKER: Right. Not all 12:36
11 communications -- he's not your client. Not
12 all communications would be privileged.

13 MS. JAMESON: Jim, I'm not sure what
14 you're trying to get at that would not be a
15 privileged communication. 12:36

16 MR. BAKER: I'm trying to get at
17 exactly what I asked. The only thing that
18 is protected is communications that he's
19 had -- the drafts are protected and then
20 certain other carved-out communications with 12:36
21 you.

22 But I don't -- I'm just asking him
23 whether he discussed whether there was
24 evidence of secondary considerations in the
25 Delaware case with you. 12:36

1 MS. JAMESON: And are you saying that 12:36
2 our communications with him related to
3 another case aren't privileged? I'm trying
4 to understand what you could be possibly
5 getting at. 12:37

6 MR. BAKER: It's not related to
7 another case, it's related to this case. I
8 guess let's just make the record clear.

9 Q I'll represent to you, Dr. Fair, that
10 in the Delaware case -- you understand there is 12:37
11 a parallel District Court litigation?

12 A Yes.

13 Q And I'll represent to you that in that
14 case, Bio-Rad has provided 10X with what it
15 believes to be substantial evidence of secondary 12:37
16 considerations, okay? I'm making that
17 representation do you.

18 And my only question is whether you
19 were aware of that?

20 A I'm going to follow -- 12:37

21 MS. JAMESON: Objection to form.

22 BY MR. BAKER:

23 Q Go ahead.

24 A So I'm not going to answer that based
25 upon privilege. 12:38

1 Q I don't think that you've been 12:38
2 instructed not to answer that. The objection
3 was just objection to form just now.

4 MR. BAKER: Samantha, correct me if
5 I'm wrong. 12:38

6 Q But I think you can answer that.

7 MS. JAMESON: He can answer it. I
8 think he already has answered that question.

9 BY MR. BAKER:

10 Q Do you want me to repeat the question, 12:38
11 Dr. Fair?

12 A Yes, that would help.

13 Q Okay. I represented to you that
14 Bio-Rad has submitted evidence of -- substantial
15 evidence of what it believes to be secondary 12:38
16 considerations.

17 And my question is whether you were
18 aware of that in preparing your declarations for
19 the IPRs?

20 A I was not. 12:39

21 Q Okay. And did you ask 10X's counsel
22 to provide you with all of the evidence that
23 they had of secondary considerations that
24 Bio-Rad had submitted?

25 MS. JAMESON: I'm also going to object 12:39

1 on privilege to the extent it's asking about 12:39
2 communications with counsel. He's testified
3 about the information he's aware of.

4 MR. BAKER: Are you instructing him
5 not to answer? 12:39

6 MS. JAMESON: To the extent he would
7 be revealing communications with counsel,
8 I'm instructing him not to answer. He
9 already told you the information that he's
10 aware of. 12:39

11 BY MR. BAKER:

12 Q Dr. Fair, can you answer my last
13 question?

14 A To the extent that it would reveal
15 conversations with counsel, I will not answer. 12:40

16 Q Does that mean you're not answering or
17 that you will answer to some other extent?

18 A I'm not going to answer based upon
19 advice of counsel.

20 Q Okay. Thank you. 12:40

21 Let's stick with your 087 declaration
22 and if you can turn to Page 77.

23 A I am.

24 Q This is a picture of a micropipette;
25 right? 12:41

1 Q When is the last time? 12:43
2 A I have them in the lab.
3 Q Just looking for another image here,
4 bear with me one second, Dr. Fair.
5 In your 086 declaration, can you turn 12:43
6 to Page 86, please? Let me know when you get
7 there.
8 A I'm there.
9 Q Okay. Now, you see there is an image
10 here; right? 12:44
11 A Yes.
12 Q This is an image from Quake; right?
13 A Yes.
14 Q And, in fact, it's Figure 6 from
15 Quake; right? 12:44
16 A Yes.
17 Q And this image shows some wells; is
18 that right?
19 A Yes.
20 Q It's your opinion that Quake used 12:44
21 these wells to collect droplets; is that right?
22 A No.
23 Q What -- how did I get that wrong?
24 A Quake did not use droplets, he
25 injected dye, which then he sorted based upon 12:45

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1 red or green. And this is not a droplet-based 12:45
2 system.

