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

- - - - - x
PARSE BIOSCIENCES INC., : Case Nos. IPR2023-00955
Petitioner, : and IPR2023-00958
v. : U.S. Patent Nos.
10X GENOMICS, INC., : 10,240,197 and
Patent Owner. : 10,697,013
- - - - - X

Deposition of GREGORY COOPER, Ph.D.
Conducted Virtually
Friday, April 19, 2024
10:05 a.m. EDT

Job No.: 534051
Pages 1 - 66
Reported by: Debra A. Whitehead

1 Deposition of GREGORY COOPER, Ph.D., conducted
2 virtually.

3
4
5 Pursuant to notice, before Debra Ann Whitehead,
6 E-Notary Public in and for the State of Maryland.

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1 A P P E A R A N C E S C O N T I N U E D

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C O N T E N T S

EXAMINATION OF GREGORY COOPER, Ph.D.	PAGE
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By Mr. Walter	61

EXHIBITS MARKED IN TODAY'S SESSION
(None Marked)

EXHIBITS MARKED IN PRIOR SESSIONS
(Not Attached)

DEPOSITION EXHIBIT	PAGE
Exhibit 1003 Linnarsson Reference	8
Exhibit 1004 McCloskey Reference	51

1 P R O C E E D I N G S

2 GREGORY COOPER, Ph.D.,

3 having been duly sworn, testified as follows:

4 EXAMINATION BY COUNSEL FOR PATENT OWNER

5 BY MS. RAYMOND:

6 Q Good morning, Dr. Cooper.

7 A Good morning.

8 Q Could you please state your name, for the
9 record.

10 A It's Gregory Cooper.

11 Q And do you have access to the exhibits
12 today?

13 A I do. I just downloaded them.

14 Q So those are all the clean copies from
15 the download link. Correct?

16 A They appear to be, yes.

17 Q And that link today has you see two
18 files, or two folders; one for the '197 proceeding
19 and one for the '013 proceeding?

20 A That's right.

21 Q And you're welcome to open it if you
22 need, but Exhibit 1002 from the '197 proceeding,

1 are you familiar with that document?

2 A Yes.

3 Q And is that your declaration containing
4 your opinion regarding U.S. Patent 10,240,197?

5 A Yes.

6 Q And if I refer to that today as your '197
7 declaration or report, will you understand what
8 I'm talking about?

9 A Yes.

10 Q And are you familiar with Exhibit 1002
11 from the '013 proceeding?

12 A Yes.

13 Q And that's your declaration containing
14 your opinion regarding U.S. Patent 10,697,013?

15 A Yes.

16 Q And if I refer to that as your '013
17 declaration or report today, you will understand
18 what I am talking about?

19 A Yes.

20 Q And you have paper copies of your report
21 with you today as well?

22 A I do not.

1 Q Okay. And in both proceedings, in both
2 of your reports you opine on the Linnarsson
3 reference.

4 Is that correct?

5 A Yes.

6 Q And that Linnarsson reference is Exhibit
7 1003 in both of those two reports.

8 Is that correct?

9 A Yes.

10 Q Great. I'd like to talk about the
11 Linnarsson reference first for a little bit. So
12 if you'd like to open Exhibit 1003, you're welcome
13 to do so.

14 (Deposition Exhibit 1003, previously
15 marked, not attached.)

16 A Okay.

17 Q And Linnarsson discusses the STRT method.
18 Is that correct?

19 A Yes, I believe that is referenced. Yes.

20 Q And what is the STRT method?

21 A Just make sure I get the acronym right.
22 It's -- yes, the acronym stands for single cell

1 tagged reverse transcription method.

2 Q And what are the steps of the STRT
3 method?

4 MR. WALTER: Objection. Form.

5 A So I think it's, there it's somewhat of a
6 broad disclosure, but there are some example
7 embodiments in there that outline a series of
8 steps, some of which are optional, essentially.
9 So I think that's kind of a broad question. There
10 are a whole bunch of steps that are outlined at
11 different parts of the document.

12 Q Would you agree that Figure 11 shows some
13 of the key steps of the STRT method?

14 A So Figure 11 is titled, A graphical
15 representation of steps optionally used in the
16 STRT method. So I think that's what I would agree
17 that it says.

18 Q Does it have some of the key steps of the
19 STRT method in Figure 11?

20 A So I don't think it uses the word "key."
21 It has steps that are used, that can be used. It
22 describes it as optionally usable in the STRT

1 method.

2 Q So in your opinion, Figure 11 doesn't
3 have the key steps of the STRT method in it?

4 A So I think it illustrates some important
5 aspects of how the STRT can be used. And I'm not
6 sure the word "key," I don't remember if I used
7 that word or not, but it's helpful as a
8 representation of how one might use the STRT.

9 Q What are the important aspects of how
10 STRT can be used?

11 A So I think there's a lot to that. I
12 mean, I guess I'm not -- what -- can you narrow
13 that down? What do you mean?

14 Q Well, you testified that Figure 11 shows
15 some important aspects of the STRT method. Right?

16 A Yes. It shows some -- yeah, as I said,
17 it shows some optional things that one can use as
18 part of the STRT method, yes.

19 Q And you said, "I think it illustrates
20 some important aspects of how the STRT can be
21 used."

22 Correct?

1 A Yes.

2 Q What do you mean by, "I think it
3 illustrates some important aspects of how the STRT
4 can be used"?

5 A So as an example, it talks about how in
6 Panel A it shows a reverse transcription step.
7 And so, obviously, that is an important part of a
8 method called single cell tag reverse
9 transcription. So, you know, that's -- that's
10 indicative of a component of the process that's
11 important to the overall process.

12 Q Is anything else in Figure -- depicted in
13 Figure 11 an important aspect of the STRT method?

14 A I mean, again, it's important aspects of
15 particular embodiments of the STRT method, but I
16 don't know that they're necessarily true for all
17 embodiments of it.

18 Q Is the use of a poly T tail on the CDS an
19 important aspect of Panel A?

20 A Of -- let me pull up those figures.

21 It is certainly -- yes, it is described
22 in Panel A of Figure 11 as a possible way to

1 initiate your cDNA reverse transcription step.

2 Q And is the use of the poly T tail on the
3 CDS an important aspect of what's shown in Panel
4 A?

5 A Yes, it is important within the context
6 of the embodiment in Figure 11, yes.

7 Q And is Figure 11 an embodiment you rely
8 on in forming your opinions?

9 A It certainly is part of what I rely on,
10 but there's reference to other figures and other
11 aspects of the disclosure in Linnarsson.

