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Transcript of Phil S. Baran, Ph.D.

Date: January 22, 2024
Case: Shanghai Hongene Biotech Corporation -v- Chemgenes Corporation (PTAB)

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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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SHANGHAI HONGENE BIOTECH CORPORATION,

Petitioner,

v.

CHEMGENES CORPORATION,

Patent Owner.

_____

IPR2023-00862

U.S. Patent No. 8,541,569

IPR2023-00875

U.S. Patent No. 8,309,707

VIRTUAL DEPOSITION OF PHIL S. BARAN, PH.D.

Monday, January 22, 2024

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Pages: 1 - 188

Reported by: Monique Vouthouris, CCR, RPR, CRR

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5 DEPOSITION OF PHIL S. BARAN, PH.D.,
6 pursuant to notice, conducted virtually via Zoom
7 Videoconference, before Monique Vouthouris,
8 Certified Court Reporter, Registered Professional
9 Reporter, Certified Realtime Reporter, and Notary
10 Public in and for the States of New Jersey and New
11 York.
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1 A P P E A R A N C E S
2
3 ON BEHALF OF PETITIONER SHANGHAI HONGENE
4 BIOTECH CORPORATION, AND THE WITNESS,
5 PHIL S. BARAN, PH.D.:
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3 Vice President and General Counsel
4 ChemGenes Corporation
5 ANUJ MOHAN SRIVASTAVA, ChemGenes COO
6 JEREMY LITTLE, Ph.D., ChemGenes Corporation
7 ERIN SCHUPPERT, Planet Depos Technician
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C O N T E N T S

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By Mr. Shores 12
By Mr. Edwards 185

E X H I B I T S

(Attached to transcript.)

BARAN DEPOSITION EXHIBITS PAGE
Exhibit 1001 ('569 IPR) U.S. Patent No. 8,541,569, Srivastava, et al., Phosphoramidites for Synthetic RNA in the Reverse Direction, Efficient RNA Synthesis and Convenient Introduction of 3'-End Ligands, Chromophores and Modifications of Synthetic RNA. 41

1 E X H I B I T S C O N T I N U E D
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5 ('707 IPR)	Srivastava, et al., RNA	
6	Synthesis-Phosphoramidites for	
7	Synthetic RNA in the Reverse	
8	Direction, and Application in	
9	Convenient Introduction of	
10	Ligands, Chromophores and	
11	Modifications of Synthetic RNA at	
12	the 3'-End.	
13 Exhibit 1003	Declaration of Phil S. Baran,	14
14 ('569 IPR)	Ph.D. in Support of Petition for	
15	Inter Partes Review of U.S.	
16	Patent No. 8,541,569.	
17 Exhibit 1003	Declaration of Phil S. Baran,	17
18 ('707 IPR)	Ph.D. in Support of Petition for	
19	Inter Partes Review of U.S.	
20	Patent No. 8,309,707.	
21 Exhibit 1004	Aerschot J. Med. Chem document re	132
22 ('569)	'569 patent.	

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4 Exhibit 1011	2000 Publication "Nucleotides,	141
5 ('707)	Part LXV, Synthesis of	
6	2'-Deoxyribonucleoside	
7	5'-Phosphoramidites: New Building	
8	Blocks for the Inverse	
9	(5'-3')-Oligonucleotide	
10	Approach," by Wagner and	
11	Pfleiderer.	
12 Exhibit 1012	Nucleic Acids Research article	148
13 ('707 IPR)	2003, "Light-directed 5'-3'	
14	synthesis of complex	
15	oligonucleotide microarrays," by	
16	Albert, et als.	
17 Exhibit 1014	U.S. Patent No. 5,869,696, Reddy,	153
18 ('707 IPR)	et al., "Universal Solid Supports	
19	and Methods for their use."	
20 Exhibit 2030	Organic Chemistry paper,	46
21	September 21,2018, "Unlocking	
22	P(V): Reagents for chiral	
23	phosphorothioate synthesis,"	
24	Knouse, et als.	

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1 E X H I B I T S C O N T I N U E D
2 (Attached to transcript.)

3 BARAN DEPOSITION EXHIBITS		PAGE
4 Exhibit 2031	Article "Enantiodivergent Formation of C-P Bonds: Synthesis of P-Chiral Phosphines and Methylphosphonate Oligonucleotides," by Dongmin Xu, et als.	50
10 Exhibit 2032	Article September 10, 2021, "A P(V) platform for oligonucleotide synthesis," by Yazhong Huang, et als.	52
13 Exhibit 2033	2021 Article "Nature Chose Phosphates and Chemists Should Too: How emerging P(V) Methods Can Augment Existing Strategies," by Knouse, et als.	53
18 Exhibit 2034	Research & Development Council of New Jersey Edison Patent Award, November 21, 2023.	20

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1 E X H I B I T S C O N T I N U E D
2 (Attached to transcript.)

3 BARAN DEPOSITION EXHIBITS		PAGE
4 Exhibit 2035	U.S. Patent Number 11,613,554, Schmidt, et al., Phosphorous (V)-Based Reagents, Processes for the Preparation Thereof, and Their Use in Making Stereo-Defined Organophosphorous (V) Compounds.	22
10 Exhibit 2036	Chemistry World article September 21, 2021, "Phosphorus(v) method to make unnatural oligonucleotides rivals industry standard," by Kira Welter.	103
15 Exhibit 2039	Businesswire article July 10, 2023, "Elsie Biotechnologies Announces Collaboration with GSK to Accelerate Oligonucleotide Discovery Technologies.	88
20 Exhibit 2042	ChemGenes v. Hongene, et als., Second Amended Complaint.	129

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1 E X H I B I T S C O N T I N U E D
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4 Exhibit 2043	U.S. Patent Application	36
5	Publication 2023/0212204, Xu, et	
6	al., Reagents and Their Use For	
7	Modular Enantiodivergent	
8	Syntheses of C-P Bonds.	
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10	No. 9,884,885.	
11 Exhibit 2045	Deposition Transcript of Phil S.	182
12	Baran, Ph.D., September 13, 2023.	

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1 P R O C E E D I N G S
2
3 THE COURT REPORTER: Good morning. My
4 name is Monique Vouthouris, representing Planet
5 Depos.
6 Today's date is Monday, January 22, 2024.
7 We are here for the deposition of Dr. Phil S. Baran,
8 in the matter before the Patent Trial and Appeal
9 Board, Shanghai Hongene Biotech Corporation,
10 Petitioner v. ChemGenes Corporation, Patent Owner,
11 IPR2023-00862 and IPR2023-00875.
12 Will counsel please identify themselves
13 and state whom they represent.
14 MR. SHORES: This is Dan Shores with
15 Rothwell, Figg in Boston, in our Boston office, and
16 with me here today is Adam Nicolais, who is in our
17 DC office, and we represent --
18 MR. EDWARDS: Go ahead, Dan.
19 MR. SHORES: -- the patent owner, we
20 represent the patent owner.
21 MR. EDWARDS: Dan -- this is Jeremy
22 Edwards from Procopio, Cory representing the witness
23 and the petitioner.
24 Dan, I think you may also have some party
25 representatives joining us. Could you identify

1 them, please, for the record.
2 MR. SHORES: Yes. Thanks. Thank you,
3 Jeremy. Yes, also joining here via Zoom is Anuj
4 Mohan, who is the COO from ChemGenes, and also
5 joining is Kevin O'Connor, who is the general
6 counsel at ChemGenes, and also Jeremy Little from
7 ChemGenes Corporation.
8 PHIL S. BARAN, PH.D.,
9 being first duly sworn or affirmed by the Notary,
10 testifies as follows:
11 EXAMINATION
12 BY MR. SHORES:
13 Q Good morning, Dr. Baran.
14 A Good morning.
15 Q Or is it good afternoon? I don't know
16 what the time --
17 A No, it's 10 o'clock here.
18 Q All right. So we're not that far off
19 sync.
20 A No.
21 MR. SHORES: So today's deposition will be
22 -- this is a statement for the record.
23 Today's deposition is being taken in
24 connection with two IPR proceedings. And this is
25 something that we, counsel -- Hongene counsel and I

1 have discussed before, you know, going on the
2 recording, going on the record. But the IPR, this
3 single deposition sitting will be for IPR2023-00862
4 relating to U.S. Patent Number 8,541,569 and IPR
5 number 2023-00875, relating to U.S. Patent Number
6 8,309,707.
7 And while we reserve the right for the
8 full seven hours for -- allotted to patent owner for
9 each examination, we believe, with everyone's
10 cooperation, that we will not have to use the full
11 allotted time and can conduct the depositions for
12 both matters today here in one sitting.
13 So I wanted to state that for the record.
14 BY MR. SHORES:
15 Q So, okay, Dr. Baran, so we've -- we've had
16 a previous deposition together, and we went over
17 some ground rules.
18 Do you remember those ground rules that we
19 covered?
20 A Yes, sir. Yes, sir, I do.
21 Q Okay. I'm not seeing a need to really go
22 through all of those, but I will touch on a few of
23 them.
24 You understand you're under oath, correct?
25 A Correct.

1 Q Okay. You understand that this deposition
2 is being videotaped via Zoom, right?
3 A Correct.
4 Q And you understand that counsel can make
5 concise objections to my questions, but your counsel
6 is not allowed to make speaking objections or to
7 coach you on your answers.
8 Do you understand that?
9 A Yes.
10 Q And you understand that unless counsel
11 instructs you not to answer my questions, unless
12 it's for the purposes of privilege, you must answer
13 my questions.
14 Do you understand?
15 A Yes.
16 Q Is there any reason why you feel you would
17 not be able to provide full, truthful testimony
18 today?
19 A No, sir.
20 MR. SHORES: Okay. Okay. I would like to
21 introduce previously marked Petitioner's Exhibit
22 1003, for the '569 -- for the matter relating to the
23 '569 patent.
24 (Exhibit 1003 ('569 IPR) marked for
25 identification.)

1 Q And then, Dr. Baran, can you see this
2 Exhibit?
3 MR. EDWARDS: I believe the witness is
4 muted.
5 A Yes, I can. Sorry, my mute -- my audio
6 button disappeared, so I'll just leave it on.
7 Q No problem. And then are you able to
8 navigate this document?
9 A No, but I can open the same document, if
10 you would like, and be able to navigate it, whatever
11 you like.
12 Q Okay. I would like you -- maybe the
13 technician can give you control to be able to
14 navigate on your end.
15 THE TECHNICIAN: Yes. The witness does
16 have remote control and we can see the cursor moving
17 around. So you should be able to -- yes.
18 Q Do you want to see how --
19 A That's cool. I've never done that before.
20 Super cool. Okay. Great.
21 Q Okay.
22 A Awesome.
23 Q And so do you recognize this document,
24 Dr. Baran?
25 A Yes, sir. Yes, I do.

1 Q And this is a copy of the declaration you
2 submitted in IPR2023-00862, right?
3 A Correct.
4 Q Okay. If you move down to page 45 of
5 the -- page 45, which is the legend at the bottom.
6 A Sorry. There's a little lag here.
7 Q Right.
8 A 45, 43. One second.
9 Q 45.
10 A 45. With my signature, okay.
11 Q Right. And that statement says, "I
12 declare under penalty of perjury under the laws of
13 the United States of America that the foregoing is
14 true and correct."
15 And is that your signature?
16 A Yes, sir.
17 Q Okay. And so is it correct that you
18 reviewed and verified the statements in this
19 declaration before you signed this declaration?
20 A Yes. There is, though -- let me see if
21 this is the one that has some typos. No, this one
22 is good. Yeah, the other one has some typos in the
23 table of contents.
24 Q Yes.
25 (Court Reporter clarification.)

1 THE WITNESS: I hear you loud and clear.
2 Q Okay. So for this Exhibit 1003 for the
3 '569 patent, you still agree with the statements
4 that you made in your declaration; is that correct?
5 A Yes, sir.
6 MR. SHORES: Okay. So if we can now take
7 this exhibit down and put up Exhibit 1003 from the
8 IPR involving the '707 patent.
9 (Exhibit 1003 ('707 IPR) marked for
10 identification.)
11 Q Dr. Baran, do you see this?
12 A Yes, sir, I do.
13 Q And is this a -- do you recognize that
14 this is a copy of the declaration that you submitted
15 in IPR2023-00875?
16 A Yes, this is it.
17 Q Okay. And then if you go to page 48.
18 A Okay.
19 Q Do you see where it says, "I declare under
20 the penalty of perjury under the laws of the United
21 States of America that the foregoing is true and
22 correct"?
23 Do you see that?
24 A Yes, I do.
25 Q I read it correctly?

1 A Yes.
2 Q And that is your signature?
3 A Yes.
4 Q Okay. And I believe you said earlier that
5 you had some comments on some typos that you wanted
6 to point out?
7 A Yeah. The -- I didn't do this table of
8 contents. It was a clerical error on the Procopio
9 side. But as you can see here, all of these error
10 things are like from Word. This table of contents
11 is a little messed up. But I didn't -- the contents
12 of the document is correct. It's just the table of
13 contents is a little screwy. Sorry about that.
14 Q Microsoft Word has its own skill set some
15 aspects, so...
16 A Indeed.
17 Q Okay. So other than the errors in the
18 table of contents and other I guess typographical
19 errors, you still agree with the statements that you
20 made in this declaration; is that correct?
21 A Yes, sir.
22 Q Okay. Thank you.
23 Okay. Now, you've -- you have, you know,
24 published papers, and, you know, a number of pages,
25 over 250 papers you've published. And you've --

1 you've published also in regard to oligonucleotides,
2 you've published papers relating to P(V) -- P(V)
3 chemistry; is that right?
4 A We've published on P(V), and as part of
5 that, done P(III) chemistry as well. In general,
6 oligonucleotide synthesis at large.
7 Q Okay. But with respect to P(V), you've
8 published on P(V) before, right?
9 A In those publications there's P(III)
10 chemistry in there as well.
11 Q Understood. Understood. But I just want
12 to talk about P(V) right now.
13 Would you consider P(V) to be an area that
14 you've, you know, an area of expertise of yours,
15 P(V) chemistry as it relates to reagents used in
16 oligonucleotide synthesis?
17 A I wouldn't put myself in a sandbox on P(V)
18 only. I've consulted broadly on P(III) for well
19 over a decade, that's how I was aware of problematic
20 aspects of certain parts of P(III).
21 So I would consider myself well-versed on
22 P(III) chemistry, P(V) chemistry, the history of
23 oligonucleotide synthesis, which actually originated
24 with P(V), not P(III). So, yeah, I think regardless
25 of the phosphorus oxidation state, I'm well aware of

1 the field.
2 Q With respect to P(V), I mean, do you
3 consider yourself to be an expert in P(V) chemistry
4 as it relates to a reagent for use in
5 oligonucleotide synthesis?
6 A Yeah. As I said P(III), P(V), either one,
7 mm-hmm.
8 Q So the answer is -- is it yes, that you
9 are an expert in P(V) chemistry as it's utilized as
10 a reagent for oligonucleotide synthesis?
11 A Yeah.
12 Q Okay. And you and your -- some of your
13 colleagues won the Edison Patent Award last year,
14 right?
15 A Yes.
16 Q Congratulations.
17 A Thanks.
18 MR. SHORES: And so if we can pull up
19 Exhibit 2034 for Dr. Baran.
20 (Exhibit 2034 marked for identification.)
21 Q And this is -- do you see this document --
22 A Yes.
23 Q -- Dr. Baran?
24 A Yes, I do.
25 Q And have you seen this document before

1 today?
2 A I don't -- I don't recall reading this
3 document, no. I don't --
4 Q Why don't you take a few minutes -- sorry
5 to interrupt. Do you want to take a few minutes to
6 scan it, that's fine.
7 A It's okay. You can go to your question.
8 Q Okay. Sure. On this page here, which
9 we --
10 A Sorry.
11 Q That's okay.
12 I guess that would be page 3 of the PDF,
13 which is with the heading "2023 Edison Patent Award
14 Winners." Do you see where it says "Bristol-Myers
15 Squibb"?
16 A Yes.
17 Q Would you mind -- I'm sorry. Do you see
18 where it says "Bristol-Myers Squibb" and it says --
19 actually, could you read that into the record, that
20 first sentence?
21 A Sure. It says, "Bristol-Myers Squibb and
22 its inventors, Michael Schmidt, Martin Eastgate, Bin
23 Zheng, Ivar McDonald, former employees Richard Olson
24 and William Ewing, along with Scripps Research
25 inventors Phil Baran and former Scripps Research

1 inventors Kyle Knouse and Justine de Gruyter, were
2 recognized with a patent award in the biotechnology
3 category for 'Phosphorus (V)-based reagents,
4 processes for the preparation thereof, and their use
5 in making stereo-defined organophosphorous (V)
6 compound.'" And then U.S. 11,613,554.
7 Q Okay. Thank you.
8 And are you proud of this award?
9 A I'm not really proud of any awards, but
10 that's just a personal thing. I have no role in
11 nomination for this. In fact, I actively discourage
12 anyone from nominating me for anything.
13 MR. SHORES: Okay. If we can pull up
14 Exhibit 2035, please.
15 This looks like it's labeled Exhibit 2034,
16 but this is actually the Exhibit 2035 I was seeking
17 to discuss.
18 THE WITNESS: Okay.
19 MR. SHORES: So just for the -- for our
20 technician.
21 (Exhibit 2035 marked for identification.)
22 Q So, Dr. Baran, do you see this patent?
23 A Yes, sir.
24 Q And is this the same patent that was
25 referenced in the article we just looked at?

1 A Yes, sir.
2 Q Okay. And the title is "Phosphorus
3 (V)-Based Reagents, Processes for the Preparation
4 Thereof, and Their Use in Making Stereo-Defined
5 Organophosphorus (V) Compounds," right?
6 A Yes.
7 Q I read that correctly, right?
8 A Yes, sir.
9 Q And so this patent -- what is this patent,
10 you know, directed to?
11 A Well, we can go to the claims, but broadly
12 speaking, it's to encompass a new set of reagents
13 that enables the synthesis of -- not limited to, but
14 mainly focusing on stereo-defined oligonucleotides,
15 but also oligonucleotides that don't have a sulphur
16 atom in them as well. So an alternative method for
17 making phosphorus (V) containing compounds that is
18 advantageous, especially when one cares about stereo
19 purity at the internucleotide bond -- when you've
20 got a phosphorothioate, for example.
21 (Court Reporter clarification.)
22 A When you have got a phosphorothioate
23 specifically.
24 Q Okay. And if we can turn to -- it would
25 be the fourth page of the PDF here.

1 A Okay. I'll try to scroll down.
2 Q So it would be Figure 2.
3 A Here we go, how's that.
4 Q That's good. And actually, just the next
5 one.
6 A The next one, okay.
7 Q Yeah, Figure 2. Okay.
8 So what does this figure represent,
9 Dr. Baran?
10 A This figure represents a general cycle for
11 the use of P(V)-based scaffold to form in a
12 canonical coupling cycle form oligonucleotide bond
13 linkages wherein there is stereo control at the
14 phosphorus atom.
15 Q Okay. So if we look at the top, I guess
16 looks like there's a compound above that's listed
17 above load?
18 A Yes.
19 Q And what is that compound?
20 A That would be a nucleoside with a free 5
21 prime OH group and it is connected at the C3 prime
22 to a resin solid.
23 Q So like a solid support?
24 A Exactly, mm-hmm.
25 Q And so then that's like a starting

1 compound?
2 A Yes, sir.
3 Q And is that something that is -- I mean,
4 is that a complex compound or that's something
5 that's just easily synthesized or can get off the
6 shelf? Like, how would you describe that -- that
7 compound?
8 A Well, it depends on the nature of the
9 linker and the resin. In general, it's a standard,
10 you know, standard type of compound that one would
11 prepare. Certainly not one that would be, you know,
12 of difficulty or complexity for a POSA to prepare.
13 Q It's not a phosphoramidite, though, right?
14 A No.
15 Q So it's just -- it has a nucleoside solid
16 support, which is the resin, and then at the -- I
17 guess at the -- I guess that's the 5 prime it will
18 have the OH?
19 A Correct.
20 Q Okay. And then the compound to the right
21 of that, I guess, I guess at 1 o'clock or 2 o'clock,
22 or the next compound as you go in the clockwise
23 direction, what is that compound?
24 A That is what we would refer to -- and I'll
25 say it slowly -- as an oxathiaphospholane ring

1 system.
2 Q Okay. And is that compound, which I am
3 not going to attempt to restate what you just said,
4 but is that compound, you know, a compound that
5 you -- you helped develop?
6 A Compounds of this sort are what are part
7 of the key part of the invention. One of them is
8 depicted here, but there are many others in the --
9 that are claimed of this ring type.
10 Q Okay. And then so what happens in the
11 next step, you know, as you continue to go clockwise
12 in this Figure 2 of the '554 patent?
13 A Certainly. So the next step is the
14 loading of that oxathiaphospholane ring system on to
15 that 5 prime OH.
16 Shall I continue?
17 Q Yes, please.
18 A And then continuing on, another nucleoside
19 is coupled generally, again, at the 3 prime 3OH, and
20 that leads to a coupling event that then liberates
21 the oxathiaphospholane ring system by what we depict
22 here as a self-immolation, which basically means it
23 falls apart and liberates the -- in the case of X
24 equal to O and Y equal to S, a phosphorothioate
25 internucleotide bond.