3 Q Got it. Okay.

4 I'm going to look now at the Ismagilov
5 '091 patent. 12:46

6 Do you know Dr. Ismagilov?

7 A No. I've not met him.

8 Q Okay. You've reviewed this patent,
9 though; right?

10 A I have. 12:46

11 Q When's the last time that you read the
12 '091 patent?

13 A Read it this week.

14 Q Did you read it cover to cover?

15 A Yes. 12:46

16 Q Okay. And before you submitted your
17 declarations in this case, did you read it cover
18 to cover?

19 A Yes.

20 Q Let me go ahead and just -- I assume 12:47
21 you have it there. Do you have the '091 patent
22 in front of you?

23 A I do.

24 Q All right. I'm going to put it into
25 the -- 12:47

1 MR. BAKER: Just for the record, I'm 12:47
2 going to go ahead and move the '091 patent
3 into the marked exhibit folder as well, just
4 in case you or anyone else needs to refer to
5 it. 12:47

6 Q So it's now in the marked exhibits
7 folder on exhibit share as 1004. Okay?

8 A Okay.

9 Q I'm happy for you to look at whatever
10 copy you want to look at, whatever is easiest 12:48
11 for you.

12 A Thank you.

13 Q If you can turn to Column 17.

14 A Okay.

15 Q Take a look at Line 23. 12:48
16 Are you there?

17 A I am.

18 Q It says, "Thus, devices according to
19 the invention may have a plurality of analysis
20 units that can collect the solution from 12:48
21 associated branch channels of each unit into a
22 manifold which routes the flow of solution to an
23 outlet. The outlet can be adapted for
24 receiving, for example, a segment of tubing for
25 a sample tube such as a standard 1.5-millimeter 12:49

1 centrifuge tube. Collection can also be done 12:49
2 using micropipettes."

3 Do you see that?

4 A I do.

5 Q So my question is about that word 12:49
6 "collection."

7 Is the word "collection" in Line 29
8 referring to the same thing that the word
9 "collect" in Line 25 is referring to?

10 A I think in Line 25 you have a 12:50
11 plurality of analysis units that can collect a
12 solution into a manifold. The manifold routes
13 the solution of the manifold to an outlet and
14 collection can be done using a micropipette is
15 one way of collecting from the outlet of the 12:50
16 manifold.

17 So "collect" on Line 25 means the
18 input and "collect" in Line 29 means the output.

19 Q Why do you think that?

20 A It's the plain reading of that 12:50
21 paragraph.

22 Q Isn't it possible that "collection" in
23 Line 29 is also referring to collecting the
24 solution from the associated branch channels of
25 each unit and routing it into the manifold? 12:51

1 A No, the preceding statement sets it up 12:51
2 for what it is. It says the outlet can be
3 adapted for receiving and then it gives various
4 ways and one of the ways is collection using a
5 micropipette. 12:51

6 I don't see that it has anything to do
7 with collecting out of the channels. You can't
8 collect using a micropipette from the inlet
9 channels.

10 Q Well, why not? 12:51

11 I mean, the sentence that starts at
12 Line 23 talks about just that. It talks about
13 collecting the solution from associated branch
14 channels; right?

15 A I see that word and I know what 12:52
16 you're -- you would like to do connect
17 "collection" with a micropipette too. But you
18 cannot collect from the channels that's
19 described in Ismagliov using a micropipette.

20 Q Why not? 12:52

21 A Micropipette is too fat.

22 Q Okay. How do you explain then the
23 word "also" in Line 30?

24 A Because it's one of the ways of
25 receiving and so the "also" means that what is 12:52

1 mentioned before also includes collection using 12:52
2 a micropipette.

3 Q Then why didn't he say receiving can
4 also be done using a micropipette?

5 A Well, you would have to ask the 12:53
6 author. I don't -- prosecuting attorney used
7 those words. But the plain meaning of what he's
8 talking about and the ensemble of methods of
9 removing material from the manifold are all put
10 at the end of that paragraph. 12:53

11 Q And so you believe that the word
12 "collection" in Line 29 is not referring to the
13 back to the word "collect" in Line 25; right?

14 A Well, yes. There is no way it can.

15 Q Okay. And the reason you think that 12:53
16 there is no way it can is because -- tell me
17 again.

18 A Because I've got micropipette tips
19 with .2 microliters and their diameter is a
20 millimeter, which is far bigger than anything 12:54
21 described in the Ismagliov reference?