12 Q Do you rely on other embodiments of
13 Linnarsson in forming your opinion?

14 A Yes.

15 Q Do you combine those embodiments of
16 Linnarsson in forming your opinions?

17 A I mean, you'd have to go through
18 individual claim elements and claims. But, yes,
19 so other figures are sort of interwoven throughout
20 the declaration. So, yes, there are aspects where
21 I point to multiple lines of evidence within
22 Linnarsson.

1 Q Let me ask you this: Is your position
2 that Linnarsson describes multiple different
3 embodiments on which you rely in forming your
4 opinions for Ground 1?

5 A Yes, I think Linnarsson is a relatively
6 broad disclosure that includes, again, as the
7 Figure 11 title tells you, that there are optional
8 aspects of how the method can be used.

9 And so it -- so by definition if there
10 are options, it discloses multiple ways of
11 performing certain tasks.

12 Q Does it describe multiple ways of
13 attaching the CDS to the mRNA molecule?

14 A Yes, I think that's fair to say.

15 Q So what are the different ways that it
16 describes for attaching the CDS to the mRNA
17 molecule?

18 A For one example it provides -- and I
19 can't remember the line number, but it talks about
20 different forms that the CDS can take. One
21 example being the oligo(dT) primer. But other
22 examples include looking at gene family or gene

1 specific primers, for example. So that's one
2 example of how the CDS can take on various forms
3 to pull down to initiate that cDNA synthesis.

4 Q In your report do you rely on the
5 disclosures of the gene family or gene-specific
6 primers in connection with a form that the CDS can
7 take?

8 A That paragraph specifically is
9 referenced, yes.

10 Q And do you rely on those disclosures of
11 the gene family or gene specific primers for your
12 opinions regarding the combination of Linnarsson
13 and McCloskey?

14 A So yeah, I guess the word -- it's
15 certainly one element that I point to as part of
16 the set of disclosures; you know, the set of
17 methods that are disclosed by Linnarsson.

18 MR. WALTER: Folks, I hate to butt in.
19 I'm having a problem with the real time. I can't
20 get it to work. Can we take a moment and go off
21 the record and fix that?

22 MS. RAYMOND: Sure.

1 (A recess was taken.)

2 BY MS. RAYMOND:

3 Q What is the role of biotin in the STRT
4 method?

5 A So biotin is not a requirement for the
6 STRT method. Biotin is included as one of the
7 optional features described in Figure 11.

8 Q Is biotin involved in separating out the
9 molecules of interest to clean them up?

10 A So in the context of Figure 11, the
11 biotin is used as part of a cleanup step, yes, to
12 separate certain fragments from certain other
13 fragments.

14 Q And does Linnarsson disclose any other
15 way of separating out molecules to clean them up
16 using the STRT method?

17 A So Linnarsson discloses forms of STRT
18 that don't require any kind of biotin cleanup
19 step.

20 Q How is cleanup performed using STRT
21 without biotin?

22 A Well, I think that presupposes that you

1 have to do a cleanup, and I think there are
2 embodiments where you wouldn't and/or you would --
3 you know, these are things that are standard
4 molecular biology techniques that would be within
5 the scope of a person of skill in the art.

6 Q Can you please point me to examples of
7 embodiments of Linnarsson where you wouldn't
8 perform cleanup?

9 A So you're talking about cleanup via
10 biotin streptavidin conjugation or cleanup in
11 general or ...

12 Q My understanding is, you just said that
13 cleanup is optional -- or there's an embodiment in
14 Linnarsson or embodiments in Linnarsson where
15 there is no cleanup required.

16 Is that correct?

17 A Well, I think it's safe to say that
18 the -- you know, if you look at the claims, for
19 example, I don't think the claims require any
20 specific cleanup or filtration or other, you know,
21 related step.

22 Q And where are those claims cited in your

1 report?

2 A So at least the claims are mentioned in
3 the claim chart where I talk about Linnarsson, the
4 provisional application supporting at least one
5 claim.

6 Q Do you discuss those claims anywhere else
7 in your reports?

8 A I mean, let me see.

9 I'm not seeing other places where I refer
10 specifically to any particular Linnarsson claim.
11 But again, there's a whole bunch of things that
12 intersect with the claims. And again, it's
13 mentioned in the claim chart looking at how the
14 provisional compares to the issued claims.

15 Q And in the claim chart that you're
16 talking about, if we could look at your '197
17 report.

18 A Okay.

19 Q And the claim chart you're talking about
20 is the one that's on Page 45 to 47.

21 Is that correct?

22 A Yes, starting with Paragraph 101, yes.

1 Q And so when you say the Linnarsson claims
2 are addressed in this, you're talking about Claim
3 1 on the left-hand side of the table that spans
4 Pages 47 to -- 45 to 47?

5 A That's right. And how the Linnarsson
6 claim language maps to particular elements of the
7 specification, yes.

8 Q And if we could look at the '013 report.
9 And there the table that you're referring
10 to that talks about Linnarsson claims is on Page
11 44 to 46.

12 Is that correct?

13 A Yeah, the exhibit page is a little bit
14 different. But, yes.

15 Q I'm sorry, I should be using the ones in
16 the bottom right, 52 to 54.

17 A Right. Starting at Paragraph 97, yes.
18 And that language will be similar between the two
19 declarations.

20 Q And there we see Linnarsson Claim 1 on
21 the left-hand side of that table. Correct?

22 A That's correct.

1 Q Are there any other disclosures of
2 Linnarsson in your report that don't require
3 cleanup?

4 A So again, it -- there are disclosures
5 that -- so for example, Figures 3 and 4, which
6 provide exemplary possibilities of designing
7 primers for the CDS and TSO, don't invoke or
8 require any particular cleanup or lack of cleanup,
9 for example. Those are generalized examples that
10 can be used in a range of possible specific
11 methods.

12 Q What is the consequence of not performing
13 cleanup in the STRT method?

14 A That is too broad to really answer with
15 any kind of detail. It all depends on all the
16 upstream aspects of it. How big your primers are,
17 for example, would be one feature that -- it's
18 very hard to know how to answer that question.

19 Q Well, if I perform -- if I go to Figure
20 11, and let's say I remove the biotin from Figure
21 11 and I proceed, what are the downstream
22 consequences of not performing cleanup, if I were

1 to remove the biotin from Figure 11?

2 A Again, I think you would have to have
3 more details than what's in Figure 11. There are
4 a whole bunch of details that aren't described in
5 Figure 11.