1 Following that, the DMT, or trityl,
2 usually a DMT, is de-protected under acidic
3 conditions, and that then liberates another 5 prime,
4 which can be brought into the same cycle again.
5 Q And then this continues to cycle and then
6 you build oligonucleotide this way, right?
7 A Exactly.
8 Q And if we look at the, I guess, the
9 backbone, which I believe is depicted under C5 prime
10 deprotection, that compound that's below C5 prime
11 deprotection, do you see that?
12 A Mm-hmm. Yes.
13 Q And is there -- there's a backbone
14 depicted there, oligonucleotide backbone?
15 A Well, once you get to -- what's depicted
16 here is a dinucleotide.
17 Q Okay.
18 A And an oligo would be two or more. So as
19 you continue to cycle, you stop whenever you reach
20 your desired length. But anything two or more is
21 considered an oligonucleotide. Although if you're
22 only making two, I would call it a dinucleotide.
23 Q Okay. So understood.
24 So this is a vertebrae, I guess, if we're
25 talking bones and --

1 A Yeah.
2 Q And that vertebrae or component or the
3 linker for that one monomer is depicted there.
4 Is that a natural backbone or vertebrae
5 of, in other words, what you would find in native
6 RNA or DNA, the P equals X PY?
7 A Well, it -- if X is equal to O and Y is
8 equal to O, that is a naturally occurring
9 phosphodiester, the type that underlies all the DNA
10 in our bodies or in nature.
11 Now, if X is equal to O and Y is equal to
12 S, or vice versa, however you want to draw the
13 resonance, that is a phosphorothioate. And to my
14 knowledge, those don't exist in nature. Those were
15 invented 30, 40 years ago by a gentleman by the name
16 of Stec, I believe he was the one who invented it.
17 S-t-e-c.
18 And the purpose of the phosphorothioate --
19 and stop me at any time if I'm going too deep -- the
20 purpose of --
21 Q No.
22 A Okay. The purpose of the phosphorothioate
23 is to prevent these oligonucleotides from being
24 degraded very quickly by nucleases. So the main
25 breakthrough that was made many years ago, that

1 enabled compounds like this to be given to patients,
2 was the introduction of the stable internucleotide
3 bonds that don't get rapidly degraded, and, thereby,
4 allowing for an actual clinical use of these things.
5 Q Right. So there is a -- is it fair to say
6 there was a -- the modification to, and we'll refer
7 to it as the backbone because, you know, just assume
8 that it's oligonucleotide, but the modification to
9 the backbone is something that would help with
10 respect to therapeutics; in other words, the -- it
11 will be -- let me back up a second. Let me forget
12 that question.
13 Is it fair to say that these -- the
14 modified backbone, as it's depicted here, and if
15 it's not naturally occurring, the modified backbone
16 would be useful in therapeutics?
17 A It could be useful in therapeutics most
18 significantly, but it could also be useful for
19 diagnostics or probes or for an academic publication
20 where one is trying to, you know, probe some sort of
21 in vitro analysis.
22 So it could have a variety of uses. The
23 most famous of them would be this enables you to use
24 such compounds in a human or veterinary or medical
25 scenario.

1 Q So is it fair to say that the difference
2 between a natural oligonucleotide that, you know,
3 say, for example to -- to RNA, that has native
4 phosphodiesters, that would react a lot differently
5 than a modified oligonucleotide, you know, to say
6 RNA, that uses phosphorothioates?
7 A React differently in the context of the
8 body as a therapeutic, yeah. So --
9 Q And you might have explained -- sorry to
10 interrupt.
11 A No, no. That's all right. I mean, it
12 just incurs a much higher level of stability so that
13 your body doesn't instantly just chew it up with
14 nucleases like Pac-Man and then it's gone.
15 Q Okay. Okay. I get it.
16 So it's a modification that was made --
17 modification that was made to -- to have higher
18 stability, you know, as compared to the natural
19 phosphodiester --
20 A You got it, yes.
21 Q Okay. And so this process -- coming back
22 to Figure 2, this process can be applied and can
23 produce an oligonucleotide with native
24 phosphodiesters, right?
25 A Exactly.

1 Q And also it can produce oligonucleotides
2 with phosphorothioates as well.
3 A Exactly, you got it.
4 Q And would you say that a key to the
5 invention is -- and you might have said this
6 already -- but a key to the invention is the fact
7 that it can be used to create oligonucleotides with
8 having the phosphorothioates?
9 A That's not the key, because you can use
10 P(III) -- people use P(III) all the time to make
11 phosphorothioates. However, it's very difficult to
12 control the stereochemistry when you do so.
13 So the key part of the invention is really
14 a few-fold. Number one, it can enable you to get
15 when you desire a phosphorothioate, high, complete
16 stereo purity at that internucleotide bond.
17 Number two, the rate of the couplings are
18 competitive with or on par with the super fast
19 kinetics of P(III) chemistry.
20 And number 3, the preparation of these
21 compounds is very simple and the intermediates are
22 stable and crystalline. And because you're going
23 through P(V), there are some efficiency advantages
24 that you can -- that are apparent relative to
25 P(III).

1 Q And what are the -- what would you say the
2 key differences between this approach and the P(III)
3 approach, phosphoramidite approach?
4 A Well, first, on first principles, you're
5 no longer dealing with an oxidation state change.
6 So in the canonical coupling cycle for P(III),
7 there's going to be an oxidation step where you need
8 to take P(III) to P(V), number one.
9 Number two, often there's extra protecting
10 group chemistry needed for P(III), which you don't
11 have in this invention.
12 And number three, it's often very
13 difficult to get complete stereo purity when you're
14 using P(III); whereas, the P(V) manifold outlined in
15 this patent and the related publications is
16 demonstrated to give to the limits of analytical
17 detection only one isomer at phosphorus.
18 Q And isn't it correct that P(V) chemistry
19 is sort of like -- isn't that -- isn't that how --
20 isn't P(V) chemistry occurring naturally?
21 A Sure. In fact, there are very few
22 examples in nature of P(III) oxidation state. There
23 are -- P(III) exists in nature. There's some rare
24 examples of it in biosynthesis. You know, on the
25 planet Venus I think the atmosphere has a lot of

1 P(III) in it. But in general, the building blocks
2 of nature that keep us all alive here today are
3 based on P(V) chemistry.
4 Q Based on P(V). But is your -- is this
5 chemistry, this breakthrough, does it mirror nature?
6 How is it different than nature?
7 A Oh, well, first, nature doesn't make
8 phosphorothioates, to my knowledge. I don't know, I
9 mean, maybe there's some random publication out
10 there that shows that there's a phosphorothioate in
11 nature. I don't know. I haven't seen it --
12 (Simultaneous speaking.)
13 A Yeah.
14 Q I'm sorry. You go ahead. You finish your
15 answer.
16 A But nature generally doesn't make
17 phosphorothioates. You certainly don't find any in
18 a biological organism like a dog or a cat or a human
19 where the body is making phosphorothioates. So that
20 is the first fundamental difference.
21 But if we're just talking about a
22 phosphodiester, then, sure. Nature uses -- you
23 know, her way of making oligonucleotides is solely
24 through the use of P(V), mm-hmm.
25 Q And is it correct that the first DNA

1 sequences were synthesized using P(V), the P(V)
2 approach?
3 A Yeah. And I think I outline that history
4 in my declaration, mm-hmm.
5 Q And tell me about how, you know, how and
6 why the field moved to P(III).
7 A Well, the breakthrough in the '70s by
8 people like Letsinger and Caruthers and Beaucage,
9 many others, there were many involved, Caruthers is
10 the paramount figure in that area, was the finding
11 that the coupling rates were far faster with the
12 phosphoramidite P(III) reagents, and that led to a
13 revolution. And companies like, you know, Hongene
14 and ChemGenes and Glen and all the other, you know,
15 famous oligo reagent suppliers, and as well as a lot
16 of companies that make oligonucleotide machines,
17 were born as a consequence of the, you know, awesome
18 power and great coupling efficiency of P(III)
19 chemistry. So it definitely was a revolution in the
20 field.
21 Q And how do you view P(V) chemistry
22 vis-a-vis P(III)? Is this the next generation?
23 How would you describe the P(III)
24 platform -- P(V) platform? Excuse me.
25 A When you say the P(V) platform, are you

1 referring to what we've patented?
2 Q Yeah, sure, we can use that as an example,
3 what's been patented. Like, for example, this, you
4 know, reagents relating to the compound that's shown
5 in Figure 2.
6 A Well, these are newcomers to the block.
7 What I can say is that a lot of companies
8 are using it for the purpose of generating
9 stereopure internucleotide bond linkages. I think
10 it's complementary to P(III). It has some distinct
11 advantages which is why many companies have started
12 to use it.
13 But as I said, it's complementary. So I
14 don't think we're going to see this disappearance of
15 P(III) chemistry any time soon. But it's just --
16 you know, organic chemists like to engage in the
17 practice of giving the practitioner, in an academic
18 setting like we did, of giving the practitioner
19 other options.
20 So never in our studies was the goal, oh,
21 we're going to do something that will make P(III)
22 obsolete. Rather, it's just, oh, here's something
23 that could be really useful, that's it.
24 Q And it would give chemists an option; they
25 could use either the P(III) phosphoramidite or they

1 could use the P(V) reagent?
2 A Precisely.
3 Q Okay. But you're not proud of this --
4 you're not proud of this achievement?
5 A I'm proud of my students. I'm proud of,
6 you know, when the lab is able to do something
7 useful. But, I mean, it's -- this is not -- this is
8 a deposition on facts, not on psychology. But my
9 psychology is just I, you know, I don't rest on
10 laurels and pride comes before a big fall. So I do
11 work, I hope it's useful, and then I move on.
12 Q Okay.
13 MR. SHORES: All right. Could we see
14 Exhibit 2043. Okay.
15 (Exhibit 2043 marked for identification.)
16 Q Dr. Baran, this is another exhibit marked
17 Exhibit 2043.
18 Do you recognize this document?
19 A Yes, sir.
20 Q And what is this?
21 A This is another chapter on P(III)
22 chemistry. In this case, related reagents are used
23 now to make carbon phosphorus bonds, again, with
24 high stereo purity by taking advantage of the P(V)
25 oxidation state.

1 Q Okay. And this is a patent application,
2 to your understanding, right?
3 In other words, have you been notified --
4 I'm sorry. Do you recognize this as being a patent
5 application?
6 A Patent application, yes. I don't know if
7 the patent was granted or not. I don't -- I have no
8 idea.
9 Q Okay. Is this relating to the same work,
10 this patent application, does it relate to the same
11 work that was conducted in connection with the '554
12 patent?
13 A It's related. It's a very -- it's a
14 different spin on things. So the prior work we just
15 talked about was focused on internucleotide bond
16 linkages, making oligonucleotides, forging
17 phosphorothioates --
18 (Court Reporter clarification.)
19 A So the prior work was focused on making
20 oligonucleotides, phosphodiesters,
21 phosphorothioates, those kinds of -- those kinds of
22 heteroatom phosphorus bonds. In this work, we were
23 focused on making carbon phosphorus bonds in a
24 stereo-defined fashion.
25 Q Okay. And to your knowledge, there hasn't

1 been a patent granted relating to this application;
2 is that right?
3 A I don't know. I don't follow it.
4 Q Okay. Did you participate in the -- in
5 the drafting of this? Did you review any of the
6 drafts, for example?
7 A Yes. We deposited, you know, the -- we
8 gave to the attorney -- I forget if the attorney was
9 at Scripps or was at BMS. I think it was at BMS,
10 Elliot was his name, I think. We, you know, gave
11 all of our data and the publication before it came
12 out, all that text. And then the attorney turned
13 that into a patent draft and we all reviewed it,
14 that kind of thing.
15 Q And did you go through that same or
16 similar process with respect to the '554 patent?
17 A Yes, sir.
18 Q And do you recall signing an oath or
19 declaration in connection with the '554 patent?
20 A Yes, we signed for everything. Yes.
21 Q You recall signing an oath or declaration
22 in connection with this application here, the
23 Exhibit 2043, which is application 17/758898?
24 A Yes, sir.
25 MR. SHORES: If we can pull up Exhibit

1 2044.
2 (Exhibit 2044 marked for identification.)
3 Q Are you familiar with this document,
4 Dr. Baran?
5 A I believe this is one of the documents --
6 this is in the prosecution history of the '885
7 patent?
8 Q Okay. I'll maybe refresh your
9 recollection. This is the patent owner's response
10 that was submitted in connection with the sister
11 proceeding related to the '885 patent. If you want
12 to scroll --
13 A Yeah, let me --
14 Q I'm going to use a figure in here to aid
15 the -- aid the examination.
16 A Yeah, yeah, uh-huh. Okay. I do recognize
17 this document. Yes. Okay.
18 Q Okay. And if you could go to page 13.
19 A Okay.
20 Q Okay. And you see there's a -- what is
21 depicted in the figure on page 13?
22 A It's an oligonucleotide. In this case,
23 RNA, a piece of RNA.
24 Q Okay. Exemplary oligonucleotide; is that
25 fair?

1 A Yeah. For RNA, yes.
2 Q RNA, okay. And then is -- what type of
3 backbone are we looking at here, what types of
4 linkages?
5 A Those are all phosphodiesters.
6 Q Okay, phosphodiesters. And we talked
7 earlier about those being natural --
8 naturally-occurring backbone?
9 A Yes, sir.
10 Q Okay. And then if we go to page 14, what
11 would you say is depicted there?
12 A You know, you could call it a chimeric
13 oligonucleotide. You could call it an
14 oligonucleotide with, you know, natural and
15 unnatural riboses. But it would be correct to call
16 it a chimeric oligonucleotide because it has within
17 it some DNA, some RNA, and some analogs of DNA and
18 RNA.
19 Q Okay. And so if we go to back to page 13,
20 could this oligonucleotide be synthesized using P(V)
21 reagent method that you've invented?
22 A Yeah, we have. Other people have as well,
23 yes.
24 Q When you say "other people have as well,"
25 what do you mean?

1 A Other companies.
2 Q What other companies?
3 A Well, other companies that are making, you
4 know, oligonucleotide analogs are, but I don't know
5 if I can reveal names without breaching
6 confidentiality. I can say, without getting in
7 trouble, my own company, Elsie, has made such
8 compounds using P(V).
9 Q Right. And so, similarly, if you go to
10 page 14, could this oligonucleotide -- chimeric
11 oligonucleotide be synthesized using P(V) chemistry?
12 A Yeah.
13 Q Okay. This could also be synthesized
14 using phosphoramidites, right?
15 A For sure.
16 Q And then back on page 13, this
17 oligonucleotide could be synthesized using
18 phosphoramidite chemistry, right?
19 A For sure.
20 MR. SHORES: Okay. If we can go to
21 Exhibit 1001 in the '569 IPR. Shifting gears here.
22 (Exhibit 1001 ('569 IPR) marked for
23 identification.)
24 Q And if we can go down to -- so do you
25 recognize this document, Dr. Baran?

1 A Yes, sir.
2 Q And what is this document?
3 A This is what I refer to as the '569
4 patent.
5 Q Okay. And if you can scroll down to the
6 claims, which appear at the end --
7 A Give me a second to navigate this.
8 Q Yeah. It's pretty fast.
9 Okay. And you see claim 1?
10 A Yes, sir.
11 Q Okay. Could -- could P(V) reagents be
12 used to synthesize any of the molecules -- I'm
13 sorry, let me back up.
14 Can we go to column 98, actually.
15 A 98, give me a second. 98, okay.
16 Q Yeah.
17 A Almost there. Okay. 98. Column 98.
18 What line?
19 Q Yeah --
20 A I was at 98 and then -- there we go.
21 Q Yeah, I have to catch up here.
22 A Sorry. There we go. 98.
23 Q And do you see the table that says,
24 "Oligonucleotide sequence synthesized by reverse
25 synthesis method"?

1 A Mm-hmm.
2 Q Could P(V) reagents be used to create this
3 -- the oligonucleotides set forth in this table?
4 A Well, I need to study. It's possible that
5 we would need to change some of the protecting
6 groups to make the efficiency better. But if you
7 mean could it make the oligonucleotide after it's
8 been completely deprotected, then I think my answer
9 would be yes.
10 But if you want the exact compound that's
11 depicted before deprotection, the yield might be
12 lower because we would recommend using a different
13 protecting group at the 2 prime position.
14 Q Right. And this would be after
15 deprotection, so this is really just
16 oligonucleotide.
17 A Oh, okay. Then my opinion would be yes.
18 Q Right.
19 MR. SHORES: And if we can go to Exhibit
20 1001 of the '707 IPR.
21 (Exhibit 1001 ('707 IPR) marked for
22 identification.)
23 MR. EDWARDS: Dan, you might want to check
24 the sticker, it says "'709" instead of --
25 MR. SHORES: Yeah, the exhibit number

1 should be -- in the parentheses should be '707 and
2 not '709. So we just want to fix that.
3 Q And, Dr. Baran, do you recognize this
4 document?
5 A Yes, sir.
6 Q And what is this document?
7 A This is what we've colloquially referred
8 to as the '707 patent.
9 Q Okay. Thank you. And if you can scroll
10 to column 27.
11 A One second. Getting there.
12 And you said 27?
13 Q Yes, sir.
14 A 27. There we go.
15 Q And you see Table 5 up in the upper left
16 corner?
17 A Yes.
18 Q Could P(V) reagents be used to create any
19 of the oligonucleotides disclosed in Table 5? We're
20 talking about the finished oligonucleotide.
21 A Well, my opinion would be yes.
22 Q Okay. Your understanding is that -- is it
23 correct that your understanding is that the '707
24 patent and the '569 patent relate to reverse RNA
25 synthesis?

1 A That's part of what the title is. It's
2 the first two claims are just for a specific
3 compound.
4 Q Right.
5 MR. SHORES: If the technician can take
6 the exhibit down.
7 Q So in terms of the, you know, reverse RNA
8 synthesis, can you describe what your understanding
9 of reverse RNA synthesis is, you know, going from
10 the 5 prime to the 3 prime direction?
11 A Well, this is outlined in my -- in my
12 declaration as well. But the name is -- it's aptly
13 named because of instead of building up by coupling
14 at the 3 prime, you know, normally you would put a
15 phosphoramidite at the 3 prime position. In this
16 case, by doing it in the reverse, you're putting the
17 phosphoramidite at the 5 prime position. So that's
18 why they are referred to as reversed.
19 Q Okay. And can P(V) reagents be utilized
20 in a process for reverse RNA synthesis?
21 A On first principles, I don't see a reason
22 why it couldn't be. I believe we may have done
23 couplings like that. But, I mean, there's nothing
24 on a basic reactivity level that would prohibit one
25 from doing that.

1 Q And have you ever done that before?
2 A I believe we did do a reverse coupling in
3 the context of making cyclic dinucleotides where we
4 appended -- where we did do that, yeah.
5 Q When was that? When did you do that?
6 A I think it was in the 2018 science paper,
7 I believe it was in there.
8 Q And when you said "we did that," which
9 group did that?
10 Was that with Scripps?
11 A Scripps and BMS collaborative team.
12 MR. SHORES: Okay. All right. We have
13 been going for about an hour. I finished a line of
14 questioning. Is it okay to take a break now?
15 THE WITNESS: You're the boss.
16 MR. SHORES: Ten minutes? Ten minutes.
17 Okay.
18 (Recess 9:04 a.m. - 9:12 a.m.)
19 MR. SHORES: If we could put up Exhibit
20 2030, please.
21 (Exhibit 2030 marked for identification.)
22 BY MR. SHORES:
23 Q Okay. Dr. Baran, do you see this Exhibit
24 2030 put up on the screen here?
25 A Yes, sir.

1 Q And you recognize this document?
2 A Yes.
3 Q Okay. What is this document?
4 A This is one of our publications from 2018.
5 Q Okay. And if you see the -- you're listed
6 as an author here; is that right?
7 A Correct. Mm-hmm, yes.
8 Q And to the right of your name there's a
9 cross symbol.
10 Do you see that?
11 A Yes.
12 Q And then at the bottom of the paper, the
13 cross symbol indicates corresponding author?
14 A Mm-hmm, yes.
15 Q You're listed there; is that right?
16 A Yes.
17 Q Okay. So what is your understanding, or,
18 you know, what is meant by "corresponding author"?
19 A I mean, the senior corresponding author,
20 the last author is generally the one who is
21 responsible for the vision, the putting the team
22 together, you know, in charge of making sure the
23 data is rigorous and the conclusions are sound, and
24 in this case, you know, wrote -- wrote the majority
25 of the paper. So basically the person who led the

team.

Q Okay. And so you were also responsible for reviewing and signing off on this paper; is that right?

A Correct.

Q Is there anything in this paper that you don't agree with?

A I don't think so.

Q And if we look at the listing of the authors here, some of these individuals are affiliated with Scripps; is that right?

A Correct.

Q And which individuals are affiliated with Scripps?

A That would be Kyle Knouse, Justine deGruyter, Julian Vantourout, Cian Kingston, and that's it. And they were affiliated with Scripps at the time of the publication, but are no longer in my group.

Q Where are they now?

A So Kyle Knouse is working at a company that we co-founded together called Elsie. Justine is a lecturer at Texas A&M University. Julian Vantourout is now -- he was a professor at the University of Lyon in France, but now he's a

1 director at Syngenta, which is an agrichemical
2 company. And Cian Kingston works at another one of
3 my companies called Vividion in San Diego.
4 Q And which of these listed authors were
5 affiliated with Bristol-Myers Squibb at the time of
6 this publication?
7 A That would be Michael Schmidt, Bin Zheng,
8 Stephen Mercer, Ivar McDonald, Richard Olson, Ye
9 Zhu, Chao Hang, Jason Zhu, Changxia Yuan, Qinggang
10 Wang, Peter Park, and Martin Eastgate.
11 Q And if you turn to page 3 -- sorry. If
12 you turn to page 5 of this article, the end of the
13 article, it's not the last page, but it's the
14 penultimate page. There, right here. Yeah.
15 And do you see --
16 A This one? This one?
17 Q No, no. Next page. There you go.
18 A This one, okay.
19 Q And if you look at the upper right-hand
20 corner, there's a statement that says, "Competing
21 Interests," and it says, "A provisional U.S. patent
22 application on this work has been filed (application
23 62657551)."
24 Do you see that?
25 A Yes.

1 Q And does that refer to the -- a patent
2 application related to the patent that -- the '554
3 patent that your team won an award for last year?
4 A Yes, I believe so.
5 Q Okay. So this was really a joint effort,
6 the work that was conducted on -- that relates to
7 P(V) that's in this article and that's in the '554
8 patent, was a joint effort between the teams of
9 Scripps and Bristol-Myers Squibb, right?
10 A Yes.
11 Q And your understanding is there are other
12 articles that were written where you're an author
13 that relates to this work as well, correct?
14 A Yes.
15 MR. SHORES: If we can put up Exhibit
16 2031, please.
17 (Exhibit 2031 marked for identification.)
18 Q And, Dr. Baran, you see this Exhibit 2031?
19 A Yes, sir.
20 Q And what is this document -- have you seen
21 this document before?
22 A Yes. I wrote the paper.
23 Q Okay. What is this document?
24 A This is referring to the chemistry that we
25 talked about and the other one of the patent

1 application you had questioned me on earlier before
2 the break. In this article we're focused mainly on
3 making phosphorus carbon bonds in a stereospecific
4 fashion.
5 Q Okay. So this relates to the work in the
6 patent application that we looked at which was
7 Exhibit 2043; is that right?
8 A I'll assume your exhibit number is right,
9 but yes.
10 MR. SHORES: If we can put that up, just
11 for the record, can we put up Exhibit 2034, please.
12 (Court Reporter clarification.)
13 BY MR. SHORES:
14 Q Okay. So does this confirm your testimony
15 that the work that was done -- the work that's
16 reflected in the article we reviewed in Exhibit
17 2031, that this patent relates to that work, this
18 patent application relates to that work; is that
19 correct?
20 A Yes, sir.
21 MR. SHORES: So if we can put up Exhibit
22 2032, please -- actually, can we go back to 2031.
23 Q And here there are a number of authors
24 that are listed, and you're listed as an author,
25 correct?