22 Q Can you repeat what you just said?
23 It's far bigger than what?

24 A The diamond or chip is a millimeter.
25 I measured that myself with calipers. And that 12:54

1 dimension is far bigger than any of the channels 12:54
2 disclosed by Ismagliov. And so -- and then you
3 would have an alignment problem.

4 How do you align a 1-millimeter tip
5 with a 1-millimeter channel but there are no 12:54
6 millimeter channels described?

7 It makes no sense whatsoever.

8 Q Okay. Let me -- so this '091 patent,
9 the application, have you looked on the front
10 cover to see the application was filed in 2003? 12:55

11 A Yes.

12 Q And the patent issued in 2006?

13 A Okay.

14 Q So I want to orient you to the time
15 frame there. I want to show you another 12:55
16 document.

17 If you go into your marked exhibit
18 folder, I have now -- I just actually marked
19 this exhibit.

20 MR. BAKER: And for the court 12:56
21 reporter's purposes, this will be an actual
22 Deposition Exhibit Number 1. It's never
23 been marked before.

24 (Exhibit 1 was marked.)
25

1 BY MR. BAKER: 12:56

2 Q Do you see in the marked exhibit

3 folder, Dr. Fair, there is an exhibit that says,

4 "Exhibit 0001, Ismagilov Current Opinions

5 Review"? 12:56

6 Do you see that?

7 A I see that.

8 Q Why don't you open that?

9 A I have that open.

10 Q And take your time, look through it. 12:56

11 I'm going to have a few questions about it. Let

12 me know when you're ready.

13 A Is there a particular section you want

14 me to focus on?

15 Q Yes, there is. I'm going to point you 12:57

16 to it in just a moment. I'll go ahead and ask

17 my questions and if you need to take some more

18 time to look at anything, you can let me know,

19 okay?

20 A Okay. 12:58

21 Q So first of all, I just want to note,

22 this is from the -- you'll see at the bottom of

23 each page, it's from a journal, "Current Opinion

24 in Structural Biology."

25 Do you see that? 12:58

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| | | | |
|---|---|-------|-------|
| 1 | A | I do. | 12:58 |
|---|---|-------|-------|

| | | |
|---|---|-------------------------------------|
| 2 | Q | Are you familiar with that journal? |
|---|---|-------------------------------------|

| | | |
|---|---|-------|
| 3 | A | I am. |
|---|---|-------|

| | | |
|---|---|--------------------------------|
| 4 | Q | Is that a trustworthy journal? |
|---|---|--------------------------------|

| | | | |
|---|---|------|-------|
| 5 | A | Yes. | 12:58 |
|---|---|------|-------|

6 Q You'll see also that this is from
7 2005; right?

| | | |
|---|---|-------|
| 8 | A | Okay. |
|---|---|-------|

| | | | |
|----|---|---|-------|
| 9 | Q | If you look on the first page, you'll | |
| 10 | | see that Ismagilov is one of the authors. | 12:58 |

| | | |
|----|---|----------|
| 11 | A | Correct. |
|----|---|----------|

12 Q All right. What I want to point your
13 attention to is the image on Page 550.

| | | |
|----|---|-------|
| 14 | A | Okay. |
|----|---|-------|

| | | | |
|----|---|------------------|-------|
| 15 | Q | Do you see that? | 12:59 |
|----|---|------------------|-------|

| | | |
|----|---|-------|
| 16 | A | I do. |
|----|---|-------|

17 Q Part A show some colored droplets
18 going through channels; right?

| | | |
|----|---|------|
| 19 | A | Yes. |
|----|---|------|

20 Q And then Part B shows a chip with some 12:59

21 micro channels in it; right?

| | | |
|----|---|------|
| 22 | A | Yes. |
|----|---|------|

23 MS. JAMESON: Objection to form,
24 foundation.

25

1 BY MR. BAKER: 12:59

2 Q There is a red what they label as a

3 protein stream flowing through those channels?

4 MS. JAMESON: Objection to form and

5 foundation. 12:59

6 BY MR. BAKER:

7 Q Right?

8 MS. JAMESON: Relevance.

9 BY MR. BAKER:

10 Q Do you see that? 12:59

11 A Well, I'm looking at the figure on

12 Page -- Figure 2 on Page 550. And it shows in

13 Part B, protein stream flowing into channels

14 with insert receiving capillary collected

15 trials. Okay. 01:00

16 Q And the insert receiving capillary

17 collect trials, to me those look like just glass

18 pipettes that I have seen before.