6 So for example, as I just mentioned, the
7 specificity of your primers. If you have a set of
8 primers that are very specific and amplify very
9 cleanly, there might be little to no benefit to
10 doing the biotin. So it depends on a whole bunch
11 of other sort of parameters and variables that go
12 into that process.

13 Q Would a POSITA have performed solid
14 sequencing without performing some sort of
15 cleanup?

16 A Again, it's hard for me to answer that
17 without all -- you know, you'd have to look at all
18 the details of the experiment. It's certainly one
19 could imagine doing it, and certainly texts say
20 that cleanup could be done without biotin
21 streptavidin conjugation.

22 Q Does Linnarsson describe performing solid

1 sequencing without cleanup?

2 A So Linnarsson certainly discloses solid
3 sequencing as one platform that can be used as a
4 sequencing -- as a tool for sequencing the
5 products that you get at the end. And I don't
6 think that they limit the disclosure to only using
7 solid with, say, a biotin option.

8 You know, again keeping in mind that it
9 talks about Figure 11 being optional step. So,
10 yes, I think it is safe to say that Linnarsson
11 discloses processes where one would use solid at
12 the end that don't require a biotin cleanup in the
13 middle.

14 Q Where does Linnarsson disclose using
15 solid sequencing at the end without biotin in the
16 middle?

17 A So I think you have to read the
18 disclosure as a whole. Looking again, for
19 example, at Figures 3 and 4 that talks about
20 primer designs that have no requirement for
21 biotin. There's just no reason to infer that the
22 disclosure of Figures 3 and 4 wouldn't be

1 compatible with solid sequencing.

2 Q Is there anywhere else in Linnarsson that
3 discloses using solid sequencing at the end
4 without biotin in the middle?

5 A I guess I would flip that around and say
6 that I'm not aware that -- again, I would not read
7 it that way, that there would necessarily be a
8 requirement that they be paired together.

9 So effectively, then, basically all the
10 disclosures that don't specifically say biotin I
11 would argue are disclosure without using biotin.

12 Q So there might be some steps in between
13 the STRT method and the use of solid sequencing
14 that just aren't disclosed in Linnarsson?

15 A No. I think to the extent that there are
16 protocol details that aren't described, they would
17 be within the realm of the sort of standard skill
18 set available to a person of skill in the art.

19 Q Do you address in your report any steps
20 that would be within the realm of the person of
21 skill in the art that aren't in the Linnarsson
22 protocol itself that would occur between the use

1 of the STRT method and followed sequencing?

2 A So I'm not understanding the question.

3 Could you repeat it or rephrase it?

4 Q Okay. You said that -- well, I had asked

5 if there would be -- if there might be some steps

6 between the STRT method and the use of solid

7 sequencing that aren't disclosed in Linnarsson.

8 And I think you said those would be within the --

9 those would be available to a person of skill in

10 the art. Right?

11 Did I understand your testimony

12 correctly?

13 A Yes.

14 Q And so I'm asking if in your report you

15 addressed or described what those steps would be

16 that are within the realm of the knowledge of a

17 person of skill in the art?

18 A Things that are disclosed or are not

19 disclosed in Linnarsson?

20 Q That are not disclosed in Linnarsson that

21 are within the level of skill in the art

22 nevertheless.

1 A So again, I think what I would -- yeah,
2 so I'm not sure I have a good answer to that
3 question.

4 There are lots of things that I would
5 assume are within the competencies of a skill in
6 the art. So things like optimizing PCR reaction
7 conditions, you know, how long certain times are,
8 what certain temperatures are, you know, having --
9 there's a lot of things that you would expect a
10 POSA to be able to do that aren't necessarily
11 written down or described. Or at least only
12 certain flavors are written down, and a POSA would
13 be considered competent to make minor
14 modifications to those steps as necessary.

15 Q Does Linnarsson disclose sequencing
16 polynucleotides without having used a CDS and/or
17 TSO?

18 A So the CDS and TSO are important aspects
19 of Linnarsson that are used frequently. I can't
20 remember if they ever have one that doesn't
21 require -- certainly you don't have to use, say,
22 barcodes in both. You know, there's an option to

1 use barcodes in one or the other, but not
2 necessarily both. Although one can perform both.

3 So, yeah.

4 Q Do you rely on any embodiments of
5 Linnarsson that don't use a CDS and TSO to
6 ultimately reverse-transcribe the mRNA into
7 double-stranded DNA?

8 A I don't believe so, no.

9 Q And then your opinion is that Linnarsson
10 ultimately describes or discloses sequencing the
11 polynucleotides that were reverse-transcribed
12 using a CDS and TSO. Correct?

13 A So, I mean, it certainly involves -- it
14 discloses methods that perform reverse
15 transcription that rely on a CDS and TSO, and then
16 eventually sequencing the output of that process.
17 There are certainly other steps that might occur
18 in the middle. Like PCR amplification, for
19 example, would be one, just one example of what
20 you can do in between that initial reverse
21 transcription step and the sequencing process.

22 Q And with respect to the sequencing

1 process, is anything other than polynucleotides
2 that were originally tagged with a CDS and TSO
3 sequenced in Linnarsson?

4 A I'm not understanding the question.

5 Q So I think you were saying that
6 Linnarsson sequences polynucleotides that were
7 tagged with a CDS and TSO. Correct?

8 A Yes.

9 Q Does Linnarsson sequence polynucleotides
10 that were not tagged with a CDS an TSO?

11 A I mean, I think that is certainly
12 possible, that certain things would bleed through
13 the process. It may not be desired, but in any
14 complex reaction like this where you're talking
15 about large numbers of molecules that may or may
16 not -- that may -- some may bleed through. But
17 there are steps to avoid that, for example, by
18 using primer sites inside your -- that are
19 connected or inside your CDS and TSO. And the
20 things that don't have them wouldn't amplify. And
21 so that would tend to dilute them.

22 But would you say that zero molecules

1 without a CDS/TSO came through, probably not. But
2 certainly you would be enriching for things that
3 you wanted to sequence.

4 Q So it would -- would you agree that it
5 wouldn't be desirable to sequence polynucleotides
6 without a CDS and TSO?

7 A I think that would depend on the goals of
8 your experiment. But generally speaking, the
9 reason that you're putting on the CDS, the reason
10 that you're, for example, putting a barcode inside
11 one or both of those, is because you want to use
12 that barcode. So that would be desirable to have
13 that in there, rather than not.

14 Q And I think you testified earlier that
15 there are steps to avoid polynucleotides that
16 aren't tagged with a CDS and TSO from bleeding
17 through.