1 A Yes.
2 Q And are there representatives from both
3 Bristol-Myers and Scripps here?
4 A Yes, there are.
5 Q Okay. Is there anything that you disagree
6 with in this -- in this article?
7 A I certainly don't think so.
8 MR. SHORES: Okay. And if we can put up
9 Exhibit 2032.
10 (Exhibit 2032 marked for identification.)
11 Q Dr. Baran, you recognize this document in
12 Exhibit 2032?
13 A Yes, I do.
14 Q And what is this document?
15 A It's a paper we published in 2021. I
16 wrote most of this paper.
17 Q Does this paper relate to the '554 patent?
18 A I believe there are aspects of this work
19 that are encompassed within the '554 patent.
20 Q If we move to page 6 of this, do you see
21 where it says "Interests"?
22 A Yes.
23 Q It says that those individuals that are
24 initialed are listed as inventors on U.S. Patent
25 Application Number 2019/0322694?

1 A Yes, I see that.
2 Q Okay. Okay. If we go back to the first
3 page. And, again, does the listing of authors here
4 represent a combination of members of both Scripps
5 and BMS?
6 A Indeed it does.
7 Q Thank you.
8 And do you disagree with anything that's
9 written in this paper?
10 A I don't think so, no.
11 Q And if we go to Exhibit 2033.
12 (Exhibit 2033 marked for identification.)
13 Q Do you recognize this document, Dr. Baran?
14 A Yes, sir.
15 Q What is this document?
16 A This is like a perspective review article
17 that we wrote to kind of summarize this emerging
18 area that we were working on.
19 Q And when you say "we were working on," who
20 was -- who is "we"?
21 A "We" is the -- primarily the Scripps team,
22 but jointly, of course, with Bristol-Myers Squibb.
23 Q Okay. If we move -- if you go to page
24 1482, which is the legend on the bottom.
25 Do you see that? Do you see where it says

1 "Corresponding Author"?
2 A Yes.
3 Q And you see where it says "Phil S. Baran -
4 Elsie Biotechnologies"?
5 A Yes.
6 Q So was this paper written on behalf of --
7 while you were, I guess, wearing your Elsie hat or
8 wearing your Scripps hat?
9 A Both, both addresses are given.
10 Q And this is dated September 10th, 2021,
11 correct?
12 A Correct.
13 Q And the prior exhibit, Exhibit 2032, is
14 also dated September 10th, 2021, right?
15 You have to go back --
16 A Correct.
17 Q So it seems that there are two papers that
18 were published on the same day; one indicates that
19 an affiliation with -- your affiliation with
20 Scripps, and the other reflects your affiliation
21 with Elsie, right?
22 A No.
23 Q Okay. Help me understand.
24 A Okay. If you look at the corresponding
25 author details, it says both Elsie and Scripps

1 there. So that's the -- because it's a review
2 article, I put both affiliations.
3 Q And do you recall the circumstances
4 surrounding when these were published?
5 They were published on the same day. Are
6 they -- do they relate to the same subject matter?
7 A Very -- yeah, the point of having this
8 come out on the same day was the science paper was a
9 big breakthrough, and this review was held in the
10 galley stage until that paper came out so that
11 people would have a broad perspective of where the
12 science paper fell into the entire field as a whole.
13 This is a review. So there's no new
14 primary data in this paper. It's just a review.
15 Q Okay. Does Elsie and Scripps have a
16 contractual relationship?
17 A Scripps has equity in Elsie.
18 Q Okay. Is there -- is there -- let me ask
19 you this. So how was Elsie formed? What's the
20 background on the formation of Elsie?
21 A So that's a fun story. How far back do
22 you want me to go?
23 Q From the beginning, if you can.
24 A Okay. So the student Kyle Knouse, who was
25 working on this -- who was the primary graduate

1 student working on P(V) chemistry in my lab, started
2 collaborating with a student in Phil Dawson's lab by
3 the name of Dillon Flood. That was, maybe, in
4 2020-ish time frame, during COVID. And they were
5 both on the same track to graduating at a relatively
6 similar time.
7 And all graduate students are faced with
8 this existential question of what to do in their
9 future career; do they do a post-doc, do they do --
10 go to industry, do they go into consulting, patent
11 law. So many different cool career options they can
12 choose. And the two of them decided that the
13 technology they had worked on and collaborated on
14 was profound enough that it would form the basis for
15 a company. And so they decided after they
16 graduated, that they would start Elsie.
17 And then in the meantime, I had been
18 working hard to try to get funding for that company.
19 We were able to identify an investor who put in a
20 seed round that enabled the company to begin. So
21 within a few weeks of their graduation, they had a
22 hood and they had supplies and they had a budget and
23 Elsie was born.
24 Q And the technology that Elsie is founded
25 upon is the P(V) reagent technology, right?

1 A I wouldn't say that. I would say one of
2 the largest value-generating aspects of Elsie is a
3 proprietary technology that was invented at Elsie.
4 After the -- Dillon and Kyle arrived
5 there, they had a really, you know, interesting idea
6 that was jointly conceived with myself and Phil
7 Dawson, who's another professor at Scripps that we
8 collaborated with and also a co-founder of that
9 company. And that technology, which is still a
10 trade secret, is a revolutionary way to identify the
11 very best sequence for a candidate oligonucleotide.
12 So it's a way of doing medicinal chemistry
13 on oligonucleotide in a very similar way to the way
14 you do medicinal chemistry on a small molecule. So
15 that is, I think, the what has so far been the
16 revenue-generating technology at that company.
17 They also have nonexclusive commercial
18 rights to use the P(V) technology within their
19 company, and they negotiated that with Bristol
20 Myers.
21 Q Okay. So Elsie has an agreement with
22 Bristol-Myers?
23 A Correct.
24 Q And who was the investor for Elsie that
25 you identified --

1 A The initial -- the initial investor for
2 Elsie was Sorrento Therapeutics.
3 Q Does Elsie -- so you're saying Elsie
4 in-licenses certain of the P(V) technology?
5 A They obtained nonexclusive license to use
6 and to be able to commercialize, and there are terms
7 associated with that contract.
8 Q Right. And then when you say "commercialize,"
9 what does that mean, like, sell the -- sell the
10 reagents?
11 A No, we wouldn't sell the reagents.
12 Meaning let's say we used the Elsie platform to
13 identify the very best oligonucleotide therapeutic
14 candidate and it has within it stereopure
15 phosphorothioate linkages. And then the way we
16 would -- the way we would make such a compound would
17 be using the P(V) sci technology, that is covered in
18 the papers we've all looked at today. And then when
19 a commercialization event happens, let's say it goes
20 all the way to FDA approval, you need a way to make
21 a lot of it. And so we have freedom to operate to
22 use sci to make that material.
23 Does that make sense?
24 Q Yeah. So you're able to use sci in order
25 to synthesize these -- these oligonucleotides, the

1 product, the commercial aspect would be the
2 oligonucleotide as a therapeutic?
3 A Exactly.
4 Q But you're allowed to use the reagents
5 internally, but you're not going to be in the
6 business of selling reagents?
7 A Exactly.
8 Q Yeah. So going back to the relationship
9 between Scripps and BMS, what is your understanding
10 of that relationship?
11 When did that -- when did this
12 relationship -- when was that relationship forged
13 relating to P(V) chemistry?
14 A Oh, that's another long story. You want
15 it from the beginning?
16 Q Yes, please.
17 A Okay. So more than a decade ago -- I have
18 been consulting with Bristol-Myers since around --
19 around 2005. And around 10 or -- 10 to 12 years
20 ago, I had the opportunity to pitch or pose to
21 executives at Bristol-Myers the formation of a
22 unique collaboration model between the research
23 institute and the company, Bristol-Myers. And as
24 part of that collaboration, they would work on
25 mutually exciting research projects with a number of

1 groups at Scripps, our group being one of them.
2 Roughly 2015 or so, Martin Eastgate, who
3 was a continuous collaborator of ours at
4 Bristol-Myers, asked us if we would be interested in
5 working on, you know, a way to fix the
6 stereochemistry problem associated with making
7 stereopure oligonucleotides bearing phosphorothioate
8 linkages.
9 And at that time this was an area that the
10 lab had not -- we had not been engaged in stereopure
11 oligonucleotide synthesis, so we viewed it as a
12 really cool opportunity to go beyond consulting,
13 just sort of giving out suggestions and actually do
14 something in our lab on this topic.
15 And so we assembled a team and we had
16 every two weeks biweekly meetings, and went back and
17 forth, thousands of experiments, many things didn't
18 work, some things did. It was long trials and
19 tribulations before the ultimate successful outcome
20 that, you know, you see in those various
21 publications.
22 Is there any detail I've missed?
23 Q No. I mean, you've generated a lot of
24 work here, it seems, from -- you know, based on P(V)
25 chemistry, you know, between the Scripps team and

1 the BMS team, and there were patents that were
2 generated as a result of that.
3 So I guess one question is: Are you
4 familiar with there being -- are you familiar with
5 the collaboration agreement -- are you familiar that
6 there -- that a collaboration agreement exists
7 between Scripps and BMS?
8 A Oh, of course, yeah.
9 Q Do you have a copy of that?
10 A I do -- I would have to obtain it. I
11 don't know if it's on my computer right now. But
12 if -- if Jeremy signs off on that, I'm sure I could
13 -- as long as Scripps doesn't think -- Scripps or
14 BMS doesn't think it's like a confidential
15 agreement, then I have no problem with sharing it
16 with anyone. But it's up to Jeremy and Scripps and
17 BMS. I have no idea.
18 MR. EDWARDS: I have no stake or guidance
19 in this, Dr. Baran. You're going to have to
20 determine for yourself whether that agreement is
21 confidential and can be disclosed to third parties,
22 and if so, under what circumstances.
23 There hasn't been a formal request for any
24 discovery in this case other than this deposition.
25 So we would have to go through the correct

1 procedures and consult with you regarding
2 confidentiality offline. We cannot do that on the
3 fly today.
4 THE WITNESS: Okay.
5 MR. SHORES: Well, I mean, Jeremy, we can
6 maybe talk off record relating to third-party
7 confidentiality. But the -- you know, this
8 deposition transcript can be marked highly
9 confidential, and then there are procedures in place
10 that would ensure the protection of third party --
11 you know, third-party confidential information.
12 And we -- we would certainly want copies
13 of some of these materials that we're going to be
14 covering and, you know, whether that's through a
15 formal document request or -- formal processes
16 through the -- through the PTAB or, you know,
17 through agreement, you know, with petitioner and
18 with these third parties to determine whether they
19 can just provide it to us. But we can talk about
20 that.
21 MR. EDWARDS: Yeah, I mean, for the time
22 being, Dr. Baran needs to use his own judgment and
23 not disclose during this deposition any information
24 that he has reason to believe is confidential --
25 regarded as confidential by some third party because

1 none of those protections are in place at the
2 moment.
3 MR. SHORES: We -- we are willing to mark
4 this transcript highly confidential. But if you're
5 saying that that's forming the basis for Dr. Baran
6 not to provide testimony whether he believes it's
7 confidential or not, then we will, you know, take
8 issue that we can call the -- call the Board to get
9 their ruling on that.
10 But unless it's privileged or work
11 product, there's -- there's really no basis to
12 refuse to provide testimony, especially when we are
13 agreeing to mark the transcript highly confidential.
14 MR. EDWARDS: Well, there's no protective
15 order in place. So marking it confidential doesn't
16 have any context or meaning, absent some prior
17 agreement that gives it meaning, and that prior
18 agreement would be a confidentiality order that's
19 been entered in these proceedings, which has not
20 happened.
21 This is the very first time right now that
22 you are broaching the subject of a protective order,
23 of marking this transcript confidential, of seeking
24 fact discovery, of seeking confidential -- discovery
25 of confidential materials either of a party or of a

1 third party. And so I'm not comfortable permitting
2 the witness to testify regarding confidential
3 information absent appropriate protections in place.
4 MR. SHORES: Okay. We can -- let's flag
5 that to call the Board. I think it's right to speak
6 with the Board about this.
7 MR. EDWARDS: That's fine. You want to do
8 that -- you want to take a break from the deposition
9 and do that today?
10 MR. SHORES: Yes. I mean, we're getting a
11 second -- we can come back and conduct another
12 deposition, but that's -- that's not an option. We
13 need to have this resolved today. And it's not our
14 confidential information to protect, so we wouldn't
15 be moving -- we wouldn't be a movant for a
16 protective order. That would be on your -- that
17 would be your call.
18 And the -- we would -- we would stipulate
19 to the Board's, you know, standard protective order.
20 But again, we would also mark this transcript highly
21 confidential and subject to the Board's, you know,
22 ruling on the protective order.
23 THE WITNESS: So counsel, if I may,
24 there's nothing to hide. It's a very simple
25 contract. And the only issue is if I had it on my

1 computer, I would be happy to just show it on the
2 screen and give it to you, it's fine by me.
3 The issue is I could get fired or the
4 contract with BMS could be terminated and I could be
5 in a big lawsuit if I did that without asking the
6 Office of Technology Development and then they have
7 to ask BMS. Like there's a procedure it has to go
8 through.
9 I mean, I can tell you in broad strokes
10 everything I know about the collaboration. But in
11 terms of getting a document like the contract
12 between Scripps and BMS which covers like eight
13 different research groups, I just don't know if I'm
14 allowed to do it without getting -- you know,
15 without being fired.
16 So, yeah, I'm happy to go through whatever
17 procedure. But it's a fairly simple contract;
18 there's nothing to hide in it.
19 MR. SHORES: Okay. Well, I guess there's
20 two different things, one is the -- and this is to
21 Jeremy, because I'll talk with Jeremy. We're not
22 looking for the documents sitting here today. What
23 we are looking for is answers to our questions --
24 you know, truthful answers to our questions that,
25 you know, whether they're confidential, whether you

1 deem those answers to be confidential or not, we're
2 entitled to that discovery, and so --
3 THE WITNESS: What did I not answer?
4 MR. SHORES: Excuse me?
5 THE WITNESS: What did I -- I've answered
6 everything. What do you want to know?
7 MR. SHORES: I'm not, with respect, I
8 didn't say --
9 THE WITNESS: Okay. Okay.
10 MR. SHORES: I'm saying I will be asking
11 questions and what I'm seeking is testimony, and if
12 you determine that that testimony is confidential,
13 you still must testify to that.
14 MR. EDWARDS: Hang on a second. So, first
15 of all, I lost my feed. Hang on.
16 Okay. I got it back.
17 I think the best next step is for you to
18 be asking the witness if he believes, sitting here
19 today, he is in possession of information that is
20 confidential to some third party. And if the
21 witness is comfortable answering questions and
22 doesn't feel there is some sort of risk of breach of
23 contract along the lines he just described, some
24 breach of confidentiality along the lines he just
25 described, then I am certainly not going to instruct

1 the witness not to answer if there's nothing
2 confidential of a third party at stake here.
3 So why don't we start by figuring out if
4 there is any risk based on what he thinks he knows.
5 MR. SHORES: Okay. That's fair. We can
6 proceed with -- in the sense of process, we don't
7 agree with how -- you know, your characterization of
8 your point of view on that. We believe that, you
9 know, the confidential information is certainly
10 discoverable, and there are procedures in place,
11 both on the trial practice guide, but also, you
12 know, with the marking it highly confidential, but
13 also agreeing to, you know, a protective order such
14 that the third-party confidential information is not
15 disclosed.
16 But let's -- we'll proceed -- I'll proceed
17 with questions and we can sort of navigate it that
18 way.
19 How does that sound?
20 MR. EDWARDS: Yeah. And I think for
21 Dr. Baran's benefit, I don't have the underlying
22 facts here, only Dr. Baran does, and only Dr. Baran
23 can figure out for himself if -- whether he believes
24 the information you're asking him to testify about
25 is confidential to some third party.

1 So, Dr. Baran, if you -- if you are asked
2 a question in this deposition that you believe
3 implicates third-party confidentiality concerns,
4 then you should say so. And then -- then and only
5 then will we have something that I think is ripe in
6 terms of a disagreement on how to proceed between
7 the counsel here.
8 But unless and until you've got some
9 confidential information that you're not comfortable
10 disclosing during this deposition, then we should
11 proceed.
12 MR. SHORES: Okay. Let's proceed. And
13 when I say "okay" it doesn't mean I agree with your
14 statement. It's just we'll proceed with the
15 questioning and we can address these as -- as, you
16 know, the need arises here.
17 MR. EDWARDS: Okay.
18 BY MR. SHORES:
19 Q So going back to your involvement with
20 Scripps -- first of all, are you a -- you're an
21 employee of Scripps, correct?
22 A Correct.
23 Q And you have been an employee of Scripps
24 for how long?
25 A Since 2003.

1 Q And then the work that Scripps did with
2 Bristol-Myers Squibb, the work that -- let me back
3 up.
4 You had some consulting relationship with
5 Bristol-Myers Squibb previously, correct?
6 A Yes, dating all the way back to I would
7 say -- could be wrong, but I believe the consulting
8 with BMS started around November of 2005.
9 Q Okay. And is that consulting -- did that
10 consulting relationship relate to P(V)?
11 A Not in 2005.
12 Q Was that consulting relationship with you
13 as an individual?
14 A Yes.
15 Q Okay. And what was the compensation of
16 that -- that consulting relationship with
17 Bristol-Myers?
18 A It fluctuated over time. I believe that a
19 formal exclusive consulting contract was codified in
20 2006, and I believe that the rate was -- for each
21 day it was about -- about $4,000 per day of
22 consulting. I think that was about the right
23 number, but I could be wrong. It's around that
24 ballpark.
25 And each day of consulting would be eight

1 hours of meetings, along with, you know, usually
2 dozens, if not hundreds of pre-read questions that I
3 would prepare for in the pre-COVID days before Zoom.
4 So, you know, lots of preparation with paper and
5 staying up all night on the red-eye flight preparing
6 the questions and answers to it.
7 And then the visits would be anywhere from
8 two or three days, sometimes a fourth day if there
9 was another site that they wanted me to go to. And
10 with each day, there was a bunch of pre-read
11 questions to address.
12 That's generally how -- how it works with
13 them. Now, these days, I don't have to travel. I
14 can do everything over Zoom.
15 Q And where are you traveling to during this
16 work with BMS in the 2005 time frame?
17 A Until around 2018, '19 is when things
18 became more virtual, WebEx, Teams, Zoom. Until that
19 period it was visiting their Connecticut site -- now
20 there's no more Connecticut site, but there was a
21 Connecticut site and New Jersey site. There was a
22 couple of New Jersey sites; one was Lawrenceville,
23 one was Hopewell, and another one was New Brunswick
24 which was a process site.
25 And then there were a couple of occasions

1 where I had to visit their San Francisco site, and
2 there were a couple of occasions where I had to
3 visit their newly-opened -- at the time their
4 newly-opened Cambridge, Massachusetts site.
5 Q Okay. And then do you still have a
6 individual consulting relationship with BMS?
7 A Oh, yes, mm-hmm.
8 Q Okay. And have you ever worked with BMS
9 as an individual on projects relating to P(V)
10 chemistry?
11 A As an individual. The lines are blurry.
12 So sometimes there would be consulting questions
13 related to it. But that was usually encompassed
14 within the collaboration with Scripps. And 99
15 percent of the consulting questions that I would get
16 as part of my individual consulting relationship
17 with the company pertained to issues of medicinal
18 chemistry, how to make a certain type of molecule,
19 the molecule could be a small molecule, it could be
20 a peptide, it could be a cyclic dinucleotide, it
21 could be oligonucleotide, it could be an antibody
22 drug conjugate. Anything you can imagine they work
23 on, that could be encompassed within the scope of
24 the types of questions I get routinely.
25 Q So did any of the consulting you've done

1 with BMS from the beginning 2005 time frame until
2 today involve P(V) chemistry?
3 A It's hard to say for me to parse out what
4 umbrella that would be under because the
5 relationship with them is so close. As I said, like
6 10 or 12 years ago, we started collaborating -- our
7 group and five or six other groups at Scripps,
8 academic groups at Scripps started collaborating
9 with them.
10 So sometimes I would get an email on a
11 question relating to P(III) or P(V), and as part of
12 my agreement with them, I answered their questions
13 to the best of my ability without regards to what
14 hat I'm wearing; am I wearing the hat of
15 collaborator that does research together or am I
16 wearing the hat of, you, know individual consultant.
17 Does that make sense? Because we're
18 super -- we have almost 20 years together. So I
19 take questions almost every -- every few days. Just
20 this weekend I got another question from them
21 randomly -- you know, they have hundreds of chemists
22 and they're welcome to email me any time with any of
23 their problems.
24 Q And is there -- who do you work with
25 primarily or who do you interact with primarily at

1 BMS?
2 A I interact with dozens of chemists there.
3 I mean, if you're asking who is like the person in
4 charge of consulting, is that the question?
5 Q Sure.
6 A So on the process side, the person who
7 primarily sends me my package for official
8 consulting business, the next one I think is next
9 week, would be Mike Schmidt, who is actually on the
10 screen right now. He's like in charge of consulting
11 relationships.
12 So for process chemistry, he'll get, you
13 know, all the teams together and say what questions
14 do we have for Phil, he's coming in a couple of
15 weeks. He puts a package together and sends out a
16 package with all the questions.
17 And then for the New Jersey sites, it's
18 Jeremy Richter. That's Jeremy, and then same as my
19 counsel spelled, and then the last name is
20 R-i-c-h-t-e-r. That's the current person who gets
21 the questions together for New Jersey.
22 For San Diego it's a mixture of various
23 people. And he -- and these people change over the
24 years. So they are the first people that are
25 currently in charge of sending those questions, but

1 over the years there is turnover and different
2 people are in charge of getting me those packages of
3 questions.
4 Q And you said you have a consulting
5 agreement with BMS and -- with BMS, correct, you as
6 an individual?
7 A Correct. Correct.
8 Q Do you have a copy of that document?
9 A My admin probably does. I -- I personally
10 have no problem with you having that document. I
11 mean, but I don't know where it is on my computer
12 now. And we can take a break, I can email my admin.
13 But after this deposition is over, I'm
14 happy to have Shelly find it and send it to you. I
15 don't see why it would be -- certainly there's
16 nothing in there that for me is confidential.
17 Q Are there any other -- is there a single
18 agreement or are there multiple consulting
19 agreements that you individually have with BMS?
20 A I mean, over the years it's basically the
21 same consulting agreement, but just the change of
22 date, and I think they increased the rate for
23 inflation over the years. But there's no, you know,
24 there's no big change over the years in the
25 consulting agreement.