19 Is that what it looks like you to as

20 well? 01:00

21 MS. JAMESON: Objection to form and

22 relevance.

23 THE WITNESS: No.

24 BY MR. BAKER:

25 Q Those do not look like the ends of 01:01

1 referring to the same thing as the word 01:02
2 "collect" in Line 25 because you did not think
3 that a pipette -- a micropipette would fit into
4 any of the channels that Ismagilov discloses;
5 right? 01:02

6 MS. JAMESON: We're back to Ismagilov?
7 I'm trying to understand where we are.

8 MR. BAKER: Yes, that's right.

9 MS. JAMESON: Thank you.

10 THE WITNESS: That's reason one. 01:02
11 Reason number two is that the manifold is
12 doing the collect function from associated
13 channels, not anything else.

14 It just says it goes into the manifold
15 and then the outlet can be adapted for 01:03
16 receiving and included also is micropipette.
17 So it's the plain meaning of the words that
18 I am reading.

19 BY MR. BAKER:

20 Q It's possible, though, isn't it, that 01:03
21 where it's talking about collection from the
22 branch channels into a manifold; right, instead
23 of the branch channels, you could use a pipette
24 just like Ismagilov is doing in the journal
25 article we're looking at right here? 01:03

1 MS. JAMESON: Objection, form. 01:03
2 THE WITNESS: That's not what it says.
3 BY MR. BAKER:
4 Q Are you saying you're disagreeing
5 because it says capillary and not pipette? 01:03
6 MS. JAMESON: Objection, form.
7 THE WITNESS: No, I'm objecting
8 because the verb "collect" is -- means
9 branch channels into a manifold which routes
10 the flow to a solution to an outlet. 01:04
11 A micropipette isn't -- would be
12 considered as an outlet.
13 BY MR. BAKER:
14 Q Sorry, a micropipette would not be
15 considered as an outlet? 01:04
16 A No, I said it would be considered as
17 an outlet.
18 Q Could the same -- look at the journal
19 article, okay. Let's look at what he's using
20 as -- Ismagilov labels as a capillary. And you 01:04
21 see that he's using that capillary to route that
22 red solution somewhere; right?
23 MS. JAMESON: Objection to form,
24 foundation.
25 THE WITNESS: What's shown in the 01:05

1 journal article in Figure 2 is a passive 01:05
2 collection of liquid from a protein stream
3 into glass capillaries.

4 If you couple that with those
5 micropipette tips, you no longer have a 01:05
6 passive collection. Now you've upset the
7 balance of the pressures in that system and
8 you don't -- you no longer have capillary
9 flow, you have forced flow by negative
10 pressure. So that's different from a 01:06
11 capillary.

12 A capillary collect trial or tube does
13 not rely upon an external pressure.

14 BY MR. BAKER:

15 Q What is it relying on in this image 01:06
16 from the journal article? It looks to me looks
17 like there's nothing on the end of those
18 capillaries.

19 MS. JAMESON: Objection, form and
20 foundation. 01:06

21 BY MR. BAKER:

22 Q Isn't that forced pressure?

23 A That is capillary action. It fills a
24 hydrophilic tube, typically fills a capillary by
25 capillary action without the requirement of any 01:06

1 external force being applied to the capillary 01:06
2 tubes.

3 Q Okay. But you would agree with me
4 that the solution is being collected in those
5 capillaries? 01:07

6 MS. JAMESON: Objection to form and
7 foundation.

8 THE WITNESS: In this particular
9 example that you've shown on Exhibit 1, the
10 capillaries are collecting the protein 01:07
11 stream passively.

12 BY MR. BAKER:

13 Q And they are collecting the protein
14 stream from the channels in the chip; right?

15 A Yes, because it was designed to -- you 01:07
16 can make extremely small capillary tubes. We
17 have no idea how big these channels are. But
18 you can --

19 Q I mean, we do. There is a
20 1-centimeter thing there. 01:08

21 A Pardon me?

22 Q The upper left-hand corner of the
23 image says 1 centimeter. There's a scale.

24 A Yes.

25 Q So I think we do have some idea of the 01:08

1 size. 01:08

2 A Well, that's fine. But these are not

3 micropipettes, they are capillary tubes, which

4 are vastly different. They operate on different

5 principles. 01:08

6 Q But you would agree with me, though,

7 that these capillary tubes are collecting the

8 protein stream from the channels within the

9 chip?

