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Transcript of Lawrence Nathan Tumey, Ph.D.

Date: February 25, 2025

Case: Synaffix B.V. -v- Hangzhou DAC Biotech Co., Ltd.

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EX1063
SYNAFFIX B.V.
IPR2022-01531

Transcript of Lawrence Nathan TumeY, Ph.D.
Conducted on February 25, 2025

1 (1 to 4)

1	1	1	3
1	UNITED STATES PATENT AND TRADEMARK OFFICE	1	A P P E A R A N C E S
2	BEFORE THE PATENT TRIAL AND APPEAL BOARD	2	
3	-----	3	ON BEHALF OF THE PETITIONER:
4	SYNAFFIX B.V.	4	MICHAEL R. HOUSTON, ESQUIRE
5	Petitioner	5	FOLEY & LARDNER LLP
6	V.	6	321 North Clark Street, Suite 3000
7	HANGZHOU DAC BIOTECH CO., LTD.,	7	Chicago, IL 60654-5313
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9		9	
10	Case No. IPR2022-01531	10	ON BEHALF OF THE PATENT OWNER:
11	Patent No. 10,131,682	11	CATHERINE MATTES, ESQUIRE
12	-----	12	JIHONG LOU, ESQUIRE
13		13	QUINN EMANUEL URQUHART & SULLIVAN LLP
14	Deposition of LAWRENCE NATHAN TUMEY, PH.D.	14	295 5th Avenue
15	New York, New York	15	New York, NY 10016
16	Tuesday, February 25, 2025	16	212.849.7000
17	9:07 A.M.	17	
18		18	
19	Job No.: 572186	19	
20	Pages: 1 - 124	20	
21	Reported By: Anita M. Trombetta, RMR, CRR,	21	
22	California CSR No. 14647	22	
2	2	4	4
1	Deposition of LAWRENCE NATHAN TUMEY, Ph.D., held	1	-----I N D E X-----
2	at the offices of:	2	WITNESS
3		3	LAWRENCE NATHAN TUMEY, PH.D.
4		4	EXAMINATION BY PAGE
5	Quinn Emanuel Urquhart & Sullivan LLP	5	ATTORNEY HOUSTON 5
6	295 5th Avenue	6	ATTORNEY MATTES 112
7	New York, NY 10016	7	ATTORNEY HOUSTON 115
8	212.849.7000	8	-----E X H I B I T S-----
9		9	Exhibit Description Page
10		10	Exhibit 1059 Decision Granting 28
11	Pursuant to notice, before Anita M. Trombetta, a	11	Rehearing; Decision on
12	Certified Shorthand Reporter in the State of	12	Rehearing Diagram of
13	California, RMR, CRR, and Notary Public in and for	13	Chemical Structure 97
14	the State of New York.	14	Diagram of
15		15	Chemical Structure 97
16		16	Diagram of
17		17	Chemical Structure 105
18		18	Diagram
19		19	
20		20	
21		21	
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Conducted on February 25, 2025

5 1 PROCEEDINGS 2 LAWRENCE NATHAN TUMEY, Ph.D., 3 called as a witness, having been first duly 4 sworn by a Notary Public, was examined and 5 testified as follows: 6 EXAMINATION BY 7 ATTORNEY HOUSTON: 8 Q Good morning. 9 Could you start by stating your name for 10 the record, please. 11 A Lawrence Nathan Tumey. 12 Q Is it okay if I refer to you as Dr. Tumey 13 for today's deposition? 14 A Absolutely. 15 Q Dr. Tumey, have you ever been deposed 16 before? 17 A No, I have not. 18 Q Okay. Then, in that case, let me review 19 just a few of the ground rules to make sure you 20 sort of understand how the proceeding is going to 21 go. 22 Obviously, you see a court reporter here	7 1 Do you agree to do that? 2 A Yes. 3 Q And I will try to take breaks roughly 4 every hour or so, but if you feel like you need a 5 break for any reason, please just speak up and 6 ask, and I'll try to make that happen. The only 7 thing we ask is that if there is a question 8 pending, we would like to get that answer from you 9 before we take a break. 10 There is a couple small exceptions to that 11 rule that I'm sure your counsel will inform you of 12 if it becomes important today. I don't think it 13 will, but just in case. Okay? 14 A Okay. 15 Q And then, also, you understand that this 16 deposition today is conducted in relation to an 17 IPR proceeding that's occurring at the U.S. Patent 18 Office? 19 A Yes. 20 Q Okay. One of the rules specific to those 21 proceedings is that witnesses are not supposed to 22 talk to their counsel about the subject matter of
6 1 sitting beside us who is going to try to just type 2 down everything that we say today. 3 And I'll be asking you questions, and ask 4 that you respond orally so that she can hear you 5 and you type your response. 6 Do you understand that? 7 A Yes. 8 Q Okay. And because she's trying to type 9 down everything we say, it just makes her job much 10 easier if we try not to talk over each other so 11 that she can get everything. I know, just in 12 natural human interactions, sometimes that's hard 13 to do, but we might have to remind each other to 14 not talk over each other so that she can record 15 everything. 16 Do you understand that? 17 A Yes. 18 Q Okay, great. 19 If I ask you a question today that you 20 don't understand, I'd ask that you just let me 21 know so that I can re-ask it or try to clarify it 22 in a way that you do understand.	8 1 their testimony while my deposition of you is 2 pending. 3 A Okay. 4 Q So that means during breaks, if we go into 5 lunch, things like that, you should refrain from 6 discussing any nature of your testimony with your 7 counsel during those time periods. 8 Do you understand that? 9 A Yes. 10 Q Okay, great. 11 Dr. Tumey, are you taking any medicines 12 today, or do you have any other impairment that 13 would present -- prevent you from testifying 14 fully, truthfully, and accurately? 15 A No. 16 Q Okay. With that background out of the 17 way, let's get into the subject matter of the '682 18 patent, shall we? 19 A Yes. 20 Q Dr. Tumey, I'd like to ask you about a 21 molecule that has a terminal vinyl sulfone group. 22 Okay?

Conducted on February 25, 2025

9 1 A Okay. 2 Q Will a molecule having a terminal vinyl 3 sulfone functional group react with a thiol group 4 on another molecule to form a thiol-ether bond? 5 ATTORNEY MATTES: Objection. 6 A Typically, yes, but context matters. 7 There are absolutely some that will, some that 8 won't. 9 Q Okay. When a thiol-ether bond is formed 10 through -- through the combination of a vinyl 11 sulfone with a thiol group, can that occur any 12 other way than through a chemical reaction? 13 ATTORNEY MATTES: Objection. Form. 14 A Can you repeat that? 15 Q Sure. 16 When a thiol-ether bond is formed through 17 the combination of a vinyl sulfone with a thiol 18 group -- can that occur any other way than through 19 a chemical reaction? 20 ATTORNEY MATTES: Objection. Form. 21 A No. A chemical reaction is what's needed 22 to take two things, bring them together, a	11 1 Q Okay. There on page 53 is where the part 2 of the claim that talks about the Z group is. 3 Do you see that, towards the bottom of 4 page 53? 5 A Yes. 6 Q And I'll let you tell me if you want me to 7 just refer to that as Z or the Z group. I'm not 8 quite sure what terminology you would prefer, but 9 if it makes a difference, please speak up. 10 A It does not make a difference. 11 Q Okay. When you look at that definition of 12 Z at the bottom of page 53, it lists a number of 13 specific types of chemical bonds that are allowed 14 for the linkage that is to be formed between Z and 15 the drug, correct? 16 A Yes. 17 Q Do those bonds form when Z undergoes a 18 chemical reaction with a corresponding functional 19 group on the drug? 20 ATTORNEY MATTES: Objection. Form. 21 A They could form when it undergoes a 22 reaction with a chemical moiety on the drug, but
10 1 chemical reaction. So -- so, no. It would occur 2 only through a chemical reaction. 3 Q And, Dr. Tumey, I believe your counsel has 4 given you a copy of your declaration, correct? 5 A Yes. 6 Q I will pull out my own copy. I also have 7 many of the documents cited there and available, 8 so if something comes up today that you would like 9 to see something, please just let me know. 10 If you could open your declaration to 11 Page 53. 12 ATTORNEY HOUSTON: Let's go off the record 13 one moment. 14 (An off-the-record discussion was held at 15 this time.) 16 Q Are you on page 53, Dr. Tumey? 17 A Yes, I am. 18 Q Do you see there, and actually spanning a 19 couple pages, is recitation of claim 1, I believe, 20 from the '682 patent. 21 Do you see that? 22 A Yes.	12 1 there are other ways that they could form. 2 Q Other way -- ways other than a chemical 3 reaction? 4 A No, not ways other than a chemical 5 reaction. I should say -- not ways other than a 6 chemical reaction. 7 Q Okay. Maybe, were you trying to say that 8 they might not always undergo a chemical reaction, 9 so they might not always form? 10 Was that what you were trying to say? 11 A My implication here is that we're talking 12 about a single chemical reaction. This is a -- Z 13 is a group that enables a linkage to form these 14 groups. And my understanding is that that does 15 not have to take place through a single chemical 16 reaction. It could be a sequence of reactions. 17 Ultimately, there is a chemical reaction that 18 happens, but this does not imply that there is 19 some single chemical reaction that happens. 20 Q I see. Thank you for that clarification. 21 Okay. So when Z forms a linkage to a drug 22 via one of those chemical bonds that are listed,

Conducted on February 25, 2025

13 1 that requires one or more chemical reactions to 2 occur to form the bond; is that fair? 3 A Yes. 4 Q Let's talk about a specific example. 5 I believe -- I believe you said, 6 originally, that vinyl sulfone groups will react 7 with thiols to form a thiol-ether bond, correct? 8 ATTORNEY MATTES: Objection. Form. 9 A I said that they typically do, often do, 10 but no, not that they always do. 11 Q So there are some conditions -- there are 12 some conditions under which the reaction won't 13 occur? 14 A There are some conditions, as well as some 15 reagents, which -- in which a reaction would 16 occur. 17 Q But if that thiol-ether bond is formed, 18 that necessarily entails a chemical reaction, 19 correct? 20 ATTORNEY MATTES: Objection. Form. 21 A If the thiol-ether bond forms, that 22 necessarily implies that at least one chemical	15 1 Q And Z is a conjugation moiety that enables 2 linkage of the linker to a drug, correct? 3 ATTORNEY MATTES: Objection. Form. 4 A Yes, that is what I say. 5 Q So to carry out their functions, both Y 6 and Z have to undergo a chemical reaction of some 7 sort, one or more chemical reactions of some sort, 8 correct? 9 ATTORNEY MATTES: Objection. Form. 10 A Yes. 11 Q What's the difference between a 12 conjugation moiety that enables a reaction versus 13 one that enables a linkage via a specific bond 14 type? 15 A A conjugation moiety that enables a 16 reaction is one in -- specifically enables a 17 reaction with this cell-binding agent -- is one in 18 which all of the reactivity is intrinsically 19 present in the two reactants that are brought 20 together. 21 Whereas, something that enables a linkage, 22 it's a more broad term that it encompasses other
14 1 reaction took place. 2 Q Okay. I'll ask you to flip ahead in your 3 declaration just a couple pages, page 58 and 4 paragraph 118. 5 You can let me know when you're there. 6 A 58, 118. 7 Yes. 8 Q You can take a second to review 9 paragraph 118, if you want. 10 A Oh, yes, please. 11 (Document review.) 12 Yes. 13 Q Oh, sorry. Okay. 14 In paragraph 118 of your declaration, you 15 were referring to the Y and Z groups in the claims 16 of the '682 patent, correct? 17 A Yes. 18 Q And you say that Y is a conjugation moiety 19 that, "enables a reaction of the linker with the 20 cell-binding agent," correct? 21 ATTORNEY MATTES: Objection. Form. 22 A That is what I say here, yes.	16 1 reaction conditions wherein perhaps a catalyst, 2 perhaps other reagents, activating reagents, and 3 so on, may be required to form that linkage. 4 Q So I believe you testified that to form a 5 linkage via one of the specific bonds, that 6 requires one or more chemical reactions, correct? 7 ATTORNEY MATTES: Objection. Form. 8 A Yes. 9 Q So if Z has to enable a linkage, and a 10 linkage necessarily requires a chemical reaction, 11 why isn't Z commensurate with Y in that regard? 12 ATTORNEY MATTES: Objection. Form. 13 A I am relying on both the definition of Z 14 and Y that's in the '682 patent, but also the 15 specific examples that are cited in the 16 specifications for -- for Z and Y. And those are 17 described differently, and hence, I am describing 18 them differently here. 19 Q So when you're describing why enabling 20 linkage is broader than enabling reaction, you're 21 basing it on the prosecution history of the '682 22 patent?

Conducted on February 25, 2025

17 1 ATTORNEY MATTES: Objection. Form. 2 A I think you stated that incorrectly. 3 I don't know if you want to restate the 4 question? 5 Q Maybe you could help me, what you think 6 was incorrect about it. I'm happy to if I could 7 understand. 8 A You stated something about Y enabling a 9 linkage. And according to the -- this is Y 10 enables a reaction. Z enables the linkage. 11 Q I see. I -- I understand the issue. 12 When I said "why," I was using W-H-Y. 13 A Oh, oh. 14 Q That explains the -- 15 A Okay. Maybe if you could restate the 16 question. 17 Q Of course, yes. Thank you for pointing 18 that out. 19 So when you are describing why Z 20 enables -- the fact that Z enables a linkage is 21 broader than Y enabling a reaction, you were 22 basing that on the prosecution history of the '682	19 1 120. 2 A Yes. 3 Q There you say that Q and T are distinct 4 structural elements and separate from the Y and Z 5 conjugation moieties. 6 Do you see that? 7 A Yes. 8 Q So is it your opinion that a single 9 terminal vinyl sulfone group cannot serve as the T 10 plus Z groups in the claims? 11 ATTORNEY MATTES: Objection. Form. 12 A Could you repeat that question one more 13 time? 14 Q Sure. 15 Is it your opinion that a single terminal 16 vinyl sulfone group cannot serve as the T plus Z 17 group in the claims? 18 A No, that is not my opinion. 19 Q Okay. So there in paragraph 120, though, 20 you say Q and T are separate from the Y and Z 21 conjugation moieties, correct? 22 A Yes.
18 1 patent? 2 ATTORNEY MATTES: Objection. Form. 3 A I am basing that, at least -- I would say, 4 I'm basing that largely on what's in the '682 5 patent itself, not on the prosecution history of 6 the '682 patent. 7 Q Can you recall what parts of the '682 8 patent you're thinking of when you -- when you 9 make that statement? 10 A The specification -- I can kind of go 11 through here and think about it, but it's -- 12 specifically, I'm -- I'm referring to the 13 specification where there are specific examples of 14 Y and Z that are called out, and they're very 15 different. 16 They're not -- they're not described -- 17 they're not -- the functional groups that are 18 described for Y and Z are very different 19 functional groups. If they were -- if it was 20 being used the same way, I would expect the same 21 examples for both Y and Z. 22 Q Let's pop ahead just two paragraphs to	20 1 Q So -- but it's your opinion that vinyl 2 sulfone can be T plus Z, correct? 3 A That is my opinion, yes. 4 Q How does the vinyl sulfone satisfy both -- 5 both T and Z if they must be separate, distinct 6 components? 7 ATTORNEY MATTES: Objection. Form. 8 A For this, I am relying on the prosecution 9 history and the fact that the applicant themselves 10 puts -- separates the vinyl sulfone into two 11 components. And -- at least -- at least, they can 12 separate those into two components. 13 Q Can vinyl, by itself, enable a chemical 14 reaction with, say, a thiol? 15 ATTORNEY MATTES: Objection. Form. 16 A Can vinyl enable a reaction with a thiol. 17 Is that the question? 18 With the appropriate catalyst and under 19 the appropriate conditions, yes. 20 Q Could you be more specific about the 21 catalyst and conditions that you're thinking of? 22 A So there -- and now I'm stepping back and

Conducted on February 25, 2025

21 1 thinking about this as an organic chemist in 2 general. And thiols absolutely can add across a 3 vinyl group under, you know, harsh conditions, 4 certainly not something that a protein can 5 survive, or anything like that. But there are -- 6 I'd have to look through some chemical databases 7 to come up with a reaction. 8 But I'm -- I would say I'm 98 percent 9 certain that there are reactions out there where 10 you could add a thiol to a vinyl. 11 Q Could you -- to a vinyl enable a reaction 12 with a thiol under physiologically acceptable 13 conditions? 14 A Not to my knowledge. 15 Q So how can vinyl alone enable a linkage to 16 a thiol on a drug if the linkage requires the 17 chemical reaction? 18 A The chemical reaction does not have to be 19 done under physiological conditions to attach the 20 drug to the linker. That's typically not done. I 21 don't want to say typically not done, but that's 22 not the typical practice.	23 1 A The type of reaction that I'm envisioning 2 would be a transition metal catalyzed reaction, 3 palladium or platinum, typically. And those do 4 promote the addition of nucleophiles -- thiols 5 being one of them -- across an unactivated vinyl 6 group. 7 Again, that's not something we would do 8 when we're attaching to an antibody or a protein. 9 That's something -- it's kind of a -- that's a 10 chemical reaction that would be done in a 11 laboratory kind of a setting, and organic 12 solvents, high temperature, perhaps, that sort of 13 thing. 14 Q How about if we're attaching the vinyl to 15 a thiol on a smaller molecule like a vitamin? 16 ATTORNEY MATTES: Objection. Form. 17 Q Could we use those conditions, the 18 catalyst you mentioned, to accomplish that 19 reaction? 20 A Maybe yes, maybe no. It -- it -- it -- I 21 would have to see the molecule. 22 Q How about a small molecule peptide? Could
22 1 Usually, we're attaching the drug to the 2 linker, and then taking that linker drug and 3 attaching that to the antibody or whatever other 4 cell body agent we're using. 5 Q So when a vinyl is reacted with a thiol on 6 a drug, as contemplated in the '682 patent, are 7 you saying that that entails the more extreme 8 conditions that you were referring to where that 9 reaction can occur by itself? 10 ATTORNEY MATTES: Objection. Form. 11 A No, I'm not. 12 Q But I believe you also said it doesn't 13 have to be done under physiological conditions, 14 correct? 15 A That's correct. 16 Q So what conditions would enable a vinyl to 17 react with a thiol on a drug? 18 ATTORNEY MATTES: Objection. Form. 19 A What kind of conditions? 20 Q What conditions would enable a vinyl, by 21 itself, to react with a thiol on a drug? 22 ATTORNEY MATTES: Same objection.	24 1 you use those catalysts and those conditions to 2 cause the vinyl to react with a thiol on a small 3 molecule peptide? 4 ATTORNEY MATTES: Objection. Form. 5 A Again, maybe -- maybe yes, maybe no. Any 6 of these, we'd have to look at the -- we would 7 have to look at the structure and, it might be a 8 matter of trial and error. Is it possible? Yes. 9 Is it likely? I don't know about the odds of that 10 happening, but, yeah. 11 Q When vinyl sulfone forms a linkage to a 12 thiol on a drug, does the sulfone group activate 13 the vinyl to promote that reaction? 14 ATTORNEY MATTES: Objection. Form. 15 A Could you ask that -- state that one more 16 time? 17 Q Sure. 18 When vinyl sulfone forms a linkage to a 19 thiol on a drug, does the sulfone group activate 20 the final -- vinyl to promote that reaction? 21 A Yes, it does. 22 ATTORNEY MATTES: Objection to form.