1 Q Okay. Do you own shares in BMS
2 individually?
3 A I might through an ETF or Fidelity or
4 something like that. But, you know, in my private,
5 you know, accounts, not to my knowledge.
6 Q That wasn't part of your arrangement with
7 BMS?
8 A No.
9 Q All right. If we now go over to Scripps,
10 in the work that Scripps conducted with BMS that
11 generated this IP that, you know, based on P(V)
12 chemistry --
13 A Yes.
14 Q -- you testified earlier that there is a
15 collaboration agreement between the Scripps and BMS,
16 as would be expected, right?
17 A Correct.
18 Q Okay. Do you know if BMS sells P(V)
19 reagents?
20 A They do not.
21 Q You know that for certain?
22 A Yes.
23 Q And do you know if BMS has collaborated
24 with another party in order to sell P(V) reagents?
25 A I believe they have an agreement with

1 Sigma-Aldrich, which is now I think owned by Merck
2 KJA, but it's known -- I think it's known as
3 MilliporeSigma. They keep changing the name. But
4 they have an agreement with MilliporeSigma,
5 Sigma-Aldrich, whatever it -- whatever it's called,
6 to be able to sell those reagents for research
7 purposes only, clearly defined as research purpose
8 only.
9 Q Your testimony is that MilliporeSigma
10 sells the P(V) reagents for research purposes only?
11 A Correct.
12 Q And how do you know that?
13 A I think that's -- that was part of the
14 contract that they negotiated with them, is that it
15 would be research purpose only. I mean, the intent,
16 of course, is that BMS very much wants the world to
17 be able to use these reagents because they think
18 they're useful. But if someone wanted to, let's
19 say, make a commercial product using these reagents,
20 then they would have to go talk to BMS and discuss
21 licensing terms.
22 Q Okay. And to your knowledge, has BMS --
23 to your knowledge, have any of these P(V) reagents
24 been sold for research purposes?
25 A I believe, yeah, they sell a lot.

1 Q When you say "a lot," how much is that?
2 A I don't know. But all I know is that I
3 think Sigma always has a hard time keeping up with
4 the demand and the stock and -- so I'm assuming they
5 sell well.
6 Q And --
7 A And I also can glean that from the patents
8 that are out there from other companies like Wave,
9 Roche, others -- there's other companies out there
10 that have used sci in their patents. So I'm
11 assuming they either made it or they purchase it
12 from Sigma-Aldrich.
13 So they're all just speculations and
14 assumptions. I don't have like an Excel spreadsheet
15 with sales numbers.
16 Q Right. Right. Thank you.
17 The patents, they are jointly owned,
18 right?
19 I mean Scripps and BMS jointly own the --
20 for example, the '554 patent we were referring to
21 looking at earlier, right?
22 A I believe that's correct, but I could be
23 wrong when it gets into law like this. It might be
24 that -- that BMS purchased all the rights. I don't
25 -- that I'm not -- I'm not a hundred percent sure on

1 that. I think they are jointly owned, but it's over
2 my head in terms of the legal ramifications of who
3 owns what.
4 Q So in terms of Scripps' deal with BMS,
5 does Scripps receive a revenue stream from BMS based
6 on the sales of P(V) reagents?
7 A I have no idea. I don't -- I don't -- I
8 have not gotten any personal compensation from the
9 sale of those reagents. I don't know if -- you
10 know, reagent business is not a generally, you know,
11 the kind of market that BMS generally cares about
12 because it's very low, low margins and low level
13 revenue. Big pharma is interested in billion dollar
14 things, not in a million here, a million there.
15 So I don't know what Scripps gets, if
16 anything, or how much BMS has gotten from the sale.
17 I don't think they care at all what they make from
18 the reagents. The point is not to make money from
19 the reagents.
20 Q When you say "the point is not to make
21 money from the reagents" --
22 A No.
23 Q -- is that also true for BMS?
24 A Yeah, all the scientists I talked to
25 there, they will admit -- all of them will say, you

1 know, whatever amount you make from a reagent sale
2 is not what's important.
3 I think where they could recoup their
4 investment is a few things. Number one, using it in
5 their own portfolio to -- which they have, to save
6 themselves millions of dollars in things like
7 manufacturing, saving their medicinal chemists time.
8 So they've saved a lot of money and time using these
9 reagents for their own personal purpose.
10 And then in the future, maybe there will
11 be a company that has a therapeutic where the best
12 way to make it is using those reagents, and then
13 they'll go to BMS and say, hey, we would like to
14 make our product and we want to use this reagent,
15 can you give us some terms so that we can license it
16 for our product. And then there will be another
17 that would be a significant probably financial event
18 for them.
19 Q But isn't that speculation, though,
20 Doctor, that, you know, knowing what BMS's business
21 model is relative to these reagents?
22 A What's the question? Isn't that what?
23 Q Isn't that speculation, your testimony
24 relating to what, you know, commercial value BMS
25 sees in these reagents?

1 A Well, it's not -- I wouldn't put it in the
2 speculation category just because I've talked to the
3 people in BD and all the scientists at BMS and their
4 opinion is very in line with what I've just stated.
5 Q And you don't have firsthand knowledge --
6 in other words, you're not making commercial
7 decisions for BMS, right?
8 A Of course, no.
9 Q And then when we talk about
10 MilliporeSigma -- so you testified BMS is a --
11 really they're focused on therapeutics, right?
12 A Correct.
13 Q For their commercial model?
14 A Correct.
15 Q And MilliporeSigma, going back, you talked
16 about there is a deal between BMS and MilliporeSigma
17 to commercialize the P(V) reagents, right?
18 A Correct.
19 Q And are you familiar with what the terms
20 of that deal is vis-a-vis --
21 A No.
22 Q -- BMS and MilliporeSigma?
23 A No, I do not know.
24 Q With respect to the agreement between
25 Scripps and BMS, do you stand to make any -- to gain

1 any financial revenues based on sales of P(V)
2 reagents?
3 A Not to my knowledge. I mean, they have
4 been on sale for a long time. I'm not aware of
5 getting any kickback or payment for them.
6 Q A lot of institutions, like for Harvard
7 University across the river here or MIT, their, you
8 know, professors stand to gain a percentage of
9 royalties that are generated from the
10 commercialization of patents and technology that
11 they were an inventor on, and those are publicly
12 available.
13 For example, if you went on to Harvard's
14 website or MIT's website, you would see how that --
15 how that works.
16 And so could you please describe the
17 process at Scripps -- the question is, do you --
18 would you stand to receive any financial
19 compensation based on royalties received on the P(V)
20 project with BMS?
21 A I don't know. I don't think so. I mean,
22 I haven't -- I haven't received anything. So I
23 don't -- the nature of this contract with -- with
24 BMS I think allows them to kind of take ownership of
25 this aspect of it. And I'm -- to my knowledge, I

1 don't get any, you know, financial gain from, you
2 know, the whatever, you know, trivial amount of
3 money that Sigma makes from selling these reagents,
4 not to my knowledge.
5 But, again, I'm, you know, happy to share
6 whatever contracts there are, share it. Who knows,
7 maybe you'll find something and I can knock on
8 Scripps' door and say, hey, you owe me a couple
9 thousand bucks, so you may be doing me a favor.
10 Q But when you say trivial amount of money
11 that MilliporeSigma makes from the reagents, what do
12 you mean by "trivial"? Like do you have an amount
13 of --
14 A Well --
15 (Simultaneous speaking.)
16 (Court Reporter clarification.)
17 Q Yeah. Okay. The question is whether
18 Dr. Baran is aware of the amount of sales that --
19 the amount of P(V) reagent sales that MilliporeSigma
20 has made to date.
21 A I don't know that. But what I can say is
22 that it's not my first time being involved in
23 reagent sales. There was another instance with a
24 reagent we developed with Pfizer, having nothing to
25 do with oligonucleotides or the subject matter of

1 this case, and there was a whole suite of reagents
2 that were commercialized, I think they sold millions
3 of dollars of reagent.
4 I think there was a check for like a
5 thousand bucks or something that came back to me
6 personally. It was like, you know, after taxes, you
7 don't even know it happened kind of thing, and
8 that's because the margins on these reagents are
9 generally low.
10 So no one in academia, with very few
11 exceptions, I know of a couple of exceptions -- but
12 no one, you know, invents a reagent to get rich.
13 It's not, you know, if you would like to make money,
14 you invent a drug, you start a company, you have a
15 liquidation event, that kind of thing. Selling a
16 reagent is like a lemonade stand.
17 Q Do you have an employment agreement in
18 place with Scripps?
19 A Of course.
20 Q Okay. Do you have a copy of that?
21 A Somewhere, but Shelly is the best person
22 to get it from and I'm happy to provide all of that,
23 of course.
24 Q So we talked earlier you were saying that
25 you haven't received any funds relating to the sales

1 of P(V) reagents through this collaboration with
2 BMS. But my question is whether you're entitled to
3 receive payments?
4 A I honestly don't know. I never even asked
5 because, like, reagents are not -- it's not a place
6 to try to earn money for an academic group, you
7 know.
8 Obviously the people in this case, Hongene
9 and ChemGenes and all the people who sell reagents,
10 if you sell a million reagents, you can do the math,
11 you don't need very high margins and you can have a
12 good company.
13 But if you're an academic and you invent a
14 reagent or two, you know, that's -- the point is --
15 stimulating the driving force or the impetus for an
16 academic to work on a new reagent is not to make
17 money. It's to do something useful for society that
18 people will use. And, you know, it's kind of like
19 an academic credential, like, look, we have a
20 reagent that people care about, can use, solve
21 problems, there's a dying cancer patient that
22 benefited in a very early stage from this reagent.
23 You know what I mean? That's the value we
24 get. Not, oh, I made $500 extra.
25 Q With respect to Scripps and Elsie, you

1 testified earlier that really Elsie -- is it fair to
2 say Elsie is a spinout of Scripps?
3 A I mean, you could look at it that way
4 because the four co-founders are all from Scripps.
5 Scripps owns a good amount of equity in the company.
6 So, yeah, you could call it -- I wouldn't be against
7 you calling it a spinout. That would be an accurate
8 -- because all the founders are from Scripps, yeah.
9 And the technology, some of it was
10 invented at Scripps. But as I mentioned before, the
11 main proprietary thing that's at Elsie right now
12 that's generating revenue did not originate from
13 Scripps. But the people who are employed there, the
14 four co-founders, yeah, those are Scripps-educated
15 folks.
16 Q And how many shares do you own in Elsie?
17 A Oh, I don't know the number of shares.
18 It's around, I think, around 3 million or so.
19 Q And what percentage of ownership do you
20 have in Elsie?
21 A I think it's about 10 percent.
22 Q Who is the majority owner in Elsie? Is
23 that Sorrento?
24 A It's not Sorrento anymore. So Sorrento
25 went bankrupt, and they owned 36 percent of the

1 shares, and it was repurchased by a separate company
2 in bankruptcy court. And so the majority
3 shareholder at this point, it's probably employees
4 and this other investor company called Awen,
5 A-w-e-n, Biosciences. But I think the majority is
6 probably all the co-founders, I think.
7 Q Does BMS have an equity interest in Elsie?
8 A They do. They do, yes.
9 Q What amount is that?
10 A I think it's around 4 or 5 percent, but
11 don't hold me to it.
12 Q And then your testimony is that Elsie
13 in-licenses the P(V) technology developed between
14 Scripps and BMS, correct?
15 A They have -- I don't know if "in-license"
16 is the -- is the word. Maybe it is. But
17 practically speaking, they have nonexclusive rights
18 to commercialize any product using the P(V)
19 technology, and then along with that, there are
20 various royalties and other things that have to be
21 paid. I don't have that contract in front of me.
22 But there are strings attached.
23 Q And that's a direct agreement between
24 Elsie and BMS, correct?
25 A Correct. Correct.

1 Q And you have a copy of that agreement?
2 A It's probably something that I can get
3 from Elsie. Shelly has everything, I'm sure. And,
4 you know, I don't know if I'm allowed to, but I'll
5 certainly say, hey, you know, can I share this and
6 see if we need to do a confidentiality agreement or
7 whatever Jeremy recommends. But me personally, if I
8 had the document, I would screen share it right now.
9 I don't care.
10 Q And going back to Elsie's -- Elsie's, I
11 guess, business model --
12 A Yes.
13 Q -- Elsie has a collaboration with Glaxo,
14 correct?
15 A Correct.
16 Q What is the nature of that agreement or
17 that relationship?
18 A Well, it's a collaboration agreement to --
19 to benchmark the fidelity and performance of the
20 platform that I mentioned before that was developed
21 at Elsie. So that collaboration doesn't really have
22 anything to do with P(V) chemistry.
23 Q That collaboration, the collaboration
24 between Elsie and Glaxo, doesn't have anything to do
25 with P(V) chemistry?

1 A No.
2 MR. SHORES: Could we please put up
3 Exhibit 2039.
4 (Exhibit 2039 marked for identification.)
5 Q Dr. Baran, do you see this document?
6 A Mm-hmm.
7 Q Have you seen it before?
8 A Yes.
9 Q Okay. What is this document which is
10 Exhibit 2039?
11 A This is a press release, which is kind of
12 like, you know, a way to get excitement in the
13 community about the company. But -- and I see it
14 says P(V) here, but the nature of what we did with
15 them, there is nothing at this stage of the
16 collaboration -- maybe in the future, but what we
17 did with them in order to get to a point where they
18 want to trigger, you know, a follow-up, had nothing
19 to do with P(V). Maybe in the future it will, and I
20 think the future is commercialization, you know,
21 moving in that direction.
22 But in the first instance, the
23 collaboration as it is, all the things we did for
24 them so far to get to that proof of concept stage
25 that satisfied what they wanted to see, no P(V)

1 chemistry was used to get to that inflection point.
2 Q But based on this, which is from July of
3 last year, doesn't this indicate that there's a
4 collaboration with GSK and Elsie relating to P(V)?
5 A It says that. But operationally, what
6 we've done so far, there is no P(V) yet. Maybe
7 soon, but not yet.
8 Q I mean, look at your quote here, where it
9 says, "Phil Baran Ph.D., co-founder Elsie
10 Biotechnologies said, 'By leveraging all the tools
11 across Elsie's platform, we can explore the entire
12 chemical oligonucleotide space and uniquely define
13 inter-nucleotide linkages and stereochemistry to
14 tune safety, activity, and delivery of
15 oligonucleotide therapeutics.'"
16 Did I read that correctly?
17 A You did.
18 Q What did you mean -- and this is --
19 what -- what did you -- and this is a quote by you,
20 this is an accurate quote from you; is that correct?
21 A Mm-hmm, yup.
22 Q So when you say "leveraging all the tools
23 across Elsie's platform," what is Elsie's platform?
24 A Elsie's platform has got three main tools.
25 The first tool is what we call Rosalind, and

1 Rosalind is the proprietary high throughput method
2 for determining what the optimum sequence is for
3 candidate oligonucleotide, without using
4 bioinformatics or in silico design, we have a way of
5 doing this high throughput to come up with the very
6 best optimum sequence.
7 And then after that downstream would be
8 fine-tuning things like stereochemistry, that would
9 be the P(V) platform. And then after that would be
10 what we call the denote platform, which allows for
11 conjugation.
12 Now, this document was meant to generate
13 enthusiasm in the community, as all small companies
14 try to do to get more collaboration set up. So it
15 is true that Elsie has three legs to its platform;
16 one is Rosalind, one is the P(V) chemistry, and one
17 is denote.
18 However, what we did with GSK so far has
19 not been P(V) chemistry. It has been, so far, only
20 the Rosalind platform, and that's what has generated
21 revenue thus far.
22 Now, moving forward, I think the next
23 stage will probably be indeed to start using P(V)
24 chemistry for sure. That's stage 2.
25 Q When you say there was revenue generated,

1 approximately how much revenue was generated from --
2 A That is -- that I can't say because I
3 would get in trouble. So that's one you would have
4 to do whatever CDA, contact Elsie because that's --
5 we don't tell anybody that.
6 Q And there's -- you're aware of the
7 existence of an agreement between Elsie and Glaxo?
8 A Yes.
9 (Simultaneous speaking.)
10 Q -- a collaboration?
11 (Court Reporter clarification.)
12 Q And do you have a copy of that document?
13 A Not on my computer. Again, you can get it
14 from Elsie, if they agree to whatever -- a CDA or
15 whatever it is that the lawyers need to work on.
16 Q So this high throughput growth -- high
17 throughput platform, is that software-related or is
18 it --
19 A No. Okay. There is a software component
20 because you have a lot of data that you need to
21 analyze. But unlike the traditional way of
22 discovering an oligonucleotide, let's say, an
23 antisense oligonucleotide, where it's only
24 computation, this is experimental results that are
25 then fed into a software algorithm to deconvolute

1 what the data means and turn it into something.
2 But it's empirically derived, not
3 in silico derived. Does that make sense?
4 Q Thank you.
5 So when you talked about the second, you
6 know, leg of the stool or, you know, relates to P(V)
7 chemistry, correct?
8 A Yes, correct.
9 Q If -- if GSK wants to take the next step
10 and license P(V) technology from you, what -- what
11 is that -- what would they use it for?
12 What would you be giving them and what
13 would they be giving you?
14 A Well, that's a nuanced question. It's
15 something that we talk about as a business every
16 day. What would we be giving them. Well, we give
17 them a lot of know-how, a lot of proprietary
18 knowledge on how and when to employ it. We would
19 give them access to the license that we negotiated
20 with BMS to be able to commercialize products that
21 use P(V).
22 What would they be giving us? Well,
23 obviously, you need capital to make things happen,
24 so they would be providing capital. They would be
25 providing know-how. And most importantly, they

1 would be providing an avenue through the incredible
2 infrastructure and really talented scientists at GSK
3 to take this vision and turn it into lifesaving
4 treatments for individuals.
5 Q But Elsie wouldn't be like a supplier of
6 these P(V) reagents, right?
7 A No. No, Elsie is not a reagent company.
8 That's small beans. No offense to the parties
9 involved here, but that's not our business model.
10 Q And if Glaxo, you know, is it fair to say
11 the more P(V) reagents that Glaxo uses, the higher
12 the financial reward is to Elsie?
13 A No, no. Like I said, if the only thing we
14 had in our platform was the P(V) technology, we
15 would not have a GSK deal. The whole year we spent
16 last year there was nothing to do with P(V), and
17 that's what the agreement was, to field test and see
18 if this platform Rosalind that I mentioned, which is
19 incredible, a large company doesn't just believe a
20 small biotech who says look how amazing this stuff
21 is and we have many case studies and we said look
22 how amazing it is, and they're, like, yeah, yeah,
23 that's great, nice. We don't trust you, why don't
24 we do a collaboration and to see if it actually
25 works on our stuff.

1 And then we did that last year and it
2 works, and none of the stuff we did has anything to
3 do with P(V) in that first stage.
4 Q If Glaxo were to sell a product that had a
5 P(V) -- you know, used P(V) or had a P(V) component
6 to it or was, you know, a therapeutic that utilized
7 P(V), would Elsie receive royalties on the sales of
8 those products?
9 A That depends. So, you know, if GSK said,
10 hey, you know, you guys are nice, but we don't want
11 to work with you, we're going to go straight to BMS
12 and just work with them on getting our own license
13 for P(V), then Elsie would not benefit at all.
14 If GSK said we want to work with you
15 because we know that this is much more than P(V) --
16 P(V) is like a useful tool. It's like a
17 screwdriver, but there's a difference between a
18 screwdriver and a Ferrari, right? The former is
19 used to make the latter, but the latter has a lot of
20 intrinsic value. And so what they are most
21 interested in is the Ferrari, the platform that does
22 the racing around the track, not the screwdriver
23 which is the -- later on may be needed for
24 stereopure oligos.
25 So we don't even know at this point

1 whether the oligos they make eventually and if they
2 were to continue with Elsie, it's all speculative,
3 whether there would even be a stereochemical
4 component to it. We don't know. It's all
5 speculation.
6 But the reason this collaboration happened
7 and the reason there's enthusiasm currently -- who
8 knows, in the biotech world tomorrow we might get a
9 call and say we don't want anything to do with you
10 anymore. It's all speculation. Right now they are
11 excited because of the Rosalind platform.
12 Q What is so unique about the Rosalind
13 platform? Why is that --
14 A Well -- well, that's a great question.
15 And we've done pitch after pitch over the years to
16 try to explain this to people.
17 The succinct answer is to think about the
18 way small molecule drugs are discovered and
19 developed, and to think about the way
20 oligonucleotides are developed. Specifically, let's
21 use as a case study, let's use an antisense
22 oligonucleotide. So a small molecule drug is
23 developed by using a lot of structural information,
24 structural activity relationships, binding to an
25 enzyme pocket, making recursive decisions based on

1 subsequent chemical modifications of a scaffold,
2 optimizing for efficacy, PK, solubility,
3 tolerability, until you finally are able to say
4 there's my API, I can formulate it into a drug.
5 Now, if you think of an antisense
6 oligonucleotide, the first step is not based on a
7 structural finding and finding of an enzyme
8 possibility. It is based upon looking at an mRNA
9 transcript that you would like to bind and then
10 using in silico software for the software to guess
11 for you, well, try this sequence. Maybe this one is
12 good. Try this one. Try that one. You make a
13 bunch of them, you find one that's okay, good, and
14 you proceed forward.
15 The revolutionary advance of the Rosalind
16 platform is that we make hundreds of thousands of
17 compounds candidate antisense oligonucleotides, and
18 we screen those hundreds of thousands of compounds
19 across the entire mRNA transcript in realtime.
20 Because mRNA is like a moving creature, it's moving.
21 It's not a frozen chicken; it's moving. So you can
22 do a direct assay of hundreds of thousands of
23 constructs within the confines, within the context
24 of the moving mRNA.
25 And using the deconvolution, tagging, and

1 software algorithm that the data -- the data is fed
2 into, it gives you candidate oligos that are super
3 potent and have unique binding sites that would not
4 be predicted through a bioinformatic regime.
5 So in that sense, it's very similar to the
6 way a small molecule is developed. Because a small
7 molecule, like Lipitor or Prozac, or whatever
8 medicine you know, they don't invent it with a
9 computer. A computer can assist something, but it's
10 not invented with a computer.
11 So does that make sense?
12 Q Yeah, I follow what you're saying.
13 A Okay. Great.
14 Q I go back to an earlier question which is
15 -- I'm not sure I got a complete answer, and that's
16 not a criticism. But it's if Glaxo develops a
17 therapeutic that utilizes P(V) chemistry, is that --
18 you know, will Elsie, under its current arrangement
19 with GSK, stand to gain from that financially?
20 A If the -- the lead is discovered in
21 collaboration with Elsie and they decide, number
22 one, their lead is discovered with the Rosalind
23 platform, and number 2, there is a P(V) element in
24 there that they decide to work with Elsie to -- to commercialize,
25 then yes, of course.