10 MS. JAMESON: Objection to form and 01:08

11 foundation.

12 THE WITNESS: It would appear that

13 this is how Ismagliov is doing protein

14 crystallization and he's using a stream of

15 proteins solution and collecting with a 01:09

16 capillary tube from the channel. That's

17 exactly right. That has nothing to do with

18 Column 17 of the '091 patent.

19 BY MR. BAKER:

20 Q Well, Line 25 is talking about 01:09

21 collecting the solution from a branch channel.

22 And that's exactly what's going on in this

23 image; right?

24 MS. JAMESON: Objection to form.

25 BY MR. BAKER: 01:09

1 Q He's collecting the protein stream 01:09
2 from the channel?

3 MS. JAMESON: Same objection.

4 THE WITNESS: I'll say it one more
5 time. Collection is being done by the 01:09
6 manifold which routes the flow of solution
7 to an outlet. And if you're going to be
8 routing that solution to an outlet and
9 collecting with a pipette, it's a totally
10 different phenomenon than what's observed in 01:09
11 Exhibit 1.

12 BY MR. BAKER:

13 Q Well, maybe there is a
14 misunderstanding. That's not what I'm talking
15 about. 01:10

16 I'm talking about in Line 23 it says,
17 "The devices according to the invention may have
18 a plurality of analysis units that can collect
19 the solution from the branch channels." Right?

20 A That's what it says. 01:10

21 Q And then the analysis units send the
22 solution to a manifold; right?

23 A The branch channels of each unit -- so
24 yes. The outputs of the branch channels are
25 collected into a manifold which reroutes to a -- 01:10

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1 the solution to an outlet. And then the outlet, 01:10
2 once they are in the manifold, can be adapted
3 for receipt and there are numbers of ways of
4 receiving that are listed there.

5 Q So just focusing on the sentence that 01:11
6 starts at Line 23. Okay?

7 The flow is going from a branch
8 channel, right, into an analysis unit and then
9 into a manifold; right?

10 A Whatever is collected, the solution 01:12
11 from associated branch channels will go then
12 into each unit of each unit into a manifold
13 which routes to the output -- the solution to an
14 output.

15 Q Right. The units collect the solution 01:12
16 from their branch channels; right?

17 A Right.

18 Q Into a manifold?

19 A With an outlet.

20 Q Right. Which routes the flow of 01:13
21 solution to an outlet.

22 And all I'm saying is: Isn't it
23 possible that that collection could also be done
24 using a micropipette?

25 A And the answer is no. 01:13

1 Q Even though in the article you just 01:13
2 saw he was collecting the protein stream using a
3 glass capillary?

4 A Well, a glass capillary is quite
5 different from a micropipette. 01:13

6 Q Okay.

7 A You can taper the glass tube down to
8 extremely small dimensions and carefully insert
9 it into the channel. Micropipettes are built
10 with a minimum dimension and none of the 01:13
11 channels that Ismagliov talks about could
12 accommodate a micropipette.

13 Q What is the minimum dimension of a
14 micropipette?

15 A The ones we have, which are the 01:14
16 smallest, are 1 millimeter.

17 Q Okay. Just to round that out for the
18 record, it's your opinion that you cannot fit a
19 micropipette into a micro channel?

20 A That mischaracterizes what I said. 01:15

21 Q How does that mischaracterize it?

22 A Because I said you could not fit a --
23 the smallest micropipette tip available into one
24 of Ismagliov's channels.

25 Q Okay. Let's talk a little bit 01:15

1 about -- by the way, I asked you if you had read 01:16
2 the Ismagilov '091 patent cover to cover. And
3 you said you had?