Conducted on February 25, 2025

25 1 Q So the sulfone is helping to enable that 2 linkage between the vinyl and the thiol in the 3 drug, correct? 4 A If the sulfone is present, adjacent to the 5 vinyl, it is absolutely playing a role in 6 facilitating that reaction. 7 Q In the course of your work on this 8 proceeding, did you review the entire prosecution 9 histories to see if the applicant or the examiner 10 ever mapped vinyl sulfone to Q and Y in the 11 claims? 12 A I reviewed the prosecution history. I did 13 not read every page of that, so I can't say for 14 certain, one way or the other. 15 Q And do you have a recollection in that 16 this case is a little bit unusual, in that there 17 are sort of two prosecution histories, one that 18 led to the issuance of the original patent, and a 19 second proceeding that we call a re-exam that led 20 to the claims being amended? 21 Do you recall that? 22 A Yes.	27 1 Q Okay. I believe paragraph 2 of your 2 declaration maybe has that information. 3 A Okay. 4 Q And the document I was referring to -- 5 let's see. I believe it's kind of given a 6 different name in this paragraph. 7 I believe it would be the document 8 referred to as the board's rehearing decision, 9 paper 23. 10 Let me just confirm that. 11 Yes. So I'm referring to paper 23. 12 A Okay. 13 Q And it looks like, in your paragraph 2, 14 you indicated that you had reviewed that? 15 A Yes. 16 Q Did you understand that decision to take a 17 position on whether vinyl sulfone could satisfy 18 the Q and Y group in claim 1? 19 A I would want to look at that document 20 again before answering that. 21 ATTORNEY HOUSTON: We can mark this 22 Exhibit 1059.
26 1 Q Did you review the prosecution history of 2 the re-exam to see if Q and Y had ever been mapped 3 to vinyl sulfone? 4 A I looked over that. Again, I don't know 5 that -- even the amended prosecution history was 6 lengthy, so I did not read every word of that. 7 But the -- I've read what I felt like were the 8 relevant parts of it. 9 Q If you were to learn that the examiner 10 mapped vinyl -- vinyl alone to Y, and Q to an 11 adjacent sulfone, would that change your opinion 12 as to whether or not vinyl sulfone could satisfy 13 the QY grouping in the claims just as you believe 14 it can satisfy the TZ grouping in the claims? 15 ATTORNEY MATTES: Objection. Form. 16 A Are you saying if the examiner? No, that 17 would not change my opinion. 18 Q Okay. Did you review the decision by the 19 delegated review panel in this proceeding? 20 A I'm -- I would have to review what I 21 stated in here. There was lots of documents I was 22 reviewing. I -- yes.	28 1 (Exhibit 1059, Decision Granting 2 Rehearing; Decision on Rehearing, marked for 3 identification.) 4 Q Dr. Tumey, feel free to review that and 5 just let me know when you're done. Then I can ask 6 you a couple specific questions. 7 A Sure. 8 (Document review.) 9 Okay. I think I -- 10 Q I'll direct your attention to Page 16 of 11 that document, the topmost paragraph. 12 A Yes. 13 Q And you see in that paragraph, the board 14 concluded -- well, it's just above their section 15 titled, "Conclusion." 16 They say "We determine that the vinyl 17 group should be mapped to Y or Z, and the sulfone 18 group should be mapped to Q or T." 19 Do you see that part? 20 A Yes, I do. 21 Q And then they go on to say, "We determine 22 that such mapping satisfies the 'enables reaction'

Conducted on February 25, 2025

29 1 and 'enables linkage' requirements of claim 1." 2 Do you see that? 3 A Yes, I do. 4 Q So do you disagree that vinyl sulfone can 5 satisfy the "enables reaction" requirement of 6 claim 1? 7 ATTORNEY MATTES: Objection. Form. 8 Q In regards to Y. 9 ATTORNEY MATTES: Objection. Form. 10 A I don't disagree that the vinyl sulfone 11 enables a reaction, but I don't think that quite 12 addresses the question that you're asking. 13 So maybe you could repeat the question one 14 more time here? 15 Q Sure. 16 As I understand this decision from the 17 board, they are determining that the vinyl group 18 can be mapped to Y or Z, and the sulfone group 19 should be mapped to Q or T. 20 Do you see that? 21 A Yes. 22 Q And then they say that that mapping	31 1 the board in this decision found that vinyl 2 sulfone could be mapped to the Q and Y groups and 3 satisfies the "enables reaction" requirement under 4 the claims, right? 5 A Mm-hmm. 6 Q But you did not apply that understanding 7 in your -- in your declaration, in your 8 conclusions. 9 You disagree with them, right? 10 A Correct. 11 Q Okay. Could you turn to paragraph 44 of 12 your declaration. 13 ATTORNEY MATTES: Can he put this aside? 14 ATTORNEY HOUSTON: Yes. 15 ATTORNEY MATTES: This can go to the side. 16 ATTORNEY HOUSTON: You can set that to the 17 side. 18 Q Page 18. 19 A Page 18? I thought you said 44. 20 Q I'm sorry. Paragraph 44, page 18. 21 Sometimes it's easier to find the page number than 22 the paragraph number.
30 1 satisfies the "enables reaction" requirement of 2 claim 1. 3 A I see that, yes. 4 Q The "enables reaction" requirement is 5 referring to Y, correct? 6 A The enables -- yes, they are determining 7 that Y enables a reaction. 8 I would disagree. Under their mapping, Y 9 does not enable a reaction. 10 Q Okay. So that was sort of what my 11 ultimate question was going to be. 12 So you disagree with the board's 13 determination? 14 A In this case, yes. 15 Q Okay. And you did not -- you did not 16 apply this understanding to your analysis in your 17 declaration in regards to the Q and Y groups and 18 vinyl sulfone, correct? 19 A This document was under consideration when 20 I wrote my -- my statement here. I guess I'm not 21 following your question. 22 Q Well, I think we just talked through how	32 1 A Okay. 2 Yes. 3 Q For context, you can look at the 4 surrounding paragraphs, of course. 5 There I believe you were discussing 6 Synaffix's definition of a person of ordinary 7 skill in the art. 8 Do you see that? 9 A Yes. 10 Q And sometimes in your declaration, in 11 different places, you use the abbreviations 12 "POSITA" or "POSA" to refer to the person of 13 ordinary skill in the art. 14 Is it okay if I do the same? 15 A Yes. 16 Q Okay. And for purposes of your 17 declaration, you are applying Synaffix's 18 definition of the person of ordinary skill in the 19 art, correct? 20 A Yes. 21 Q And do you -- do you have an appreciation 22 that a POSA is supposed to be deemed to have been

Conducted on February 25, 2025

33 1 aware of all of the relevant art at the time of 2 the invention in question, or sometimes what we 3 refer to in legalese as "analogous art"? 4 A Yes. 5 Q And in this case, given the filing date of 6 the '682 patent, the -- that means the art that 7 was available as of September 24th, 2012, which is 8 the date you reference in paragraph 43 of your 9 declaration. 10 Do you see that? 11 A Yes. 12 Q In paragraph 44, you -- in the second 13 line, you make reference to biologically active 14 molecules. 15 Do you see that? 16 A Yes. 17 Q What does the term "biologically active 18 molecule" mean to a POSA in that context? 19 ATTORNEY MATTES: Objection. Form. 20 A Just the term "biologically active 21 molecule"? You're asking what a biologically 22 active molecule is?	35 1 don't have regulatory approval. 2 Q I don't know the answer either. Both 3 those terms get used in various places. 4 A So there might be subtle differences is 5 what I'm saying. But, generally, I use them 6 synonymously. 7 Q They both would be considered to be 8 biologically active molecules. 9 Is that fair, at least? 10 ATTORNEY MATTES: Objection to form. 11 A Yes. 12 Q Would a POSA have considered drugs to have 13 a desirable function in the body? 14 ATTORNEY MATTES: Objection. Form. 15 Q Let me rephrase that. 16 Your response to your last question made 17 me realize that someone could be thinking of 18 illicit drugs or something of that nature. So I 19 realize now I need to reframe a little bit. 20 Would a POSA have considered at least some 21 drugs to have a desirable function in the body? 22 A Yes.
34 1 Q What would a POSA understand a 2 biologically active molecule to refer to? 3 A A molecule that modulates a living cell or 4 a -- biological systems, at minimum, a living 5 cell, or some organism that's composed of cells. 6 That's the way I would -- I guess, kind of off 7 the top of my head, that's the way I would 8 typically think of this. 9 Q Would a POSA have considered drugs to be 10 biologically active molecules? 11 A Yes. 12 Q Would the term "pharmaceutical" be 13 synonymous with the term "drug," or do they cover 14 different things? 15 A That's an interesting question. 16 I -- I guess I would use them synonymously 17 in my everyday conversation. There may be some 18 subtle difference about whether one has regulatory 19 approval or is used in medical practice versus -- 20 or not. So there might be things that I would 21 consider kind of drugs that may not be a 22 pharmaceutical agent, just simply because they	36 1 Q And would a POSA have appreciated that it 2 would sometimes be beneficial to mask the body's 3 immune response to certain drugs that have a 4 desirable function in the body? 5 ATTORNEY MATTES: Objection. Form. 6 A Yes. 7 Q And would a POSA have appreciated that 8 drugs can be modified to contain one or more thiol 9 groups, if desired? 10 ATTORNEY MATTES: Objection. Form. 11 A Can you repeat that one more time? 12 Q Would a POSA have appreciated that drugs 13 can be modified to contain one or more thiol 14 groups, if desired? 15 A I'm hesitating because there absolutely 16 are drugs that could not be modified with a thiol, 17 but at least some subset of drugs could be 18 modified with a thiol. 19 Q Okay. Backing up now just a minute. 20 Would a POSA have considered antibodies to 21 be biologically active molecules? 22 A Not every antibody, but most -- well, some

Conducted on February 25, 2025

37 1 antibodies, some subset of antibodies, would be 2 biologically active, yes. 3 Q Would a POSA have understood that 4 antibodies biologically modify cells when the 5 antibodies are bound to the cell surface? 6 ATTORNEY MATTES: Objection. Form. 7 A Again, an antibody may modulate the 8 properties of a cell when it's bound to the 9 surface, but not necessarily. 10 Q So an antibody bound to a surface may or 11 may not biologically modify the cell -- the cell 12 as to which the -- I need to rephrase that 13 question. 14 Let me try again. 15 So the antibody bound to a surface of a 16 cell may or may not biologically modify that cell? 17 A Correct. 18 Q Is there a difference between biologically 19 modifying a cell and therapeutically modifying a 20 cell? 21 A Yes. 22 Q Can you explain what the difference would	39 1 discloses that the cell-binding agent, "Complexes 2 with or reacts with the moiety of a cell 3 population thought to be therapeutically or 4 otherwise biologically modified." 5 Do you see that? 6 A Yes. 7 Q So if I heard your testimony right just a 8 moment ago, you said that some antibodies may bind 9 to a cell but not biologically modify that cell. 10 Do I recall that correctly? 11 ATTORNEY MATTES: Objection to form. 12 A Yes. 13 Q So not all antibodies will be a 14 cell-binding agent for purposes of the '682 15 patent; is that fair? 16 ATTORNEY MATTES: Objection. Form. 17 A I guess, when we look at this definition 18 in light of that, that's an interesting thought 19 that hadn't occurred to me, but I think -- I think 20 it's conceivable, whether that's -- yeah, I think 21 it's conceivable. 22 Q I'm sorry. What's conceivable?
38 1 be. 2 A One can biologically modify something in a 3 way that is therapeutically useless. So maybe 4 perturbing some pathway that is irrelevant to a 5 disease -- yeah, there's lots of ways you could 6 think about doing something biologically that does 7 not necessarily imply doing something 8 therapeutically. 9 Q So therapeutically, it is better thought 10 of as a subset -- let me start over. 11 Therapeutically modifying a cell should be 12 thought of as a subset of biologically modifying a 13 cell? Is that -- 14 A Yes, I think that's fair. 15 Q Okay. Let's turn to paragraph 126 in your 16 declaration for a moment. 17 A Yes. 18 Q In that paragraph, you were discussing the 19 definition of cell-binding agent. 20 Do you see that? 21 A Yes. 22 Q And you say that the specification	40 1 A That a -- something could bind to a -- 2 could something bind to a cell -- well, actually, 3 let me look back up here. 4 This is sought to be. So something could 5 bind -- so for the purposes of this definition, 6 this is saying that it complexes with a cell that 7 is sought to be therapeutically or biologically 8 modified. 9 So in other words, not all antibodies, 10 when they bind to a cell, necessarily will 11 therapeutically or biologically modify it. But it 12 is the general -- the general expectation. At 13 minimum, it's got to complex with it or react with 14 it in order to therapeutically or biologically 15 modify it. 16 So "sought to be," I guess, would be 17 something I would point to there. 18 Q Well, let's talk about that. 19 What -- how do you interpret the term 20 "sought" in that phrase? 21 A Well, that's what we do in science is we 22 try things out with the intention of doing

Conducted on February 25, 2025

41 1 something, but we don't know until we actually get 2 in the lab and do it. You know, we don't know if 3 it actually will -- will be -- will work or not. 4 Q So in order for something to qualify as a 5 cell-binding agent under the '682 patent, it has 6 to be an agent that the person using it is seeking 7 to use to therapeutically or biologically modify a 8 cell? 9 ATTORNEY MATTES: Objection to form. 10 Q In other words, let me state that another 11 way. I'll rephrase that. 12 Are you saying that it depends on what the 13 person's intention is, in terms of whether or not 14 something is a cell-binding agent or not, under 15 the '682 patent? 16 ATTORNEY MATTES: Objection. Form. 17 A Yes. I mean, and that's what is sought to 18 be -- yes, the intention matters, yes. 19 Q Okay. So if someone is using a conjugate 20 that happens to therapeutically or biologically 21 modify a cell population, but that's not their 22 intent, then they're not using a cell-binding	43 1 Does there have to be a determination or 2 some evidence that the cell population is actually 3 therapeutically or otherwise biologically modified 4 in order for a conjugate to qualify as a 5 cell-binding agent under this definition? 6 ATTORNEY MATTES: Objection. Form. 7 A Does there have to be any actual evidence 8 of it? No. Let's say, it seems that there should 9 be a hypothesis, but not actual evidence. 10 Q So if someone is seeking to 11 therapeutically or otherwise biologically modify a 12 cell population using a cell-binding agent, but, 13 in fact, in the real-world experiment, that 14 therapeutic or biological modification does not 15 occur, then, in your opinion, that would still be 16 using a cell-binding agent under the '682 patent; 17 is that right? 18 ATTORNEY MATTES: Objection. Form. 19 A If there's -- if they're seeking to 20 complex this cell-binding agent with a cell 21 population for the purposes listed here, that 22 would qualify.
42 1 agent for purposes of the definition in this 2 patent; is that right? 3 ATTORNEY MATTES: Objection. Form. 4 A Perhaps when that experiment was initially 5 done, I -- you know, that's an interesting -- hmm. 6 I -- I'm not exactly sure how to answer 7 that question. Maybe you can ask it one more 8 time. I could... 9 Q The question was, if someone is using a 10 conjugate that happens to therapeutically or 11 biologically modify a cell population, but that is 12 not their intent in using that conjugate, then 13 they're not using a cell-binding -- a 14 "cell-binding agent" for purposes of the 15 definition in this patent; is that right? 16 ATTORNEY MATTES: Objection. Form. 17 A That is my initial assessment. That's not 18 something I've really thought through. So I 19 hesitate to make a blanket statement. 20 Q Let's talk about the therapeutically or 21 otherwise biologically modified part of that 22 definition for a moment.	44 1 Q Even if it didn't actually work? It 2 didn't actually chemically or -- I'm sorry -- 3 therapeutically or biologically modify the cell 4 population in the way they had hoped it would? 5 ATTORNEY MATTES: Objection to form. 6 A Correct. Even if it didn't actually work. 7 Q What does it mean in this definition when 8 it says that the cell-binding agent must "complex 9 with or react with a moiety of a cell population"? 10 Specifically, I'm referring to the 11 "complex with" or "react with" part of that 12 definition. 13 A I interpret that to mean some sort of a 14 bond forming, whether that is a noncovalent bond 15 or a covalent bond. 16 Q Do antibodies have varying degrees of 17 binding across different cell populations? 18 A Yes, they do. 19 Q How would a POSA go about determining when 20 a given antibody is or isn't sufficiently binding 21 to or complexing or reacting with a moiety of a 22 cell population?

Conducted on February 25, 2025

45 1 A We typically use something called flow 2 cytometry. It's a technical – it's an instrument 3 that – that is used for assessing binding between 4 proteins and cells. 5 Q And that technique can determine varying 6 levels of binding, correct? 7 A Yes. 8 Q Would an antibody that weakly binds -- 9 Let me rephrase that. 10 Would an agent that weakly binds to the 11 surface of a cell be considered a cell-binding 12 agent in regards to the requirement that it 13 complex with or react with a moiety of a cell 14 population? 15 ATTORNEY MATTES: Objection. Form. 16 A It – yes, something can have a weak 17 interaction and still meet this definition. 18 Q Well, I think my question is a little more 19 specific than that. 20 If it does have weak binding, would that 21 meet this definition, just in regards to the first 22 part, that complexes with or reacts with?	47 1 But I do have a sense, again, of somebody 2 skilled in the art, of where does it cross that 3 bound between kind of an irrelevant weak binding 4 and real weak binding. Like, that there is 5 legitimate weak binders that still bind. 6 But there are also just -- you get to high 7 enough concentrations, just kind of going to 8 artificially shove two molecules together. High 9 enough concentration, just about everything will 10 bind with something else. 11 Q So I appreciate that, obviously, you are 12 an expert in this field. 13 Do you think a POSA in this field is able 14 to make that distinction between weak binding that 15 satisfies this definition and weak binding that 16 does not? 17 A I think so, yes. 18 Q And how would a POSA go about doing that? 19 A Probably, based on literature and 20 experience, and we would -- we would determine the 21 binding affinity. That's -- that's -- you're 22 using the term "weak binder," "strong binder,"
46 1 ATTORNEY MATTES: Objection. Form. 2 A Yes, something that is a weak binder, we 3 could still use the term "complexes with" or 4 "reacts with." 5 Now, when you are in that realm of a weak 6 binder, there is a bit of a judgment call. You 7 get to high enough concentration, just about 8 anything binds, right? 9 And so there is a sense where you can kind 10 of grasp at straws here and incubate things at 11 high millimolar concentrations, and, "Oh, I see 12 some interaction in it, but is that biologically 13 or therapeutically relevant?" 14 Again, a POSA would generally say no. 15 But – so, I guess the – I guess it 16 depends on what you mean by "weak interaction." 17 People can mean lots of things by "weak 18 interaction." 19 And I don't want -- there's no numbers 20 listed in this patent, and so I can't -- I don't 21 want to, you know, box them into some sort of, it 22 needs to be this measure of affinity.	48 1 right. Those are -- we actually numerically 2 quantify that. 3 And so I would want to see the number. 4 And a number that I typically might use would be 5 in the, say, high micromolar range, hundreds of 6 micromolar. 7 And below that might be, okay, that's kind 8 of a legitimate -- okay, there really is some 9 binding going on. 10 Weaker than that, I don't know that I 11 would really trust that to call that a binder, 12 even though you might artificially see some signal 13 in an assay. 14 Q Do -- so you've thrown out some numbers 15 for affinities. 16 Do I recall, though, that you conceded 17 that the '682 patent doesn't report any such 18 numbers for binding affinities? 19 A That's correct. To my knowledge, it does 20 not. I did not do an exhaustive search for those 21 terms, but to my knowledge, it does not report any 22 affinities.

Conducted on February 25, 2025

49 1 Q Are there antibodies that are nonspecific 2 in their binding properties across different cell 3 types? 4 A Yes -- well, hmm, hmm. 5 There are antibodies that don't bind, 6 that, you know -- 7 (Reporter clarification.) 8 A There are antibodies that would not bind 9 to cells or do not bind to cells. There are 10 antibodies that would bind broadly to just about 11 any cell. And then there are antibodies that 12 would bind to specific cells. 13 Q Okay. Let me ask you about that middle 14 category, antibodies that would bind broadly to 15 just about any cell. 16 Would those types of antibodies be 17 considered a cell-binding agent under the 18 definition of the '682 patent? 19 ATTORNEY MATTES: Objection. Form. 20 A Under the definition of the '682 patent, 21 I -- probably, yes. And I use the word "probably" 22 because, again, sought to be therapeutically or	51 1 effect, or whether the complex with the conjugate 2 results in a therapeutic or biological effect. 3 Q So an antibody that binds, even if it 4 binds with high affinity to a specific cell 5 population, if it doesn't create a therapeutic or 6 biological effect on that cell population, then 7 that antibody is not a cell-binding agent under 8 this definition; is that right? 9 A It's sought to. So there still is an 10 intent, not -- not whether it actually does -- 11 Q Okay. 12 A -- but there is an intent to. 13 Q If the researcher's intent is to see 14 whether or not the antibody specifically binds or 15 not, or perhaps to see what the affinity is of 16 binding, but the intent is not to biologically or 17 therapeutically modify the cells, and, in fact, 18 that doesn't happen, then that antibody is not a 19 cell-binding agent for purposes of this 20 definition, correct? 21 ATTORNEY MATTES: Objection. Form. 22 A I guess I'm not sure I would agree with
50 1 biologically modified. That's just not the way we 2 typically would use an antibody. 3 We use it to target to specific cells, not 4 just broadly to any cell. So it's not really 5 something that I had contemplated here, as I look 6 at this definition. 7 Q Let me ask one more question, then I think 8 we can take a break. 9 In this definition of "cell-binding 10 agent," we've talked a little bit about the 11 purpose of therapeutically or otherwise 12 biologically modifying a cell population. 13 I'd like to understand, are you saying 14 that that result has to happen from just the 15 cell-binding agent itself, or does that result 16 happen from the conjugate, and the cell-binding 17 agent is linked to a drug, as referenced in the 18 claims? 19 ATTORNEY MATTES: Objection. Form. 20 A I would envision that both of those are 21 covered under this definition, whether the complex 22 itself drives the therapeutic or biological	52 1 that. 2 Could you maybe say that statement one 3 more time? 4 Q If a researcher is conducting an 5 experiment to test, say, the binding affinity of 6 an antibody to a given cell population, and they 7 do not have the intent to therapeutically or 8 biologically modify the cell population, and, in 9 fact, that antibody, when bound, does not 10 therapeutically or biologically modify the cell 11 population, then that antibody would not be a 12 cell-binding agent for purposes of this 13 definition, correct? 14 ATTORNEY MATTES: Objection. Form. 15 A No, I'm not -- I'm not sure I -- hmm. 16 I can envision circumstances in which -- 17 and that's the kind of premise of antibody drug 18 conjugates is, you may have a binding event that 19 is -- the binding event itself is not -- the 20 binding itself -- the binding event itself is not 21 doing the biological modification, but it's -- the 22 intent is to use that -- that antibody as a

Conducted on February 25, 2025

53 1 vehicle for doing something else. So it's part of 2 a therapeutic -- part of a therapeutic -- 3 Q Maybe I can -- I'm sorry. I didn't mean 4 to interrupt. 5 A Part of a therapeutic. 6 Q Maybe I can clarify it, because I'm going 7 to ask you two questions. 8 My first question, the question I was 9 trying to ask you just then -- and maybe I didn't 10 clarify this -- is, the experiment was being done 11 with just the antibody. 12 And then I'll just go ahead and tell you, 13 I was going to ask the separate question of if 14 it's the antibody conjugated to a drug. 15 A Mm-hmm. 16 Q So let me try again with that 17 clarification. 18 If we first do an experiment with just the 19 antibody, and a binding affinity experiment is 20 being conducted on a given cell population, and 21 the researcher does not intend to therapeutically 22 or biologically modify the cell population, and in	55 1 it's time to take the break. 2 Q Let me just try to wrap this up here real 3 quick. 4 I guess what I'm trying to get at, 5 Dr. Tumey, is, I'm just trying to understand this 6 definition of "cell-binding agent." 7 Is it really directed at the antibody 8 itself, or is it directed to the antibody plus 9 drug conjugate? 10 ATTORNEY MATTES: Objection. Form. 11 A The cell-binding agent within the patent 12 claims seems to be referring to the antibody 13 itself, or it could be something other than an 14 antibody, not to the entire ADC. 15 Q This definition that you've put into your 16 paragraph 126 actually comes from the term 17 "cell-binding molecule," I believe. And we can -- 18 you've got a cite there to the patent, and we can 19 take a look at that, if that would help. 20 A Okay. 21 Q Does that change your understanding at all 22 as to whether or not the definition that's in
54 1 reality, when the binding occurs, the cells aren't 2 biologically or therapeutically modified, that 3 antibody by itself would not be a cell-binding 4 agent for purposes of this definition, correct? 5 ATTORNEY MATTES: Objection. Form. 6 A I guess, under those very specific 7 conditions, I could agree that that antibody may 8 fall outside of this definition. 9 Q That same antibody conjugated to a drug 10 where the conjugate, when bound to the cell 11 surface, now does have a therapeutic or biological 12 effect, or at least that's the intent, then that 13 conjugate would qualify as a cell-binding agent; 14 is that right? 15 ATTORNEY MATTES: Objection. Form. 16 A The -- the conjugate -- yes, at that 17 point, there would be a therapeutic or biological 18 modification. So I believe so. Yeah. 19 Q I guess -- 20 ATTORNEY MATTES: Sorry. 21 ATTORNEY HOUSTON: Oh, yeah. 22 ATTORNEY MATTES: I was just going to say,	56 1 quotes applies to just a cell-binding agent like 2 an antibody versus the entire conjugate molecule? 3 ATTORNEY MATTES: Objection. Form. 4 A Well, yes, it might. And we could look at 5 the patent to see the context of that. Yeah, I 6 would want to look at where this is described 7 specifically. 8 Because in claim 3, for example, there is 9 a linkage to a cell-binding agent. And you can't 10 have a linkage to a molecule without creating yet 11 another molecule. You can't have a molecule that 12 encompasses two molecules, right. So... 13 Yes, so that word matters, I guess. So I 14 would want to review the patent. If that word is 15 there, I would want to review the patent, in light 16 of that. 17 Q Would you be okay if we did that right now 18 before we take a break, or do you feel like you 19 need to take a break? 20 A I'm fine. I'm fine. 21 Q Just real quick, I'll get the patent in 22 front of you.