1 Q And then if a product is, you know, goes
2 commercial, if, you know, an oligonucleotide
3 product, therapeutic goes commercial, then a
4 significant amount of P(V) reagents would be needed
5 in order to synthesize a commercial product,
6 correct?
7 A It depends. I mean, the
8 oligonucleotide -- let's imagine, if we're going to
9 do hypotheticals and speculation, let's say they
10 settle on a 16-mer gapmer. And in that gapmer there
11 are two phosphorothioate linkages, with only two
12 linkages, you don't need much reagent to get those
13 two linkages. And so they probably won't need a lot
14 of it, but they will still need a freedom to
15 operate, and that's what Elsie provides.
16 Now, if they have a 20-mer and every
17 single linkage requires P(V), a lot more reagent is
18 needed.
19 Does that make sense?
20 Q Yes, it does.
21 And so if there's -- but my question is
22 relative to the current arrangement between Elsie
23 and Glaxo, if that were to occur and they would need
24 a license to the P(V) from Elsie, does Elsie stand
25 to receive financial gain from that?

1 A Of course, sure.
2 Q And similarly with the relationship
3 between Elsie and BMS, that's a different
4 relationship, though, right?
5 A Elsie owns -- BMS owns 4 or 5 percent of
6 the company equity. They also, I believe, have some
7 terms that give them some royalty stream of any
8 product that uses P(V) in the construction of a
9 commercial product. So BMS definitely stands to
10 gain in any big financial, you know, windfall event
11 for the company.
12 Q When you say "the company," you mean
13 Elsie?
14 A Correct, yes.
15 MR. SHORES: Okay. Maybe take a
16 five-minute break.
17 THE WITNESS: Sure.
18 MR. EDWARDS: That's fine.
19 (Recess 10:33 a.m. - 10:42 a.m.)
20 BY MR. SHORES:
21 Q Dr. Baran, you're also a co-founder of
22 polyARNA; is that correct?
23 A Yeah. And they have changed their name
24 recently, they are still in stealth, but they have
25 changed their name.

1 Q Okay. What's the name changed to?
2 A The new name is Convergents Therapeutics.
3 Q Okay. And then when was polyARNA founded?
4 A Well, it was ideated and seeded about two
5 years ago, and then another influx of capital came
6 in from a few VCs roughly six months ago, and now
7 it's operating in stealth. And we anticipate
8 emerging from stealth at the end of the year,
9 meaning we announce our existence to the world.
10 Q Right. Right. And who are the -- who are
11 the lead investors for polyARNA?
12 A Currently it is NewPath is one, Google
13 Ventures, another one, and Arch.
14 Q Are there any pharma companies that have
15 ownership in polyARNA?
16 A No.
17 Q What is polyARNA's platform?
18 A The convergence platform is, broadly
19 speaking, a new generation of mRNA medicines.
20 Q Does polyARNA utilize P(V) chemistry --
21 A They do P(III), P(V), everything, mm-hmm.
22 Q How does polyARNA utilize P(V) chemistry?
23 A Well, without revealing like, you know,
24 confidential details, in some cases stereochemistry
25 matters a lot in certain parts of mRNA, and that can

1 be the cap or the body or the tail.
2 So when we incorporate stereochemistry in
3 certain parts of the mRNA, we're making various
4 analogs, we use P(V) to put the stereochemistry in
5 just because it's the best way.
6 Q It's better than P(III) --
7 A Well, P(III), there aren't really any good
8 ways to use P(III) to put stereochemistry. And I
9 know your colleagues here probably would object, but
10 the Wave technology that is out there using P(III)
11 to incorporate stereopure phosphorothioates, the
12 dirty secret of that chemistry is that it
13 stereo-enriched, not stereopure. And further, it is
14 encumbered by IP that is owned by Wave.
15 And so to avoid all that, the chemical
16 problem of needing stereopure and not
17 stereo-enriched --
18 (Court Reporter clarification.)
19 A To avoid stereo chemical problems and to
20 avoid IP issues, they use P(V) instead for research
21 purposes.
22 Q When you say the "stereopure," you're
23 talking about the phosphorothioates, right?
24 A Correct.
25 Q And what do you mean by that?

1 A Well, in mRNA, which is a big oligo, much
2 bigger than an antisense oligonucleotide, some of
3 the internucleotide bonds, you might want to make
4 them phosphorothioate instead of phosphodiester, so
5 that's what I mean.
6 Q Okay. But can't you use P(III)
7 phosphoramidites to make phosphoro --
8 phosphorothioates? Excuse me.
9 A You can and we do. The problem is it
10 gives a mixture of the two isomers.
11 Q So it's like a racemic mixture?
12 A Well, racemic is --
13 (Technical interruption.)
14 THE WITNESS: Uh-oh. The recording
15 stopped.
16 MR. SHORES: Looks like we lost our
17 technician.
18 (Recess 10:47 a.m. - 10:48 a.m.)
19 MR. SHORES: Can you read the last
20 question, if there was a pending question.
21 (The following is read by the Court
22 Reporter:
23 "QUESTION: So it's like a racemic
24 mixture?
25 "ANSWER: Well, racemic is --")

1 A Racemic is a word that usually -- people
2 refer to them as racemic linkages, but technically
3 it's not racemic, because a racemic compound is if
4 you have one enantiomer and another enantiomer and
5 you've got both of them in a one-to-one mixture,
6 that would be racemic.
7 These compounds would have a couple of
8 linkages, for example, and if there are mixtures at
9 that phosphorus, we usually refer to them as --
10 (Reporter Clarification.)
11 A If, for example, there are more than one
12 phosphorus stereocenter and you have mixtures at
13 both of those phosphorus stereocenters, the correct
14 terminology would be mixtures of diastereomers.
15 However, for the purpose of this
16 deposition and the colloquialism, it's fine if we
17 refer to a phosphorus stereochemistry that's not
18 controlled as being racemic, it's fine.
19 Q Okay.
20 MR. SHORES: Maybe this exhibit will help.
21 So can we put up Exhibit 2036, please.
22 (Exhibit 2036 marked for identification.)
23 Q Dr. Baran, do you see this document?
24 A Yes, I do.
25 Q Have you seen it before?

1 A Chemistry World maybe, probably -- yeah,
2 probably. I don't remember what it says.
3 Q Okay. If you want to take a minute to
4 flip through. It's only a few pages long.
5 A Yeah, just tell me where you want me to
6 focus.
7 Q This -- what is this document?
8 A It looks like a -- some sort of news
9 article in Chemistry World that is highlighting one
10 of our papers.
11 Q Relating to P(V) chemistry?
12 A Yeah.
13 Q Okay. If you go to page 2 of this
14 document, there's a figure there. I thought this
15 might be useful to our conversation about the
16 different linkages.
17 Down at the bottom where it says "Native
18 phosphodiesters," do you see that?
19 A Yes.
20 Q Is that the naturally occurring vertebrae
21 that we were referring to earlier?
22 A Vertebrae, internucleotide bond, yes.
23 Mm-hmm, exactly.
24 Q And then if you go all the way up to the
25 top, we see racemic phosphorothioate there, correct?

1 A Yes. As I said, people often use that
2 term, and if it's referring to the actual
3 phosphorus, you can -- it's fine to say racemic, as
4 I said.
5 Q Yeah, understood.
6 And then you described -- would you mind
7 describing the following three internucleotide
8 linkages?
9 A So the next one down is a
10 phosphorothioate, where the phosphorus
11 stereochemistry is defined as being S at phosphorus.
12 The next one is the phosphorus
13 stereochemistry where the phosphorothioate is
14 defined as being R at phosphorus.
15 The next one is an achiral linkage that
16 has two sulphurs, and it's known as a
17 phosphorodithioate.
18 And then the final one is the one we
19 talked about before, which is the one found in
20 nature.
21 Q Okay. Can you use -- or could one use,
22 one ordinary skill in the art use P(III)
23 phosphoramidite chemistry to synthesize an
24 oligonucleotide having a (audio disruption).
25 (Court Reporter clarification.)

1 Q Okay. So one of ordinary skill in the
2 art, a chemist use P(III) phosphoramidite chemistry
3 to synthesize an oligonucleotide having a native
4 phosphodiester internucleotide linkage?
5 A Of course.
6 Q What about a racemic phosphorothioate
7 linkage?
8 A Of course.
9 Q What about SP phosphorothioate?
10 A Like I said, there is a technology out
11 there that was invented in Tokyo by the Wada Group
12 that was licensed by Wave, and the -- my contention
13 is that it is generally known that it will deliver
14 stereoenrichment. Some cases will be very high,
15 some cases won't be as high.
16 So will it give you the S
17 phosphorothioate? Yeah. But will it be a hundred
18 percent to the limits of detection? Often no.
19 MR. SHORES: Okay. I'm sorry, someone
20 is -- yes. Thank you.
21 Q Is there any, you know, like we have these
22 racemic mixtures, and I know with your qualification
23 -- with your qualification earlier really means
24 here. But both enantiomers or stereoisomers
25 together, is there an advantage of having one of

1 them isolated versus the racemic?
2 A Well, it depends who you ask and it
3 depends what data. I remember many years ago when I
4 started talking about this at oligonucleotide
5 conferences, there would be great debate. And some
6 people at certain companies would say
7 stereochemistry doesn't matter, and some people
8 would give presentations showing data that
9 stereochemistry definitely matters.
10 Now, fast forward a few years, there are a
11 number of publications and there is a number of
12 pieces of data from various companies that point to
13 the fact that stereochemistry can be hugely
14 important on dictating things like efficacy and even
15 physical properties of an oligo with a
16 stereo-defined linkage.
17 So in my opinion, it's context dependent,
18 because you'll find scientists who will say we don't
19 care stereocontrolled, and you'll find scientists
20 who will say, oh, we've got to have it
21 stereocontrolled.
22 Q Okay. So your testimony is that -- let me
23 go back to let's just talk about P(V).
24 So is it correct to say that P(V) can be
25 used to synthesize any of these internucleotide

1 linkages?
2 A Any ones on the slide, correct.
3 Q On page 2 of Exhibit 2036, the figure
4 shown there, correct?
5 A Correct, yes.
6 Q And your testimony is that P(III)
7 phosphoramidites can be used to synthesize all of
8 these as well?
9 A They can, with the proviso that I have
10 outlined that often the current technology to make S
11 and P are often not stereopure, they are
12 stereoenriched, which may be good enough for some
13 companies. But for -- the reason those two papers
14 were accepted in science was that if you want to
15 make a stereopure, meaning to the limits of
16 analytical detection, there's only one isomer there.
17 As of today, the P(V) technology is, if not the
18 best, a really good option.
19 Q And do you feel that P(V) chemistry has
20 significant advantages over P(III) chemistry?
21 A It can.
22 Q And does that have to do with the -- what
23 advantages does it have, P(V) chemistry?
24 A Well, it depends on the context. But on
25 first principles grounds, the P(V) chemistry that we

1 and BMS collaboratively worked on has the advantage
2 of cutting out some steps from the canonical
3 coupling cycle, removing the redox fluctuation,
4 removing some of the protecting groups, and ensuring
5 that you get homogeneous stereopure product.
6 The other thing that's advantageous is
7 that the P(V)-based reagents are a lot more stable,
8 they are bench stable, moisture stable. So when you
9 order a phosphoramidite from a vendor, they are
10 generally vacuum-sealed bags with the bottle, and,
11 you know, you want to keep them far away from
12 moisture, if you can.
13 The equipment that's been invented to do
14 oligonucleotide synthesis using phosphoramidite is
15 airtight and excludes moisture for that reason.
16 Whereas, with the P(V), it's a little bit more
17 forgiving. That's some of the advantages of P(V).
18 Q And you would agree that the use of
19 oligonucleotides as a therapeutic is a growing --
20 growing field?
21 A Based on the data, yes.
22 Q And where do you see this field going in
23 the next, say, five or ten years?
24 A It depends who you ask. Some people think
25 that it's only going to be growing, and some people

1 say exponential growth. Some leaders of large
2 companies think that it's the future. That might be
3 too exaggerated.
4 I mean, my personal opinion, if you're
5 looking for that, is that it will be an important
6 component in the arsenal of modalities that we use
7 to potentially treat certain types of diseases.
8 That's what I can say would be like a non-hyperbole
9 answer to the question.
10 Q And you can use P(V) chemistry for these
11 oligonucleotides, correct?
12 A Correct.
13 Q You can also use them, as you discussed
14 earlier, for much larger molecules including
15 messenger RNA, correct?
16 A Correct.
17 Q Are you familiar with phosphoramidite
18 chemistry being used in connection with synthesizing
19 messenger RNA molecules?
20 A Of course.
21 Q And would you see P(V) chemistry as being
22 a replacement for P(III) chemistry in some of those
23 applications?
24 A Maybe. I mean, you know, my job is to
25 educate students, that's my primary job. And from

1 the beginning, when I got into this collaboration
2 with BMS, when I gave talks on this topic, it was a
3 very calm thing for me because I don't really have
4 skin in the game. I said at many of these lectures
5 in front of hundreds, if not a thousand people, I
6 personally don't care what the result is. Like, if
7 50 years from now nobody is using P(V), I probably
8 won't be alive, but it won't matter to me. I'm just
9 trying to do something useful, and time will tell if
10 the chemistry is, you know, as robust and useful as
11 the gold standard, which is phosphoramidite.
12 But I'm just proud of the great students
13 I've had, and if this is useful, great. If it turns
14 out not to be so useful, all right, well, we're an
15 academic group, we tried.
16 Q But if P(V) chemistry hockey sticks and
17 becomes a very widespread technology that's used to
18 develop a number of therapeutics, you would stand to
19 financially gain; isn't that correct?
20 A Well, that would only be if -- if the
21 various companies I'm involved in do well as a
22 consequence of that. Like, I don't know if -- if we
23 do -- let's do hypotheticals. If we say random
24 company X needs to use P(V) and they approach
25 Bristol-Myers and they say here's, you know, $10

1 million for us to be able to use P(V) to make our
2 oligonucleotide, I don't know if I get any of that
3 $10 million or it just goes to BMS. I don't think I
4 get any of it.
5 So I would personally financially benefit
6 if Elsie does well, if Convergence Therapeutics does
7 well. You know, that's the -- I think that's where,
8 you know, my conflict of interest or individual
9 ability to profit comes from.
10 Q Let's go back to polyARNA. I just want to
11 close out that, you know, questions surrounding it.
12 What is your role at polyARNA -- I'm sorry
13 -- Convergence Therapeutics pre-stealth?
14 A I'm a co-founder and consultant.
15 Q Okay. Do you serve in any executive role
16 there?
17 A Scripps doesn't allow me to. I'm not
18 legally allowed to be an executive or anything
19 beyond a consultant and a co-founder in any company.
20 Q Does polyARNA have any agreement with
21 Scripps?
22 A Does -- no.
23 Q Does polyARNA in-license or license any of
24 the P(V) technology that you generated with BMS at
25 Scripps?

1 A As of today, no.
2 Q How does polyARNA use P(V) reagents in its
3 program?
4 A To make various analogs of mRNA constructs
5 and test their activity. There's tons of companies
6 that use P(V) chemistry, but as I mentioned, they
7 don't have to pay anything until they get to the
8 point of commercialization. So that could be years
9 from now before, you know, BMS has to engage in a
10 license with any of those companies.
11 They're allowed to use it just by buying
12 the reagent from Sigma or they can have a CRO make
13 the reagent themself. So people are free to use the
14 published work and see where it takes them, if it's
15 useful or not.
16 Q PolyARNA uses phosphoramidite chemistry in
17 its program; is that correct?
18 A Yup, yes, correct.
19 Q And how does it use P(III) phosphoramidite
20 chemistry?
21 A To make various pieces of mRNA that are
22 ligated onto the -- you know, the body is generally
23 made through in vitro transcription, you know, the
24 body which is, you know, hundreds of oligos long,
25 and then the little tail or the cap might be, you

1 know, made through phosphoramidite chemistry and
2 then ligated on to the big piece.
3 Q Does polyARNA have any agreements in place
4 with Hongene?
5 A Not to my knowledge. I mean, I think
6 polyARNA buys reagents, as does Elsie, from every
7 vendor out there, including Glen, Hongene, ChemGenes
8 and whatever, Aldrich -- they just basically, you
9 know, look on SciFinder, see it's available, and if
10 it's a reasonable price, I don't think they pay any
11 attention to who they buy it from.
12 Q So polyARNA, to your knowledge, doesn't
13 have, you know, like a supply contract or anything
14 like that with Hongene or --
15 A No.
16 Q -- or any other kind --
17 A No.
18 Q -- of contract with Hongene?
19 A With any -- with any supplier, ChemGenes,
20 Glen, whatever, there are no -- no. They're just,
21 you know, like Bonds or Albertsons, it's where they
22 buy their bread.
23 Q And what about Elsie, does Elsie have a
24 contract with Hongene, to your knowledge?
25 A No. No.

1 Q No, you mean you know they don't; or you
2 do not to your knowledge?
3 A Not to my knowledge, I don't know of any
4 contract existing between Hongene or ChemGene or
5 Glen, or whatever the suppliers are out there.
6 As far as I know, all of the suppliers are
7 just suppliers. They have a catalog, they buy a
8 reagent from them.
9 Q So in terms of like your time commitment,
10 you're employed by Scripps, you have a consulting
11 relationship with BMS, you're a co-founder at Elsie,
12 you're a co-founder at polyARNA, you're on the
13 scientific advisory of Nutcracker, right?
14 A Yes.
15 Q So in terms of your role at Elsie, are you
16 in any kind of a management role to -- describe what
17 your time commitment and participation is at Elsie.
18 A I'm a consultant and co-founder. So, for
19 example, we have a weekly leadership meeting that I
20 attend that's about 45 minutes long every Friday.
21 And we have a Slack channel, so the
22 scientists can ping me and say, hey, Phil, we're
23 having a problem with the deprotection of this
24 nucleoside, what conditions do you recommend, or
25 whatever random question they may have. Just like

1 any other company I consult with, they can send me
2 emails and say, hey, we have a problem, can you help
3 solve it, or any of my students, which I'm getting a
4 bunch of Slack messages as this deposition goes on
5 that I'm going to have to answer.
6 So I'm always being pinged on every
7 direction.
8 Q You have -- as an individual, you have an
9 agreement with Elsie based on your consultancy and
10 also with regard to your stock ownership in Elsie;
11 is that correct?
12 A I believe so, yes, with all of them, I
13 have to for compliance.
14 Q Okay. And you have a copy of that
15 agreement?
16 A Shelly does and I'm sure she can get it to
17 you after this call.
18 Q Okay. Similarly, you have an agreement in
19 place with polyARNA?
20 A Correct. And everything is open to you;
21 there's nothing to hide.
22 Q And that's a consulting agreement?
23 A It's consulting and co-founder, yes;
24 shares, things like that.
25 Q You have a copy of that?

1 A I -- on my computer, I doubt it. But
2 Shelly does. She has everything because she keeps
3 me compliant with the institute.
4 Q Okay. Thank you.
5 Do you have any direct consulting
6 relationship with Glaxo as an individual? Do you
7 have an individual -- I'll restate the question.
8 Dr. Baran, do you have an individual
9 consulting relationship with Glaxo?
10 A No, I do not.
11 Q Your interaction, professional
12 relationship with Glaxo is solely through your role
13 at Elsie?
14 A Well, it depends how you -- professional,
15 yeah. I have students who work there, a few
16 students who are employed there. And Glaxo will
17 reach out to me on occasion because they would like
18 to hire students, and they say, hey, Phil, we have a
19 position open, do you have any students, that kind
20 of thing.
21 But currently, no collaboration agreement
22 -- no consulting agreement. And I've given talks at
23 GSK over the years and been compensated for those,
24 giving those talks where you fly out and give a
25 lecture and then you go home kind of thing. But no,

1 not like BMS, no consultant.
2 Q In terms of Nutcracker, you're on the
3 scientific advisory board, right?
4 A Correct.
5 Q And do you have an agreement with
6 Nutcracker?
7 A I do, yes.
8 Q And what is the -- okay. Do you have a
9 copy of that?
10 A Shelly does. You can get whatever you
11 want. It's a consulting agreement.
12 Q What is your compensation from Nutcracker?
13 A Just -- I believe it's just equity. I
14 didn't ask for any pay. Just some shares.
15 Q How many shares do you have?
16 A I think it's like 50,000, I think.
17 Q Do you have an idea of ballpark what
18 percentage ownership that is?
19 A It's a very minute, I don't know, sub --
20 sub 1 -- 001. It's very small.
21 Q In terms of your relationship with Elsie,
22 do you receive compensation as a consultant from
23 Elsie?
24 A No. Not one dollar.
25 Q So your financial relationship with Elsie

1 is -- what is that --
2 A Just equity.
3 Q Okay. What about with polyARNA?
4 A With polyARNA is equity and consulting
5 agreement for a hundred thousand a year.
6 Q Okay. And you serve on the advisory board
7 of Hongene, correct?
8 A As of a couple of months ago, yes.
9 Q Okay. What was the -- when did that
10 discussion start relating to your service on the
11 advisory board of Hongene?
12 A It was some time last year. David, I
13 forget his last name, contacted me and wanted to see
14 if -- because they're interested in getting into the
15 P(V) area and knew that, you know, our lab is doing
16 a lot of oligonucleotide work and wanted my advice
17 on, you know, high-level matters like, you know,
18 things they should sell, that kind of thing. So
19 they wanted to see if I might be interested in
20 joining the SAB. So I said okay, sure.
21 Q And what is David's last name?
22 A Is it okay for me to search my email real
23 quick to find it, or I can't touch my computer?
24 Q Sure.
25 A I can.