18 Is that correct?

19 A What I mentioned was example just PCR.
20 That you would take advantage of, you're putting
21 prime in-site handles on your cDNA, and then
22 you're amplifying. And those will preferentially

1 amplify only the fragments that have the handles
2 on them correctly, and they won't amplify the ones
3 that don't.

4 Q Are there other examples in Linnarsson of
5 steps that are taken to minimize polynucleotides
6 that aren't tagged with a CDS and TSO from
7 bleeding through?

8 A So I certainly think Figure 11 would be
9 another example of an option, you know, that
10 biotin is a way to very effectively separate
11 molecules of interest from molecules that are not
12 of interest. It's certainly another option that
13 they disclose.

14 Q In Linnarsson, if we could look at
15 Linnarsson, and I'll give you the cite in just a
16 second. I'd like to look at Linnarsson, I think
17 it's cited in your report at 21, Page 21, Lines 13
18 to 25. It's actually stamped Page 22 of
19 Linnarsson.

20 A Okay. Which lines?

21 Q Sorry, Lines 13 to 25.

22 A Okay.

1 Q And that quote, do you recall citing that
2 portion of Linnarsson in your declaration? It's
3 like, for example, Paragraph 175 of the '197
4 report.

5 A Yes, I see that.

6 Q And that citation in Linnarsson refers to
7 obtaining a short-fragment 5 prime-end library.

8 Do you see that?

9 A Well, it says to obtain a library
10 suitable for sequencing.

11 Q And then it says, As such, the cDNA
12 library can be processed by fragmenting the cDNA
13 library, e.g. with DNase, to obtain a
14 short-fragment 5 prime-end library.

15 Do you see that?

16 A So, yes. I think that is sort of the
17 paragraph starts fairly general, and talks about
18 building libraries suitable for sequencing. And
19 then it gives particular examples as might be used
20 for a SOLiD or Illumina sequencing.

21 Q Are you aware of any explicit disclosure
22 in Linnarsson describing obtaining a

1 short-fragment 3 prime-end library?

2 A I don't see that phrase occurring in
3 Linnarsson, so no.

4 Q And do you remember citing anything from
5 Linnarsson in either of your reports that state
6 that the 3 prime fragment is released from the
7 bead?

8 MR. WALTER: Objection. Form.

9 A So I don't think -- if the reference is
10 within the scope of Figure 11, I don't think that
11 that is disclosed, correct. But again, but that
12 ignores the other embodiments that don't use that
13 steps that are described in Figure 11.

14 Q And even setting aside Figure 11, do you
15 remember citing anything in Linnarsson that states
16 that the 3 prime fragment is released from the
17 bead?

18 MR. WALTER: Objection. Form.

19 A With the caveat that not all requirements
20 have beads at all in them, so you wouldn't talk
21 about releasing a 3 prime fragment from a bead if
22 there were no beads to begin with.

1 Q Can you point me to the citations in your
2 report to Linnarsson -- well, maybe I'm just not
3 understanding.

4 So are you saying that you don't remember
5 citing anything in Linnarsson that states that the
6 3 prime fragment is released from the bead when
7 there is a bead?

8 A Right. What I'm trying to say is that I
9 don't -- within the context of Figure 11, it
10 doesn't disclose that. But there are other
11 disclosures that wouldn't involve beads at all.
12 So, obviously, they're not going to disclose
13 something about releasing 3 prime ends from beads
14 if there are no beads in the protocol like one
15 might do when using the primer design from Figures
16 3 and 4, for example. So there's no bead to
17 release from, so they wouldn't disclose to release
18 from the bead.

19 Q Other than Figures 3 and 4, are there any
20 other disclosures in Linnarsson that you rely on
21 that don't require beads at all for the STRT
22 method?

1 A Oh, I think there's a lot. You know, I
2 think -- again, I would flip that around and say
3 Figure 11 is, I believe, the only one that does
4 specifically talk about streptavidin-coated beads.
5 And so as I say, I would say that all disclosures
6 that don't mention that specifically are
7 disclosures that don't require or need it.

8 Q Let's go to ligation for a bit.
9 You recall that the '197 Claim 5 requires
10 ligation?

11 A That sounds correct.

12 Q And the '013 claims require ligation?

13 A Yes.

14 Q And in your reports you discuss the
15 possibility of using the Hug ligation technique to
16 ligate a tag to the end of a polynucleotide in
17 modifying Linnarsson.

18 Is that correct?

19 A I do cite to Hug as one example of a
20 technique that a person of skill in the art might
21 have used to ligate on tags. I don't think I
22 stated that that was the only way to do it; it was

1 really just an example.

2 Q And Hug's ligation technique involves the
3 use of restriction enzyme.

4 Is that correct?

5 A Yes, I believe so. I can't say for
6 certain whether it only required that, but I
7 believe it is used.

8 Q Do you recall the use of restriction
9 enzyme being optional in Hug?

10 A I can't remember if it's -- certainly
11 it's employed within some of the disclosures of
12 Hug. What I can't remember right here is whether
13 that's the only form of that, if it always
14 required it.

15 Q Which disclosures of Hug did you rely on
16 in forming your opinion?

17 A Well, I don't think I relied on Hug as a
18 specific document for a specific grounds. It was
19 provided as an example of, you know, essentially a
20 toolkit or a technique that would be available to
21 a POSA.

22 Q Can you say, sitting here today, whether

1 Hug's technique requires the use of a restriction
2 enzyme?

3 MR. WALTER: Objection. Form.

4 A I can say that --

5 MR. WALTER: Objection. Form.

6 A Okay. I can say that certainly much of
7 the disclosure in Hug uses restriction enzymes. I
8 can't remember if they are all -- if a hundred
9 percent of the disclosures required restriction
10 enzymes.

11 Q And did you discuss restriction enzymes
12 in either of your reports?

13 MR. WALTER: Objection. Form.

14 A In the context of Hug or in the context
15 of Linnarsson or ...

16 Q In any context?

17 A So I believe Figure 11 is cited in my
18 report, which has a restriction enzyme in one of
19 the -- in one or both of the primers that are
20 used. So to the extent that it's disclosed in
21 Figure 11, it's in my report.

22 Q And do you rely on the use of that

1 restriction enzyme in your -- in forming your
2 opinion of how one would have ligated using the
3 Hug technique?