Conducted on February 25, 2025

57 1 This has been premarked as Exhibit 1001. 2 So we don't have to mark it again. 3 Your cite there points to column 14, 4 starting at line 42. So let's start there. 5 You, of course, are welcome to read the 6 surrounding text. I think the relevant text 7 actually starts at line 39 and maybe goes to 44. 8 But feel free to review that whole section, and 9 let me know when you're ready. 10 A (Document review.) 11 Okay. 12 Q So I think my question I'm trying to 13 understand is, at column 14, line 39, of the '682 14 patent, it starts off by referring to the 15 cell-binding molecule. 16 And what I'm trying to understand is, when 17 it says "cell-binding molecule," is that referring 18 specifically to the cell-binding agent that 19 appears in the claims, or is that referring to the 20 conjugate that is the cell-binding agent and the 21 linker and the drug? 22 A This appears to be referring to the	59 1 exists. Now there is a new molecule that kind of 2 encompasses the cell-binding molecule, plus more. 3 But this paragraph seems to be 4 specifically talking about that portion of the 5 conjugate that was derived from just the 6 cell-binding molecule itself. 7 Q I'm -- I apologize. I'm just having 8 trouble understanding you when you use the term 9 "cell-binding molecule" versus -- versus a term 10 that appears in here, "cell-binding agent." 11 So I guess I'm -- I'm trying to 12 understand. 13 When it says -- when it refers to 14 "cell-binding molecule," is that synonymous with 15 "cell-binding agent," or is that after the 16 cell-binding agent has been reacted in some way? 17 ATTORNEY MATTES: Objection. Form. 18 A Just from a quick look here, it appears 19 that the patent is using the term "cell-binding 20 molecule" and "cell-binding agent" synonymously. 21 But I would want to reserve judgment and 22 do a search for those terms to be sure that that
58 1 species that is reacted with the linker. It's 2 back on the previous page, column 12, line 49. 3 So it says, "The cell-binding agent 4 modified by," whatever. 5 So it seems to say the cell-binding agent 6 is one thing, and we are reacting it to form a new 7 molecular entity. 8 Q So if we go back to that paragraph, in 9 column 14, when it makes reference to -- it uses 10 the word "sought," -- "seeking to therapeutically 11 or otherwise biologically modify a cell 12 population." 13 Does that suggest that that paragraph is 14 referring to the conjugate that includes the drug 15 as well? 16 ATTORNEY MATTES: Objection. Form. 17 A Well, it says, "The cell-binding molecule 18 that comprises the conjugate." 19 So the cell -- there is a cell-binding 20 molecule -- and we often use this word "comprise." 21 But -- so it has been reacted to form a new 22 species. That cell-binding molecule no longer	60 1 usage is consistent throughout this before making 2 a definitive statement about that. 3 Q If the term "cell-binding molecule" is 4 synonymous with "cell-binding agent," how does the 5 first part of that sentence make sense when it 6 says, "The cell-binding molecule that comprises 7 the conjugates"? 8 How could the cell-binding molecule 9 comprise a conjugate if it's synonymous with the 10 term "cell-binding agent"? 11 ATTORNEY MATTES: Objection. Form. 12 A There is -- this word "comprise" is a 13 colloquial term that we often use in a way that is 14 not entirely chemically accurate. 15 So in other words, a molecule cannot be 16 comprised of multiple molecules in a chemical 17 sense, but we do use that terminology, at times. 18 And it appears that they -- the writers of 19 this patent use that terminology here. 20 And I will say, I use that terminology, 21 from time to time. I've used the term that an 22 antibody drug conjugate is comprised of an

Conducted on February 25, 2025

61 1 antibody and a linker and a drug, even though the 2 antibody and the linker and the drug are separate 3 molecules in a sense that the species comprises 4 all three, but not in a true chemically accurate 5 sense. 6 Again, it's a colloquial term. 7 ATTORNEY HOUSTON: Okay. Why don't we 8 take a break. 9 (Recess.) 10 BY ATTORNEY HOUSTON: 11 Q Dr. Tumey, I believe you still have the 12 '682 patent in front of you. 13 A Yes. 14 Q I'm going to ask you to turn back to that 15 section that discusses cell-binding molecule we 16 were just discussing. That was at column 14 -- 17 A Okay. 18 Q -- starting around line 39. 19 A Okay. 20 Q At lines 39 and 40, the patent says, "The 21 cell-binding molecule that comprises the 22 conjugates and the modified cell-binding agents of	63 1 ATTORNEY MATTES: Objection. Form. 2 A I guess I'm not clear -- the -- the 3 sentence here is talking about two different 4 things. That's why that phrase is here. 5 So the first one is the cell-binding 6 molecule that comprises the conjugates. So that's 7 the antibody, the unmodified antibody, for 8 example. And then it's saying, and the modified 9 cell-binding agent. So that would encompass the 10 ADC. 11 Q Okay. I want to make sure I understand 12 what you just said. 13 Did you say the term "conjugate" refers to 14 the antibody by itself? 15 A It doesn't say that the cell-binding 16 molecule is a conjugate. It says the cell-binding 17 molecule that comprises the conjugate. 18 So the conjugate is referring to the ADC. 19 So it's referring to a specific cell-binding 20 molecule that is part of or will become the 21 conjugate of the present invention. 22 Q Yeah, and I just -- I just want to make
62 1 the present invention." 2 Do you see that? 3 A Yes. 4 Q Do you have an understanding of what it 5 means when it refers to "the modified cell-binding 6 agents of the present invention"? 7 A So I guess that would be referring to the 8 conjugate itself, the ADC or the, say, ADC-like 9 molecule. 10 Q So when it says "modified cell-binding 11 agent," it's -- it's a cell-binding agent that is 12 bound to a drug via one of the disclosed linkers? 13 A Yes. 14 Q And is that what's also meant by the term 15 "conjugate" that appears just before that on the 16 line above? Or does the term "conjugate" mean 17 something different? 18 A I think that's referring to the same 19 thing. 20 Q So referring to the cell-binding agent 21 bound to a drug via one of the disclosed linkers; 22 is that right?	64 1 sure I understand what you're referring to -- or 2 what you think it means when it says "conjugates." 3 So the conjugate in that context is the 4 antibody or cell-binding agent linked to a drug 5 with one of the linkers. 6 That's what "conjugate" refers to; is that 7 right? 8 ATTORNEY MATTES: Objection to form. 9 A That's what "conjugate" means here, yes. 10 Q Okay. I was just trying to clarify that. 11 Thank you. 12 Okay. Could you turn -- I'm going to ask 13 you to look at your declaration again. And I'll 14 ask you to turn to paragraph 170, which is on 15 page 83 and 84. 16 And let me know when you've scanned that. 17 A You said 170 and -- 18 Q Paragraph 170, across pages 83 and 84, 19 yes. 20 A Okay. Got it. Give me just a second 21 here. 22 (Document review.)

Conducted on February 25, 2025

65 1 Okay. 2 Q I want to just ask you about the very last 3 sentence, actually, which appears on page 84. 4 You say in that sentence, "Such conditions 5 are not the conditions for cell binding as 6 contemplated by the '682 patent." 7 Do you see that? 8 A Yes. 9 Q What are the conditions for cell binding 10 that are contemplated by the '682 patent? 11 A Well, this was written in 2012. This is 12 kind of the date we're looking at. And at that 13 point, we go back to what I mentioned earlier, 14 flow cytometry. 15 There is another assay we call ELISA, or 16 enzyme-linked immuno absorption [sic] assay, I 17 believe is what it stands for. 18 Those are a couple of methods that are 19 commonly used in the field for determining cell 20 binding for drug delivery approaches like what is 21 being described in this patent. 22 Q So when you refer to the conditions for	67 1 the '682 patent include in vitro conditions? 2 A Yes, they would. 3 Q And, again, just for clarity, what would a 4 POSA understand "in vitro" to refer to? 5 A Related to a living system, maybe 6 derived -- hmm. 7 Let me tell you the way that I 8 interpret -- I don't know what they would have 9 interpreted this. So in vitro versus in vivo. 10 "In vivo" meaning a living organism. That 11 could be a mouse. Could be a fish. Could be 12 human. 13 Versus "in vitro" will take cells isolated 14 from one of those species in an artificial 15 environment, but they're still living cells, and 16 we're doing an assay with those living cells. 17 Q Okay. And then, similar question, but I 18 will repeat it anyway. 19 Do the binding conditions contemplated in 20 the '682 patent include ex vivo conditions? 21 A Yes. 22 Q What's -- do you have an understanding or
66 1 cell binding, you're referring to techniques like 2 flow cytometry and ELISA? 3 A I am -- specifically, I'm referring to 4 binding to live cells here. The Straus does not 5 discuss the binding of HRP to living cells. 6 Q Okay. So that's the distinction you're 7 making, is that the '682 patent is talking about 8 cell binding to live cells? 9 A To modify something biologically or 10 therapeutically, the cell has to be alive. 11 Q Okay. So the '682 patent binding 12 conditions you're referring to are directed to 13 living cells; is that right? 14 A That would be my interpretation and the 15 way that I would approach this language, yes. 16 Q Does that include in vivo binding? 17 A Yes. 18 Q What would a POSA understand "in vivo" to 19 mean, just so we're clear? 20 A "In vivo" typically means in a living 21 organism. 22 Q Do the binding conditions contemplated in	68 1 an opinion on the difference between ex vivo and 2 in vitro? 3 A Those are terms that are closely related, 4 but, usually, the term "ex vivo" means we have a 5 tissue that is excised from a living organism, and 6 we're doing some sort of an experiment with those 7 tissues or cells that have been very recently 8 excised from an organism. 9 Q And how would that differ from what in 10 vitro encompasses? 11 A So in vitro, we often are using 12 immortalized cell lines. For example, in my lab, 13 we use a cancer cell line that was isolated back 14 in the 1960s. It is still a perfectly good cell 15 line for studying cancer, but I wouldn't consider 16 it ex vivo because, you know, it's so ancient. 17 Whereas, if I isolated cells, you know, 18 last week, from a cancer patient, and cultured 19 those, I would more consider that ex vivo. 20 So there is a subtle difference, but 21 they're related concepts. 22 Q I want to make sure I understand something

Conducted on February 25, 2025

69 1 you mentioned. 2 You said you used -- in your lab, you used 3 some cells -- I think the term you used -- that 4 had been immortalized? 5 A Yes. 6 Q What does that mean? 7 A So cells that will grow indefinitely. 8 Right. So they aren't -- cancer -- cancer 9 cells -- I don't know if they're always immortal. 10 Basically, we shut down the pathways in 11 the cell that cause it to self-destruct. And so 12 we can just grow those cells indefinitely. As 13 long as I keep supplying the nutrients to it and 14 keep the cell density low enough, it will just 15 grow forever. 16 Q And just, again, to clarify, when you say 17 "grow," "grow indefinitely," does that refer to or 18 include replicating? 19 A That's what I -- 20 Q Or do you mean growing in size? 21 A Replicating. 22 Q Replicating. Okay. Thank you.	71 1 to have an azide group. 2 Would a POSA understand that the azide 3 group on such a modified antibody can react with 4 an alkyne group on another molecule through a 5 copper-catalyzed click chemistry? 6 ATTORNEY MATTES: Objection to form. 7 A They -- yes, they would understand that 8 they could react, not necessarily that they would. 9 But they could react, yes. 10 Q They could be made to react using the 11 right catalyst and conditions? 12 ATTORNEY MATTES: Objection to form. 13 A They could likely be made to react using 14 the right conditions and catalysts. I don't know 15 that -- I don't think -- I would not have the 16 confidence to say that an antibody modified with 17 an azide and another molecule with an alkyne, 18 could I always tweak the conditions enough to get 19 them to react? I think there are some that would 20 never react. 21 Q There might be some hindrance effects 22 or --
70 1 I'm going to change topics on you for a 2 moment -- 3 A Okay. 4 Q -- just to give you a warning. 5 Would a POSA have understood antibodies to 6 be proteins? 7 A Yes. 8 Q Would a POSA have understood at least some 9 antibodies to have cysteine units? 10 ATTORNEY MATTES: Objection to form. 11 A Yes. 12 Q Would a POSA have understood antibodies to 13 have thiol groups? 14 A No. 15 Q Would a POSA have understood that 16 antibodies could be modified to have thiol groups? 17 A Yes. 18 Q Would a POSA have understood that 19 antibodies could be modified to have azide groups? 20 A Yes. 21 Q So I want to ask about that type of 22 antibody, specifically one that has been modified	72 1 A Yes. 2 Q -- things of that nature? 3 A Yes. 4 Q Sorry. Are you okay? 5 A Sorry. I was going too fast there. 6 Q That's okay. 7 You mentioned, at some points in your 8 declaration, that using copper catalysts for 9 certain types of chemistry present drawbacks in 10 the use of ADCs; is that right? 11 A Yes. 12 Q Were those drawbacks so severe that 13 copper-catalyzed click chemistry would never be 14 used to form ADCs as of 2012? 15 ATTORNEY MATTES: Objection to form. 16 A Would never be used. No, I don't think I 17 would make a blanket statement like that. 18 Q So as of 2012, a POSA was aware of ways to 19 minimize or avoid the negative effects of copper 20 so that that type of chemistry could be used for 21 ADCs, if needed? 22 ATTORNEY MATTES: Objection to form.

Conducted on February 25, 2025

73 1 A You could make an ADC using a 2 copper-catalyzed reaction and sufficiently remove 3 the copper to show activity in an in vitro system. 4 But there would be significant skepticism, very 5 significant skepticism, to actually using it in a 6 drug that one was going to take into the clinic. 7 So for academic explorations, yes, one 8 could use it. 9 For real therapeutic applications, I'm 10 doubtful anybody would have brought that forward. 11 Q Is an appropriate way to think about the 12 distinction you just made that there would be 13 significant hesitation if the ADC were going to be 14 used in vivo, but less hesitation if it were only 15 going to be used in vitro or ex vivo? 16 ATTORNEY MATTES: Objection to form. 17 A That would be -- yes, I would agree with 18 that statement. As scientists, we do experiments 19 as kind of a proof of concept experiment very 20 frequently, but that experiment, we know, is not 21 going to have the rigor needed to actually result 22 in a therapeutic.	75 1 A Yes. 2 Q I'd like you to look at your description 3 in paragraph 91 of page 43 of your declaration. 4 You can take a moment to review that. 5 A (Document review.) 6 Okay. 7 Q I want to ask you about one of the 8 sentences there in paragraph 91, where you say 9 that, "Harris's bifunctional PEG derivative may be 10 used to attach a biologically active molecule to a 11 surface or to attach more than one such 12 biologically active molecule to the PEG molecule." 13 Do you see that? 14 A Yes. 15 Q A POSA would view that statement in Harris 16 as at least encompassing the use of Harris's 17 bifunctional PEG derivatives to attach a drug on 18 one end and something like an antibody on the 19 other end; is that fair? 20 ATTORNEY MATTES: Objection to form. 21 A Somebody could read this description and 22 envision that possibility. I don't believe that
74 1 So I would -- I would say some of the 2 copper-catalyzed reactions that you're talking 3 about, they're useful for academic papers, for 4 proving an interesting concept biologically, but 5 probably not for an actual drug. I don't think 6 anybody would have taken that technology forward 7 to make an actual drug. 8 Q But somebody could have used the 9 copper-catalyzed click chemistry to make a 10 conjugate that is then being tested using an in 11 vitro or ex vivo environment, correct? 12 ATTORNEY MATTES: Objection to form. 13 A Yes. 14 Q I'm going to ask you to turn to your 15 declaration. Let's go to page 43. 16 And actually, before we get there, I want 17 to make sure that we're on the same page. 18 I believe, previously, you testified as to 19 biologically active molecules that some drugs and 20 some -- at least some antibodies would qualify as 21 biologically active molecules to a POSA, correct? 22 ATTORNEY MATTES: Objection to form.	76 1 possibility was articulated in Harris, however. 2 Q I'm going to hand you what is marked 3 Exhibit 1007, which you can scan. I believe 4 you'll recognize that as the Harris reference. 5 A Yes. 6 Q In Harris, I'll ask you to turn to -- let 7 me just confirm. 8 I'll ask you to turn to page 20, using the 9 page numbers at the bottom. Or it's marked as 10 column 18 up at the top. 11 A Okay. 12 Q And I specifically want to ask you about 13 the paragraph that starts down at the bottom at 14 line 31. 15 That paragraph starts, "It should be 16 apparent to the skilled artisan that the dumbbell 17 structures discussed above could be used to carry 18 a wide variety of substituents and combinations of 19 substituents." 20 Do you see that? 21 A Yes. 22 Q It goes on in the next sentence to list

Conducted on February 25, 2025

77 1 pharmaceuticals such as aspirin, vitamins, 2 penicillin. 3 Do you see that? 4 A Yes. 5 Q Then there is a semicolon, and it lists 6 polypeptides or proteins and protein fragments of 7 various functionalities and molecular weights. 8 Do you see that? 9 A Yes. 10 Q So it's your opinion that that does not 11 suggest to a POSA attaching a drug and a protein 12 such as an antibody to each end of its 13 bifunctional PEG derivatives? 14 ATTORNEY MATTES: Objection to form. 15 A I mean, okay. If I'm a POSA, and I'm 16 looking at this, I'm reading the entire paragraph, 17 and just a couple sentences later, it says almost 18 any substance could be modified. 19 So no, I would not look at this as 20 specifically pointing to this being useful for 21 crosslinking two pharmaceutical agents. In fact, 22 this says it's useful for crosslinking just about	79 1 Q Would a POSA, similarly, have considered 2 vinyl sulfone as being useful for attaching the 3 dumbbell structure to this other category, 4 polypeptides or proteins and protein fragments? 5 ATTORNEY MATTES: Objection to form. 6 A Can I clarify whether you mean 7 sequentially or individually? 8 In other words, are we talking about 9 making the dumbbell, or are we talking about just 10 reacting – whatever the second thing was you 11 mentioned – pharmaceutical agents, with a PEG 12 molecule? 13 Q Well, we can talk about both cases. 14 Let's say that the PEG molecule on one end 15 has been attached to a drug -- 16 A Okay. 17 Q -- via whatever attachment technique. 18 On the other end, it has a vinyl sulfone. 19 A Okay. 20 Q Would a POSA consider that to be a useful 21 approach for then connecting that molecule to a 22 protein such as an antibody?
78 1 anything. 2 So maybe this is the magic – the magic 3 chemical here, but I – this is such a broad 4 statement. I would not look at this and make any 5 sort of determination about what it's useful for. 6 Q How -- if a POSA were considering 7 attaching a pharmaceutical to its dumbbell 8 structure, as it refers to it, how would a POSA 9 have thought to accomplish that attachment? 10 ATTORNEY MATTES: Objection to form. 11 A Well, I would look at functional groups 12 that are present on the two molecules that I'm 13 trying to link. And, generally, I would want 14 functional groups that are complementary with one 15 another in order to use those as handles for 16 linking them. 17 Q Would a POSA have considered vinyl sulfone 18 as a functional group on the PEG polymer for 19 attaching to a drug? 20 ATTORNEY MATTES: Objection to form. 21 A That would be one thing, among many, that 22 a POSA would consider, yes.	80 1 ATTORNEY MATTES: Objection to form. 2 A Well, it kind of depends on what's on the 3 other side. 4 Q You mean what drug is on the other side? 5 A No. What – what linkage – because you 6 use the term anything was used to attach the PEG 7 group to the protein on the one side. 8 Q Okay. 9 A That linkage matters in terms of what an 10 ideal or optimal linkage is on the other. 11 Q Okay. Let's -- let's just start with an 12 example. 13 What if the linkage to the drug was via a 14 thiol-ether bond? So that has been created. 15 A Okay. 16 Q And vinyl sulfone is the other end of the 17 PEG. 18 A Yep. 19 Q Would that be considered to be a useful 20 approach to then attach that conjugate to a 21 protein such as an antibody? 22 ATTORNEY MATTES: Objection to form.