1 David Butler, B-u-t-l-e-r.
2 Q So David Butler reached out to you last
3 year?
4 A Correct.
5 Q And do you know when that first date of
6 contact was?
7 A I'm searching. Searching for the first
8 date. It was around -- looks like around July is
9 when it started, July.
10 Q July 2023?
11 A July of last year, 2023, yes.
12 Q And you're looking at emails right now
13 that you have that relate to --
14 A Uh-huh, yes.
15 Q Who initiated the contact for your service
16 on the advisory board? Was it David?
17 A David, he's the chief technology officer.
18 Q And is there anyone else that you -- tell
19 me about the process of that appointment.
20 Did you speak with anyone else besides
21 David Butler, anyone else at Hongene besides David
22 Butler?
23 A No. He was the lead and he just contacted
24 me and said, hey, you know, we're putting together a
25 newly-formed SAB, there's a couple other people in

1 there, and, you know, said would you like to join.
2 That's it.
3 Q What's your compensation?
4 A I believe it is 70K per year.
5 Q And did you sign an agreement with Hongene
6 relating to --
7 A I did, yes.
8 Q And you have a copy of that?
9 A Shelly does and you can have it.
10 Q Have you ever met Hongene's CEO, Dr. Wei
11 Jiang?
12 A He was at the first SAB meeting. I wasn't
13 there in person, but he was in the room on a Zoom
14 meeting like this. So I met him over Zoom or Teams.
15 Q And when was the first Hongene SAB
16 meeting?
17 A Is it okay to open my calendar and search?
18 Q Sure.
19 A The first Hongene advisory board meeting,
20 October 16.
21 Q 2023?
22 A 10:00 a.m. Pacific, yeah.
23 Q And these meetings were -- that meeting
24 was conducted via Zoom?
25 A I'm seeing if it was Zoom or Teams.

1 Teams.
2 Q Do you know if the meeting was recorded?
3 A I don't think it was. Recorded, but, I
4 mean, if it was, subject to them agreeing, there was
5 -- nothing related to this case certainly was
6 discussed.
7 I don't even know if they know I'm
8 involved. I have no clue. It was never mentioned
9 in any correspondence. They have no clue.
10 Q When you say they had no clue, who had no
11 clue?
12 A David, Wei Jiang, no one's ever mentioned
13 like, oh, I know you're involved in a case. So I
14 never said anything. And when I got invited to this
15 thing, I believe I contacted Jeremy and I said I was
16 invited to this, is it okay to do it, I don't want
17 to cause any trouble. And he's, like, there's no
18 overlap, you can do whatever you want.
19 Q And when you mean "no overlap," that means
20 what?
21 A There's no relationship of this SAB
22 meeting and the services I provide on the SAB to
23 providing expert opinions to the content of this
24 case.
25 Q When was your next -- did you have another

1 meeting after the October meeting --
2 A That is scheduled for -- I don't know that
3 they have -- let me look at the calendar here. I
4 have a hold -- Shelly put a hold on my calendar for
5 February 13th, but it's a hold, which means I don't
6 know if it's the final date or not. I don't have
7 any -- it just says hold. So I think Shelly is
8 trying to figure out a date.
9 Q So how many meeting -- SAB meetings have
10 you attended?
11 A Just one.
12 Q And what did you talk about at the SAB
13 meeting?
14 A It was first -- David gave a really nice
15 introduction to the history of the company; all the
16 different sites, like where their revenue comes
17 from, what kind of products they work on, what areas
18 they would like to get into in the future.
19 And then, you know, they had some specific
20 questions on like trends in manufacturing, you know,
21 what areas should -- that are emerging should they
22 consider getting into. Like high-level discussions
23 like that, like an introductory, you know, meeting
24 to meet and greet the other -- the other people are
25 really well known in the field. So for all of us to

1 chat, talk, and, you know, try to provide guidance
2 to them on, you know, things that are interesting in
3 the future that the company should be looking at.
4 Q And who else was in attendance at this
5 meeting?
6 A Okay. If it's okay, I'm going to go back
7 to my calendar because I've got it all there.
8 October. Okay. So Masad Damha, he's a
9 professor.
10 Q Can you spell that for the record?
11 A At McGill. M-a-s-a-d is his first name,
12 and D as in David a-m-h-a is his last name. That's
13 -- he's another SAB member.
14 And then the third member is John
15 Maraganore. John is his first name and the last
16 name is spelled M-a-r-a-g-a-n-o-r-e. And then it
17 looks like Wei Jiang is there from Hongene. And
18 David Butler.
19 Q Had you met any of the other members
20 serving on the advisory board prior to this meeting?
21 A Yeah, I knew John from his time at
22 Alnylam. He's like a legend in the field of
23 oligonucleotides. And I knew Masad from oligo
24 conferences, I had met him before.
25 Q Have you ever had any relationship with

1 Alnylam? A consulting relationship, for example?
2 A No.
3 Q At this meeting was ChemGene discussed at
4 all, ChemGenes?
5 A No.
6 Q And you testified earlier that Hongene has
7 an interest in getting involved in P(V) reagent
8 technology; is that right?
9 A Yes.
10 Q Did you talk about P(V) technology at this
11 SAB meeting?
12 A Yeah, there was a slide on it where we
13 talked about like what -- what are the problems,
14 what are the opportunities, what needs to be done
15 next, how does Hongene get further involved in that
16 area. There was a brief discussion on it.
17 Q And when you say "slide," is that a
18 presentation that you created?
19 A No, I didn't -- I didn't present. It was
20 them.
21 Q "Them" meaning Hongene?
22 A Yeah.
23 Q And were there any meeting minutes from
24 this follow-up, meeting minutes sent around to those
25 that participated?

1 A I don't remember if there were meeting
2 minutes. But I think, look here -- let's see.
3 Oh, yeah, there are -- I have it here.
4 Let's see, what does it say? Yeah, there's a
5 document here with bullet points, meeting minutes by
6 topic. I don't know if I should read these meeting
7 minutes without you getting -- like, I mean, this is
8 up to Jeremy. It's kind of like, you know, it feels
9 a little slimy to tell you what they were talking
10 about.
11 But it's, generally speaking, things like
12 protein engineering, manufacturing, geopolitics,
13 de-risking, marketing, ligation technology, that
14 kind of thing. The actual details of the minutes, I
15 have to defer to Jeremy and Hongene folks and see if
16 they're willing to reveal it to you.
17 But there's nothing there. I mean, I
18 don't see anything super like, whoa, ChemGenes is
19 going to have a competitive advantage if they see
20 that.
21 Q Do you own shares in Hongene?
22 A No. I don't even know how to own shares
23 in Hongene.
24 Q Did they offer you that as part of your
25 compensation, shares in their company?

1 A No.
2 Q So the only compensation that you receive
3 from Hongene is $70,000 per year?
4 A Correct.
5 Q And are there meetings scheduled for this
6 year?
7 A Yeah, like I said, there's a hold on my
8 calendar for February 13. But it's a hold, so I
9 don't know if that's a final date or not. That's --
10 Shelly usually just puts hold on the calendar when
11 there's a tentative time, but it hasn't been
12 confirmed, so I don't know if that's a confirmed
13 date.
14 Q Is there any agreement between you and
15 Hongene relating to IP that you might develop while
16 you serve on the advisory board?
17 A No. I mean, there may be something in the
18 contract that's, like -- I don't think so because it
19 has to be -- attached to that is the Scripps uniform
20 consulting agreement, which doesn't let me --
21 wouldn't let me do that. So, no, I don't think
22 that's allowed.
23 Q And Shelly has a copy --
24 A Shelly has a copy, yup. You're going to
25 get like a hundred documents from her after this.

1 Q And did you know David Butler prior to --
2 prior to 2022?
3 A Prior to -- no, I didn't know him prior to
4 2023 when he contacted me in whatever it was, May,
5 July, I don't remember the first contact. But no, I
6 didn't know anybody at Hongene personally.
7 Q So you didn't know the CEO, Dr. Wei Jiang,
8 prior to 2022?
9 A No.
10 Q You're familiar with the District Court
11 case that was filed by ChemGenes against Hongene in
12 2022?
13 A If -- is it in one of my -- have I opined
14 on it in one of my declarations?
15 Q You're saying just sitting here you don't
16 remember?
17 A No, I don't know anything about that. Or
18 maybe -- maybe Jeremy sent something to me, but I
19 have no -- I don't know anything about that.
20 Q Okay. When were you first contacted by --
21 who first contacted you with respect to the
22 litigation involving Hongene and ChemGenes, who from
23 -- who contacted you about that?
24 A I believe it was Jeremy on the line here.
25 Q And was that --

1 A He would have the accurate date. He would
2 have the date -- unless you wanted me to search
3 through emails, but he probably has it on his
4 notepad.
5 Q And was that in connection with these
6 IPRs, or was that in connection with the District
7 Court action?
8 A He would know exactly what -- there's a
9 lot of stuff going on here. But it's the '885,
10 there's the two patents that we were -- that this is
11 supposed to be about today.
12 So Jeremy would -- that's a legal
13 question, you should ask him exactly what he
14 contacted me for. I get them all mixed up.
15 MR. SHORES: All right. Can we go to
16 Exhibit 2042.
17 (Exhibit 2042 marked for identification.)
18 Q Do you see this document, Dr. Baran?
19 A Yes.
20 Q Have you seen this before?
21 A Maybe. It doesn't look familiar. I
22 looked at a lot of documents, so I don't know if
23 this is one I've seen.
24 Q You just don't remember?
25 A I don't remember, no.

1 Q This is -- you know, for the record, this
2 is the Second Amended Complaint filed by ChemGenes
3 against Hongene in the District of Massachusetts,
4 which was originally filed in February of 2022.
5 And really my question is were you
6 retained as an expert in connection with this
7 District Court litigation, or were you retained
8 solely in connection with the IPRs which are
9 separate proceedings in the U.S. Patent and
10 Trademark Office which we're, you know, currently
11 litigating?
12 A Certainly you know the answer to the
13 question and I know Jeremy does, so maybe we should
14 just ask him. I don't remember.
15 Q That's fine.
16 MR. SHORES: Okay. Thank you. You can
17 take the exhibit down.
18 Okay. Maybe take a break?
19 THE WITNESS: Sure.
20 (Recess 11:29 a.m. - 11:36 a.m.)
21 BY MR. SHORES:
22 Q Dr. Baran, we talked earlier about your
23 affiliation with several companies and your
24 financial relationship with those companies.
25 Do you recall?

1 A Yes, sir.
2 Q I just had a few questions, follow-up
3 questions.
4 With respect to your arrangement with
5 Elsie, you testified that you have stock ownership
6 in Elsie, correct?
7 A Correct.
8 Q Do you have stock options as well?
9 A I think -- options. I don't know if
10 they're options or just granted shares.
11 Q But that would be reflected in your
12 agreement with Elsie?
13 A Nothing is secret. You can have it all.
14 Q And then with respect to your arrangement
15 with polyARNA, does that arrangement include stock
16 options?
17 A You'll have to look at the contract. I
18 think I just, again, have shares. I don't know if
19 it's listed as an option or as a share, but when you
20 get the document, you'll see it.
21 Q Similarly, with respect to Nutcracker
22 Therapeutics, do you have stock options in
23 Nutcracker Therapeutics?
24 A I think they are options, but they may
25 vest at a certain point. I think -- I recall

1 because I have that Carta app and it shows what you
2 have -- I think they are referred to as options and
3 they vest over time, I think.
4 Q Okay. And what about your arrangement
5 with Hongene, do you have any stock options with
6 Hongene?
7 A No.
8 MR. SHORES: Okay. If we could put up
9 Exhibit 1004.
10 (Exhibit 1004 marked for identification.)
11 Q Do you see this document, Dr. Baran?
12 A Yes, I do.
13 Q And you're familiar with this?
14 A Yeah. This is the Aerschot J. Med. Chem
15 document.
16 Q And this -- this exhibit, you referenced
17 this exhibit in connection with the -- your -- your
18 declaration relating to the '569 patent, correct?
19 A Correct, yes.
20 Q And you cited this reference as an
21 anticipatory reference to claims 1 and 2 of the '569
22 patent?
23 A Correct.
24 Q How did you find this -- this article?
25 A It was either -- either I think I found it

1 or the counsel found it. We collaborated to find
2 it. And I was informed basically of the species
3 genus legal principle that, you know, anticipation
4 of a single species in a claim genus anticipates the
5 entirety of the genus. And so as a matter of
6 efficiency, we just identified this one to
7 anticipate claims 1 and 2 of the '569 patent.
8 Q Were you aware of this publication before
9 you began consulting on the case?
10 A I mean, I'm not sure. I've read thousands
11 and thousands of papers over the course of my
12 career, so I don't remember.
13 Q Okay. Could you read the first line of
14 the abstract into the record, please?
15 A Sure. Let me zoom in a little bit.
16 Q Starts with "A series."
17 A Yeah, let me zoom in.
18 "A series of 2 prime- and 3 prime-
19 fluorinated 2 prime, 3 prime-dideoxynucleosides and
20 3 prime-azido-2 prime, 3 prime-dideoxynucleosides
21 were synthesized and evaluated for their inhibitory
22 activity against human immunodeficiency virus-1
23 (HIV-1) replication in MT-4 cells. Neither
24 conversion of 3 prime-fluoro or 3 prime-azido-2
25 prime, 3 prime-dideoxyadenosine to the corresponding

1 inosine derivatives nor 8-bromination of 2 prime, 3
2 prime-dideoxyadenosine resulted in increased
3 anti-HIV-1 activity, nor did --"
4 Q Sorry to interrupt. I just don't want
5 to -- I was just asking for the first sentence and I
6 just didn't want you to have to read the entire
7 abstract --
8 A Oh, okay.
9 Q -- that first sentence, so.
10 A Sure, whatever.
11 Q And then in the first paragraph, it
12 states, "The discovery of the human immunodeficiency
13 virus (HIV) as a causative agent of AIDS 1,2 and the
14 identification of HIV as a retrovirus have prompted
15 the search for agents that would be able to block
16 the HIV replication process."
17 Did I read that correctly?
18 A Yes.
19 Q And after it reads, "Our efforts have
20 mainly focused on the design and synthesis of
21 reverse transcriptase inhibitors. 2 prime, 3
22 prime-dideoxynucleoside analogues..." and later,
23 "...have attracted considerable attention as an
24 anti-HIV compound, and several congeners of this
25 class are currently subject to clinical trials."

1 Did I read that correctly?
2 A Yes.
3 Q So is it fair to say that this publication
4 concerns the development of the anti-HIV compound?
5 A Yeah.
6 Q Okay. And is it fair to say there's
7 nothing in Aerschot that talks about the synthesis
8 or use of any phosphoramidite?
9 A That is correct.
10 Q And is it fair to say that there's nothing
11 in Aerschot that talks about the synthesis or use of
12 any oligonucleotide?
13 A I don't see any oligonucleotides in here.
14 Q And Aerschot, this reference does not
15 report on oligonucleotides synthesis in the
16 conventional 3 prime to 5 prime direction, correct?
17 A Correct.
18 Q And Aerschot does not -- this reference in
19 Aerschot does not report on oligonucleotide
20 synthesis in the unconventional 5 prime to 3 prime
21 direction, right?
22 A Correct.
23 MR. SHORES: Okay. If you can go to -- if
24 we can pull up Exhibit 1003 from the '569
25 proceeding.

1 Q Okay. If we can go to paragraph 20.
2 A Give me a second.
3 Q Yeah, no problem.
4 A 20. Okay. I'm there.
5 Q In paragraph 20, you testified that "Both
6 the '569 patent and the relevant prior art relate to
7 reverse RNA oligonucleotide synthesis using reverse
8 phosphoramidite chemistry."
9 Did I read that correctly?
10 A Yes.
11 Q That's your testimony?
12 A Yes.
13 Q And by "relevant prior art," you're not
14 referring to Aerschot; correct?
15 A That prior art doesn't refer, obviously,
16 to reverse RNA oligonucleotide synthesis.
17 Q Right. So your testimony and the
18 testimony just read into the record, you're not --
19 by "relevant prior art" you're not referring to
20 Aerschot?
21 A Aerschot only invalidates claims 1 and 2
22 because they're anticipated, that's all.
23 Q So just again, my question is by "relevant
24 prior art" here you're not referring to Aerschot,
25 correct?

1 A The only relevancy of Aerschot is to
2 render claims 1 and 2 invalid.
3 Q Respectfully, that's not answering my
4 question.
5 My question was by "relevant prior art"
6 here you're not referring to Aerschot, correct?
7 A I think you asked it and I answered it
8 already. Aerschot does not refer to reverse RNA
9 oligonucleotides synthesis, again.
10 Q So the answer is no?
11 MR. EDWARDS: Object to form.
12 Q I'm just looking for an -- it's a simple
13 yes or no question.
14 A I'm just giving you --
15 MR. EDWARDS: There's no question.
16 (Court Reporter clarification.)
17 Q Yeah, understood.
18 I'm just -- I keep asking it. I think
19 it's a pretty -- pretty clear yes or no.
20 Here in paragraph 20 of your declaration
21 in Exhibit 1003, by "relevant prior art" you are not
22 referring to the Aerschot reference, correct?
23 MR. EDWARDS: Form. Asked and answered.
24 MR. SHORES: Hasn't been answered.
25 A All I can say is that the relevance of

1 Aerschot is only with regards to the anticipation of
2 claims 1 and 2 rendering them emphatically and
3 unassailably invalid.
4 Now, with regards to Aerschot's
5 participation in RNA oligonucleotide synthesis, it
6 has nothing to do with that.
7 Q Aerschot has nothing to do with reverse
8 RNA oligonucleotide synthesis, correct?
9 A That paper is not about that at all. But
10 the building block described therein is useful for
11 -- potentially useful for the purposes of RNA or
12 reverse RNA synthesis.
13 Q Isn't it correct that Aerschot doesn't
14 teach a POSA anything about oligonucleotide
15 synthesis?
16 A Well, that's not true, because a POSA who
17 needs to make an oligonucleotide would look for
18 monomers, and they would look for preparation of
19 monomers, and they would find in Aerschot a very
20 good and reliable preparation of a monomer that
21 could be used in oligonucleotide chemistry.
22 Q But Aerschot doesn't relate to
23 oligonucleotide synthesis, though.
24 A It doesn't need to.
25 Q Does it or doesn't it?

1 You've already testified to this, so I'm
2 just --
3 A Well, Aerschot reports a tool and that
4 tool is a compound and that compound can be used for
5 HIV, but it can be used for other things as well.
6 So a POSA would use that reference in
7 order to make analogs containing that nucleoside.
8 They wouldn't look at that reference and say, oh,
9 those building blocks that are super useful for my
10 study, I can't use them because HIV is in the title.
11 Does that make sense?
12 Q I'll take it as a non-answer.
13 A Okay.
14 Q What's the -- what is the advantage of
15 5 -- going, you know, in the reverse direction
16 synthesizing oligo going from 5 prime to 3 prime,
17 why -- are there any advantages that's conferred by
18 that process versus the 3 prime to 5 prime
19 synthesis?
20 A Well, as is known in that field of, you
21 know, reverse oligonucleotide synthesis, on occasion
22 it can have benefits in terms of purification
23 efficiency, coupling -- coupling efficiency. There
24 are times when one would want to employ that.
25 Q And are there any specific applications

1 that you can identify where 5 prime to 3 prime would
2 be a more useful tool than 3 prime to 5 prime when
3 synthesizing an oligo?
4 A I mean, it's case dependent. The vast
5 majority of folks will do it in the canonical
6 fashion. And if they encounter problems, they may
7 then start looking at the reverse method that, you
8 know, I think I referenced some papers in my
9 declaration, some (indiscernible) paper. There's a
10 few papers in this area that talk about reverse
11 oligonucleotide synthesis and how it can be
12 advantageous on some occasions. It's not often
13 used.
14 Q "It" being the 5 prime to 3 prime?
15 A The reverse method.
16 Q And do you use this in any of your work,
17 the process of 5 prime to 3 prime synthesis?
18 A No.
19 Q Has anyone on any of your teams used
20 this --
21 A They may have.
22 Q -- to your knowledge?
23 A It's possible, but I just don't know.
24 It's possible. I see tons and tons of experiments,
25 so I don't remember.

1 MR. SHORES: Okay. If we can go to
2 Exhibit 1011, please.
3 (Exhibit 1011 ('707) marked for
4 identification.)
5 Q Have you seen this document in Exhibit
6 1011, Dr. Baran?
7 A Yeah, I believe I reference this in my
8 declaration.
9 Q Okay. It's a publication from 2000 by
10 Wagner; is that right?
11 A Mm-hmm, yes.
12 Q And it's titled "Synthesis of
13 2'-Deoxyribonucleoside 5'-Phosphoramidites: New
14 Building Blocks for the Inverse (5' to 3')-
15 Oligonucleotide Approach."
16 Did I read that correctly?
17 A Yes.
18 Q And then you cited to this in connection
19 with your declaration that supported the petition
20 for the '707 patent, correct?
21 A Yes.
22 Q And so you read this article before you
23 signed your declaration, correct?
24 A Yeah.
25 Q Thank you.