4 A Yes.

5 Q And you did that before preparing your 01:16
6 declarations?

7 A Yes.

8 Q Have you also read the Quake patent
9 cover to cover?

10 A Yes. 01:16

11 Q You did that before preparing your
12 declaration?

13 A Yes.

14 Q And did you also read Thorsen cover to
15 cover? 01:16

16 A Yes.

17 Q And you did that before preparing your
18 declarations?

19 A Correct.

20 Q Do you know Dr. Thorsen? 01:16

21 A Well, I know of his work. After he
22 went to M.I.T., I don't know -- I think he's
23 at -- he's moved on from M.I.T. now. But I've
24 never met him. But I know of his work. I've
25 met his boss. 01:17

1 Q How did you prepare your declarations? 01:17
2 A Well, I read the patents. I read the
3 file histories. I had lengthy discussions with
4 counsel and read cited references. I had
5 assistance with typing, so that's how I did it. 01:17
6 Q Did you write the declarations?
7 A As I said, I had assistance with
8 typing. There were sections I did not write.
9 Q Which sections --
10 A The legal sections, we had discussions 01:18
11 and then I had assistance with distilling those
12 discussions into words, into text.
13 Q That's for the legal sections?
14 A No, these were the technical sections.
15 Q Okay. So your counsel wrote the legal 01:18
16 sections?
17 A Yes.
18 MS. JAMESON: Objection to form,
19 mischaracterizes.
20 BY MR. BAKER: 01:18
21 Q And you worked with counsel to write
22 the technical sections?
23 A Correct.
24 Q Are the words -- I understand that you
25 had help with typing, but are the words in those 01:18

1 technical sections yours? 01:18

2 A They are words that I -- once the

3 typing would be done, I would do editing, so I

4 approved all the words.

5 Q Did you come up with the words, 01:19

6 though? Did you simply approve or endorse the

7 words or did you come up with them yourself?

8 A In some cases I would come up with the

9 words, but generally I did editing upon

10 discussion. 01:19

11 Q So your counsel wrote the first

12 drafts?

13 A Well, as I said, I had assistance with

14 typing. I played my role and I take that

15 seriously as to having significant input and 01:19

16 review.

17 Q I appreciate that. Who wrote the

18 first draft?

19 MS. JAMESON: I'm going to object that

20 who drafted that is going to be privileged. 01:19

21 Dr. Fair has provided you with information

22 on how the report was prepared and I

23 instruct you not to answer.

24 BY MR. BAKER:

25 Q Are you going to accept your counsel's 01:20

1 instruction, Dr. Fair? 01:20

2 A Yes.

3 Q Who found the references that you

4 used?

5 A I think the references were identified 01:20

6 by counsel for our discussions whether they were

7 suitable and how they should be applied.

8 But other than that, I did not

9 independently find these references, but we

10 jointly discussed and approved them. 01:20

11 Q What do you think is the weakest part

12 of your declarations?

13 MS. JAMESON: Objection, form.

14 THE WITNESS: I found no weakness.

15 BY MR. BAKER: 01:21

16 Q You found no weakness?

17 A No.

18 Q Did you find any references that

19 contradict your opinions?

20 A No. 01:21

21 Q And did you prepare for your

22 deposition today?

23 A How did I prepare?

24 Q Did you prepare?

25 A I did. 01:21

1 Q And how did you prepare for your 01:21
2 deposition today?

3 A Reread the patents, reread the file
4 histories, met with counsel for prep, reread my
5 IPR declarations and that was it. 01:21

6 Q Who did you meet with?

7 A With 10X counsel.

8 Q Sometimes people forget names. I
9 always feel bad about putting witnesses on the
10 spot. So I'll ask you: Did you meet with 01:22
11 Ms. Jameson?

12 A Yes, I met with Robert Gerrity and
13 Samantha Jameson.

14 Q Anybody else?

15 A No, not during prep. 01:22

16 Q When did you meet with Ms. Jameson and
17 Mr. Gerrity?

18 A I had four or five days working with
19 them.

20 Q And when was that? 01:22

21 A I have to do a calendar.

22 Q Did you meet with them this week?

23 A Yes. Yes.

24 Q And then you met with them -- did you
25 meet with them last week? 01:23

1 A I met with them July 1st, July 3rd and 01:23
2 6th and then two days this week.

3 Q Okay. I'm not going to ask you
4 whether you met with them in person and wore
5 masks. I'll refrain. It's a very strange time 01:23
6 we live in.

7 Did you talk with -- other than 10X's
8 counsel at Tensegrity, did you talk with anybody
9 else in preparation for your deposition today?

10 A No. 01:24

11 Q Did you talk with anybody else in
12 preparation of your declarations?

13 A I may have on some conference calls
14 last fall, but I don't recall names, I'm sorry.
15 There may have been three people on the 01:24
16 conference call in addition to me.