Conducted on February 25, 2025

81 1 A Not really, no. 2 Q Why not? 3 A Because you really need different 4 chemistry on either side. If -- by making a 5 thiol-ether on both sides, you're setting yourself 6 up for problems by creating a situation where this 7 dumbbell is going to have two of the same things 8 attached to either side. So it's going to be very 9 complicated to get one thing attached to one side 10 and one thing attached to the other if both ends 11 of the PEG have the same reactive functional 12 group. 13 Q Can one end of the PEG be protected or 14 otherwise rendered less active while you do one 15 connection and then converted to vinyl sulfone 16 after that first reaction is done? 17 ATTORNEY MATTES: Objection to form. 18 A In a hypothetical world, yes. But when 19 we're making these bioconjugates, protecting group 20 chemistry is strongly avoided because there is a 21 limited number of protecting groups that are 22 compatible with biomolecules and doing reactions	83 1 discussion of Harris, I believe. 2 I'll let you get there and review that. 3 A (Document review.) 4 Okay. 5 Q Right at the bottom of page 101, you point 6 out that Harris refers to a polymer activation 7 group. 8 Do you see that reference? 9 A Oh. 10 Q Let me give it more context, Dr. Tumey. 11 I'll restate that. 12 In your quote from Harris in your 13 paragraph 209, I believe the quote says that the R 14 group -- and this is Harris's R group -- can be 15 hydrogen, methyl, vinyl sulfone, chloroethyl 16 sulfone, or a polymer-activating group other than 17 vinyl sulfone or chloroethyl sulfone. 18 Do you see that? 19 A Yes. 20 Q Do you have an understanding of what 21 Harris refers to when it says a polymer activating 22 group?
82 1 under aqueous conditions that are typically used 2 for making these bioconjugates. 3 Q Would it matter if the order were 4 reversed, and the one end of the dumbbell you 5 sought to attach to the protein first while 6 protecting the other end? 7 ATTORNEY MATTES: Objection to form. 8 A Actually, I was envisioning the other way 9 around. 10 Okay. So, basically, does the sequence 11 matter? 12 Q Yeah. Does the sequence matter to the 13 response you just gave? 14 ATTORNEY MATTES: Objection to form. 15 A Yes. It -- the sequence could matter. 16 I still think a vinyl sulfone is going to 17 present significant problems because I am not 18 aware of any protecting group for a vinyl sulfone. 19 It doesn't mean one doesn't exist, but it's not 20 common knowledge in the field, for sure. 21 Q Let's look at paragraph 209 of your 22 declaration, which, again, continues your	84 1 A Yes. 2 Q What is it referring to, in your opinion? 3 A In my opinion, this is referring to an 4 electrophilic functional group that can react with 5 a nucleophile on whatever is being brought in, 6 whether it be a protein or whatever they're trying 7 to link here. 8 Q Whatever they're trying to attach to one 9 side of the dumbbell that has the R group, right? 10 A Yeah, yeah. 11 Q And are you saying that by just describing 12 it as an activating group, that means that it 13 could be all possible activation groups? Is that 14 what you are your sentence there at the very end 15 of paragraph 209 means? 16 ATTORNEY MATTES: Objection to form. 17 A I'm just looking at the language here, 18 and, yes, that's a very broad statement. 19 Polymer -- a polymer activating group in 20 the absence of any other context, I would assume, 21 could be any electrophilic functional group. It 22 may even encompass things beyond electrophilic

Conducted on February 25, 2025

85 1 functional groups. 2 Q And in your opinion, does that make 3 Harris's disclosures so broad that a POSA can't 4 understand what is encompassed by that? 5 ATTORNEY MATTES: Objection to form. 6 A No. Harris is describing -- all of the 7 examples, again, to my recollection, involve an 8 electrophile reacting with a nucleophile, either 9 at the surface or on a protein or, I'd have to 10 look back at what they -- I think it was mostly 11 surfaces is what was described here. 12 So there are lots of electrophilic groups 13 other than vinyl sulfone and halo ethyl sulfone 14 that could react in a similar manner. And those 15 would be encompassed. 16 So it's -- so I would say a POSA would be 17 able to look at this and understand whether or not 18 a molecule fits this definition. 19 Q I'm trying to understand -- I'm trying to 20 understand what your point is here, just to be 21 frank about it. 22 You say in your first sentence of	87 1 is here. 2 Q Okay. If the board, the patent office in 3 this case, determines that vinyl sulfone can 4 satisfy the Q and Y groups as well as the T and Z, 5 then you would agree that Harris expressly 6 discloses vinyl sulfone at both ends of its linker 7 molecule, correct? 8 ATTORNEY MATTES: Objection to form. 9 A I don't see how that is any different. 10 What -- what the patent board decides about the 11 definitions of Q and T and whether they are 12 encompassed in Y or whether they're separate from 13 Y, has -- does not seem to have a bearing, in my 14 mind, on whether Harris is -- specifically 15 discloses these -- bis-sulfone type molecules or 16 bis-vinyl sulfone molecules. 17 Q Let me ask it this way. You make a fair 18 point, so let me ask it this way. 19 Is it your position that Harris does not 20 disclose bis-vinyl sulfone PEG polymers? 21 ATTORNEY MATTES: Objection to form. 22 A No, that is not my position.
86 1 paragraph 209 that Harris's disclosure is 2 exceedingly broad. 3 And I'm not trying to be flip about it, 4 but I'm just trying to ask, so what? What does 5 that mean to you? Why are you making this point? 6 How is that relevant? 7 Okay. So Harris's disclosure is broad. 8 What does that -- how is that relevant, or why 9 does that matter? 10 A My understanding is, there was an 11 obviousness argument that was made by Synaffix, 12 and there should be some specificity within Harris 13 that points to the present invention under 14 question for an obviousness argument to stand up. 15 So I'm not a legal person, but, hey, I'm 16 looking at this, and there is not anything 17 specifically in Harris that I'm looking at and it 18 says, "Oh, yeah, if" -- if I had been in -- back 19 in 2011, and had read Harris, "Oh, yeah, I would 20 have certainly thought of the molecules described 21 in the '682 patent." 22 I think that's why it's -- this paragraph	88 1 Q So it does disclose bis-vinyl sulfone PEG 2 polymers -- let me restate. 3 So Harris does disclose bis-vinyl sulfone 4 PEG polymers, correct? 5 ATTORNEY MATTES: Objection to form. 6 A As one among many, many, many 7 possibilities, yes. 8 Q Are you still in Harris? Or no, I'm 9 sorry. You're looking at your declaration. 10 A No, I'm -- 11 Q I'll let you pick back up Harris and turn 12 to page 18. 13 A Yeah. 14 Okay. Wait, 18 at the bottom. 15 Q Yeah, page 18 at the bottom. Yes, 16 correct. 17 A Got it. 18 Q The very last sentence on page 18 that 19 spans to page 19 makes specific reference to PEG 20 bis-vinyl sulfone, doesn't it? 21 A Yes. 22 Q Okay. Let's turn back to your

Conducted on February 25, 2025

1 declaration, please. I think you can set Harris 2 aside for the time being. 3 And I'll ask you to turn to page 52, 4 paragraph 108. 5 On page 52, you have a table that's 6 labeled table 1 there. 7 Do you see that? 8 A Yes. 9 Q In that table, you show the structure for 10 three formulas that are labeled formulas I -- 11 Roman numeral I, II, and IV, correct? 12 A Yes. 13 Q And is it correct to say that formula I 14 shown there is a linker from the '682 patent 15 before it has been attached to any drug or 16 cell-binding agent? 17 ATTORNEY MATTES: Objection to form. 18 A Yes. 19 Q And is it correct to say that formula IV 20 shown in table 1 is a linker from the '682 patent 21 that has been reacted with the drug on one side 22 but has not yet been attached to a cell-binding	1 I'm sorry. I said -- oh, I'm sorry. I -- 2 well, let's see here. No, that's correct. 3 Page 124 kind of gets into your appendix, 4 and that's where you have the claim listing. 5 A Okay. So -- 6 ATTORNEY MATTES: So the pages are down 7 here, so it's this page 124. 8 A Got it, got it. 9 Q The page numbering kind of got -- 10 A So we're looking at claim 3? 11 Q Yes. Exactly. 12 A Okay. 13 Q Now, that formula in claim 3 doesn't have 14 a Y group as part of the formula, correct? 15 A Correct. 16 Q And claim 3 states that the Q and T groups 17 can be a phosphate, a sulfone, or a sulfoxide; is 18 that right? 19 A Yes. 20 Q Okay. I'd like you to imagine a linker 21 that has the structure called for in formula II, 22 and specifically where there is a sulfone group
1 agent on the other side? 2 A Yes. 3 Q And then, finally, is it correct to say 4 that formula II shown in table 1 is a linker from 5 the '682 patent that has been attached to both a 6 drug and a cell-binding agent? 7 A Yes. 8 Q Would a POSA reading the '682 patent 9 understand that the linker of formula I is 10 intended to be used to create the conjugates that 11 are depicted in formulas II and IV? 12 ATTORNEY MATTES: Objection to form. 13 A Yes. 14 Q And then the linker of formula IV at least 15 could be used to create the conjugate depicted in 16 figure -- formula II, correct? 17 ATTORNEY MATTES: Objection to form. 18 A Yes. 19 Q Okay. So I want to ask you some questions 20 about the -- the formula II linker. 21 And let's turn to page 124 of your 22 declaration for that.	1 present as the Q called for in formula II. 2 A Okay. 3 Q Can you imagine that linker? 4 A Yes. 5 Q Okay. So just for purposes of my 6 question, we'll just assume that the linker 7 satisfies the other requirements of claim 3, which 8 are quite lengthy. I just want to focus on Q 9 being a sulfone in this linker. 10 Imagining that linker, let's further 11 imagine that the Q originated from a terminal 12 vinyl sulfone in the precursor molecule where the 13 vinyl group of the vinyl sulfone was made to react 14 with a thiol group on the cell-binding agent. 15 Can you picture that scenario? 16 ATTORNEY MATTES: Objection to form. 17 A I can, but there is other elements that 18 would render what you just said nonsensical. 19 Q Okay. Could you try to help me understand 20 what you mean? 21 A What is M? 22 Q I'm sorry?

Conducted on February 25, 2025

93 1 A M. 2 Q M? 3 A Yes. Under your scenario, I don't know 4 what M is. 5 Q Okay. Let's assume that M is 1. 6 A Okay. So we're going to assume that M is 7 1. 8 Q Which I believe is allowed by claim 3, 9 correct? 10 A Okay. 11 Q I'm certainly not trying to trip you up on 12 that, if you think otherwise, but I believe, on 13 the next page, it says M can equal 1. 14 A Yes. Okay. 15 Q Okay. 16 A Yes, so it's one of the possibilities for 17 M, yes. 18 Q Okay. So I just want you to imagine a 19 scenario where we have a linker where the Q is 20 sulfone and the -- the way we got to this linker 21 is, it previously had a terminal vinyl sulfone 22 that reacted with a thiol on a cell-binding agent,	95 1 Is that correct? 2 A You would have to spell that out for me. 3 I'm not following -- 4 Q Sure. 5 A -- what you're saying. 6 Q What I'm trying to get at in this line of 7 questioning is if there is a vinyl sulfone that is 8 used to react to the cell-binding agent. 9 I believe it's your position that the 10 vinyl sulfone cannot serve as the Q and Y in 11 formula I. 12 And if you'd like to just refresh your 13 recollection, that formula is shown just on the 14 prior page for claim 1 in your declaration. 15 You can kind of flip back and forth 16 between the two formulas. 17 So I just want to make sure I understand 18 your opinion that, yes, a molecule that we arrived 19 at by using vinyl sulfone can still fall under 20 claim 3, but the precursor molecule would not fall 21 under claim 1 if that molecule has the vinyl 22 sulfone in the position of the Q and Y?
94 1 and that's how we arrived at this molecule. 2 Are you with me so far? 3 ATTORNEY MATTES: Objection to form. 4 A Yes. 5 Q So my question is, in that scenario where 6 we started with a molecule that had a terminal 7 vinyl sulfone that was then reacted with a 8 cell-binding agent to arrive at a molecule that 9 looks like what's listed here in formula II, will 10 that still be covered under claim 3, even though a 11 vinyl sulfone was used to get there? 12 ATTORNEY MATTES: Objection to form. 13 A The compound shown in formula II is being 14 claimed regardless of how we got there. That's 15 how claims work, from my understanding. 16 Q Okay. 17 A So... 18 Q I'm just asking what your opinion is. 19 That's fine. 20 But that would also mean, then, that the 21 precursor that is used to get to that formula II 22 compound would not fall under claim 1.	96 1 ATTORNEY MATTES: Objection to form. 2 A I think I would really want to look at a 3 specific molecule and evaluate, is a specific 4 molecule covered under claim 1 and a specific 5 molecule covered under claim 2. And then we can 6 ask the question, okay, did this molecule -- you 7 know, how did we get there. 8 I would really want to look at a specific 9 molecule before answering that question. It gets 10 kind of difficult to talk in abstract terms and 11 make blanket statements about whether molecules 12 would or wouldn't be covered by a specific claim 13 without looking at a specific molecule. 14 Q Okay. Perhaps we'll take a short break, 15 and I'll see if I can draw one for you. 16 A Okay. 17 ATTORNEY HOUSTON: We can go off the 18 record. 19 (Recess.) 20 BY ATTORNEY HOUSTON: 21 Q Dr. Tumey, I'm going to ask the court 22 reporter to mark these two documents as

Conducted on February 25, 2025

97 1 Exhibits 1060 and 1061. 2 (Exhibit 1060, Diagram of Chemical 3 Structure, marked for identification.) 4 (Exhibit 1061, Diagram of Chemical 5 Structure, marked for identification.) 6 Q Could you take a moment and look at the 7 chemical structures shown on those two exhibits. 8 A (Document review.) 9 Okay. 10 Q What I've tried to show in Exhibit 1061 11 is -- is in response to your request to see an 12 actual molecule. 13 So what I tried to do is take the molecule 14 shown in Exhibit 1060, and in 1061, depict the 15 result of reacting the molecule in 1060 with a 16 drug having a thiol group to the right-hand vinyl 17 sulfone, and a cell-binding agent having a thiol 18 group on the left-hand side of that molecule. And 19 that's what I've tried to depict in 1061. 20 A Okay. 21 Q Does the chemistry look right to you, the 22 way I've described it?	99 1 Q Okay. So my question -- my initial 2 question for you is, is the molecule shown on 3 Exhibit 1061 with that edit that you've made, 4 would that fall under the requirements of claim 3 5 in the '682 patent? 6 A Okay. Let's see here. 7 ATTORNEY MATTES: If you need paper, let 8 us know, Dr. Tumey. 9 THE WITNESS: Okay. 10 ATTORNEY MATTES: He has extra. 11 I guess, also, we object to form. 12 A (Document review.) 13 Yes, I believe this would fall under 14 claim 3. 15 Q Okay. But at the same time, it is your 16 position that the molecule shown on Exhibit 1060 17 would not fall under claim 1; is that correct? 18 A That is correct. 19 Q And, specifically, it would not fall under 20 claim 1 because of the interpretation of the Q and 21 the Y groups that you were applying in your 22 declaration, correct?
98 1 A Not quite, but I'm understanding your 2 intent. 3 Q Okay. 4 A There should not be an oxygen between the 5 sulfur and the carbon on both the left and the 6 right. 7 Q Okay. 8 A So it's that oxygen, that oxygen. That 9 should not be there. 10 Q Okay. How about we just cross that oxygen 11 out, then. Because I don't want to be -- 12 A Okay. 13 Q So if I drew it wrong, then I appreciate 14 you pointing that out. 15 So we'll consider that molecule without 16 the oxygens. 17 A Okay. 18 Q Is that fair? 19 A Yes. 20 Q Okay. We can take the time to redraw it 21 if you'd like. 22 A That's fine.	100 1 Maybe I could ask that question a little 2 bit differently. 3 Besides the issue involving the definition 4 of the Q and Y groups, is there any other reason 5 why that molecule would not satisfy claim 1 of the 6 '682 patent? 7 ATTORNEY MATTES: Objection to form. 8 A I don't believe there is any other reason 9 beyond that, that I can think of. 10 Q I'm not aware of any either. I'm not 11 trying to trick you. I just want to make sure 12 we're on the same page. 13 A Yeah. 14 Q So the real reason that you believe 1060 15 doesn't satisfy -- satisfy claim 1 is the 16 construction of the Q and Y terms that you've 17 applied in your declaration, correct? 18 ATTORNEY MATTES: Objection to form. 19 A I would say specifically the Y term. I 20 don't believe the Q term has been under dispute. 21 Q Okay. Fair enough. 22 The Y term, where you argued that Y

Conducted on February 25, 2025

101 1 requires that it be a group that independently 2 enables reaction with the cell-binding agent, 3 right? 4 A Yes. 5 Q Okay. Now, the word "independently" that 6 you apply to that construction for Y doesn't 7 appear expressly in the claims, correct? At least 8 as to the Y group? 9 ATTORNEY MATTES: Objection to form. 10 A Not in the -- no, it does not. 11 Q And, again, I'm not trying to trip you up, 12 but the word "independently" does appear in other 13 locations, for other groups. 14 But I just want to clarify that it's not 15 written there for the definition of Y, correct? 16 A That is correct. 17 Q So you've added that requirement that 18 the -- that enabling the reaction to the 19 cell-binding agent for Y be independent of Q. 20 You've added that requirement that it be 21 independent, correct? 22 ATTORNEY MATTES: Objection to form.	103 1 Q So in your view, Z does not have to be a 2 functional group that independently enables 3 linkage to a drug; is that right? 4 A That is correct. 5 Q But nonetheless, it is your position that 6 a vinyl group can independently enable linkage to 7 a drug; is that right? 8 ATTORNEY MATTES: Objection to form. 9 A Yes. 10 Q And what are those conditions that would 11 allow a vinyl to independently link a vinyl to a 12 drug? 13 A Are we talking about -- well, yeah, 14 this -- okay, this is any drug. It's any drug. 15 I'm -- I'm trying to narrow down -- I was 16 thinking about do I have to narrow this down to a 17 specific class of drugs or not. 18 Q Well, to be clear, actually, on that 19 point, let's just make clear so we don't mess 20 things up. 21 I believe it says a cytotoxic drug. 22 A Okay, okay.
102 1 A I am interpreting it in that manner for 2 two reasons that I can think of off the top of my 3 head. 4 Number 1 is the fact that Y says -- it 5 represents a functional group that enables 6 reaction, whereas Z says it is a functional group 7 that enables linkage. So in what sense is a 8 linkage different than a reaction? So they 9 cannot -- I think there has to be some difference 10 between Y and Z based on that language within the 11 claim. 12 And secondly, I am looking at the examples 13 and the specifications that apply to Y or that are 14 given for Y, and those are unique from the 15 examples that are given for Z. 16 And so my word "independently" is coming 17 from those two observations, perhaps among others 18 that I'm not considering at the moment, but... 19 Q Okay. When you interpret Z in the claims, 20 are you similarly importing that "independently" 21 limitation? 22 A No.	104 1 Q Right? In claim 1, I see "cytotoxic 2 drug." 3 A Okay. Okay. So as an example here, one 4 of the Z groups that is listed is a 5 heteroaromatic. 6 There are various reactions -- among them, 7 a click reaction, that we spoke about earlier -- 8 in which a vinyl group could be reacted with a 9 functional group on a drug, resulting in the 10 formation of a heteroaromatic group. 11 Actually, let me correct that. That 12 should be the one prior to that. 13 Cycloheteroalkane, I guess, would probably 14 be the more appropriate one that I'm having -- the 15 one that I'm having in mind at the moment. 16 Q In that example that you have in your 17 mind, what is the functional group on the drug 18 that would click react with a vinyl group when the 19 vinyl group is reacting independently? 20 A Can I draw -- I don't know what it's 21 called. I can draw the functional group here. 22 Q Sure. We'll hand you a piece of paper,

Conducted on February 25, 2025

105 1 and you can draw it, and then we'll just mark it 2 as an exhibit. 3 A Okay. 4 (Witness complies.) 5 And I'm just going to draw the reaction 6 that I'm having in mind here. 7 So this is that reaction. 8 ATTORNEY HOUSTON: I'll have the court 9 reporter go ahead and mark this as Exhibit 1062. 10 (Exhibit 1062, Diagram, marked for 11 identification.) 12 Q In Exhibit 1062, I see that you have a -- 13 it looks like the letter D drawn in a couple 14 places. 15 Does that represent a drug? 16 A Yes. 17 Q Okay. And then on the left-hand-most side 18 of what you've drawn on this exhibit, there is -- 19 there are some atoms. There is a group attached 20 to the drug. 21 Do you see that? 22 A Yes. There is a nitrogen and an oxygen	107 1 attached to the drug have a name? Is that what 2 you couldn't remember -- 3 A That's what I -- 4 Q -- not sure? 5 A I don't remember the name of it, but yes, 6 it has a name. 7 Q Fair enough. This isn't a memory contest. 8 A Lots of names in organic chemistry. 9 Q Okay. So you believe that that group on a 10 drug would independently react with a vinyl to 11 create a link between the drug and whatever is 12 attached to the vinyl? 13 ATTORNEY MATTES: Object -- hold on. 14 Objection to form. 15 A With the same caveats earlier. It's not 16 necessarily going to react, but, you know, my 17 intuition is that it would. 18 Q In this reaction that you've shown in 19 Exhibit 1062, if there were a sulfone group 20 adjacent to the vinyl, would that sulfone group 21 contribute to the reactivity of the vinyl with the 22 group that you've shown on the left-hand side?
106 1 and three carbons there, five-numbered ring, and 2 there is a squiggly line. That squiggly line is 3 indicating where the remainder of the linker would 4 be. 5 Q Oh, okay. This is the -- the double 6 lines, that represents the vinyl group -- 7 A That represents the vinyl group. 8 Q -- on the linker, correct? Okay. 9 I want to just ask about what's attached 10 to the drug over here -- 11 A Yes. 12 Q -- on the left-hand side of the paper, the 13 left-hand side of the plus, if you will. 14 There is -- is this a chlorine? 15 A Yes. 16 Q And then there is a carbon that's bonded 17 to the chlorine, the drug, and a double bond to 18 the nitrogen; is that right? 19 A Yes. 20 Q And then the nitrogen also has an OH? 21 A Yes. 22 Q Does the group that you've shown here	108 1 ATTORNEY MATTES: Objection to form. 2 A I don't know. My gut feeling is the 3 reaction would proceed roughly the same whether or 4 not that sulfone was present. 5 And that's why I picked that example is 6 because this is an example that does enable a 7 linkage here. A vinyl group enables a linkage, 8 but is not dependent on that sulfone. 9 Could the sulfone increase or decrease the 10 reactivity a bit? Yes. But the fundamental 11 reaction is independent of the sulfone. 12 Q Are there any special or particular 13 conditions or catalysts you're aware of that would 14 be required to cause that reaction to occur that 15 you've shown in 1062? 16 A Yes. 17 ATTORNEY MATTES: Objection to form. 18 Q And what are those? 19 A It would need heat and base. 20 Q When you say -- when you refer to it 21 needing a base, basically, that means in a basic 22 environment?