1 And how did you find this article?
2 A Just literature searching.
3 Q Okay. So you found this article?
4 A I believe I found it. But, you know, we
5 pass between the -- counsel and I pass a lot of
6 papers between each other, but I believe this is one
7 of the ones that I independently found as well.
8 They may have found it, too.
9 Q Were you aware of this publication before
10 consulting on this case?
11 A Maybe. I don't remember. As I said, I've
12 read thousands of papers over the years.
13 Q And then looking on the first page, do you
14 see there's a -- it's the second sentence in the
15 first introduction paragraph starts with "Even
16 though"?
17 A Yes.
18 Q Okay. It says "Even though" -- I'm going
19 to read it into the record.
20 "Even though primary phosphoramidites are
21 often used for the synthesis of 3 prime to 3 prime
22 and 5 prime to 5 prime internucleotide linkages,
23 very little is known in literature about the
24 detailed specification of the synthesis of the
25 appropriate 5 prime phosphoramidites suitable for

1 the built-up of oligonucleotides in the 5 prime to 3
2 prime direction."
3 Do you see that?
4 A Yes.
5 Q Do you agree with that statement?
6 A I mean, it's a peer-reviewed paper, and at
7 the time of the publication we have to assume that
8 that's a correct assessment.
9 Q So is it fair to say that based on this
10 statement, that 5 prime to 3 prime direction
11 synthesis was still in its infancy when this article
12 came out?
13 A I don't know if "infancy" is the right
14 word. But in 2000 that's the statement they write
15 that passed peer review.
16 Q And it's fair to say at the time this
17 article was released, there was much research to be
18 done to understand how to run oligo synthesis in the
19 reverse direction?
20 A That might be true, but I really haven't,
21 as part of this declaration, been asked to, you
22 know, research this super heavily. The substance of
23 my declaration is just in anticipation of claims 1
24 and 2 as they are anticipated.
25 Q Would you -- is it fair to say that

1 traditional synthesis, you know, 3 prime to 5 prime,
2 was more common in the early 2000s?
3 A It's probably true. But I would need to
4 do a, you know, more --to come up with a guaranteed
5 answer more -- more searching and reading to make
6 sure that that was a correct assessment. But it's
7 not what I was asked to opine on for these
8 declarations.
9 Q What about sitting here, sitting here
10 today, is -- the traditional 3 prime to 5 prime is
11 more common than 5 prime to 3 prime, right?
12 A As of today, it's still more common for
13 people to employ the 3 prime to 5 prime.
14 Q Right. So back in 2000, the 5 prime to 3
15 prime wasn't really an established technique?
16 A I mean, it's established in this paper.
17 And, you know, as I said already, that I would need
18 to do much more reading and analysis because that's
19 not what I was asked to opine on.
20 Q And if you look at the bottom of the
21 introduction, still on this page here, it starts
22 with "Application."
23 Do you see that?
24 A Yes.
25 Q Could you read that sentence into the

1 record, please -- actually, the -- I'm sorry to
2 interrupt. The two sentences, the rest of the
3 paragraph --
4 A Okay. "Application of the npe/npeoc
5 strategy (npe equals 2-(4-nitrophenyl) ethyl, npeoc
6 equals [2-(4 nitrophenyl) ethoxy]carbonyl) [12]
7 allows also the inverse (5 prime to 3
8 prime)-directed build-up" -- "built-up of
9 oligonucleotides of high purity starting with the
10 appropriately protected 5 prime phosphoramidites.
11 By this strategy, totally unprotected
12 oligonucleotides still attached to the solid support
13 are available, and final cleavage with ammonia
14 affords the oligonucleotides for direct use without
15 further purification."
16 Q Thank you for that.
17 What you just read into the record and
18 what this exhibit states is it refers to npe and
19 npeoc, right?
20 A Yes.
21 Q And are those protecting groups?
22 A Yes.
23 Q Okay. So is it fair to say the authors
24 are saying that the npe and npeoc protecting group
25 strategy allows for high purity synthesis due to the

1 totally unprotected oligonucleotides?
2 A Due to the totally unprotected
3 oligonucleotides? No. It's the use of that
4 strategy that -- that allows for -- yeah, without
5 having to protect, I believe, it's the nucleobase.
6 But let me see here. No, it is on the nucleobase
7 that they are protected.
8 Q Right. So -- sorry. Go ahead.
9 A No, go ahead.
10 Q Okay. So it's -- the protecting groups
11 are being used that -- that's what causes the high
12 purity, but it's not really the synthesis, the
13 synthesis process itself, right?
14 A I don't think you can make that inference.
15 It's a culmination of both features that you're
16 going in a reverse direction and they find using
17 these protecting groups as advantageous for that.
18 Q So where in this reference does it
19 indicate that the reverse synthesis has a -- you
20 know, causes the higher purity in the
21 oligonucleotide?
22 A If you give me a few minutes, I'll scan
23 through.
24 Q Okay.
25 A Well, one of the advantages that's clear

1 is if you want to conjugate something to the 3 prime
2 end, that's going to be impossible to do with the
3 conventional approach because it's connected to a
4 resin.
5 So with regards to making specific
6 modified oligo sequences that have, for instance,
7 something unusual at the end, the conventional
8 strategy won't let you do that. And that's
9 exemplified in the end here. It's just one example,
10 but I'd have to read more on this.
11 Q So it's your testimony is definitely the
12 protecting groups have something to do with it, but
13 you're also saying that the -- the direction also
14 has something to do with it as well, "it" being the
15 achievement of higher purity in the oligonucleotide?
16 A I didn't say higher purity. But in terms
17 of actually making, you know, conjugates where
18 something is terminating on the 3 prime division,
19 you can't easily do that with the conventional way
20 of making oligos because it's connected to the
21 resin. So once you de-protect it, it's over.
22 Q But I guess I'm trying to clarify. I want
23 to understand here.
24 So the protecting groups have -- this
25 paper is about the protecting groups having an

1 effect -- a positive effect on purity, correct?
2 A Among other things. But the reverse
3 oligonucleotide synthesis in this paper is allowing
4 them to make constructs that would be difficult to
5 make with the conventional means of oligo synthesis.
6 Q So your testimony is you would need both
7 the protecting groups, but also the reverse
8 synthesis?
9 A No, that's not my testimony. I mean, as I
10 said, this is not a topic I was instructed to study
11 in great detail. I'm looking at the paper now. I
12 read it, but it's not what is in my declaration.
13 My declaration is mainly concerned with --
14 as a background matter for the folks involved, the
15 history of oligonucleotide synthesis to put things
16 in perspective. But as a factual matter, the
17 anticipation of claims 1 and 2, that's the main
18 heart of the declaration in both cases.
19 MR. SHORES: If you can put up Exhibit
20 1012 from the '707 IPR.
21 (Exhibit 1012 ('707 IPR) marked for
22 identification.)
23 Q And have you seen this document,
24 Dr. Baran?
25 A I think so.

1 Q Okay. What's your -- what is this
2 document?
3 A This is a publication on making various
4 microarrays using synthesis in the reverse
5 direction, making those microarrays using the
6 reverse direction modality.
7 Q And it's titled "Light-directed 5 prime to
8 3 prime synthesis of complex oligonucleotide
9 microarrays." Is that correct?
10 A Yes.
11 Q And you cited to this in your declaration
12 that you submitted in connection with the '707
13 patent; is that right?
14 A Mm-hmm, yes.
15 Q And you reviewed this publication?
16 A I read it, yes.
17 Q You agree with its contents?
18 A I mean, I agree that this is a published
19 paper. But I don't know if I agree with every
20 single word that's written. I didn't write the
21 paper.
22 Q The paper relates to the synthesis of DNA
23 in the 5 prime to 3 prime direction, correct?
24 A Mm-hmm, yes.
25 Q It doesn't report any results for RNA

1 synthesis, correct?
2 A I have to check. I don't think so.
3 That's not what the -- what the point of this was
4 was for DNA. It doesn't say RNA.
5 Q Okay. If you want to take a look to
6 confirm, that's fine.
7 A Looks like only DNA here.
8 Q Okay. And so it doesn't have synthesis of
9 RNA in the 5 prime to 3 prime direction, correct?
10 A Not in this paper, no.
11 Q The focus is on DNA in this publication,
12 right?
13 A Looks like it, yes.
14 Q So if you look at the sentence on the
15 bottom of page 4, the bottom left, starts with "This
16 is consistent..."
17 A Page 4?
18 Q Yes, on the bottom left. You can see the
19 -- it's like six lines up from the bottom. It says,
20 "This is consistent with..."
21 A Yeah.
22 Q So that sentence says, "This is consistent
23 with previous studies using DMT based 5 prime to 3
24 prime synthesis. Stepwise yields are slightly lower
25 on average than 3 prime to 5 prime synthesis using

1 NPPOC chemistry, even with longer coupling times."
2 Did I read that correctly?
3 A Yes.
4 Q Is it fair to say that the authors here
5 found oligonucleotide synthesis in the 5 prime to 3
6 prime direction vis-a-vis synthesis in the 3 prime
7 to 5 prime resulted in poor coupling yields?
8 A I mean, that's what they say. But it's a
9 very different strategy. They are doing this on
10 arrays, which could be different than an
11 oligonucleotide synthesizer.
12 And if your purpose was to have a
13 construct with something connected at the 3 prime
14 position, C 3 prime position at the end, your best
15 bet would be to do reverse if you wanted to change
16 the nature of the group at the end point.
17 So 5 prime to 3 prime could have
18 advantages with regards to purity, depending on the
19 building blocks you used and depending on the kind
20 of construct you're trying to make.
21 But for further, you know, in-depth study
22 and evaluation and analysis, that would be something
23 I would need to spend a lot of time and -- and
24 specifically be asked to opine on, and that's not
25 what I was asked to do.

1 Q So if you look at Table 1 on page 2, is it
2 fair to say that this shows a higher stepwise yield
3 for a 3 prime to 5 prime than 3 (audio disruption).
4 (Court Reporter clarification.)
5 Q Versus 5 prime to 3 prime with every base?
6 A I mean, it really depends on if the -- if,
7 you know, how many data points there are, if this is
8 a really rigorous statistical analysis.
9 The yields are close, they are very close,
10 number one. Number two, they are done on a
11 microarray, which is a very specialized type of
12 oligonucleotide synthesis.
13 Q Is it fair to say that the poorer coupling
14 yields shown here would render synthesis of longer
15 oligonucleotides less plausible?
16 A No, I don't know that you could say that
17 based on what is seen here, because I don't know how
18 much time has gone in to optimize. And again, this
19 was done on an array, not on an oligo synthesizer.
20 So there could be different variables to explore.
21 Q But this paper doesn't teach synthesizing
22 oligonucleotides in the 5 prime to 3 prime would
23 necessarily produce longer oligos than synthesis of
24 3 prime to 5 prime, right?
25 A Yeah, I would have to study it more. I

1 don't know if it teaches that or not. I would need
2 time to look at this and look at the context.
3 Again, this was not a topic I was asked to study in
4 depth.
5 Q So sitting here today, you can't point to
6 anything that indicates that the synthesis of oligos
7 in the 5 prime to 3 prime direction would produce
8 longer oligos than synthesis in -- of oligos in the
9 3 prime to 5 prime direction, right?
10 A I mean, maybe given more time and looking
11 at background literature, perhaps. But I really
12 need the time to do the proper analysis, and that's
13 not what I was asked to do.
14 Q So the answer is no, sitting here today?
15 A The answer is I don't know. I need more
16 time.
17 Q Is the answer yes, sitting here today?
18 A I think I just gave my answer.
19 MR. EDWARDS: Objection to form.
20 MR. SHORES: Okay. Can we pull up Exhibit
21 1014 from the '707.
22 (Exhibit 1014 ('707 IPR) marked for
23 identification.)
24 Q Dr. Baran, do you see this document on the
25 screen?

1 A Yes.
2 Q Are you familiar with this document?
3 A Yes, this is the anticipatory reference
4 for -- for the other patent.
5 Q So this is U.S. Patent --
6 A '707.
7 Q So this is U.S. Patent Number 5,869,696,
8 correct?
9 A Correct.
10 Q And it's titled "Universal Solid Supports
11 And Methods For Their Use"?
12 A Yes.
13 Q And then this is cited in your declaration
14 in connection with the '707 IPR, correct?
15 A Yes.
16 Q And you cited it as an anticipatory
17 reference for claims 1 and 2 of the '707 patent,
18 correct?
19 A Correct. Correct.
20 Q And you've reviewed this patent?
21 A Yes.
22 Q And did you find this patent yourself?
23 A Again, I don't remember if it was me or
24 counsel. We passed a lot of documents back and
25 forth to each other.

1 Q The title says "Universal Solid Support."
2 So is it your understanding that the
3 universal supports are solid supports that allow a
4 practitioner to use one type of support for an
5 oligonucleotide synthesis?
6 A "Universal" is a strong term to use. But
7 that's -- you know, the inclination is to inform the
8 public that this can be used for a variety of
9 different purposes.
10 Q And is it your understanding that the
11 teachings of this reference indicate that the use of
12 the disclosed universal solid support allows a
13 practitioner to avoid stockpiling different solid
14 supports?
15 A By universal, the goal would be, you know,
16 to allow people to focus on using one for all their
17 needs versus having, you know, multiple different
18 types, so yeah.
19 Q If you go to, you know, if you turn to --
20 go to column 1, line 34.
21 Do you see the statement, it says,
22 "Maintaining a supply of at least 8 different
23 prederivatized solid supports is inconvenient and
24 expensive"?
25 Do you see that?

1 A Yes.
2 Q Would you agree with that statement as a
3 general proposition?
4 A I mean, it depends on the -- you know,
5 certainly if you had one support, it's better than
6 having eight. But if your purpose is -- if you're a
7 large or even a regular biotech company, you need to
8 make something, you're going to use the support
9 which is fit for purpose.
10 So yeah, I agree with the statement that
11 if you have one support that works as well as eight,
12 it's probably better to just have one.
13 Q And you agree that in solid phase
14 oligonucleotide synthesis in the traditional 3 prime
15 to 5 prime direction typically requires the use of
16 solid supports that have the 3 prime most nucleotide
17 attached to it?
18 A Yeah, that's how it works.
19 Q And if you can go to claim -- the claims
20 of the '696 patent, and column 33.
21 A Okay. Column 33. There's 32. 33. Okay.
22 There you go.
23 Q Okay.
24 A It went up again. Sorry.
25 Q The sequences get in the way sometimes.

1 A Yeah.
2 Q So claim 1 is directed to a cleaving
3 reagent, correct?
4 A That's what it looks like, yes.
5 Q Looks like all these claims are directed
6 to a cleaving reagent, is that fair to say?
7 A Looks like it, mm-hmm, yeah.
8 Q Is it fair to say that cleaving reagents
9 are useful for moving oligonucleotides from the
10 solid support on which they are synthesized?
11 A Yeah.
12 Q And is it also fair to say that these
13 claims are not directed to oligonucleotide
14 synthesis?
15 A I think they -- well, I mean, there are
16 oligonucleotide cleaving reagents, though, by
17 definition, they are useful for the synthesis of
18 oligonucleotides.
19 Q Do they -- do these claims indicate
20 synthesis in either the 5 prime to 3 prime or the 3
21 prime to 5 prime direction?
22 A I don't know that that's relevant here.
23 Q I'm just asking you --
24 A I don't know. I would have to, you know,
25 refresh my memory on the -- go through the written

1 description. But either way, the claims are to
2 cleaving reagents, so...
3 Q Right. Okay. So they are to cleaving
4 reagents.
5 I'm just talking about the claims, not the
6 description. I'm asking -- the claims aren't
7 directed to 5 prime to 3 prime or 3 prime to 5 prime
8 synthesis, right?
9 A They could -- the claims don't have that
10 written in them, correct.
11 Q And then the claims are also not directed
12 to nucleosides, correct?
13 A No, doesn't look like it.
14 Q And they are not -- okay. Thank you.
15 And they are also not directed to
16 phosphoramidites?
17 A The claims, no.
18 Q And they are not -- the claims aren't
19 directed to solid supports either; is that right?
20 A I don't see anything regarding a solid
21 support on these claims, no.
22 Q Okay.
23 MR. SHORES: I think we're probably at a
24 good stopping point here. I think we probably want
25 to take a lunch break.

1 Does that work for everybody? Dr. Baran,
2 you're on a different timetable, so I don't know if
3 you --
4 THE WITNESS: Lunch would be great. I've
5 been waiting all day. I'm happy to go as long as
6 you want. You're the boss, you tell me what to do.
7 MR. SHORES: Maybe we can -- maybe we can
8 take, you know, about maybe 45 minutes.
9 THE WITNESS: Can you just give me an
10 exact time to come back to this computer and then
11 I'll be here promptly at that exact time.
12 MR. SHORES: Why don't we come back at 12
13 -- or our time it actually would be I guess 1:15.
14 Am I getting that right? Hold on. Yeah.
15 1:15.
16 THE WITNESS: 1:15. Okay.
17 MR. EDWARDS: 1:15 Eastern we'll be back.
18 (Recess 12:22 p.m. - 1:23 p.m.)
19 BY MR. SHORES:
20 Q All right. Dr. Baran, we talked before
21 the break we talked about your agreement with
22 Hongene.
23 Do you recall that testimony?
24 A Yes.
25 Q And how long does that agreement go for?

1 How long is your contract for?
2 A I think it's like every year they can
3 renew it. I don't think it's binding for more than
4 a year. But again, I defer to the document that you
5 are free to get.
6 Q And to your knowledge, does Hongene
7 in-license any P(V) technology?
8 A Currently, no.
9 Q Is that to your knowledge, or no --
10 A To my knowledge.
11 Q Okay. Is it possible they could
12 in-license it, but you don't know one way or the
13 other?
14 A Anyone could in the future, even
15 (indiscernible).
16 (Court Reporter clarification.)
17 A I said anyone could in the future,
18 ChemGenes, Glen, anyone who wants.
19 Q So would Elsie be in a position to license
20 that type of technology -- let me ask it again a
21 different way.
22 Would Elsie consider licensing P(V)
23 technology to Hongene?
24 A I don't think they legally can. I think
25 that needs to be done like a -- for selling

1 reagents, I think they need to go work with BMS on
2 that. I don't think Elsie has the right to
3 sublicense things for reagents.
4 Q So if a company wanted to license P(V)
5 reagents, to your knowledge, they would approach
6 BMS?
7 A Correct.
8 Q And to your knowledge, MilliporeSigma is a
9 current, I guess, sublicensee of the technology?
10 A Correct.
11 Q Are there any other licensees or
12 sublicensees to the P(V) reagent technology, to your
13 knowledge?
14 A Aside from Elsie and Sigma-Aldrich, not to
15 my knowledge.
16 Q And do you have any other agreements with
17 Hongene besides the agreement that you referenced
18 earlier that relates to the service on the advisory
19 board?
20 A No.
21 Q And it's your understanding that Hongene
22 sells phosphoramidites as part of its product
23 offering?
24 A Yes.
25 Q And you've -- have you ever been

1 affiliated with an organization that's purchased
2 Hongene phosphoramidites?
3 A I believe all the companies I work with
4 have ordered from every vendor out there; ChemGenes,
5 Hongene, Glen, TCI, Aldrich. Organizations don't
6 really care where they buy from. If it's commercial
7 and reasonably priced, they buy it.
8 Q And you characterize, you know, ChemGenes,
9 Hongene as competitors in the marketplace?
10 A They're all selling reagents. So, yeah,
11 it's a -- it's a crowded market. So, you know,
12 ChemGenes, Hongene, Glen, to some extent Sigma,
13 other vendors, Combi Blocks, TCI.
14 But the vendors that specialize in, like,
15 you know, oligo-specific stuff and go to a lot of
16 conferences are places like ChemGene, Hongene, Glen,
17 and there's probably some other boutique reagent
18 suppliers that are heavy into the oligo space.
19 MR. SHORES: So if we can pull up Exhibit
20 1003 from the '569.
21 Q We looked at this exhibit earlier today.
22 Do you recall?
23 A Yes.
24 Q And this is a copy of your declaration in
25 support of petition for IPR relating to the '707

1 patent?
2 A Correct.
3 Q Okay. And if we go to paragraph 21 of
4 this document -- or, excuse me, paragraph 20.
5 Actually, I think the wrong exhibit is up.
6 This exhibit is -- okay. Well, I asked
7 for the exhibit to the '569, but that was the
8 exhibit for the '707. We can still use that
9 document. I just was looking to start with '569.
10 But this is fine.
11 So you see here in paragraph 20, you see
12 the statement?
13 A Yeah.
14 Q Okay. And do you still agree -- I'm
15 sorry -- the testimony that is provided in paragraph
16 20 says, and I'll read it into the record, "In my
17 opinion, a POSA would have had a Ph.D. (or
18 equivalent) in organic or medicinal chemistry, and
19 two to three years of postgraduate work experience
20 in medicinal chemistry, synthetic organic chemistry,
21 and nucleic acid chemistry, including the
22 development of oligonucleotide therapeutics,
23 diagnostics, or building blocks. Alternatively,
24 someone who had extensive work experience in these
25 fields, and who had gained a thorough understanding

1 of the development of nucleic acid-based materials,
2 would also have qualified as a POSA with a
3 bachelor's or master's degree in organic chemistry
4 or medicinal chemistry."
5 Did I read that correctly?
6 A Yeah.
7 Q And you agree with that testimony?
8 A Yes.
9 Q Under this definition, if a person had all
10 the qualifications that are described here, but did
11 not have work experience in medicinal chemistry,
12 would they still qualify as a POSA?
13 A I'm not sure. You would have to look at
14 it at a case-by-case basis and see what their
15 experience was. I'm not -- I don't know if we
16 can -- you know, it has to be taken on a
17 case-by-case basis perhaps.
18 Q In connection with the claims of the '707
19 patent and the claims of the '569 patent, those
20 claims are directed to building blocks, correct?
21 A Correct.
22 Q Including phosphoramidites, correct?
23 A Including phosphoramidites and some
24 precursors thereof.
25 Q And nucleosides?