17 Q Were those people from 10X?

18 A No, they were counsel.

19 Q It was other counsel?

20 A Yes. 01:24

21 Q But not from Tensegrity?

22 A Yes, Tensegrity.

23 Q Oh, I see. So three additional people
24 from Tensegrity?

25 A Three total. 01:24

1 Q Understood. Have you ever spoken with 01:25
2 anyone from 10X about these cases?

3 A Not substantively.

4 Q And in what form have you spoken to
5 them? 01:25

6 A Just I believe in-house counsel for
7 10X sat in on the preps but offered no
8 assistance.

9 MS. JAMESON: The contents of what's
10 said in the preps is privileged. 01:25

11 BY MR. BAKER:

12 Q Do you have any financial stake in
13 10X?

14 A None.

15 MR. BAKER: Why don't we take a 01:25
16 ten-minute break. I think I'm almost done.
17 We'll come back and try to wrap it up, all
18 right?

19 THE WITNESS: Thank you.

20 MR. BAKER: All right. Thanks. 01:25

21 VIDEOGRAPHER: Off the record at
22 4:25 p.m.

23 (Recess taken.)

24 VIDEOGRAPHER: We're back on the
25 record at 4:59. 01:59

1 MR. BAKER: Okay. I have no further 01:59
2 questions.

3 MS. JAMESON: All right. I'm going to
4 do a redirect on Dr. Fair. I have just a
5 couple of questions for you. 01:59

6 THE WITNESS: Okay.

7 EXAMINATION

8 BY MS. JAMESON:

9 Q Dr. Fair, do you recall Bio-Rad's
10 counsel asking you about Figure 3.29A in Thorsen 01:59
11 and whether it showed an inlet?

12 A Yes, I do.

13 Q Could you please take a look at the
14 Thorsen thesis? And that should be Exhibit 1003
15 in the 087 IPR. 02:00

16 Do you have that, Dr. Fair?

17 A Yes.

18 Q Could you please -- sorry, strike
19 that.

20 I'll direct you to Figure 3.29A which 02:00
21 is on stamped Page 103, internal Page 84. And
22 would you go ahead and read that page and figure
23 legend and take a look at the figure and let me
24 know when you're finished?

25 A What is the paragraph. 02:00

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1 Q It's Page 103 of the Thorsen thesis. 02:01
2 A Okay. Got it.
3 MR. BAKER: Objection, form.
4 THE WITNESS: Okay.
5 BY MS. JAMESON: 02:01
6 Q Does this refresh your recollection
7 about what is being shown in Figure 3.29A?
8 A So, sure. Generated water drops
9 entered the incubation chamber. They slowed
10 down, took an hour for the droplets to pass 02:02
11 entirely through the cavity and reenter the
12 narrow outlet channel.
13 Yes. So there is an inlet and an
14 outlet.
15 Q And, Dr. Fair, looking at the sentence 02:02
16 that you read -- excuse me. Earlier on the page
17 you were reading the sentence, "Generated water
18 droplets entered the incubation cavity where
19 they encountered a sharp drop in flow velocity,"
20 Figure 3.29A. 02:03
21 Was that the sentence you were reading
22 from?
23 A Yes. Okay. So Figure A, as the
24 caption says, water droplets entering the
25 cavity, they slow down and accumulate. So I had 02:03

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Solutions.

02:06

We're off the record at 5:06.

(Proceedings concluded at 5:06 p.m.)

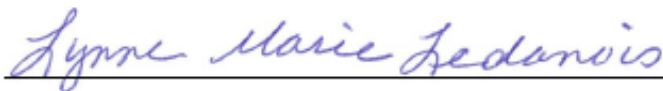
1 I, LYNNE M. LEDANOIS, a Certified
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4 That the foregoing proceedings were
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11 Further, that if the foregoing
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16 I further certify I am neither
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18 relative or employee of any attorney or party
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20 IN WITNESS WHEREOF, I have this date
21 subscribed my name: July 25, 2020.

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24

LYNNE MARIE LEDANOIS

25 CSR No. 6811

1 NAME OF CASE: Bio-Rad v X10 Genomics
2 DATE OF DEPOSITION: 7/23/20
3 NAME OF WITNESS: Richard Fair
4 Reason codes:
5 1. To clarify the record.
6 2. To conform to the facts.
7 3. To correct transcription errors.
8
9 Page ____ Line ____ Reason____
10 From _____ to_____
11
12 Page ____ Line ____ Reason____
13 From _____ to_____
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18 Page ____ Line ____ Reason____
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