Conducted on February 25, 2025

109 1 A Yes. 2 Q Do you know at approximately what pH it 3 would need to be for that reaction to start 4 occurring? 5 ATTORNEY MATTES: Objection to form. 6 A I usually think in terms of the base 7 itself, but my -- if I had to guess, I would say 8 probably nine or ten. 9 Q And when you say you think in terms of the 10 base itself, what base or bases do you have in 11 mind that would -- that would be needed to cause 12 that reaction to occur? 13 A Triethylamine is one among many, but that 14 would be one that I would probably try first. 15 Q Maybe I can ask it this way. 16 Is there a specific class of bases that 17 are needed to help catalyze or cause that reaction 18 to occur, or is it really just using a base that 19 achieves the pH you want? 20 ATTORNEY MATTES: Objection to form. 21 A There are many bases that I would not want 22 to use here, for other reasons.	111 1 A It's been a long time since I've done 2 these, but in the range of 50 to 100 degrees 3 Celsius. And I know that's broad, but that would 4 be the -- yeah, in that range. 5 Q Is there any reason why that reactive 6 group that you've shown on the drug, again, to the 7 left-hand side of the plus mark, why that reactive 8 group could not be added to a small molecule such 9 as a vitamin or a peptide and -- 10 ATTORNEY MATTES: Objection -- sorry. 11 Q -- and then have the same reaction occur 12 with a vinyl group? 13 ATTORNEY MATTES: Objection to form. 14 A There is no fundamental reason it 15 couldn't. 16 Q Okay. 17 ATTORNEY HOUSTON: Okay. Counsel, I don't 18 believe I have any further questions. I'll pass 19 the witness. 20 ATTORNEY MATTES: Okay, great. 21 Can we go off the record. 22 (Recess.)
110 1 So I wouldn't say any base that achieves a 2 pH of 9 is necessarily going to work. But there 3 are many bases that will. Tertiary means are the 4 ones that are commonly used for this reaction. 5 Q Okay. Are there -- is there just a 6 general class of bases that you say you would 7 avoid, or is it just too broad of a category to 8 say? 9 ATTORNEY MATTES: Objection to form. 10 A It gets a little bit technical, I guess, 11 but I would say I want a base that is a strong 12 base but a non-nucleophilic base. 13 Q So you'd want a non-nucleophilic base. 14 A Yes. 15 Q That's right? Okay. 16 And you also mentioned that heat -- heat 17 would be desired to make that reaction occur, 18 correct? 19 A Yes. 20 Q Do you have a sense of what temperature 21 would be needed or would be desired to drive that 22 reaction to an appreciable degree?	112 1 2 EXAMINATION BY 3 ATTORNEY MATTES: 4 Q All right. So, Dr. Tumey, before the 5 break, we had Exhibit 1062 in front of you. 6 Do you recall that? 7 A Yes. 8 Q Okay. In this exhibit, is there -- is 9 there anything else required to enable the linkage 10 of the drug to the vinyl group you have depicted 11 here? 12 A Yes. 13 Q What else is required? 14 A Base, heat. Probably organic solvent as 15 well -- 16 (Reporter clarification.) 17 A Organic solvent. 18 Q Does the vinyl group here enable 19 linkage -- excuse me. 20 Does the vinyl group here independently 21 enable linkage to the drug? 22 A No.

Conducted on February 25, 2025

113 1 Q Is the structure you drew here in any of 2 the prior art -- is the structure you drew here 3 that's attached to the drug relied on in any of 4 the prior art references in this case by Dr. Chari 5 or Synaffix? 6 A No. 7 Q You were asked by Mr. Houston earlier -- 8 and let me know if you recall this -- "Is there 9 any reason why the reactive group you've shown on 10 the drug to the left-hand side of the plus mark, 11 why that reactive group could not be added to 12 small molecules such as a vitamin or a peptide and 13 then have the same reaction occur with the vinyl 14 group?" 15 Do you recall that interaction? 16 A Yes. 17 Q You responded, "There is no fundamental 18 reason it couldn't." 19 Do you recall that response? 20 A Yes. 21 Q What did you mean when you said there is 22 no fundamental reason it couldn't?	115 1 A No. 2 Q And why not? 3 A There needs to be a catalyst, which is 4 almost always going to be the copper catalyst that 5 I mentioned earlier. It will not happen on its 6 own. 7 Q Okay. Thank you. 8 ATTORNEY MATTES: Okay. I think that's it 9 for our redirect. 10 ATTORNEY HOUSTON: Okay. Just one or two 11 questions of recross, Dr. Tumey. 12 CONTINUED EXAMINATION BY 13 ATTORNEY HOUSTON: 14 Q So I believe you recall that we discussed 15 previously your opinion that the Y group in the 16 claims -- your opinion is that the Y group has to 17 independently enable the reaction that connects it 18 to the cell-binding agent, correct? 19 A Yes. 20 Q And we talked about the fact that you are 21 applying that interpretation of independently 22 based on the factors you mentioned such as the
114 1 A So this is an organic reaction that, under 2 the right conditions -- again, meaning base, heat, 3 organic solvent -- has a strong possibility of 4 having it. That's what I meant. 5 Q So is it your opinion that the vinyl group 6 here would independently react with a protein or 7 with a peptide or a vitamin? 8 A No. 9 ATTORNEY HOUSTON: Objection. Form. 10 Q And why not? 11 A Because it needs base, solvent, heat. 12 Q Okay. And so then I'm going to switch a 13 little bit, Dr. Tumey, right now. 14 So earlier today, do you recall having a 15 conversation with Mr. Houston regarding a reaction 16 between an azide and an alkyne group? 17 Do you recall that? 18 A Yes. 19 Q Okay. Would a terminal alkyne group 20 independently enable a reaction with an azide 21 group? 22 ATTORNEY HOUSTON: Objection. Form.	116 1 prosecution history in the patent, etc., correct? 2 ATTORNEY MATTES: Objection, to the extent 3 it mischaracterizes his prior testimony. 4 Q These were some of the reasons why you 5 gave. You may have given others. 6 But you gave some reasons why you are 7 applying that independently -- independent 8 requirement for the reaction for the Y group, 9 correct? 10 ATTORNEY MATTES: Objection to form. 11 A I gave several reasons, yes, that were 12 both within the patent and within the prosecution 13 history. 14 Q Okay. When you are applying that 15 qualification that the reaction needs to occur 16 independently, are you interpreting or are you -- 17 are you interpreting independently to mean it 18 cannot be assisted by a catalyst? 19 ATTORNEY MATTES: Objection to form. 20 A In part. 21 Q So that's one of your requirements in 22 terms of what "independently" means, that it

Conducted on February 25, 2025

1 cannot be catalyst-assisted? 2 A That -- yes, that is one of the criteria 3 that I am applying. 4 Q So none of the reactions reported in the 5 '682 patent for reacting Y with a cell-binding 6 agent involve the use of a catalyst; is that your 7 position? 8 ATTORNEY MATTES: Objection to form. 9 A When I looked at that list, I did not see 10 any of those reactions that required a catalyst 11 for -- for -- for them to occur. 12 Q And if they do require a catalyst, then 13 they would not fall under your characterization of 14 what Y can be; is that fair? 15 ATTORNEY MATTES: Objection, to the extent 16 it's an hypothetical. 17 A Could you repeat that question one more 18 time? 19 Q If there is a reaction shown for Y 20 attaching to a cell-binding agent in the '682 21 patent that does require a catalyst, then that 22 reaction or that Y group would not fall under your	117 1 about the reaction shown in Exhibit 1062, she 2 asked if there was anything else required to 3 enable the linkage of the drug to the vinyl group 4 that you've depicted in that exhibit, and then she 5 asked -- and you said yes, and then she asked, 6 "What else is required?" 7 In the transcript, it's reported as you 8 saying, "Base, heat, 'probability' organic 9 solvent." 10 I believe you said "probably organic 11 solvent"; is that correct? 12 A Yes. 13 Q Okay. I just wanted the record to be 14 clear on that. 15 So you're not sure if an organic solvent 16 would be required? 17 A That's correct. I'm not sure if an 18 organic solvent. I'm 90 percent sure, but I can't 19 say with certainty. 20 Q Are there any peptides or vitamins that 21 can maintain their structure in a basic 22 environment of a pH of 9 to 10?
118 1 character -- your characterization of what Y is 2 allowed to be in the claims; is that fair? 3 ATTORNEY MATTES: Objection, to the extent 4 it mischaracterizes his prior testimony or 5 declaration. And hypothetical. 6 A I would have to think about that. But -- 7 I think I would have to think about that, but I -- 8 yeah, let me just leave it there for a second. I 9 would have to think about that one for a bit. 10 ATTORNEY MATTES: Is there a question -- 11 oh. 12 A Yeah, is there -- are you still waiting on 13 me to answer the question? 14 Q Oh, it looked like you were thinking. You 15 said you had to think about on it. I wasn't sure. 16 I was waiting until you said you either want to 17 move on or -- 18 A I would rather move on. I don't -- I... 19 Q You're not sure how to answer that 20 question? 21 A I'm not sure how to answer that. Yes. 22 Q Okay. When your counsel was asking you	119 1 ATTORNEY MATTES: Objection to form. 2 A I mean, there is -- are there any, and 3 that's a large number. So... 4 Q Okay. 5 A I don't know. I mean, there -- probably, 6 there are, but I really don't know the answer. I 7 certainly can't think of any and don't know of 8 any. 9 Q Well, is it your position that all 10 peptides and all vitamins would not be able to 11 maintain their structure at a pH of 9 to 10? 12 ATTORNEY MATTES: Objection, to the extent 13 it's outside the scope of his opinions. 14 A I would -- that's a very broad statement. 15 So that is -- no, that would not be my position. 16 Q Is it your position that all peptides and 17 all vitamins could not withstand a temperature of 18 between 50 and 100 degrees C? 19 ATTORNEY MATTES: Same objection. 20 A No, I don't -- I don't think I can make a 21 blanket statement like that. 22 Q And then, lastly, is it your opinion that
	120

Transcript of Lawrence Nathan TumeY, Ph.D.
Conducted on February 25, 2025

31 (121 to 124)

121 1 all peptides and all vitamins could not withstand 2 the organic solvent environment that you 3 referenced as possibly being required for 4 Exhibit 1062? 5 The reaction in Exhibit 1062. Excuse me. 6 ATTORNEY MATTES: Objection, to the extent 7 it's outside the scope of his opinions. 8 A I can't make a blanket statement like 9 that, no. 10 ATTORNEY HOUSTON: No further questions 11 from me. Thank you. 12 ATTORNEY MATTES: Just give us five 13 minutes, unless -- let's go off the record. 14 (Time Noted: 1:45 P.M.) 15 16 17 18 19 20 21 22	123 1 CERTIFICATE OF SHORTHAND REPORTER - NOTARY PUBLIC 2 3 I, Anita M. Trombetta, Certified Reporter and 4 Notary Public within and for the State of New York 5 do hereby certify: 6 7 That LAWRENCE NATHAN TUMEY, Ph.D., the 8 witness whose deposition is hereinbefore set forth, 9 was duly sworn by me before the commencement of such 10 deposition and that such deposition was taken before 11 me and is a true record of the testimony given by such 12 witness. 13 14 I further certify that the adverse party was 15 represented by counsel at the deposition. 16 17 I further certify that the deposition of 18 LAWRENCE NATHAN TUMEY, Ph.D., occurred at the 19 offices of Quinn Emanuel Urquhart & Sullivan LLP 20 295 5th Avenue, New York, New York 10016 on 21 Tuesday, February 25th, 2025, commencing at 22 9:07 A.M. to 1:45 P.M.
122 1 ACKNOWLEDGMENT OF DEPONENT 2 I, LAWRENCE NATHAN TUMEY, Ph.D., do hereby 3 acknowledge that I have read and examined the 4 foregoing testimony and the same is a true, 5 correct, and complete transcription of the 6 testimony given by me and any corrections appear 7 on the attached errata sheet signed by me. 8 9 _____ 10 (SIGNATURE) (DATE) 11 12 13 14 15 16 17 18 19 20 21 22	124 1 I further certify that I am not related to 2 any of the parties to this action by blood or 3 marriage, I am not employed by or an attorney to 4 any of the parties to this action, and that I am 5 in no way interested, financially or otherwise, in 6 the outcome of this matter. 7 8 IN WITNESS WHEREOF, I have hereunto set my 9 Hand this 2nd day of March, 2025. 10 11  12 _____ 13 Anita M. Trombetta 14 NOTARY PUBLIC IN AND FOR THE STATE OF NEW YORK 15 16 17 18 19 20 21 22

A			
abbreviations	academic	43:2, 44:1,	69:16, 82:22,
32:11	73:7, 74:3	44:2, 44:6,	85:7, 101:11,
able	acceptable	48:1, 51:10,	111:6, 114:2
47:13, 85:17,	21:12	55:16, 57:7,	agent
120:10	accomplish	65:3, 73:5,	14:20, 15:17,
about	23:18, 78:9	73:21, 74:16,	22:4, 34:22,
7:22, 8:20,	according	82:8, 103:18,	38:19, 39:1,
11:2, 12:12,	17:9	104:11	39:14, 41:5,
13:4, 17:6,	accurate	adc	41:6, 41:14,
17:8, 18:11,	60:14, 61:4	55:14, 62:8,	42:1, 42:14,
20:20, 21:1,	accurately	63:10, 63:18,	43:5, 43:12,
23:14, 23:22,	8:14	73:1, 73:13	43:16, 43:20,
24:9, 34:18,	achieves	adc-like	44:8, 45:10,
38:6, 40:18,	109:19, 110:1	62:8	45:12, 49:17,
42:20, 44:19,	acknowledge	adcs	50:10, 50:15,
46:7, 47:9,	122:3	72:10, 72:14,	50:17, 51:7,
47:18, 49:10,	acknowledgment	72:21	51:19, 52:12,
49:13, 49:15,	122:1	add	54:4, 54:13,
50:10, 59:4,	across	21:2, 21:10	55:6, 55:11,
60:2, 63:3,	21:2, 23:5,	added	56:1, 56:9,
65:2, 66:7,	44:17, 49:2,	101:17, 101:20,	57:18, 57:20,
70:21, 73:11,	64:18	111:8, 113:11	58:3, 58:5,
74:3, 75:7,	action	addition	59:10, 59:15,
76:12, 77:22,	124:2, 124:4	23:4	59:16, 59:20,
78:5, 79:8,	activate	addresses	60:4, 60:10,
79:9, 79:13,	24:12, 24:19	29:12	62:11, 62:20,
85:21, 86:3,	activating	adjacent	63:9, 64:4,
87:10, 90:20,	16:2, 83:21,	25:4, 26:11,	89:16, 90:1,
96:11, 98:10,	84:12, 84:19	107:20	90:6, 92:14,
103:13, 103:16,	activation	adverse	93:22, 94:8,
104:7, 106:9,	83:6, 84:13	123:14	95:8, 97:17,
115:20, 118:6,	active	affinities	101:2, 101:19,
118:7, 118:9,	33:13, 33:17,	48:15, 48:18,	115:18, 117:6,
118:15, 119:1	33:20, 33:22,	48:22	117:20
above	34:2, 34:10,	affinity	agents
28:14, 62:16,	35:8, 36:21,	46:22, 47:21,	61:22, 62:6,
76:17	37:2, 74:19,	51:4, 51:15,	77:21, 79:11
absence	74:21, 75:10,	52:5, 53:19	ago
84:20	75:12, 81:14	after	39:8
absolutely	activity	59:15, 81:16	agree
5:14, 9:7,	73:3	again	7:1, 51:22,
21:2, 25:5,	actual	23:7, 24:5,	54:7, 73:17,
36:15	43:7, 43:9,	26:4, 27:20,	87:5
absorption	74:5, 74:7,	37:7, 37:14,	ahead
65:16	97:12	46:14, 47:1,	14:2, 18:22,
abstract	actually	49:22, 53:16,	53:12, 105:9
96:10	10:18, 40:2,	57:2, 61:6,	alive
	41:1, 41:3,	64:13, 67:3,	66:10

alkyne 71:4, 71:17, 114:16, 114:19 all 15:18, 33:1, 39:13, 40:9, 55:21, 61:4, 84:13, 85:6, 112:4, 120:9, 120:10, 120:16, 120:17, 121:1 allow 103:11 allowed 11:13, 93:8, 118:2 almost 77:17, 115:4 alone 21:15, 26:10 also 7:15, 10:6, 16:14, 22:12, 47:6, 62:14, 94:20, 99:11, 106:20, 110:16 always 12:8, 12:9, 13:10, 69:9, 71:18, 115:4 amended 25:20, 26:5 among 78:21, 88:6, 102:17, 104:6, 109:13 analogous 33:3 analysis 30:16 ancient 68:16 anita 1:21, 2:11, 123:3, 124:13 another 9:4, 41:10, 56:11, 65:15,	71:4, 71:17, 78:15 answer 7:8, 35:2, 42:6, 118:13, 118:19, 118:21, 120:6 answering 27:20, 96:9 antibodies 36:20, 37:1, 37:4, 37:5, 39:8, 39:13, 40:9, 44:16, 49:1, 49:5, 49:8, 49:10, 49:11, 49:14, 49:16, 70:5, 70:9, 70:12, 70:16, 70:19, 74:20 antibody 22:3, 23:8, 36:22, 37:7, 37:10, 37:15, 44:20, 45:8, 50:2, 51:3, 51:7, 51:14, 51:18, 52:6, 52:9, 52:11, 52:17, 52:22, 53:11, 53:14, 53:19, 54:3, 54:7, 54:9, 55:7, 55:8, 55:12, 55:14, 56:2, 60:22, 61:1, 61:2, 63:7, 63:14, 64:4, 70:22, 71:3, 71:16, 75:18, 77:12, 79:22, 80:21 any 7:5, 8:6, 8:11, 8:12, 9:11, 9:18, 24:5, 43:7, 48:17,	48:21, 49:11, 49:15, 50:4, 77:18, 78:4, 82:18, 84:20, 84:21, 87:9, 89:15, 100:4, 100:8, 100:10, 103:14, 108:12, 110:1, 111:5, 111:18, 113:1, 113:3, 113:9, 117:10, 119:20, 120:2, 120:7, 120:8, 122:6, 124:2, 124:4 anybody 73:10, 74:6 anything 21:5, 46:8, 78:1, 80:6, 86:16, 112:9, 119:2 anyway 67:18 apologize 59:7 apparent 76:16 appeal 1:2 appear 101:7, 101:12, 122:6 appears 57:19, 57:22, 59:10, 59:18, 60:18, 62:15, 65:3 appendix 91:3 applicant 20:9, 25:9 applications 73:9 applied 100:17 applies 56:1	apply 30:16, 31:6, 101:6, 102:13 applying 32:17, 99:21, 115:21, 116:7, 116:14, 117:3 appreciable 110:22 appreciate 47:11, 98:13 appreciated 36:1, 36:7, 36:12 appreciation 32:21 approach 66:15, 79:21, 80:20 approaches 65:20 appropriate 20:18, 20:19, 73:11, 104:14 approval 34:19, 35:1 approximately 109:2 aqueous 82:1 aren't 54:1, 69:8 argued 100:22 argument 86:11, 86:14 around 61:18, 82:9 arrive 94:8 arrived 94:1, 95:18 art 32:7, 32:13, 32:19, 33:1, 33:3, 33:6, 47:2, 113:2, 113:4
--	--	--	--

articulated 76:1	23:8, 23:14, 77:11, 78:7,	115:22	being 18:20, 23:5,
artificial 67:14	78:19, 79:2, 117:20	bases 109:10, 109:16,	25:20, 53:10,
artificially 47:8, 48:12	attachment 78:9, 79:17	109:21, 110:3, 110:6	53:20, 65:21,
artisan 76:16	attention 28:10	basic 108:21, 119:21	74:10, 77:20,
aside 31:13, 89:2	available 10:7, 33:7	basically 69:10, 82:10,	79:2, 84:5,
asked 113:7, 119:2, 119:5	avenue 2:6, 3:14, 123:20	108:21	89:2, 92:9,
asking 6:3, 29:12, 33:21, 94:18, 118:22	avoid 72:19, 110:7	basing 16:21, 17:22, 18:3, 18:4	94:13, 121:3
aspirin 77:1	avoided 81:20	bearing 87:13	believe 10:3, 10:19,
assay 48:13, 65:15, 65:16, 67:16	aware 33:1, 72:18, 82:18, 100:10, 108:13	because 6:8, 34:22, 36:15, 49:22, 53:6, 56:8, 68:16, 80:5, 81:3, 81:20, 82:17, 98:11, 99:20, 108:6, 114:11	13:5, 16:4, 22:12, 26:13, 27:1, 27:5, 27:7, 32:5, 54:18, 55:17, 61:11, 65:17, 74:18, 75:22, 76:3, 83:1, 83:13, 93:8, 93:12, 95:9, 99:13, 100:8, 100:14, 100:20, 103:21, 107:9, 111:18, 115:14, 119:10
assessing 45:3	azide 70:19, 71:1, 71:2, 71:17, 114:16, 114:20	become 63:20	below 48:7
assessment 42:17	B	becomes 7:12	beneficial 36:2
assisted 116:18	back 20:22, 40:3, 58:2, 58:8, 61:14, 65:13, 68:13, 85:10, 86:18, 88:11, 88:22, 95:15	been 5:3, 5:15, 26:2, 32:22, 57:1, 58:21, 59:16, 68:7, 69:4, 70:22, 79:15, 80:14, 86:18, 89:15, 89:21, 89:22, 90:5, 100:20, 111:1	beside 6:1
assume 84:20, 92:6, 93:5, 93:6	background 8:16	59:16, 68:7, 69:4, 70:22, 79:15, 80:14, 86:18, 89:15, 89:21, 89:22, 90:5, 100:20, 111:1	besides 100:3
atoms 105:19	backing 36:19	before 1:2, 2:11, 5:16, 7:9, 27:20, 56:18, 60:1, 62:15, 74:16, 89:15, 96:9, 112:4, 123:9, 123:10	better 38:9
attach 21:19, 75:10, 75:11, 75:17, 80:6, 80:20, 82:5, 84:8	base 108:19, 108:21, 109:6, 109:10, 109:18, 110:1, 110:11, 110:12, 110:13, 112:14, 114:2, 114:11, 119:8	behalf 3:3, 3:10	between 11:14, 15:11, 25:2, 37:18, 45:3, 47:3, 47:14, 68:1, 95:16, 98:4, 102:10, 107:11, 114:16, 120:18
attached 79:15, 81:8, 81:9, 81:10, 89:15, 89:22, 90:5, 105:19, 106:9, 107:1, 107:12, 113:3, 122:7	based 47:19, 102:10,		beyond 84:22, 100:9
attaching 22:1, 22:3,			bifunctional 75:9, 75:17, 77:13