4 A No, I don't think there has to be a
5 one-to-one connection between the restriction site
6 in Figure 11 of Linnarsson and the use of Hug.
7 Certainly they could be made compatible. You
8 know, that would be within the skill set of a
9 POSA, but I don't think I relied on that
10 particular -- any specific embodiment that
11 required the Linnarsson cut site to be merged into
12 the Hug process.

13 Q And in your reports in discussing the Hug
14 technique in the context of ligating a tag to
15 Linnarsson, do you discuss restriction enzymes?

16 A So I -- so I do reference Hug
17 specifically. And what I can't remember is every,
18 all the bits of text that I cited to in Hug,
19 whether that explicitly or implicitly calls for
20 restriction enzymes. So it's possible, but I
21 can't remember whether or not I did.

22 Q So to the extent you did, it would be in

1 a citation to Hug in your report?

2 A Yes, I think that's fair to say.

3 Q And did you ever describe how you would
4 modify Linnarsson to incorporate a restriction
5 enzyme site in your report?

6 A So I guess I'm not totally understanding
7 the question, since Linnarsson discloses at least
8 one method that has a built-in restriction site in
9 Figure 11. So that is part and parcel of at least
10 one embodiment. Again, not all, but that's
11 already disclosed within Linnarsson directly.

12 Q Did you describe in your report using the
13 built-in restriction site in Figure 11 in order to
14 ligate a tag?

15 A No. I think those are all competencies
16 within the scope of a person of skill in the art.

17 Q But you didn't discuss that in your
18 report?

19 A Well, I think I disclosed that it would
20 be obvious to a person of skill in the art of how
21 to -- to do it and how to do it. So, yes,
22 that's -- yeah.

1 Q So with respect to Claim 5 of the '197,
2 where in your report, if anywhere, do you describe
3 when ligation occurs in the method of -- in the
4 method of Linnarsson-McCloskey combination that
5 you describe?

6 A So I talk about -- Paragraph 224 talks
7 about ligating an oligonucleotide comprising a
8 second tag sequence to Linnarsson's CDS and/or
9 TSO. So certainly it would be after the extension
10 step that included those into the tagged cDNA.

11 Q And do you say -- you indicate which
12 steps occur, if any, after the ligation step in
13 your combination?

14 A So the -- I think an important part of
15 that disclosure is that the main reason -- the
16 motivation for a person of skill in the art to
17 combine Linnarsson with McCloskey was to reduce
18 the amplification bias problem. And so it would
19 be understood in that logic that a person of skill
20 in the art would know to put on the second barcode
21 before any PCR or other amplification was
22 performed.

1 Q And where do you describe that in the
2 context of the Claim 5 combination in your report?

3 A So I talk about the use of -- I talk
4 about the motivation to combine as the primary
5 motivation being to reduce amplification bias at
6 length. And so certainly that informs that
7 combination as well, because that's the primary
8 criteria that I talk about as being the reason why
9 one would combine the two references.

10 Q And in the context of Claim 5, where do
11 you call that out in your report?

12 MR. WALTER: Objection. Form. Asked and
13 answered.

14 A So the -- yeah, I'm trying to pull up the
15 language that I used. You're talking about
16 specifically in the paragraphs where I talk about
17 Claim 5 itself?

18 Q Yes.

19 A So I -- let me look for a moment.

20 So, yeah, so I guess I don't specifically
21 talk about it there, but it is -- it is referred
22 to by definition because I talk about that's the

1 whole reason to combine the two references. So I
2 think it would be understood what that is meant to
3 say.

4 And, sorry, Paragraph 231, it also says
5 that it would have been an obvious design choice
6 to ligate the second tag sequence to the TSO
7 and/or CDS to generate the tag to polynucleotide.
8 Which, obviously, if you are going to amplify the
9 tag of polynucleotide, you have to do it, you have to
10 put that in before. So it also is explicitly
11 there.

12 Q Would you turn in your '197 report to
13 Paragraph 223.

14 A Okay.

15 Q And you refer there to the Section
16 XII.A.1 and the combination of Linnarsson and
17 McCloskey.

18 Do you see that?

19 A I do.

20 Q And that's referring to the combination
21 that you describe in Ground 1 of Linnarsson and
22 McCloskey. Correct?

1 A I'm going to have to look at XII.A.1.

2 Yes, that is the grounds, yes. That is
3 the obviousness grounds for Claims 1 through 4, 6
4 through 11, 20, and 23 to 25.

5 Q And why do you reference Ground 1 in
6 Paragraph 223 of your '197 report?

7 A So I think one important reason is that
8 it's talking about the motivation to combine the
9 methods, as I talked about earlier. That the
10 reason to combine them -- at least one reason to
11 combine them is to use the McCloskey ability to
12 reduce or control for amplification bias to solve
13 a problem that is raised within Linnarsson.

14 Q And is there any other reason why this
15 statement referring to Ground 1 in Paragraph 223
16 of your report is there?

17 A So I think another reason would be that
18 Claim 5 depends on Claim 1. So all the evidence
19 that would be relevant to discussion of Claim 1
20 would then by definition sort of carry through to
21 Claim 5, since it inherits all the -- all the
22 limitations of Claim 1.

1 Q And your Claim 1-Ground 1 opinion
2 involves incorporating two tags, but not through
3 ligation.

4 Is that correct?

5 A It certainly involves two tags, but not
6 necessarily through ligation.

7 Q In your Claim 1 analysis you don't talk
8 about ligating the tags. Correct?

9 A I don't believe so. I think I reserve
10 that for the Claim 5. But again, I don't think
11 there is anything that would have excluded it, in
12 that that just wasn't part of the claim language,
13 so I didn't talk about it in that particular
14 context.

15 Q But the Ground 1-Claim 1 combination has
16 the -- in your opinion, has the claimed first tag
17 and the claimed second tag. Right?

18 A I am assuming so. Let me review Claim 1
19 just to be sure.

20 Yes, so Claim 1 certainly requires a
21 first and second tag.

22 Q And then in your opinion are you

1 modifying that McCloskey-Linnarsson combination
2 from Ground 1 in connection with Claim 5, Ground
3 2?

4 A I don't know that I would agree with
5 modifying. I think the key point is that in the
6 grounds for Claim 1 we're talking about combining
7 the single cell first tag of the Linnarsson with
8 the amplification bias reduction effect of the
9 second tag from McCloskey. And so then the
10 question becomes how does one add the second tag
11 effectively to a Linnarsson process. And there's
12 really only a couple of options. Right? There is
13 to build it into the primers they used to make the
14 cDNA or to ligate it on after you've made that
15 initial cDNA. And so I think it's just talking
16 about the possible choices that one would -- that
17 a POSA would pursue to add the McCloskey second
18 tag to the Linnarsson first tag process.