1 A Yes.
2 Q Okay. They are not -- those claims, the
3 claims in the '707 patent, are not directed to
4 oligonucleotides, correct?
5 A For claims 1 and 2, they are just
6 compounds, building blocks, as you said.
7 Q And they are not directed to therapeutics,
8 correct?
9 A I would have to read the claim language,
10 but I think they are just building blocks.
11 Q Same with the '569, claims 1 and 2 of the
12 '569 patent, are those claims just directed to
13 building blocks?
14 A As I recall, yes.
15 Q And those claims are not directed to
16 oligonucleotides, correct?
17 A I don't believe so. I think they are just
18 building blocks.
19 Q Those claims in the '569 patent, claims 1
20 and 2, are not directed to therapeutics, correct?
21 A If you want to show the document really
22 quick to make sure, but I don't -- as I recall, they
23 are just building blocks.
24 Q Is it fair to say that the building blocks
25 that are claimed in the '707 and '569 patent may not

1 have been used for therapeutic purposes?
2 A That's fair.
3 Q And from the perspective of a medicinal
4 chemist, can you describe the role that a medicinal
5 chemist plays in this -- in the development of a
6 therapeutic, for example?
7 A Sure. A medicinal chemist working in this
8 area might have a need for a tool compound, they may
9 have a need for a model compound that may not be a
10 therapeutic, or they may be working on something
11 which is deliberately intended to be used for
12 therapeutic purposes.
13 And in the process of doing the medicinal
14 chemistry on that, they would have a target
15 sequence. They would explore various permutations
16 of the ribose structure and fashion a route based on
17 that target sequence that would reliably work in the
18 oligonucleotide synthesizer to deliver the desired
19 product for some sort of assay or readout to check
20 for properties. That's like really high level.
21 Q Right, right. That's fine.
22 So when you're talking about a target
23 sequence, is there an example of a particular
24 disease that an oligo is used to treat or to, you
25 know, mitigate the effects of?

1 A Well, it depends what kind of oligo. I
2 mean, there's famous examples like the COVID
3 therapeutic mRNA. And then there's -- if you're
4 talking about a smaller oligonucleotide, you can
5 think of another famous example, which is Spinraza,
6 which is an antisense nucleotide, so it's much, much
7 smaller. Both of those are therapeutic
8 oligonucleotides.
9 Q So you would consider the mRNA an
10 oligonucleotide, right?
11 A That's what it is.
12 Q Is it fair to say it's a rather lengthy
13 oligonucleotide?
14 A Like I said before, oligo, if you define
15 it, is two or more. So it can be several hundred
16 and it can be 15, and you still classify it as
17 oligonucleotide.
18 Q Okay. That's fair.
19 I think a lot of times the conversation
20 around some of these oligonucleotides is that they
21 are a certain limited size in mers, but an mRNA
22 molecule is larger. So I was just looking for that,
23 you know, distinction. Thank you.
24 A Sure.
25 Q Now, for the shorter oligonucleotide

1 sequences, are those -- how are those -- I'm sorry.
2 My understanding is messenger RNA
3 therapeutics is delivered -- the payload, the mRNA
4 payload, like, for example, in the COVID vaccine, is
5 delivered via a lipid nanoparticle delivery system
6 that interacts with the cell and the cell takes
7 the -- takes the payload up into its cell and then
8 it affects the therapeutic by causing the cell to
9 produce, you know, the subject protein there, the
10 spike protein from the coronavirus.
11 Are the shorter oligos -- maybe "shorter"
12 isn't the right term -- but oligos that are, you
13 know, shorter in length, are they delivered the same
14 way? Are they delivered via lipid nanoparticle?
15 How do those therapeutics make their way
16 into the cell?
17 A Yeah, it's a good question, and it really
18 depends. So, for example, bigger oligos but not
19 quite as big as mRNA, like siRNA, are usually
20 formulated with some sort of lipid nanoparticle on
21 occasion. Often the -- they also have some kind of
22 conjugation to something which makes them localized
23 in an organ or behave better.
24 So, for example, some ASOs and some
25 smaller oligos are connected to sugars to, you know,

1 improve their properties. But sometimes ASOs can be
2 delivered just as, you know, the oligo by itself in
3 a formulated solution with various excipients. And
4 in the case of something like Spinraza, you've got
5 direct injection into the spinal fluid of an infant.
6 So it really depends on -- that goes down
7 to a formulation conjugation question, and the
8 delivery is a really hot and important topic in the
9 oligonucleotide world.
10 Q And are you -- are you familiar, you know,
11 whether mRNA -- the mRNA utilized, for example, in
12 these, you know, coronavirus vaccines, the ones that
13 are produced by Moderna and BioNTech with Pfizer,
14 are those phosphodiester backbones or do they have
15 different backbones?
16 A They feature unusual (audio distortion).
17 (Court Reporter clarification.)
18 A They feature unusual bases. So N-methyl
19 pseudouridine is a common base that you can find in
20 an mRNA vaccine to reduce immunogenic properties and
21 make it safer. But, to my knowledge, they don't
22 contain phosphorothioate.
23 Q So when a medicinal chemist is evaluating
24 a, you know, candidate, and if the candidate is an
25 ASO --

1 A Okay.
2 Q -- for a particular, you know, indication,
3 what does that process involve?
4 Is there an example of a medicinal chemist
5 designing an ASO and then applying that to a
6 particular -- a particular disease?
7 A Yeah. So Spinraza, since I mentioned it,
8 is a good sort of flagship example that a lot of
9 people like to use. That one was discovered through
10 first a bioinformatics search on an mRNA transcript
11 to find what would be an ideal, a good sequence.
12 I suppose several candidates were made,
13 various analogs were made. And then I believe it's
14 a 17 mer, I'm not -- I think it's a 17 mer, and then
15 it contains within it all the linkages are
16 phosphorothioate linkages.
17 Q And then the Spinraza, how -- what's
18 the -- you know, how does that -- how does that
19 treat the disease?
20 Does it make its way into the cell and is
21 it interfering RNA? How does it work?
22 A So it's a steric block antisense
23 oligonucleotide. And I think how it works is you
24 inject it directly into the cerebral spinal fluid,
25 it has a half life of about half a year, so the

1 patients have to get a treatment every, you know,
2 once or twice a year.
3 And I think the way it works is it
4 prevents or allows for a certain protein to be
5 produced that alleviates the spinal muscular atrophy
6 indication that, you know, leads to -- I think one
7 of the leading causes of western infant mortality,
8 and this is not curative, but it allows them, these
9 kids to lead a normal life.
10 Q So the 17 mer oligo, does that cause the
11 cells to generate that specialty protein? Is it
12 just like how mRNA works? Or how does the 17 mer
13 oligo operate? Does it cause transcription?
14 A It binds to a certain part of mRNA that
15 then leads to a blockage of cascade events that then
16 prevent or -- or I would have to look up the biology
17 -- I think prevent the protein from being generated.
18 But it's like a form of gene therapy that
19 allows you to tinker with inner workings of the --
20 the protein production, but in the area where it
21 matters most, in the brain.
22 Q And that's sort of a -- that's a classic
23 example of what a medicinal chemist would do to
24 engineer, you know, an oligonucleotide and then
25 direct its use in testing for a particular

1 indication. Is that fair to say?
2 A Yeah, I think that's fair to say, mm-hmm.
3 Q So when the medicinal chemist is building
4 or wants to build that therapeutic, the medicinal
5 chemist will look towards -- will utilize building
6 blocks or cause others to utilize building blocks in
7 order to construct the subject therapeutic, right?
8 A Well, eventually -- what will eventually
9 become the therapeutic, yeah. So they're looking
10 for lead compounds, they might test 10, 20, a
11 hundred or more various leads and they'll run them
12 through a battery of different assays and then go to
13 a rodent perhaps and then maybe a dog. And once
14 they are convinced of the efficacy as measured by
15 protein expression levels, and safety profile is
16 good, then they will put the package together and
17 file an IND, and try to get into a phase 1 where
18 they give it to healthy patients, make sure it's
19 safe.
20 Q In terms of from the viewpoint of a
21 medicinal chemist, assembling these therapeutics,
22 these oligonucleotides, generally speaking, the
23 medicinal chemist isn't the one that's involved in
24 creating the individual building blocks, though,
25 correct?

1 A No, they are. I mean, definitely wouldn't
2 be a competent medicinal chemist if you didn't know
3 how -- like, if you were only able to make things
4 where you could buy the building blocks, that would
5 be a pretty -- pretty sad medicinal chemist.
6 Q Just going back to the, you know,
7 definition here. What if there was a chemist that
8 was an expert in synthesizing the building blocks;
9 that that was their -- the chemist's focus was for
10 years, two to three years or even more, expertise at
11 synthesizing the building blocks, but they knew
12 nothing about medicinal chemistry, would that person
13 be a POSA, in your -- under your definition?
14 A I mean, it's really a strange
15 hypothetical. I don't know anybody like that. I've
16 never heard of anybody like that. It would be a
17 very sad intellectual human who would devote their
18 life to making oligonucleotide building blocks, but
19 not have any interest in how they are used.
20 So I've never met anybody like that in
21 companies that just knows how to make a sugar but
22 doesn't know what it's used for, or why certain
23 building blocks are employed in certain cases. So
24 it's a strange hypothetical, but I'm happy to
25 entertain it.

1 If the purpose was, you know, let's find
2 the building block in this particular case, they
3 would look and they would find that building block,
4 let's say in the Aerschot example or the '596
5 example, and they would say, oh, here's a building
6 block. And they would use that to make, you know,
7 the key intermediate used for whatever their oligo
8 synthesis regime would be.
9 So it doesn't take a tremendous amount of
10 skill to do a first initial pass to scan the
11 literature for what is known.
12 Q So if -- I don't know if I characterized
13 the chemist the way you characterized it in my
14 hypothetical.
15 But what if there is a chemist that was an
16 expert at synthesizing just these building blocks,
17 maybe they were aware of, you know, the ultimate
18 therapeutic, you know, and they care about that as a
19 human being, but they are not a medicinal chemist,
20 but they understand that what they are doing is part
21 of a project that involves medicinal chemistry, but
22 they don't have the expertise that a medicinal
23 chemist would have to apply this product to a
24 therapeutic. Would they qualify as a POSA under
25 your definition?

1 A Well, I'm not going to sort of -- this is
2 a weird, very weird hypothetical. But I think there
3 is too much compartmentalization going on. That's
4 not how drug discovery works.
5 So there's people who -- you know, the
6 medicinal chemist is usually -- the synthetic
7 organist chemist in general is usually the sole
8 person on the project who knows the most about
9 everything. So they know how to make the building
10 blocks, they know how to make stuff. You know, all
11 pharma companies are making products that are
12 chemicals.
13 So they are the ones that are -- they are
14 the creators, and they work with the biologists hand
15 in hand on the assays, they know what their target
16 product profile is supposed to look like in terms of
17 efficacy and the various liabilities they want to
18 try to solve by making analogs of them. And so it's
19 a very -- a weird hypothetical to have someone who
20 only knows how to make building blocks, but has no
21 idea about the when and where and why of how those
22 building blocks are used.
23 So, yeah, would they fall into this
24 definition? I don't know. It's sort of a weird
25 hypothetical. I mean, I'll stick with what I've got

1 written here. I mean, if you want to take your
2 hypothetical chemist who doesn't know medicinal
3 chemistry, but only knows how to make building
4 blocks, and ask a specific instance of would they
5 know this or would they know that, we can go further
6 on that.
7 But, yeah, they might be a POSA in certain
8 cases. I mean, it just depends on what you are
9 asking, like, what's the problem you are asking them
10 to solve. You know what I mean?
11 Q Yeah. So I just want to be clear as to
12 what your viewpoint in the definition is. And it
13 says here, medicinal chemistry, synthetic organic
14 chemistry, and nucleic acid chemistry.
15 And so the way this is written, it seems
16 that all of those -- experience in all of those
17 areas are required under your definition, and I'm
18 just confirming if that is what your testimony is.
19 A I mean, to some extent I've seen chemists
20 who didn't necessarily know -- they didn't
21 practice -- I've had students who were experts in
22 synthetic organic chemistry, knew a lot about
23 medicinal chemistry, hadn't really focused in the
24 area of nucleic acid chemistry and then gone on to
25 companies that engage in nucleic acid chemistry, and

1 they were hired because if, you know, if you're a
2 really, really talented synthetic organic chemist,
3 learning the various aspects of the application part
4 are much easier to teach.
5 So companies usually want to hire people
6 who are really talented organic chemists because
7 they know that learning the other stuff doesn't take
8 as much time. So a good Ph.D. student from my
9 group, for example, had maybe worked on a project
10 that had nothing to do with nucleic acids, could
11 easily go to a company like Alnylam or Moderna, and
12 within a few weeks would be running circles around
13 people because they would be so good at chemistry,
14 and it would be very simple for them to use their
15 skills to apply it to the area of nucleic acid. So
16 maybe that addresses the question.
17 Q I'm not really sure I got an answer. And
18 I just want to know if one must be a medicinal
19 chemist or have experience in medicinal chemistry in
20 order to be a POSA under your definition, that's
21 what my question is.
22 A I mean, I don't want to revise the
23 testimony. It is what's written here. But, sure,
24 there's exceptions to this that -- you know, it's
25 malleable, I believe other definitions were

1 proposed, and I had no problem with them as well.
2 It's a pretty straightforward set of
3 chemistries that is in these various cases we have
4 been talking about. So, you know, I suppose the
5 definition could be malleable on a case-by-case
6 basis depending on who the chemist is.
7 MR. SHORES: All right. I think if we can
8 take a break, a short break, come back on.
9 (Recess 1:52 p.m. - 2:04 p.m.)
10 BY MR. SHORES:
11 Q Dr. Baran, we want to pull -- we were just
12 looking at Exhibit 1003 from the '707 IPR. I would
13 like to look now --
14 MR. SHORES: I'm sorry, what were we
15 looking at before -- I'm sorry, Court Reporter, what
16 did we have up before?
17 Q Okay. This is Exhibit 1001 from the '707
18 patent and we were looking at paragraph 20 of this
19 declaration.
20 Do you recall, Dr. Baran?
21 A Yes, sir.
22 Q Okay. And if we could pull up Exhibit
23 1001 -- 1003 from the '569 patent.
24 Dr. Baran, have you seen this document
25 before?

1 A Yes.
2 Q What is this document?
3 A This is my declaration regarding the '569
4 patent and the (indiscernible) thereof.
5 Q Thank you.
6 And if you could refer to paragraph 21,
7 which is on page 6 of this document.
8 A 6, paragraph 21. Okay. I'm there.
9 Q Okay. And if you see there paragraph 21
10 states, "In my opinion, a POSA would have had a
11 Ph.D. (or equivalent degree) in organic or medicinal
12 chemistry and two to three years of postgraduate
13 work experience in medicinal chemistry, synthetic
14 organic chemistry, and nucleic acid chemistry,
15 including the development of oligonucleotide
16 therapeutics, diagnostics, or building blocks."
17 Did I read that correctly?
18 A Yes.
19 Q And that testimony is the same as the
20 testimony that was provided in the Exhibit 1003 of
21 the '707 patent?
22 A Looks like it, yeah.
23 Q And then the second sentence of paragraph
24 21 of Exhibit 1003 from the '569 patent says, and
25 I'll read that into the record, "Alternatively,

1 someone who had at least three years of work
2 experience in these fields and who had gained a
3 thorough understanding of the development of nucleic
4 acid-based materials would also have qualified as a
5 POSA with a bachelor's or master's degree in organic
6 chemistry or medicinal chemistry."
7 Did I read that correctly?
8 A Yes.
9 Q And is that the same testimony that is
10 reflected in paragraph 20 of the Exhibit 1003 from
11 the '707 proceeding?
12 A I guess so. I'm assuming so.
13 Q And then the last sentence says, of
14 paragraph 21 of Exhibit 1003 of the '569 patent, the
15 last sentence of paragraph 20 says, "As of September
16 6th, 2008, I was a person of at least ordinary skill
17 in the art as set forth above."
18 Do you see that?
19 A Yes.
20 Q And what is the basis for that statement?
21 What -- sorry. What was the basis for that
22 statement?
23 A Well, I have a tremendous amount of
24 experience in medicinal chemistry, synthetic organic
25 chemistry, consulted at numerous companies working

1 in the area of nucleic acid chemistry. So was well
2 aware of the challenges of the field. I taught
3 nucleic acid synthesis in class.
4 So, yeah, I would consider myself at least
5 to be a person of ordinary skill in the art at that
6 time.
7 Q And then if you remember that sentence,
8 "As of September 6th, 2008, I was a person of at
9 least ordinary skill in the art as set forth above,"
10 and then if we go to the previous exhibit, if we can
11 go to Exhibit 1003 from '707, paragraph 20, that
12 sentence does not appear as part of your testimony
13 in connection with paragraph 20 for Exhibit 1003 in
14 the '707 patent; is that correct?
15 A It doesn't look like it's there.
16 Q Is that an omission or were you not a
17 person of ordinary skill in the art in connection
18 with the '707 patent in the 2008 time frame?
19 A I don't know why that sentence is missing,
20 but I would still offer to put the same sentence
21 back in there.
22 Q Maybe I'll ask the question, which is
23 precise wordsmithing sentences and declarations, and
24 we understand there is a lot of materials in there.
25 As of in the 2008 time frame, your

1 testimony in connection with the '707 patent is that
2 you were a person of at least ordinary skill in the
3 art as set forth above in paragraph 20; is that
4 correct?
5 A Yes.
6 Q Thank you.
7 And with respect to your -- with respect
8 to your publications, we talked about in the last
9 deposition in the '885 -- in the patent proceedings,
10 the IPR involving the '885 patent, we talked about
11 your -- some of your literature.
12 Do you recall that testimony?
13 A Yes.
14 MR. SHORES: Okay. And if we can pull up
15 Exhibit -- I think it might be currently listed as
16 2009, and we would want to mark as 2045, and that's
17 the deposition transcript from the '885 -- from the
18 deposition in the '885 proceeding.
19 (Exhibit 2045 marked for identification.)
20 MR. SHORES: So it should be listed as
21 Exhibit 2009 maybe in the --
22 THE TECHNICIAN: Yes, would you like
23 that --
24 MR. SHORES: -- marked as 2045.
25 THE TECHNICIAN: Okay.

1 MR. SHORES: Yeah. Thank you.
2 BY MR. SHORES:
3 Q And I've -- this exhibit, you see this
4 exhibit on the screen, Dr. Baran?
5 A Yes, sir.
6 Q And this is a deposition transcript
7 relating to the '885 patent that was conducted
8 September 13th, 2023.
9 Do you have any reason to doubt this?
10 A No, not at all.
11 Q Okay. And so if we go to page 75 of this,
12 I think it's -- yeah, page 75.
13 Do you agree that only about 14 of the
14 over 250 papers that you published relates to
15 oligonucleotide synthesis?
16 A Yeah, as of that date.
17 Q Okay.
18 MR. SHORES: You can take the exhibit
19 down.
20 Q Okay. So you've published over 250
21 papers, correct?
22 A Yes.
23 Q And around -- at that time, in September,
24 around 14 or, you know, 14 or more papers related to
25 oligonucleotides, correct?

1 A Approximately, yes.
2 Q And as we covered earlier today, you know,
3 several of those papers are focused on, you know,
4 P(V) -- the P(V) chemistry that you championed,
5 right?
6 A Yes.
7 Q And have you ever published a paper that
8 is related to the synthesis of a phosphoramidite?
9 A There may be something in the papers. I'm
10 not sure. But for certain, I have consulted on this
11 topic on multiple occasions and taught it in class.
12 I think looking at papers is just one
13 myopic way of trying to pitch and hold one's
14 expertise. One doesn't reach my level by not having
15 expertise in something as fundamental and
16 foundational to the field of organic chemistry as
17 oligonucleotide synthesis.
18 So I've consulted on it for years, taught
19 classes on it. Certainly well aware of the area as
20 of the 2008 time frame, regardless of whatever the
21 publications are.
22 Q Yeah, I'm not trying to pigeonhole you.
23 I'm trying to understand the work that you've
24 conducted in connection with the synthesis of
25 building blocks. So that's the purpose of -- of my

1 inquiry here.
2 Have you ever published a paper that
3 relates to the synthesis of, you know, building
4 blocks that go into the oligonucleotides?
5 A Generally those are too simple. Our lab
6 is really focused on far more complicated things.
7 So the synthesis of basal nucleotide
8 building blocks is pedestrian, and honestly, below
9 that of the capabilities of our lab.
10 And so I think that your intent, though,
11 based on what you've written after the deposition,
12 is indeed to try to invalidate me as a POSA or cast
13 shade in some light, and I understand that's your
14 job; it's wonderful. But it's a -- a tactic which
15 is, while legal, it's probably not morally right.
16 So I'm stating the fact that, yeah, I'm a
17 POSA of that date. This chemistry is quite simple
18 and beneath the skills of our group. It's
19 pedestrian science, to be honest.
20 MR. SHORES: Okay. I have no further
21 questions at this time.
22 MR. EDWARDS: A couple, maybe just one.
23 EXAMINATION
24 MR. EDWARDS:
25 Q Dr. Baran, what, if anything, do you stand

1 to gain if any of the claims of the '707 and/or '569
2 patents are invalidated in this proceeding?
3 A Nothing at all.
4 MR. EDWARDS: I have no more questions.
5 MR. SHORES: No questions.
6 (Time noted: 2:17 p.m.)
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1 CERTIFICATE OF CERTIFIED SHORTHAND REPORTER
2 NOTARY PUBLIC
3
4 I, MONIQUE VOUTHOURIS, Certified Court
5 Reporter and Notary Public within and for the State
6 of New Jersey, do hereby certify:
7 That PHIL S. BARAN, PH.D., the witness
8 whose deposition is hereinbefore set forth, was duly
9 sworn by me before the commencement of such
10 deposition, and that such deposition was taken
11 before me and is a true record of the testimony
12 given by such witness.
13 I further certify that the adverse party,
14 SHANGHAI HONGENE BIOTECH CORPORATION, was
15 represented by counsel at the deposition.
16 I further certify that the deposition of
17 PHIL S. BARAN, PH.D. occurred remotely on Monday,
18 January 22, 2024, commencing at 8:05 a.m. to 2:15
19 p.m. EST.
20 I further certify that I am not related to
21 any of the parties to this action by blood or
22 marriage, I am not employed by or an attorney to any
23 of the parties to this action, and that I am in no
24 way interested, financially or otherwise, in the
25 outcome of this matter.

1 IN WITNESS WHEREOF, I have hereunto set my
2 hand this 26th day of January 2024.
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7 Monique Vouthouris, CCR, RPR, CRR
8 Notary Public of the State of New Jersey
9 My commission expires: April 8, 2024
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