bind 39:8, 40:1, 40:2, 40:5, 40:10, 47:5, 47:10, 49:5, 49:8, 49:9, 49:10, 49:12, 49:14 binder 46:2, 46:6, 47:22, 48:11 binders 47:5 binding 44:17, 44:20, 45:3, 45:6, 45:20, 47:3, 47:4, 47:14, 47:15, 47:21, 48:9, 48:18, 49:2, 51:16, 52:5, 52:18, 52:19, 52:20, 53:19, 54:1, 65:5, 65:9, 65:20, 66:1, 66:4, 66:5, 66:8, 66:11, 66:16, 66:22, 67:19 binds 45:8, 45:10, 46:8, 51:3, 51:4, 51:14 bioconjugates 81:19, 82:2 biological 34:4, 43:14, 50:22, 51:2, 51:6, 52:21, 54:11, 54:17 biologically 33:13, 33:17, 33:20, 33:21, 34:2, 34:10, 35:8, 36:21, 37:2, 37:4, 37:11, 37:16,	37:18, 38:2, 38:6, 38:12, 39:4, 39:9, 40:7, 40:11, 40:14, 41:7, 41:20, 42:11, 42:21, 43:3, 43:11, 44:3, 46:12, 50:1, 50:12, 51:16, 52:8, 52:10, 53:22, 54:2, 58:11, 66:9, 74:4, 74:19, 74:21, 75:10, 75:12 biomolecules 81:22 biotech 1:7 bis-sulfone 87:15 bis-vinyl 87:16, 87:20, 88:1, 88:3, 88:20 bit 25:16, 35:19, 46:6, 50:10, 100:2, 108:10, 110:10, 114:13, 118:9 blanket 42:19, 72:17, 96:11, 120:21, 121:8 blood 124:2 board 1:2, 28:13, 29:17, 31:1, 87:2, 87:10 board's 27:8, 30:12 body 22:4, 35:13, 35:21, 36:4 body's 36:2	bond 9:4, 9:9, 9:16, 13:2, 13:7, 13:17, 13:21, 15:13, 44:14, 44:15, 80:14, 106:17 bonded 106:16 bonds 11:13, 11:17, 12:22, 16:5 both 15:5, 16:13, 18:21, 20:4, 20:5, 35:2, 35:7, 50:20, 79:13, 81:5, 81:10, 87:6, 90:5, 98:5, 116:12 bottom 11:3, 11:12, 76:9, 76:13, 83:5, 88:14, 88:15 bound 37:5, 37:8, 37:10, 37:15, 47:3, 52:9, 54:10, 62:12, 62:21 box 46:21 break 7:5, 7:9, 50:8, 55:1, 56:18, 56:19, 61:8, 96:14, 112:5 breaks 7:3, 8:4 bring 9:22 broad 15:22, 78:3, 84:18, 85:3, 86:2, 86:7, 110:7, 111:3,	120:14 broader 16:20, 17:21 broadly 49:10, 49:14, 50:4 brought 15:19, 73:10, 84:5 C california 1:22, 2:13 call 25:19, 46:6, 48:11, 65:15 called 5:3, 18:14, 45:1, 91:21, 92:1, 104:21 can't 25:13, 46:20, 56:9, 56:11, 85:3, 119:18, 120:7, 121:8 cancer 68:13, 68:15, 68:18, 69:8 cannot 19:9, 19:16, 60:15, 95:10, 102:9, 116:18, 117:1 carbon 98:5, 106:16 carbons 106:1 carry 15:5, 76:17 case 1:10, 5:18, 7:13, 25:16, 30:14, 33:5, 87:3, 113:4 cases 79:13 catalyst 16:1, 20:18,
---	--	--	--

20:21, 23:18, 71:11, 115:3, 115:4, 116:18, 117:6, 117:10, 117:12, 117:21 catalyst-assisted 117:1 catalysts 24:1, 71:14, 72:8, 108:13 catalyze 109:17 catalyzed 23:2 category 49:14, 79:3, 110:7 catherine 3:11 cause 24:2, 69:11, 108:14, 109:11, 109:17 caveats 107:15 cell 22:4, 34:3, 34:5, 37:5, 37:8, 37:11, 37:16, 37:19, 37:20, 38:11, 38:13, 39:2, 39:9, 40:2, 40:6, 40:10, 41:8, 41:21, 42:11, 43:2, 43:12, 43:20, 44:3, 44:9, 44:17, 44:22, 45:11, 45:13, 49:2, 49:11, 49:15, 50:4, 50:12, 51:4, 51:6, 52:6, 52:8, 52:10, 53:20, 53:22, 54:10, 58:11, 58:19, 65:5,	65:9, 65:19, 66:1, 66:8, 66:10, 68:12, 68:13, 68:14, 69:11, 69:14 cell-binding 14:20, 15:17, 38:19, 39:1, 39:14, 41:5, 41:14, 41:22, 42:13, 42:14, 43:5, 43:12, 43:16, 43:20, 44:8, 45:11, 49:17, 50:9, 50:15, 50:16, 51:7, 51:19, 52:12, 54:3, 54:13, 55:6, 55:11, 55:17, 56:1, 56:9, 57:15, 57:17, 57:18, 57:20, 58:3, 58:5, 58:17, 58:19, 58:22, 59:2, 59:6, 59:9, 59:10, 59:14, 59:15, 59:16, 59:19, 59:20, 60:3, 60:4, 60:6, 60:8, 60:10, 61:15, 61:21, 61:22, 62:5, 62:10, 62:11, 62:20, 63:5, 63:9, 63:15, 63:16, 63:19, 64:4, 89:16, 89:22, 90:6, 92:14, 93:22, 94:8, 95:8, 97:17, 101:2, 101:19, 115:18, 117:5, 117:20 cells 34:5, 37:4,	45:4, 49:9, 49:12, 50:3, 51:17, 54:1, 66:4, 66:5, 66:8, 66:13, 67:13, 67:15, 67:16, 68:7, 68:17, 69:3, 69:7, 69:9, 69:12 celsius 111:3 certain 21:9, 25:14, 36:3, 72:9 certainly 21:4, 86:20, 93:11, 120:7 certainty 119:19 certificate 123:1 certified 2:12, 123:3 certify 123:5, 123:14, 123:17, 124:1 change 26:11, 26:17, 55:21, 70:1 character 118:1 characterization 117:13, 118:1 chari 113:4 chemical 4:15, 4:17, 4:19, 9:12, 9:19, 9:21, 10:1, 10:2, 11:13, 11:18, 11:22, 12:2, 12:4, 12:6, 12:8, 12:12, 12:15, 12:17, 12:19, 12:22, 13:1, 13:18,	13:22, 15:6, 15:7, 16:6, 16:10, 20:13, 21:6, 21:17, 21:18, 23:10, 60:16, 78:3, 97:2, 97:4, 97:7 chemically 44:2, 60:14, 61:4 chemist 21:1 chemistry 71:5, 72:9, 72:13, 72:20, 74:9, 81:4, 81:20, 97:21, 107:8 chicago 3:7 chlorine 106:14, 106:17 chloroethyl 83:15, 83:17 circumstances 52:16 cite 55:18, 57:3 cited 10:7, 16:15 claim 10:19, 11:2, 27:18, 29:1, 29:6, 30:2, 56:8, 91:4, 91:10, 91:13, 91:16, 92:7, 93:8, 94:10, 94:22, 95:14, 95:20, 95:21, 96:4, 96:5, 96:12, 99:4, 99:14, 99:17, 99:20, 100:5, 100:15, 102:11, 104:1 claimed 94:14
--	--	---	--

claims 14:15, 19:10, 19:17, 25:11, 25:20, 26:13, 26:14, 31:4, 50:18, 55:12, 57:19, 94:15, 101:7, 102:19, 115:16, 118:2 clarification 12:20, 49:7, 53:17, 112:16 clarify 6:21, 53:6, 53:10, 64:10, 69:16, 79:6, 101:14 clarity 67:3 clark 3:6 class 103:17, 109:16, 110:6 clear 63:2, 66:19, 103:18, 103:19, 119:14 click 71:5, 72:13, 74:9, 104:7, 104:18 clinic 73:6 closely 68:3 colloquial 60:13, 61:6 column 57:3, 57:13, 58:2, 58:9, 61:16, 76:10 combination 9:10, 9:17 combinations 76:18 come 21:7	comes 10:8, 55:16 coming 102:16 commencement 123:9 commencing 123:21 commensurate 16:11 common 82:20 commonly 65:19, 110:4 compatible 81:22 complementary 78:14 complete 122:5 complex 40:13, 43:20, 44:8, 44:11, 45:13, 50:21, 51:1 complexes 39:1, 40:6, 45:22, 46:3 complexing 44:21 complicated 81:9 complies 105:4 components 20:6, 20:11, 20:12 composed 34:5 compound 94:13, 94:22 comprise 58:20, 60:9, 60:12 comprised 60:16, 60:22 comprises 58:18, 60:6,	61:3, 61:21, 63:6, 63:17 conceded 48:16 conceivable 39:20, 39:21, 39:22 concentration 46:7, 47:9 concentrations 46:11, 47:7 concept 73:19, 74:4 concepts 68:21 concluded 28:14 conclusion 28:15 conclusions 31:8 conditions 13:11, 13:12, 13:14, 16:1, 20:19, 20:21, 21:3, 21:13, 21:19, 22:8, 22:13, 22:16, 22:19, 22:20, 23:17, 24:1, 54:7, 65:4, 65:5, 65:9, 65:22, 66:12, 66:22, 67:1, 67:19, 67:20, 71:11, 71:14, 71:18, 82:1, 103:10, 108:13, 114:2 conducted 7:16, 53:20 conducting 52:4 confidence 71:16 confirm 27:10, 76:7 conjugate 41:19, 42:10,	42:12, 43:4, 50:16, 51:1, 54:10, 54:13, 54:16, 55:9, 56:2, 57:20, 58:14, 58:18, 59:5, 60:9, 60:22, 62:8, 62:15, 62:16, 63:13, 63:16, 63:17, 63:18, 63:21, 64:3, 64:6, 64:9, 74:10, 80:20, 90:15 conjugated 53:14, 54:9 conjugates 52:18, 60:7, 61:22, 63:6, 64:2, 90:10 conjugation 14:18, 15:1, 15:12, 15:15, 19:5, 19:21 connecting 79:21 connection 81:15 connects 115:17 consider 34:21, 68:15, 68:19, 78:22, 79:20, 98:15 consideration 30:19 considered 34:9, 35:7, 35:12, 35:20, 36:20, 45:11, 49:17, 78:17, 79:1, 80:19 considering 78:6, 102:18 consistent 60:1 construction 100:16, 101:6
--	---	---	---

contain 36:8, 36:13 contemplated 22:6, 50:5, 65:6, 65:10, 66:22, 67:19 contest 107:7 context 9:6, 32:3, 33:18, 56:5, 64:3, 83:10, 84:20 continued 115:12 continues 82:22 contribute 107:21 conversation 34:17, 114:15 converted 81:15 copper 72:8, 72:19, 73:3, 115:4 copper-catalyzed 71:5, 72:13, 73:2, 74:2, 74:9 copy 10:4, 10:6 correct 10:4, 11:15, 13:7, 13:19, 14:16, 14:20, 15:2, 15:8, 16:6, 19:21, 20:2, 22:14, 22:15, 25:3, 30:5, 30:18, 31:10, 32:19, 37:17, 44:6, 45:6, 48:19, 51:20, 52:13, 54:4, 74:11, 74:21, 87:7, 88:4, 88:16, 89:11, 89:13,	89:19, 90:3, 90:16, 91:2, 91:14, 91:15, 93:9, 95:1, 99:17, 99:18, 99:22, 100:17, 101:7, 101:15, 101:16, 101:21, 103:4, 104:11, 106:8, 110:18, 115:18, 116:1, 116:9, 119:11, 119:17, 122:5 corrections 122:6 correctly 39:10 corresponding 11:18 could 5:9, 10:10, 11:21, 12:1, 12:16, 17:5, 17:6, 17:15, 19:12, 20:20, 21:10, 21:11, 23:17, 23:22, 24:15, 26:12, 27:17, 29:13, 31:2, 31:11, 35:17, 36:16, 36:17, 38:5, 40:1, 40:2, 40:4, 42:8, 46:3, 52:2, 54:7, 55:13, 56:4, 60:8, 64:12, 67:11, 70:16, 70:19, 71:8, 71:9, 71:10, 71:13, 71:18, 72:20, 73:1, 73:8, 74:8, 75:21, 76:17, 77:18, 82:15, 84:13, 84:21, 85:14, 90:15, 92:19,	97:6, 100:1, 104:8, 108:9, 111:8, 113:11, 117:17, 120:17, 121:1 couldn't 107:2, 111:15, 113:18, 113:22 counsel 7:11, 7:22, 8:7, 10:3, 111:17, 118:22, 123:15 couple 7:10, 10:19, 14:3, 28:6, 65:18, 77:17, 105:13 course 17:17, 25:7, 32:4, 57:5 court 5:22, 96:21, 105:8 covalent 44:15 cover 34:13 covered 50:21, 94:10, 96:4, 96:5, 96:12 create 51:5, 90:10, 90:15, 107:11 created 80:14 creating 56:10, 81:6 criteria 117:2 cross 47:2, 98:10 crosslinking 77:21, 77:22 crr 1:21, 2:13 csr 1:22	cultured 68:18 cycloheteroalkane 104:13 cysteine 70:9 cytometry 45:2, 65:14, 66:2 cytotoxic 103:21, 104:1 D dac 1:7 databases 21:6 date 33:5, 33:8, 65:12, 122:10 day 124:9 decides 87:10 decision 4:10, 4:12, 26:18, 27:8, 27:16, 28:1, 28:2, 29:16, 31:1 declaration 10:4, 10:10, 14:3, 14:14, 27:2, 30:17, 31:7, 31:12, 32:10, 32:17, 33:9, 38:16, 64:13, 72:8, 74:15, 75:3, 82:22, 88:9, 89:1, 90:22, 95:14, 99:22, 100:17, 118:5 decrease 108:9 deemed 32:22 definition 11:11, 16:13,
---	---	--	---

32:6, 32:18, 38:19, 39:17, 40:5, 42:1, 42:15, 42:22, 43:5, 44:7, 44:12, 45:17, 45:21, 47:15, 49:18, 49:20, 50:6, 50:9, 50:21, 51:8, 51:20, 52:13, 54:4, 54:8, 55:6, 55:15, 55:22, 85:18, 100:3, 101:15 definitions 87:11 definitive 60:2 degree 110:22 degrees 44:16, 111:2, 120:18 delegated 26:19 delivery 65:20 density 69:14 dependent 108:8 depends 41:12, 46:16, 80:2 depict 97:14, 97:19 depicted 90:11, 90:15, 112:10, 119:4 deponent 122:1 deposed 5:15 deposition 1:14, 2:1, 5:13, 7:16, 8:1, 123:8, 123:10,	123:15, 123:17 derivative 75:9 derivatives 75:17, 77:13 derived 59:5, 67:6 described 16:17, 18:16, 18:18, 56:6, 65:21, 85:11, 86:20, 97:22 describing 16:17, 16:19, 17:19, 84:11, 85:6 description 4:9, 75:2, 75:21 desirable 35:13, 35:21, 36:4 desired 36:9, 36:14, 110:17, 110:21 determination 30:13, 43:1, 78:5 determine 28:16, 28:21, 45:5, 47:20 determines 87:3 determining 29:17, 30:6, 44:19, 65:19 diagram 4:14, 4:16, 4:18, 4:20, 97:2, 97:4, 105:10 differ 68:9 difference 11:9, 11:10, 15:11, 34:18, 37:18, 37:22, 68:1, 68:20,	102:9 differences 35:4 different 18:15, 18:18, 27:6, 32:11, 34:14, 44:17, 49:2, 62:17, 63:3, 81:3, 87:9, 102:8 differently 16:17, 16:18, 100:2 difficult 96:10 direct 28:10 directed 55:7, 55:8, 66:12 disagree 29:4, 29:10, 30:8, 30:12, 31:9 disclose 87:20, 88:1, 88:3 disclosed 62:12, 62:21 discloses 39:1, 87:6, 87:15 disclosure 86:1, 86:7 disclosures 85:3 discuss 66:5 discussed 76:17, 115:14 discusses 61:15 discussing 8:6, 32:5, 38:18, 61:16 discussion 10:14, 83:1 disease 38:5	dispute 100:20 distinct 19:3, 20:5 distinction 47:14, 66:6, 73:12 document 14:11, 27:4, 27:7, 27:19, 28:8, 28:11, 30:19, 57:10, 64:22, 75:5, 83:3, 97:8, 99:12 documents 10:7, 26:21, 96:22 doing 38:6, 38:7, 40:22, 47:18, 52:21, 53:1, 67:16, 68:6, 81:22 done 21:19, 21:20, 21:21, 22:13, 23:10, 28:5, 42:5, 53:10, 81:16, 111:1 double 106:5, 106:17 doubtful 73:10 down 6:2, 6:9, 69:10, 76:13, 91:6, 103:15, 103:16 dr 5:12, 5:15, 8:11, 8:20, 10:3, 10:16, 28:4, 55:5, 61:11, 83:10, 96:21, 99:8, 112:4, 113:4, 114:13, 115:11
---	--	---	---

draw 96:15, 104:20, 104:21, 105:1, 105:5 drawbacks 72:9, 72:12 drawn 105:13, 105:18 drew 98:13, 113:1, 113:2 drive 110:21 drives 50:22 drug 11:15, 11:19, 11:22, 12:21, 15:2, 21:16, 21:20, 22:1, 22:2, 22:6, 22:17, 22:21, 24:12, 24:19, 25:3, 34:13, 50:17, 52:17, 53:14, 54:9, 55:9, 57:21, 58:14, 60:22, 61:1, 61:2, 62:12, 62:21, 64:4, 65:20, 73:6, 74:5, 74:7, 75:17, 77:11, 78:19, 79:15, 80:4, 80:13, 89:15, 89:21, 90:6, 97:16, 103:3, 103:7, 103:12, 103:14, 103:21, 104:2, 104:9, 104:17, 105:15, 105:20, 106:10, 106:17, 107:1, 107:10, 107:11, 111:6, 112:10, 112:21, 113:3, 113:10, 119:3	drugs 34:9, 34:21, 35:12, 35:18, 35:21, 36:3, 36:8, 36:12, 36:16, 36:17, 74:19, 103:17 duly 5:3, 123:9 dumbbell 76:16, 78:7, 79:3, 79:9, 81:7, 82:4, 84:9 during 8:4, 8:7 E each 6:10, 6:13, 6:14, 77:12 earlier 65:13, 104:7, 107:15, 113:7, 114:14, 115:5 easier 6:10, 31:21 edit 99:3 effect 51:1, 51:2, 51:6, 54:12 effects 71:21, 72:19 either 35:2, 81:4, 81:8, 85:8, 100:10, 118:16 electrophile 85:8 electrophilic 84:4, 84:21, 84:22, 85:12 elements 19:4, 92:17 elisa 65:15, 66:2 else 47:10, 53:1,	112:9, 112:13, 119:2, 119:6 emanuel 2:5, 3:13, 123:19 employed 124:3 enable 16:9, 20:13, 20:16, 21:11, 21:15, 22:16, 22:20, 25:1, 30:9, 103:6, 108:6, 112:9, 112:18, 112:21, 114:20, 115:17, 119:3 enables 12:13, 14:19, 15:1, 15:12, 15:13, 15:15, 15:16, 15:21, 17:10, 17:20, 28:22, 29:1, 29:5, 29:11, 30:1, 30:4, 30:6, 30:7, 31:3, 101:2, 102:5, 102:7, 103:2, 108:7 enabling 16:19, 16:20, 17:8, 17:21, 101:18 encompass 63:9, 84:22 encompassed 85:4, 85:15, 87:12 encompasses 15:22, 56:12, 59:2, 68:10 encompassing 75:16 end 75:18, 75:19, 77:12, 79:14, 79:18, 80:16,	81:13, 82:4, 82:6, 84:14 ends 81:10, 87:6 enough 46:7, 47:7, 47:9, 69:14, 71:18, 100:21, 107:7 entails 13:18, 22:7 entire 25:8, 55:14, 56:2, 77:16 entirely 60:14 entity 58:7 environment 67:15, 74:11, 108:22, 119:22, 121:2 envision 50:20, 52:16, 75:22 envisioning 23:1, 82:8 enzyme-linked 65:16 equal 93:13 errata 122:7 error 24:8 esquire 3:4, 3:11, 3:12 etc 116:1 ethyl 85:13 evaluate 96:3 even 26:5, 44:1, 44:6, 48:12, 51:3, 61:1, 84:22, 94:10
--	--	---	---