19 Q So your Claim 5 theory doesn't involve
20 building in the second tag using the CDS or TSO;
21 it involves ligating a second tag.

22 Is that correct?

1 MR. WALTER: Objection. Form.

2 A So the -- yeah, the key is it's again
3 connecting it to the specific claim language of
4 Claim 5, where you have to perform at least one
5 ligation. And again it's pointing to the fact
6 that a POSA could easily add the second tag via
7 ligation to achieve the amplification bias
8 reduction that McCloskey provides.

9 Q So your Claim 5 theory is that instead of
10 adding the claim -- the second tag by
11 incorporating a sequence into the CDS or TSO, you
12 ligate it to the end of a polynucleotide.

13 Is that correct?

14 A Yes, that involves ligation to that cDNA,
15 yes.

16 Q So for Claim 5, you're not starting with
17 a -- you're not starting by modifying a
18 polynucleotide that already has a first tag and a
19 second tag by virtue of incorporation of those
20 tags into the CDS and/or TSO. Correct?

21 A So I guess I'm not following. It's
22 certainly at that point it would have a CDS and/or

1 TSO. But that the additional ligation step would
2 be adding on that second tag in the context of the
3 claim language, which is used to differentiate
4 input molecules from within a cell.

5 Q And that second tag wouldn't already
6 exist in your ground -- or in your Claim 5 theory.
7 Right? What I'm trying to get at is, you're not
8 saying that a POSITA would have modified the
9 Ground 1 combination to remove the tags from
10 Linnarsson and McCloskey's CDS and/or TSO?

11 A Correct, it does not involve removing any
12 tags. This is talking about essentially making
13 the process a little bit modular, where you have
14 one set of tags that are for putting on your first
15 cell tag and then another set of tags that -- for
16 the purpose of keeping your process flexible and
17 weighted and give you twice -- to optimize it you
18 keep that second barcoding tag which is used to
19 separate molecules in a separate reaction in a
20 second step.

21 Q And then in the next paragraph of your
22 declaration, Paragraph 224 of the '197

1 declaration, you say, a POSITA -- or "A POSA would
2 have been motivated to adopt McCloskey's teachings
3 to modify Linnarsson's methods so that the tags
4 include a first sequence which could distinguish
5 between different cells," and then it goes on.

6 Do you see that?

7 A Yes.

8 Q Can you point me to where in your
9 declaration you describe how Linnarsson was
10 modified with respect to the tag sequence that
11 distinguishes between different cells?

12 MR. WALTER: Objection. Form.

13 A I'm not sure I understand. I say right
14 there that you're modifying the first -- you're
15 modifying the Linnarsson process that has that
16 first tag by adding a second molecular identifier
17 tag as taught by McCloskey.

18 Q So you're not modifying -- excuse me.
19 You're not modifying Linnarsson's -- the first tag
20 that you rely on Linnarsson for; you're just
21 adding a second tag?

22 A Well, right. I think the language says

1 by ligating an oligonucleotide comprising a second
2 tag sequence to Linnarsson's CDS and/or TSO.

3 Q Yes. And I was just focusing on, you're
4 saying in the beginning of that paragraph,
5 Adopting McCloskey's teachings to modify
6 Linnarsson's method so that the tags include a
7 first sequence. And I was just trying to
8 understand what you were saying by modifying
9 Linnarsson's methods so that the tags include a
10 first sequence.

11 A Well, that -- but that paragraph is to
12 include a first sequence which could distinguish
13 between different cells and a second sequence
14 which could distinguish sample polynucleotides
15 originated from the same single cell.

16 So that as a whole is talking about
17 modifying Linnarsson to have both the first and
18 second tag.

19 Q Is your Claim 5 theory that Linnarsson
20 would be modified with respect to inclusion of the
21 first tag?

22 A No. I think --

1 MR. WALTER: Objection. Form.

2 A Yeah, I think we can reread the sentence.
3 But it's to modify the Linnarsson approach such
4 that there's a first tag and a second tag.

5 Q But the proposed modification to
6 Linnarsson in your report relates to the second
7 tag and the inclusion of a second tag. Correct?

8 A Yes. I don't think that excludes
9 potentially changing how one designs the first
10 tag. But it's certainly not a requirement, I
11 don't think. This is just talking about modifying
12 the Linnarsson process to add the second tag.

13 Q And you don't describe anywhere specifics
14 of modifying Linnarsson's first tag. Correct?

15 A Except insofar as we're ligating on a
16 second tag to it, right.

17 Q Okay. We can keep going now, or would
18 you like a short break? We've been going about an
19 hour.

20 A Yeah, a two-minute break would be good,
21 or five minutes.

22 Q Maybe five, yeah.

1 A Okay.

2 Q Great.

3 (A recess was taken.)

4 BY MS. RAYMOND:

5 Q In forming your opinions regarding the
6 '197 and '013 patents, are you relying on
7 embodiments from Linnarsson other than STRT method
8 embodiments?

9 A I'm not sure I can answer that, because I
10 don't recall if Linnarsson describes everything in
11 the context of STRT. So as an example, I don't
12 think -- let me just pull it up.

13 So Figures 3 and 4, for example, don't
14 specifically refer to STRT, although obviously
15 they fit into STRT. So I guess my answer is that
16 it's a little difficult to say, because the
17 disclosure is fairly broad and not everything is
18 described using that acronym. Although many
19 things certainly are compatible or fit under the
20 umbrella defined by this acronym.

21 Q All right. Sitting here today, you're
22 not sure whether you relied on embodiments from

1 Linnarsson other than STRT method embodiments.

2 Is that correct?

3 A I think this would get into the issue of
4 whether you're requiring that acronym to be used
5 as encompassing everything that's embodied by
6 Linnarsson or not. And certainly many of the
7 embodiments are within the scope of that STRT.
8 And so I relied upon many of those that are --
9 again, Figures 3 and 4 can be used for that. I'm
10 not sure that Linnarsson themselves would have
11 said that encompasses everything, but -- so it's a
12 little hard for me to answer that because it's --
13 the patent is not titled STRT. Right?

14 Q In forming your opinions, is your
15 reliance on Figures 3 and 4 in the context of
16 using those figures in the STRT method?

17 A I think those are amenable to use within
18 methods that would fall within the scope of what
19 could be called STRT.