event 52:18, 52:19, 52:20 ever 5:15, 25:10, 26:2 every 7:4, 25:13, 26:6, 36:22 everyday 34:17 everything 6:2, 6:9, 6:11, 6:15, 47:9 evidence 43:2, 43:7, 43:9 ex 67:20, 68:1, 68:4, 68:16, 68:19, 73:15, 74:11 exactly 42:6, 91:11 examination 4:4, 5:6, 112:2, 115:12 examined 5:4, 122:3 examiner 25:9, 26:9, 26:16 example 13:4, 56:8, 63:8, 68:12, 80:12, 104:3, 104:16, 108:5, 108:6 examples 16:15, 18:13, 18:21, 85:7, 102:12, 102:15 exceedingly 86:2 exceptions 7:10 excised 68:5, 68:8	excuse 112:19, 121:5 exhaustive 48:20 exhibit 4:9, 4:10, 4:14, 4:16, 4:20, 27:22, 28:1, 57:1, 76:3, 97:2, 97:4, 97:10, 97:14, 99:3, 99:16, 105:2, 105:9, 105:10, 105:12, 105:18, 107:19, 112:5, 112:8, 119:1, 119:4, 121:4, 121:5 exhibits 97:1, 97:7 exist 82:19 exists 59:1 expect 18:20 expectation 40:12 experience 47:20 experiment 42:4, 43:13, 52:5, 53:10, 53:18, 53:19, 68:6, 73:19, 73:20 experiments 73:18 expert 47:12 explain 37:22 explains 17:14 explorations 73:7 expressly 87:5, 101:7	extent 116:2, 117:15, 118:3, 120:12, 121:6 extra 99:10 extreme 22:7 F facilitating 25:6 fact 17:20, 20:9, 43:13, 51:17, 52:9, 77:21, 102:4, 115:20 factors 115:22 fair 13:2, 35:9, 38:14, 39:15, 75:19, 87:17, 98:18, 100:21, 107:7, 117:14, 118:2 fall 54:8, 94:22, 95:19, 95:20, 99:4, 99:13, 99:17, 99:19, 117:13, 117:22 far 94:2 fast 72:5 february 1:16, 123:21 feel 7:4, 28:4, 56:18, 57:8 feeling 108:2 felt 26:7 few 5:19 field 47:12, 47:13, 65:19, 82:20	figure 90:16 filing 33:5 final 24:20 finally 90:3 financially 124:5 find 31:21 fine 56:20, 94:19, 98:22 first 5:3, 45:21, 53:8, 53:18, 60:5, 63:5, 81:16, 82:5, 85:22, 109:14 fish 67:11 fits 85:18 five 121:12 five-numbered 106:1 flip 14:2, 86:3, 95:15 flow 45:1, 65:14, 66:2 focus 92:8 foley 3:5 following 30:21, 95:3 follows 5:5 foregoing 122:4 forever 69:15
---	---	--	--

formation 104:10 formed 9:9, 9:16, 11:14, 13:17 forming 44:14 forms 12:21, 13:21, 24:11, 24:18 formula 89:13, 89:19, 90:4, 90:9, 90:14, 90:16, 90:20, 91:13, 91:14, 91:21, 92:1, 94:9, 94:13, 94:21, 95:11, 95:13 formulas 89:10, 90:11, 95:16 forth 95:15, 123:8 forward 73:10, 74:6 found 31:1 fragments 77:6, 79:4 frank 85:21 free 28:4, 57:8 frequently 73:20 front 56:22, 61:12, 112:5 fully 8:14 function 35:13, 35:21, 36:4 functional 9:3, 11:18, 18:17, 18:19, 78:11, 78:14,	78:18, 81:11, 84:4, 84:21, 85:1, 102:5, 102:6, 103:2, 104:9, 104:17, 104:21 functionalities 77:7 functions 15:5 fundamental 108:10, 111:14, 113:17, 113:22 further 92:10, 111:18, 121:10, 123:14, 123:17, 124:1 G gave 82:13, 116:5, 116:6, 116:11 general 21:2, 40:12, 110:6 generally 35:5, 46:14, 78:13 give 64:20, 70:4, 83:10, 121:12 given 10:4, 27:5, 33:5, 44:20, 52:6, 53:20, 102:14, 102:15, 116:5, 122:6, 123:11 go 5:21, 8:4, 10:12, 18:10, 28:21, 31:15, 44:19, 47:18, 53:12, 58:8, 65:13, 74:15, 96:17, 105:9, 111:21, 121:13 goes 57:7, 76:22	going 5:20, 6:1, 30:11, 47:7, 48:9, 53:6, 53:13, 54:22, 61:14, 64:12, 70:1, 72:5, 73:6, 73:13, 73:15, 73:21, 74:14, 76:2, 81:7, 81:8, 82:16, 93:6, 96:21, 105:5, 107:16, 110:2, 114:12, 115:4 good 5:8, 68:14 granting 4:10, 28:1 grasp 46:10 great 6:18, 8:10, 111:20 ground 5:19 group 8:21, 9:3, 9:11, 9:18, 11:2, 11:7, 11:19, 12:13, 19:9, 19:16, 19:17, 21:3, 23:6, 24:12, 24:19, 27:18, 28:17, 28:18, 29:17, 29:18, 71:1, 71:3, 71:4, 78:18, 80:7, 81:12, 81:19, 82:18, 83:7, 83:14, 83:16, 83:22, 84:4, 84:9, 84:12, 84:19, 84:21, 91:14, 91:22, 92:13, 92:14, 97:16,	97:18, 101:1, 101:8, 102:5, 102:6, 103:2, 103:6, 104:8, 104:9, 104:10, 104:17, 104:18, 104:19, 104:21, 105:19, 106:6, 106:7, 106:22, 107:9, 107:19, 107:20, 107:22, 108:7, 111:6, 111:8, 111:12, 112:10, 112:18, 112:20, 113:9, 113:11, 113:14, 114:5, 114:16, 114:19, 114:21, 115:15, 115:16, 116:8, 117:22, 119:3 grouping 26:13, 26:14 groups 12:14, 13:6, 14:15, 18:17, 18:19, 19:10, 30:17, 31:2, 36:9, 36:14, 70:13, 70:16, 70:19, 78:11, 78:14, 81:21, 84:13, 85:1, 85:12, 87:4, 91:16, 99:21, 100:4, 101:13, 104:4 grow 69:7, 69:12, 69:15, 69:17 growing 69:20 guess 30:20, 34:6, 34:16, 39:17, 40:16, 46:15, 51:22, 54:6, 54:19, 55:4,
--	---	---	--

56:13, 59:11, 62:7, 63:2, 99:11, 104:13, 109:7, 110:10 gut 108:2	hear 6:4 heard 39:7 heat 108:19, 110:16, 112:14, 114:2, 114:11, 119:8 held 2:1, 10:14 help 17:5, 55:19, 92:19, 109:17 helping 25:1 hence 16:17 here 5:22, 12:11, 14:22, 16:18, 18:11, 26:21, 29:14, 30:20, 40:3, 43:21, 46:10, 50:5, 55:2, 59:10, 59:18, 60:19, 63:3, 63:4, 64:9, 64:21, 66:4, 78:3, 84:7, 84:17, 85:11, 85:20, 87:1, 91:2, 91:7, 94:9, 99:6, 104:3, 104:21, 105:6, 106:10, 106:22, 108:7, 109:22, 112:11, 112:18, 112:20, 113:1, 113:2, 114:6 hereby 122:2, 123:5 hereinbefore 123:8 hereunto 124:8 hesitate 42:19	hesitating 36:15 hesitation 73:13, 73:14 heteroaromatic 104:5, 104:10 hey 86:15 high 23:12, 46:7, 46:11, 47:6, 47:8, 48:5, 51:4 hindrance 71:21 histories 25:9, 25:17 history 16:21, 17:22, 18:5, 20:9, 25:12, 26:1, 26:5, 116:1, 116:13 hmm 42:5, 49:4, 52:15, 67:6 hold 107:13 hoped 44:4 hour 7:4 houston 3:4, 4:5, 4:7, 5:7, 10:12, 27:21, 31:14, 31:16, 54:21, 61:7, 61:10, 96:17, 96:20, 105:8, 111:17, 113:7, 114:9, 114:15, 114:22, 115:10, 115:13, 121:10 however 76:1 hrp 66:5 human 6:12, 67:12	hundreds 48:5 hydrogen 83:15 hypothesis 43:9 hypothetical 81:18, 117:16, 118:5
H			I
halo 85:13 hand 76:2, 104:22, 124:9 handles 78:15 hangzhou 1:7 happen 7:6, 50:14, 50:16, 51:18, 115:5 happening 24:10 happens 12:18, 12:19, 41:20, 42:10 happy 17:6 hard 6:12 harris 75:15, 76:1, 76:4, 76:6, 83:1, 83:6, 83:12, 83:21, 85:6, 86:12, 86:17, 86:19, 87:5, 87:14, 87:19, 88:3, 88:8, 88:11, 89:1 harris's 75:9, 75:16, 83:14, 85:3, 86:1, 86:7 harsh 21:3 head 34:7, 102:3			ideal 80:10 identification 28:3, 97:3, 97:5, 105:11 ii 89:11, 90:4, 90:11, 90:16, 90:20, 91:21, 92:1, 94:9, 94:13, 94:21 il 3:7 illicit 35:18 imagine 91:20, 92:3, 92:11, 93:18 imagining 92:10 immortal 69:9 immortalized 68:12, 69:4 immune 36:3 immuno 65:16 impairment 8:12 implication 12:11 implies 13:22 imply 12:18, 38:7 important 7:12

importing 102:20 include 66:16, 67:1, 67:20, 69:18 includes 58:14 incorrect 17:6 incorrectly 17:2 increase 108:9 incubate 46:10 indefinitely 69:7, 69:12, 69:17 independent 101:19, 101:21, 108:11, 116:7 independently 101:1, 101:5, 101:12, 102:16, 102:20, 103:2, 103:6, 103:11, 104:19, 107:10, 112:20, 114:6, 114:20, 115:17, 115:21, 116:7, 116:16, 116:17, 116:22 indicated 27:14 indicating 106:3 individually 79:7 inform 7:11 information 27:2 initial 42:17, 99:1 initially 42:4 instrument 45:2	intend 53:21 intended 90:10 intent 41:22, 42:12, 51:10, 51:12, 51:13, 51:16, 52:7, 52:22, 54:12, 98:2 intention 40:22, 41:13, 41:18 interaction 45:17, 46:12, 46:16, 46:18, 113:15 interactions 6:12 interested 124:5 interesting 34:15, 39:18, 42:5, 74:4 interpret 40:19, 44:13, 67:8, 102:19 interpretation 66:14, 99:20, 115:21 interpreted 67:9 interpreting 102:1, 116:16, 116:17 interrupt 53:4 intrinsically 15:18 intuition 107:17 invention 33:2, 62:1, 62:6, 63:21, 86:13 involve 85:7, 117:6 involving 100:3	ipr 1:10, 7:17 irrelevant 38:4, 47:3 isolated 67:13, 68:13, 68:17 issuance 25:18 issue 17:11, 100:3 itself 18:5, 20:13, 22:9, 22:21, 50:15, 50:22, 52:19, 52:20, 54:3, 55:8, 55:13, 59:6, 62:8, 63:14, 109:7, 109:10 iv 89:11, 89:19, 90:11, 90:14 J jihong 3:12 job 1:19, 6:9 judgment 46:6, 59:21 K keep 69:13, 69:14 kind 18:10, 22:19, 23:9, 23:11, 27:5, 34:6, 34:21, 46:9, 47:3, 47:7, 48:7, 52:17, 59:1, 65:12, 73:19, 80:2, 91:3, 91:9, 95:15, 96:10 know 6:11, 6:21,	10:9, 14:5, 17:3, 21:3, 24:9, 26:4, 28:5, 35:2, 41:1, 41:2, 42:5, 46:21, 48:10, 49:6, 57:9, 64:16, 67:8, 68:16, 68:17, 69:9, 71:14, 73:20, 93:3, 96:7, 99:8, 104:20, 107:16, 108:2, 109:2, 111:3, 113:8, 120:5, 120:6, 120:7 knowledge 21:14, 48:19, 48:21, 82:20 L lab 41:2, 68:12, 69:2 labeled 89:6, 89:10 laboratory 23:11 language 66:15, 84:17, 102:10 lardner 3:5 large 120:3 largely 18:4 last 35:16, 65:2, 68:18, 88:18 lastly 120:22 later 77:17 lawrence 1:14, 2:1, 4:3, 5:11, 122:2,
--	--	---	---

123:7, 123:18 learn 26:9 least 13:22, 18:3, 20:11, 35:9, 35:20, 36:17, 54:12, 70:8, 74:20, 75:16, 90:14, 101:7 leave 118:8 led 25:18, 25:19 left 98:5 left-hand 97:18, 106:12, 106:13, 107:22, 111:7, 113:10 left-hand-most 105:17 legal 86:15 legalese 33:3 legitimate 47:5, 48:8 lengthy 26:6, 92:8 less 73:14, 81:14 let's 8:17, 10:12, 13:4, 18:22, 27:5, 38:15, 40:18, 42:20, 43:8, 57:4, 74:15, 79:14, 80:11, 82:21, 88:22, 90:21, 91:2, 92:10, 93:5, 99:6, 103:19, 121:13 letter 105:13 levels 45:6	light 39:18, 56:15 likely 24:9, 71:13 limitation 102:21 limited 81:21 line 33:13, 57:4, 57:7, 57:13, 58:2, 61:18, 62:16, 68:13, 68:15, 76:14, 95:6, 106:2 lines 61:20, 68:12, 106:6 link 78:13, 84:7, 103:11, 107:11 linkage 11:14, 12:13, 12:21, 15:2, 15:13, 15:21, 16:3, 16:5, 16:9, 16:10, 16:20, 17:9, 17:10, 17:20, 21:15, 21:16, 24:11, 24:18, 25:2, 29:1, 56:9, 56:10, 80:5, 80:9, 80:10, 80:13, 102:7, 102:8, 103:3, 103:6, 108:7, 112:9, 112:19, 112:21, 119:3 linked 50:17, 64:4 linker 14:19, 15:2, 21:20, 22:2, 57:21, 58:1, 61:1, 61:2, 87:6, 89:14,	89:20, 90:4, 90:9, 90:14, 90:20, 91:20, 92:3, 92:6, 92:9, 92:10, 93:19, 93:20, 106:3, 106:8 linkers 62:12, 62:21, 64:5 linking 78:16 list 76:22, 117:9 listed 12:22, 43:21, 46:20, 94:9, 104:4 listing 91:4 lists 11:12, 77:5 literature 47:19 little 25:16, 35:19, 45:18, 50:10, 100:1, 110:10, 114:13 live 66:4, 66:8 living 34:3, 34:4, 66:5, 66:13, 66:20, 67:5, 67:10, 67:15, 67:16, 68:5 llp 2:5, 3:5, 3:13, 123:19 locations 101:13 long 69:13, 111:1 longer 58:22 look 11:11, 21:6,	24:6, 24:7, 27:19, 32:3, 39:17, 40:3, 50:5, 55:19, 56:4, 56:6, 59:18, 64:13, 75:2, 77:19, 78:4, 78:11, 82:21, 85:10, 85:17, 96:2, 96:8, 97:6, 97:21 looked 26:4, 117:9, 118:14 looking 65:12, 77:16, 84:17, 86:16, 86:17, 88:9, 91:10, 96:13, 102:12 looks 27:13, 94:9, 105:13 lots 26:21, 38:5, 46:17, 85:12, 107:8 lou 3:12 low 69:14 lunch 8:5 M made 35:16, 71:10, 71:13, 73:12, 86:11, 92:13, 99:3 magic 78:2 maintain 119:21, 120:11 make 5:19, 7:6, 11:10, 18:9,
--	---	---	--

33:13, 42:19, 47:14, 60:5, 63:11, 63:22, 68:22, 72:17, 73:1, 74:7, 74:9, 74:17, 78:4, 85:2, 87:17, 95:17, 96:11, 100:11, 103:19, 110:17, 120:20, 121:8 makes 6:9, 11:9, 58:9, 88:19 making 60:1, 66:7, 79:9, 81:4, 81:19, 82:2, 86:5 manner 85:14, 102:1 many 10:7, 78:21, 88:6, 109:13, 109:21, 110:3 mapped 25:10, 26:2, 26:10, 28:17, 28:18, 29:18, 29:19, 31:2 mapping 28:22, 29:22, 30:8 march 124:9 mark 27:21, 57:2, 96:22, 105:1, 105:9, 111:7, 113:10 marked 28:2, 76:2, 76:9, 97:3, 97:5, 105:10 marriage 124:3 mask 36:2	matter 7:22, 8:17, 24:8, 82:3, 82:11, 82:12, 82:15, 86:9, 124:6 matters 9:6, 41:18, 56:13, 80:9 maybe 12:7, 17:5, 17:15, 23:20, 24:5, 27:2, 29:13, 38:3, 42:7, 52:2, 53:3, 53:6, 53:9, 57:7, 67:5, 78:2, 100:1, 109:15 mean 33:18, 41:17, 44:7, 44:13, 46:16, 46:17, 53:3, 62:16, 66:19, 69:6, 69:20, 77:15, 79:6, 80:4, 82:19, 86:5, 92:20, 94:20, 113:21, 116:17, 120:2, 120:5 meaning 67:10, 114:2 means 8:4, 33:6, 62:5, 64:2, 64:9, 66:20, 68:4, 84:12, 84:15, 108:21, 110:3, 116:22 meant 62:14, 114:4 measure 46:22 medical 34:19 medicines 8:11	meet 45:17, 45:21 memory 107:7 mentioned 23:18, 65:13, 69:1, 72:7, 79:11, 110:16, 115:5, 115:22 mess 103:19 metal 23:2 methods 65:18 methy 83:15 michael 3:4 micromolar 48:5, 48:6 middle 49:13 might 6:13, 12:8, 12:9, 24:7, 34:20, 35:4, 48:4, 48:7, 48:12, 56:4, 71:21 millimolar 46:11 mind 87:14, 104:15, 104:17, 105:6, 109:11 minimize 72:19 minimum 34:4, 40:13 minute 36:19 minutes 121:13 mischaracterizes 116:3, 118:4 mm-hmm 31:5, 53:15	modification 43:14, 52:21, 54:18 modified 36:8, 36:13, 36:16, 36:18, 39:4, 40:8, 42:21, 43:3, 50:1, 54:2, 58:4, 61:22, 62:5, 62:10, 63:8, 70:16, 70:19, 70:22, 71:3, 71:16, 77:18 modify 37:4, 37:11, 37:16, 38:2, 39:9, 40:11, 40:15, 41:7, 41:21, 42:11, 43:11, 44:3, 51:17, 52:8, 52:10, 53:22, 58:11, 66:9 modifying 37:19, 38:11, 38:12, 50:12 modulate 37:7 modulates 34:3 moieties 19:5, 19:21 moiety 11:22, 14:18, 15:1, 15:12, 15:15, 39:2, 44:9, 44:21, 45:13 molecular 58:7, 77:7 molecule 8:21, 9:2, 9:4, 23:15, 23:21, 23:22, 24:3, 33:18, 33:21, 33:22, 34:2,
---	--	--	--

34:3, 55:17, 56:2, 56:10, 56:11, 57:15, 57:17, 58:17, 58:20, 58:22, 59:1, 59:2, 59:6, 59:9, 59:14, 59:20, 60:3, 60:6, 60:8, 60:15, 61:15, 61:21, 62:9, 63:6, 63:16, 63:17, 63:20, 71:4, 71:17, 75:10, 75:12, 79:12, 79:14, 79:21, 85:18, 87:7, 92:12, 94:1, 94:6, 94:8, 95:18, 95:20, 95:21, 96:3, 96:4, 96:5, 96:6, 96:9, 96:13, 97:12, 97:13, 97:15, 97:18, 98:15, 99:2, 99:16, 100:5, 111:8 molecules 33:14, 34:10, 35:8, 36:21, 47:8, 56:12, 60:16, 61:3, 74:19, 74:21, 78:12, 86:20, 87:15, 87:16, 96:11, 113:12 moment 10:13, 38:16, 39:8, 42:22, 70:2, 75:4, 97:6, 102:18, 104:15 more 13:1, 15:7, 15:22, 16:6, 19:12, 20:20,	22:7, 24:15, 29:14, 36:8, 36:11, 36:13, 42:7, 45:18, 50:7, 52:3, 59:2, 68:19, 75:11, 83:10, 104:14, 117:17 morning 5:8 most 36:22 mostly 85:10 mouse 67:11 move 118:17, 118:18 much 6:9 multiple 60:16 must 20:5, 44:8 N name 5:9, 27:6, 107:1, 107:5, 107:6 names 107:8 narrow 103:15, 103:16 nathan 1:14, 2:1, 4:3, 5:11, 122:2, 123:7, 123:18 natural 6:12 nature 8:6, 35:18, 72:2 necessarily 13:18, 13:22, 16:10, 37:9, 38:7, 40:10, 71:8, 107:16,	110:2 need 7:4, 35:19, 37:12, 56:19, 81:3, 99:7, 108:19, 109:3 needed 9:21, 72:21, 73:21, 109:11, 109:17, 110:21 needing 108:21 needs 46:22, 114:11, 115:3, 116:15 negative 72:19 never 71:20, 72:13, 72:16 new 1:15, 2:7, 2:14, 3:15, 58:6, 58:21, 59:1, 123:4, 123:20, 124:14 next 76:22, 93:13 nine 109:8 nitrogen 105:22, 106:18, 106:20 non-nucleophilic 110:12, 110:13 noncovalent 44:14 none 117:4 nonetheless 103:5 nonsensical 92:18 nonspecific 49:1 north 3:6 notary 2:13, 5:4,	123:1, 123:4, 124:14 noted 121:14 notice 2:11 nucleophile 84:5, 85:8 nucleophiles 23:4 number 11:12, 31:21, 31:22, 48:3, 48:4, 81:21, 102:4, 120:3 numbering 91:9 numbers 46:19, 48:14, 48:18, 76:9 numeral 89:11 numerically 48:1 nutrients 69:13 ny 2:7, 3:15 O object 99:11, 107:13 objection 9:5, 9:13, 9:20, 11:20, 13:8, 13:20, 14:21, 15:3, 15:9, 16:7, 16:12, 17:1, 18:2, 19:11, 20:7, 20:15, 22:10, 22:18, 22:22, 23:16, 24:4, 24:14, 24:22, 26:15, 29:7, 29:9, 33:19, 35:10, 35:14, 36:5,
--	---	--	---