20 But what I'm trying to avoid is saying
21 it's somehow exclusive that those are -- or
22 Figures 3 and 4, for example, are talking about

1 the primers that one can use for reverse
2 transcription. And in the context here,
3 Linnarsson is talking about reverse transcription
4 of nucleotides from single cells. But it -- I
5 don't necessarily would -- but would agree with
6 you and read that and be somehow exclusionary.

7 Q But what I'm asking about is your own
8 reliance on Figures 3 and 4. And whether in
9 relying on Figures 3 and 4 you're relying on them
10 in the context of performing the STRT method or
11 some other embodiment --

12 MR. WALTER: Objection to form.

13 Q -- that's not an embodiment of the STRT
14 method?

15 MR. WALTER: Objection. Form.

16 A So I think there are -- part of the way I
17 would understand Linnarsson as a whole. And again
18 what I'm struggling with is STRT is defined with
19 particular embodiments, and they're -- Figures 3
20 and 4 are clearly relevant to many of those, but
21 whether they're confined to all of those.

22 And so the way I use Figures 3 and 4 --

1 well, they're used extensively throughout. But
2 talking about examples of how you design a primer
3 that has a tag and an RNA complementary sequence,
4 for example, how you construct cDNA as part of the
5 Linnarsson method, et cetera.

6 So to the extent those are overlapping
7 extensively with STRT -- and they are -- then,
8 yes, it's relevant to STRT; but it's not
9 necessarily true that they're a hundred percent
10 co-extensive.

11 Q Turning to McCloskey. And that's Exhibit
12 1004 in both of your reports.

13 Is that correct?

14 A That looks right.

15 (Deposition Exhibit 1004, previously
16 marked, not attached.)

17 Q And McCloskey refers to something called
18 a batch stamp. Correct?

19 A Yes.

20 Q What is a batch in the context of a batch
21 stamp?

22 A So McCloskey uses that as a fairly

1 general way to indicate basically the use of a
2 barcode to track some unit of experimental work
3 throughout a process.

4 So a batch stamp could refer to a sample
5 identity, like from a particular patient. It
6 could refer to experiments brought on a particular
7 day or in a particular series of wells. It can
8 refer to a particular single cell, et cetera. So
9 it's clearly intended to be a generic term that
10 would really be defined by the -- by the reader,
11 by the person using the method, the batch would be
12 what's appropriate to them to track.

13 Q And is it your opinion that McCloskey
14 teaches tagging individual cells from different
15 sample the same way?

16 A Again, McCloskey teaches the use of
17 essentially combinatorial tags that allow one to
18 track sample-level information -- which could
19 include single cells, but it doesn't necessarily
20 have to -- along with tracking individual input
21 molecules.

22 Q If I have a 96-well plate, and I have a

1 cell from one tissue sample in one well and I have
2 a cell from a different person's tissue sample in
3 another well, is it your opinion that McCloskey
4 teaches that those two cells are part of the same
5 batch, or part of a different batch?

6 A So again, I think the key is that it
7 would be up to the experimental designer to
8 determine what is important to them. So batch
9 could -- basically batch can encompass whatever it
10 is that -- whatever unit of work that that person
11 of skill in the art wants to keep track of.

12 So it could be, for example -- again, the
13 simplest example they give is to track everything
14 that comes from one patient. But it certainly is
15 meant to be more general than that. It could be
16 everything that comes from I have liver cells in
17 one batch and heart cells in another, or, you
18 know, I think there's a range of possible uses of
19 that batch stamp. And that would depend upon what
20 the downstream application was intended to
21 achieve.

22 Q Back to Linnarsson for a bit. I

1 apologize for jumping around.

2 In the Linnarsson-McCloskey combination
3 of Claim 1 for both the '197 and '013 patent, is
4 the tagged polynucleotide there fragmented in the
5 embodiment or embodiments of Linnarsson on which
6 you rely?

7 MR. WALTER: Objection. Form.

8 A I'm not sure I understand. I don't --
9 yeah, I'm not sure I understand your question.

10 Q Well, Linnarsson, you would agree with me
11 that Linnarsson discloses fragmenting of
12 polynucleotides. Right?

13 A Linnarsson discloses fragmenting as one
14 possibility. You know, for example, there is a
15 dependent claim that talks about fragmenting,
16 which sort of necessarily implies a broader scope
17 that doesn't depend upon fragmenting.

18 Q And so do you rely on embodiments of
19 Linnarsson that fragment, or do you rely on
20 embodiments of Linnarsson that don't fragment?

21 A I think both. So to the extent, for
22 example, Figure 11, with the way that Figure 11 is

1 drawn up, that involves cutting with a cut site.
2 But that certainly is not a restriction -- you
3 know, it's not a restriction to all embodiments,
4 like the ones that would be carried out using
5 Figures 3 and 4. So I think it's broad, it
6 includes both kinds of embodiments.

7 Q Can you turn to Page 112 of your '197
8 report. And this is the discussion of Claim 1.

9 A Is that 112 for the stamp?

10 Q Oh, I'm sorry. Let me check. The
11 stamped Page 119.

12 A Okay.

13 Q And your opinion here builds from your
14 Claim 1, Ground 1, Linnarsson-McCloskey
15 combination. Correct?

16 A Sorry, can you point to a specific
17 paragraph number, just make sure I'm on the
18 right --

19 Q Sure. I'm -- starting in Paragraph 239.

20 A Okay.

21 Q We're talking about Paragraph 239 through
22 245. That's your opinion about Claim 21.

1 Correct?

2 A Yes.

3 Q And it looks like in Paragraph 239 you
4 talk about your opinion about the combination of
5 Linnarsson and McCloskey rendering obvious the
6 method of Claim 1?

7 A Yes.

8 Q And then it says, "Wherein Step (c)
9 comprises hybridizing said tagged polynucleotides
10 to a solid support."

11 Right?

12 A Yes.

13 Q And so what you're addressing in your
14 Claim 21 analysis is the additional limitation in
15 Claim 21 of hybridizing said tagged
16 polynucleotides to a solid support.

17 Is that correct?

18 A Within the context of step little C
19 within Claim 1, yes.

20 Q Right. Okay. And then starting in
21 Paragraph 240, you discuss Linnarsson's disclosure
22 of high throughput screening methods, including

1 the SOLiD sequencing platform.

2 Do you see that?

3 A Yes.

4 Q And does the SOLiD method involve
5 fragmenting tagged polynucleotides before
6 sequencing?

7 A I don't -- it involves beads. I don't
8 know the exact range of things that you can put on
9 the SOLiD sequencer. But it certainly has an
10 optimal size. I think the -- at that time the
11 reads were on the order of a few hundred, maybe
12 400 nucleotides. So you might want to fragment to
13 get the most out of the SOLiD system, as we put in
14 that quote there about fragment libraries similar
15 to those of other next-generation platforms.

16 But I think the key is that with respect
17 to the Claim 21, the important aspect of the
18 limitation is that the sequencing be performed by
19 attaching to a solid support, which SOLiD does
20 require. That's how SOLiD worked.

21 Q And so to use the SOLiD method, do the
22 tagged polynucleotides from your

1 Linnarsson-McCloskey combination in Ground 1 need
2 to be fragmented?

3 A Not necessarily.

4 Q Can SOLiD sequencing sequence the length
5 of the polynucleotide that you would get when
6 reverse-transcribing the mRNA in Linnarsson into
7 double-stranded DNA?

8 A It certainly could sequence many of them.
9 It would depend on a whole variety of other
10 preparation steps. For example, which primers
11 you're using would dictate the expected length of
12 those cDNAs. So if those -- if the cDNAs that
13 you're targeting are within the scope of the
14 length that you could do on a SOLiD, then, yes,
15 absolutely.

16 So the answer to that question is, it
17 depends on the sort of upstream process.

18 Q And you also talk about using the Roche
19 454 platform. Correct?

20 A Yes.

21 Q Does that require that the -- what size
22 polynucleotides does the Roche 454 platform

1 accommodate?

2 A I think I might have put it in there.

3 But again, it's on the order of a hundred, you

4 know, couple hundred.

5 Q And what you've identified as the tagged

6 polynucleotides from the Linnarsson-McCloskey

7 combination of Ground 1 need to be fragmented in

8 order to perform the sequencing in the Roche 454

9 platform?

10 A Again, not necessarily.

11 Q Okay.

12 A Because there's a -- again, because the

13 sample preparation steps could enrich for things

14 of only a certain size or it could perform a size

15 selection step that wasn't fragmenting. Or, you

16 know, it really depends on a lot of other factors.

17 Q Would you need some sort of size

18 selection step to use the 454 platform if you're

19 starting with the McCloskey -- or the

20 Linnarsson-McCloskey combination of Claim 1?

21 A Again, maybe not. Because if you design

22 your RCS, that component of the CDS that initiates

1 cDNA synthesis, to only amplify cDNAs of a certain
2 length, then you wouldn't necessarily need to,
3 because your cDNA synthesis and then amplification
4 would achieve that size selection for you. So no;
5 it depends on the details.

6 Q Do you discuss the design of an RCS
7 component of the CDS that would only amplify cDNAs
8 of a certain length in your report?

9 A So the RCS is certainly referred to, and
10 that is one key way that a POSA would understand.
11 That's how they go after the portions of the
12 particular subsets of polynucleotides that they're
13 interested in.

14 Q Is your opinion that the RCS in
15 Linnarsson as described would amplify cDNA of only
16 a certain length?

17 A Well, the opinion is that the RCS was
18 described -- defined to be flexible and
19 generalizable to whatever purpose the person of
20 skill in the art wanted to use it for, you know,
21 with the examples being, obviously, a poly A tail
22 allows you to pull down essentially all the mRNAs,

1 but it can also have gene family specific versions
2 or random sequences, et cetera. So that it's
3 definitely written to be flexible and adaptable to
4 the needs of the POSA.

5 MS. RAYMOND: I think we can wrap up
6 pretty quickly. But if we can take a ten-minute
7 break then come back, that would be great.

8 MR. WALTER: Okay.

9 (A recess was taken.)

10 MS. RAYMOND: And I don't have any
11 further questions.

12 MR. WALTER: All right.

13 EXAMINATION BY COUNSEL FOR PETITIONER

14 BY MR. WALTER:

15 Q Dr. Cooper, I've just got a couple of
16 quick questions.

17 You recall you were asked some questions
18 about whether you discussed the motivation to
19 combine Linnarsson and McCloskey in the context of
20 Claim 5?

21 A Yes.

22 Q Could you please take a look at Paragraph

1 224 in your declaration on the '197 patent.

2 A Yes. Okay.

3 Q And do you see this is in the Claim 5
4 section?

5 A Yes.

6 Q And do you see the first sentence of
7 Paragraph 224 reads, "As discussed above in
8 Section 12.1.f.ii, a POSA would have been
9 motivated to adopt McCloskey's teachings to modify
10 Linnarsson's methods so that the tags include a
11 first sequence which could distinguish between
12 different cells and a second sequence which can
13 distinguish sample polynucleotides originating
14 from the same single cell."

15 Do you see that?

16 A I do.

17 Q What specifically is the motivation
18 you're discussing there?

19 A So, yeah, the main motivation is to
20 reduce the amplification bias problem that was
21 raised by Linnarsson, that McCloskey can solve.

22 MR. WALTER: I don't have any further

1 questions.

2 MS. RAYMOND: No questions here.

3 (Off the record at 11:44 p.m. EDT.)

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ACKNOWLEDGMENT OF DEPONENT

I, GREGORY COOPER, Ph.D., do hereby
acknowledge that I have read and examined the
foregoing testimony, and the same is a true,
correct and complete transcription of the
testimony given by me, and any corrections appear
on the attached Errata sheet signed by me.

(DATE)

(SIGNATURE)

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C E R T I F I C A T E

I, Debra Ann Whitehead, E-Notary Public in and for
the State of Maryland, do hereby certify:

That GREGORY COOPER, Ph.D., the witness
whose deposition is hereinbefore set forth, was duly
sworn by me before the commencement of such
deposition and that such deposition was taken
virtually and is a true record of the testimony
given by such witness.

I further certify that the adverse party,
PARSE BIOSCIENCES INC., was represented by counsel
at the deposition.

I further certify that the deposition of
GREGORY COOPER, Ph.D., occurred virtually, on
Friday, April 19, 2024, from 10:05 a.m. to 11:44
a.m. EDT.

1 I further certify that I am not related to
2 any of the parties to this action by blood or
3 marriage, I am not employed by or an attorney to any
4 of the parties to this action, and that I am in no
5 way interested, financially or otherwise, in the
6 outcome of this matter.

7
8 IN WITNESS WHEREOF, I have hereunto set my
9 hand this 22nd day of April, 2024.

10
11 My commission expires:
12 April 30th, 2027

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17 E-NOTARY PUBLIC IN AND FOR THE
18 STATE OF MARYLAND

Transcript of Gregory Cooper, Ph.D.
Conducted on April 19, 2024

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