36:10, 37:6, 39:11, 39:16, 41:9, 41:16, 42:3, 42:16, 43:6, 43:18, 44:5, 45:15, 46:1, 49:19, 50:19, 51:21, 52:14, 54:5, 54:15, 55:10, 56:3, 58:16, 59:17, 60:11, 63:1, 64:8, 70:10, 71:6, 71:12, 72:15, 72:22, 73:16, 74:12, 74:22, 75:20, 77:14, 78:10, 78:20, 79:5, 80:1, 80:22, 81:17, 82:7, 82:14, 84:16, 85:5, 87:8, 87:21, 88:5, 89:17, 90:12, 90:17, 92:16, 94:3, 94:12, 96:1, 100:7, 100:18, 101:9, 101:22, 103:8, 107:14, 108:1, 108:17, 109:5, 109:20, 110:9, 111:10, 111:13, 114:9, 114:22, 116:2, 116:10, 116:19, 117:8, 117:15, 118:3, 120:1, 120:12, 120:19, 121:6 observations 102:17 obviously 5:22, 47:11 obviousness 86:11, 86:14 occur 9:11, 9:18,	10:1, 13:2, 13:13, 13:16, 22:9, 43:15, 108:14, 109:12, 109:18, 110:17, 111:11, 113:13, 116:15, 117:11 occurred 39:19, 123:18 occurring 7:17, 109:4 occurs 54:1 odds 24:9 off-the-record 10:14 office 1:1, 7:18, 87:2 offices 2:2, 123:19 often 13:9, 58:20, 60:13, 68:11 oh 14:10, 14:13, 17:13, 46:11, 54:21, 83:9, 86:18, 86:19, 91:1, 106:5, 106:20, 118:11, 118:14 one 7:20, 10:13, 12:22, 13:1, 13:22, 15:7, 15:13, 15:16, 15:17, 16:5, 16:6, 19:12, 23:5, 24:15, 25:14, 25:17, 29:13, 34:18, 36:8, 36:11, 36:13, 38:2, 42:7, 50:7, 52:2, 58:6, 62:12, 62:21, 63:5, 64:5,	67:14, 70:22, 73:6, 73:7, 75:7, 75:11, 75:18, 78:14, 78:21, 79:14, 80:7, 81:9, 81:10, 81:13, 81:14, 82:4, 82:19, 84:8, 88:6, 89:21, 93:16, 96:15, 104:3, 104:12, 104:14, 104:15, 109:13, 109:14, 115:10, 116:21, 117:2, 117:17, 118:9 ones 110:4 only 7:6, 10:2, 73:14 open 10:10 opinion 19:8, 19:15, 19:18, 20:1, 20:3, 26:11, 26:17, 43:15, 68:1, 77:10, 84:2, 84:3, 85:2, 94:18, 95:18, 114:5, 115:15, 115:16, 120:22 opinions 120:13, 121:7 optimal 80:10 orally 6:4 order 40:14, 41:4, 43:4, 78:15, 82:3 ordinary 32:6, 32:13, 32:18	organic 21:1, 23:11, 107:8, 112:14, 112:17, 114:1, 114:3, 119:8, 119:10, 119:15, 119:18, 121:2 organism 34:5, 66:21, 67:10, 68:5, 68:8 original 25:18 originally 13:6 originated 92:11 other 6:10, 6:13, 6:14, 8:12, 9:12, 9:18, 12:1, 12:2, 12:4, 12:5, 15:22, 16:2, 22:3, 25:14, 40:9, 41:10, 55:13, 60:15, 75:19, 79:3, 79:8, 79:18, 80:3, 80:4, 80:10, 80:16, 81:10, 82:6, 82:8, 83:16, 84:20, 85:13, 90:1, 92:7, 92:17, 100:4, 100:8, 101:12, 101:13, 109:22 others 102:17, 116:5 otherwise 39:4, 42:21, 43:3, 43:11, 50:11, 58:11, 81:14, 93:12, 124:5 out 8:16, 10:6,
--	---	--	--

15:5, 17:18, 18:14, 21:9, 40:22, 48:14, 83:6, 95:2, 98:11, 98:14 outcome 124:6 outside 54:8, 120:13, 121:7 over 6:10, 6:14, 26:4, 38:10, 106:10 own 10:6, 115:6 owner 1:8, 3:10 oxygen 98:4, 98:8, 98:10, 105:22 oxygens 98:16	palladium 23:3 panel 26:19 paper 27:9, 27:11, 99:7, 104:22, 106:12 papers 74:3 paragraph 14:4, 14:9, 14:14, 19:19, 27:1, 27:6, 27:13, 28:11, 28:13, 31:11, 31:20, 31:22, 33:8, 33:12, 38:15, 38:18, 55:16, 58:8, 58:13, 59:3, 64:14, 64:18, 75:3, 75:8, 76:13, 76:15, 77:16, 82:21, 83:13, 84:15, 86:1, 86:22, 89:4 paragraphs 18:22, 32:4 part 11:1, 28:19, 42:21, 44:11, 45:22, 53:1, 53:2, 53:5, 60:5, 63:20, 91:14, 116:20 particular 108:12 parties 124:2, 124:4 parts 18:7, 26:8 party 123:14 pass 111:18 patent 1:1, 1:2, 1:8,	1:11, 3:10, 7:17, 8:18, 10:20, 14:16, 16:14, 16:22, 18:1, 18:5, 18:6, 18:8, 22:6, 25:18, 33:6, 39:15, 41:5, 41:15, 42:2, 42:15, 43:16, 46:20, 48:17, 49:18, 49:20, 55:11, 55:18, 56:5, 56:14, 56:15, 56:21, 57:14, 59:19, 60:19, 61:12, 61:20, 65:6, 65:10, 65:21, 66:7, 66:11, 67:1, 67:20, 86:21, 87:2, 87:10, 89:14, 89:20, 90:5, 90:8, 99:5, 100:6, 116:1, 116:12, 117:5, 117:21 pathway 38:4 pathways 69:10 patient 68:18 peg 75:9, 75:12, 75:17, 77:13, 78:18, 79:11, 79:14, 80:6, 80:17, 81:11, 81:13, 87:20, 88:1, 88:4, 88:19 pending 7:8, 8:2 penicillin 77:2 people 46:17	peptide 23:22, 24:3, 111:9, 113:12, 114:7 peptides 119:20, 120:10, 120:16, 121:1 percent 21:8, 119:18 perfectly 68:14 perhaps 16:1, 16:2, 23:12, 42:4, 51:15, 96:14, 102:17 periods 8:7 person 32:6, 32:12, 32:18, 41:6, 86:15 person's 41:13 perturbing 38:4 petitioner 1:5, 3:3 ph 1:14, 2:1, 4:3, 5:2, 109:2, 109:19, 110:2, 119:22, 120:11, 122:2, 123:7, 123:18 pharmaceutical 34:12, 34:22, 77:21, 78:7, 79:11 pharmaceuticals 77:1 phosphate 91:17 phrase 40:20, 63:4 physiological 21:19, 22:13 physiologically 21:12
P			
page 4:4, 4:9, 10:11, 10:16, 11:1, 11:4, 11:12, 14:3, 25:13, 28:10, 31:18, 31:19, 31:20, 31:21, 58:2, 64:15, 65:3, 74:15, 74:17, 75:3, 76:8, 76:9, 83:5, 88:12, 88:15, 88:18, 88:19, 89:3, 89:5, 90:21, 91:3, 91:7, 91:9, 93:13, 95:14, 100:12 pages 1:20, 10:19, 14:3, 64:18, 91:6			

pick 88:11 picked 108:5 picture 92:15 piece 104:22 place 12:15, 14:1 places 32:11, 35:3, 105:14 platinum 23:3 playing 25:5 please 5:10, 7:5, 10:9, 11:9, 14:10, 89:1 plus 19:10, 19:16, 20:2, 55:8, 59:2, 106:13, 111:7, 113:10 point 40:17, 54:17, 65:13, 83:5, 85:20, 86:5, 87:18, 103:19 pointing 17:17, 77:20, 98:14 points 57:3, 72:7, 86:13 polymer 78:18, 83:6, 83:21, 84:19 polymer-activati- ng 83:16 polymers 87:20, 88:2, 88:4 polypeptides 77:6, 79:4	pop 18:22 population 39:3, 41:21, 42:11, 43:2, 43:12, 43:21, 44:4, 44:9, 44:22, 45:14, 50:12, 51:5, 51:6, 52:6, 52:8, 52:11, 53:20, 53:22, 58:12 populations 44:17 portion 59:4 posa 32:12, 32:22, 33:18, 34:1, 34:9, 35:12, 35:20, 36:1, 36:7, 36:12, 36:20, 37:3, 44:19, 46:14, 47:13, 47:18, 66:18, 67:4, 70:5, 70:8, 70:12, 70:15, 70:18, 71:2, 72:18, 74:21, 75:15, 77:11, 77:15, 78:6, 78:8, 78:17, 78:22, 79:1, 79:20, 85:3, 85:16, 90:8 posita 32:12 position 27:17, 87:19, 87:22, 95:9, 95:22, 99:16, 103:5, 117:7, 120:9, 120:15, 120:16 possibilities 88:7, 93:16	possibility 75:22, 76:1, 114:3 possible 24:8, 84:13 possibly 121:3 practice 21:22, 34:19 precursor 92:12, 94:21, 95:20 prefer 11:8 premarked 57:1 premise 52:17 present 8:13, 15:19, 25:4, 62:1, 62:6, 63:21, 72:9, 78:12, 82:17, 86:13, 92:1, 108:4 prevent 8:13 previous 58:2 previously 74:18, 93:21, 115:15 prior 95:14, 104:12, 113:2, 113:4, 116:3, 118:4 probability 119:8 probably 47:19, 49:21, 74:5, 104:13, 109:8, 109:14, 112:14, 119:10, 120:5 problems 81:6, 82:17 proceed 108:3	proceeding 5:20, 7:17, 25:8, 25:19, 26:19 proceedings 7:21 promote 23:4, 24:13, 24:20 proof 73:19 properties 37:8, 49:2 prosecution 16:21, 17:22, 18:5, 20:8, 25:8, 25:12, 25:17, 26:1, 26:5, 116:1, 116:12 protected 81:13 protecting 81:19, 81:21, 82:6, 82:18 protein 21:4, 23:8, 77:6, 77:11, 79:4, 79:22, 80:7, 80:21, 82:5, 84:6, 85:9, 114:6 proteins 45:4, 70:6, 77:6, 79:4 proving 74:4 public 2:13, 5:4, 123:1, 123:4, 124:14 pull 10:6 purpose 50:11 purposes 32:16, 39:14, 40:5, 42:1,
---	--	--	--

42:14, 43:21, 51:19, 52:12, 54:4, 92:5 pursuant 2:11 put 31:13, 55:15 puts 20:10	123:19 quite 11:8, 29:11, 92:8, 98:1 quote 83:12, 83:13 quotes 56:1 qy 26:13	9:21, 10:1, 10:2, 11:18, 11:22, 12:3, 12:5, 12:6, 12:8, 12:12, 12:16, 12:17, 12:19, 13:12, 13:15, 13:18, 14:1, 14:19, 15:6, 15:12, 15:16, 15:17, 16:1, 16:10, 16:20, 17:10, 17:21, 20:14, 20:16, 21:7, 21:11, 21:17, 21:18, 22:9, 23:1, 23:2, 23:10, 23:19, 24:13, 24:20, 25:6, 28:22, 29:5, 29:11, 30:1, 30:4, 30:7, 30:9, 31:3, 73:2, 81:16, 101:2, 101:18, 102:6, 102:8, 104:7, 105:5, 105:7, 107:18, 108:3, 108:11, 108:14, 109:3, 109:12, 109:17, 110:4, 110:17, 110:22, 111:11, 113:13, 114:1, 114:15, 114:20, 115:17, 116:8, 116:15, 117:19, 117:22, 119:1, 121:5 reactions 12:16, 13:1, 15:7, 16:6, 21:9, 74:2, 81:22, 104:6, 117:4, 117:10 reactive 81:11, 111:5,	111:7, 113:9, 113:11 reactivity 15:18, 107:21, 108:10 reacts 39:2, 45:22, 46:4 read 25:13, 26:6, 26:7, 57:5, 75:21, 86:19, 122:3 reading 77:16, 90:8 ready 57:9 reagents 13:15, 16:2 real 47:4, 55:2, 56:21, 73:9, 100:14 real-world 43:13 reality 54:1 realize 35:17, 35:19 really 42:18, 48:8, 48:11, 50:4, 55:7, 81:1, 81:3, 96:2, 96:8, 109:18, 120:6 realm 46:5 reason 7:5, 100:4, 100:8, 100:14, 111:5, 111:14, 113:9, 113:18, 113:22 reasons 102:2, 109:22, 116:4, 116:6, 116:11
Q	R		
qualification 116:15 qualify 41:4, 43:4, 43:22, 54:13, 74:20 quantify 48:2 question 6:19, 7:7, 17:4, 17:16, 19:12, 20:17, 29:12, 29:13, 30:11, 30:21, 33:2, 34:15, 35:16, 37:13, 42:7, 42:9, 45:18, 50:7, 53:8, 53:13, 57:12, 67:17, 86:14, 92:6, 94:5, 96:6, 96:9, 99:1, 99:2, 100:1, 117:17, 118:10, 118:13, 118:20 questioning 95:7 questions 6:3, 28:6, 53:7, 90:19, 111:18, 115:11, 121:10 quick 55:3, 56:21, 59:18 quinn 2:5, 3:13,	range 48:5, 111:2, 111:4 rather 118:18 re-ask 6:21 re-exam 25:19, 26:2 react 9:3, 13:6, 22:17, 22:21, 24:2, 40:13, 44:9, 44:11, 45:13, 71:3, 71:8, 71:9, 71:10, 71:13, 71:19, 71:20, 84:4, 85:14, 92:13, 95:8, 104:18, 107:10, 107:16, 114:6 reactants 15:19 reacted 22:5, 58:1, 58:21, 59:16, 89:21, 93:22, 94:7, 104:8 reacting 44:21, 58:6, 79:10, 85:8, 97:15, 104:19, 117:5 reaction 9:12, 9:19,		

recall 18:7, 25:21, 39:10, 48:16, 112:6, 113:8, 113:15, 113:19, 114:14, 114:17, 115:14 recently 68:7 recess 61:9, 96:19, 111:22 recitation 10:19 recognize 76:4 recollection 25:15, 85:7, 95:13 record 5:10, 6:14, 10:12, 96:18, 111:21, 119:13, 121:13, 123:11 recross 115:11 redirect 115:9 redraw 98:20 refer 5:12, 11:7, 32:12, 33:3, 34:2, 65:22, 67:4, 69:17, 108:20 reference 33:8, 33:13, 58:9, 76:4, 83:8, 88:19 referenced 50:17, 121:3 references 113:4 referred 27:8 referring 14:15, 18:12,	22:8, 27:4, 27:11, 30:5, 44:10, 55:12, 57:14, 57:17, 57:19, 57:22, 58:14, 62:7, 62:18, 62:20, 63:18, 63:19, 64:1, 66:1, 66:3, 66:12, 84:2, 84:3 refers 59:13, 62:5, 63:13, 64:6, 78:8, 83:6, 83:21 refrain 8:5 reframe 35:19 refresh 95:12 regard 16:11 regarding 114:15 regardless 94:14 regards 29:8, 30:17, 45:12, 45:21 regulatory 34:18, 35:1 rehearing 4:11, 4:13, 27:8, 28:2 related 67:5, 68:3, 68:21, 124:1 relation 7:16 relevant 26:8, 33:1, 46:13, 57:6, 86:6, 86:8 relied 113:3 relying 16:13, 20:8	remainder 106:3 remember 107:2, 107:5 remind 6:13 remove 73:2 render 92:18 rendered 81:14 repeat 9:14, 19:12, 29:13, 36:11, 67:18, 117:17 rephrase 35:15, 37:12, 41:11, 45:9 replicating 69:18, 69:21, 69:22 report 48:17, 48:21 reported 1:21, 117:4, 119:7 reporter 2:12, 5:22, 49:7, 96:22, 105:9, 112:16, 123:1, 123:3 represent 105:15 represented 123:15 represents 102:5, 106:6, 106:7 request 97:11 require 117:12, 117:21 required 16:3, 108:14, 112:9, 112:13, 117:10, 119:2, 119:6, 119:16,	121:3 requirement 29:5, 30:1, 30:4, 31:3, 45:12, 101:17, 101:20, 116:8 requirements 29:1, 92:7, 99:4, 116:21 requires 13:1, 16:6, 16:10, 21:16, 101:1 researcher 52:4, 53:21 researcher's 51:13 reserve 59:21 respond 6:4 responded 113:17 response 6:5, 35:16, 36:3, 82:13, 97:11, 113:19 restate 17:3, 17:15, 83:11, 88:2 result 50:14, 50:15, 73:21, 97:15 resulting 104:9 results 51:2 reversed 82:4 review 5:18, 14:8, 14:11, 25:8, 26:1, 26:18, 26:19, 26:20, 28:4, 28:8, 56:14, 56:15, 57:8, 57:10, 64:22, 75:4,
---	---	---	---

75:5, 83:2, 83:3, 97:8, 99:12 reviewed 25:12, 27:14 reviewing 26:22 right 31:4, 31:9, 39:7, 42:2, 42:15, 43:17, 46:8, 48:1, 51:8, 54:14, 56:12, 56:17, 62:22, 64:7, 66:13, 69:8, 71:11, 71:14, 72:10, 83:5, 84:9, 91:18, 97:21, 98:6, 101:3, 103:3, 103:7, 104:1, 106:18, 110:15, 112:4, 114:2, 114:13 right-hand 97:16 rigor 73:21 ring 106:1 rmr 1:21, 2:13 role 25:5 roman 89:11 roughly 7:3, 108:3 rule 7:11 rules 5:19, 7:20	17:12, 22:12, 31:19, 39:8, 63:12, 64:17, 69:2, 91:1, 92:18, 113:21, 118:15, 118:16, 119:5, 119:10 same 18:20, 22:22, 32:14, 54:9, 62:18, 74:17, 81:7, 81:11, 99:15, 100:12, 107:15, 108:3, 111:11, 113:13, 120:19, 122:4 satisfies 28:22, 30:1, 31:3, 47:15, 92:7 satisfy 20:4, 26:12, 26:14, 27:17, 29:5, 87:4, 100:5, 100:15 say 6:2, 6:9, 12:5, 12:7, 12:10, 14:18, 14:22, 15:4, 18:3, 19:3, 19:20, 20:14, 21:8, 21:21, 25:13, 28:16, 28:21, 29:22, 38:22, 43:8, 46:14, 48:5, 52:2, 52:5, 54:22, 58:5, 60:20, 62:8, 63:13, 63:15, 65:4, 69:16, 71:16, 74:1, 75:8, 79:14, 85:16, 85:22, 89:13, 89:19, 90:3, 100:19, 108:20, 109:7, 109:9,	110:1, 110:6, 110:8, 110:11, 119:19 saying 22:7, 26:16, 35:5, 40:6, 41:12, 50:13, 63:8, 84:11, 95:5, 119:8 says 44:8, 57:17, 58:3, 58:17, 59:13, 60:6, 61:20, 62:10, 63:16, 64:2, 77:17, 77:22, 83:13, 83:21, 86:18, 93:13, 102:4, 102:6, 103:21 scan 76:3 scanned 64:16 scenario 92:15, 93:3, 93:19, 94:5 science 40:21 scientists 73:18 scope 120:13, 121:7 search 48:20, 59:22 second 14:8, 25:19, 33:12, 64:20, 79:10, 118:8 secondly 102:12 section 28:14, 57:8, 61:15 see 5:22, 10:9, 10:18, 10:21, 11:3, 12:20,	17:11, 19:6, 23:21, 25:9, 26:2, 27:5, 28:13, 28:19, 29:2, 29:20, 30:3, 32:8, 33:10, 33:15, 38:20, 39:5, 46:11, 48:3, 48:12, 51:13, 51:15, 56:5, 62:2, 65:7, 75:13, 76:20, 77:3, 77:8, 83:8, 83:18, 87:9, 89:7, 91:2, 96:15, 97:11, 99:6, 104:1, 105:12, 105:21, 117:9 seeking 41:6, 43:10, 43:19, 58:10 seem 87:13 seems 43:8, 55:12, 58:5, 59:3 self-destruct 69:11 semicolon 77:5 sense 46:9, 47:1, 60:5, 60:17, 61:3, 61:5, 102:7, 110:20 sentence 60:5, 63:3, 65:3, 65:4, 76:22, 84:14, 85:22, 88:18 sentences 75:8, 77:17 separate 19:4, 19:20, 20:5, 20:12, 53:13, 61:2,
---	--	--	--

87:12 separates 20:10 september 33:7 sequence 12:16, 82:10, 82:12, 82:15 sequentially 79:7 serve 19:9, 19:16, 95:10 set 31:16, 89:1, 123:8, 124:8 setting 23:11, 81:5 several 116:11 severe 72:12 shall 8:18 sheet 122:7 short 96:14 shorthand 2:12, 123:1 should 8:5, 12:5, 28:17, 28:18, 29:19, 38:11, 43:8, 76:15, 86:12, 98:4, 98:9, 104:12 shove 47:8 show 73:3, 89:9, 97:10 shown 89:14, 89:20, 90:4, 94:13, 95:13, 97:7, 97:14, 99:2, 99:16, 106:22,	107:18, 107:22, 108:15, 111:6, 113:9, 117:19, 119:1 shut 69:10 sic 65:16 side 31:15, 31:17, 80:3, 80:4, 80:7, 81:4, 81:8, 81:9, 84:9, 89:21, 90:1, 97:18, 105:17, 106:12, 106:13, 107:22, 111:7, 113:10 sides 81:5 signal 48:12 signature 122:10 signature-plkal 124:11 signed 122:7 significant 73:4, 73:5, 73:13, 82:17 similar 67:17, 85:14 similarly 79:1, 102:20 simply 34:22 since 111:1 single 12:12, 12:15, 12:19, 19:8, 19:15 sitting 6:1 situation 81:6 size 69:20	skepticism 73:4, 73:5 skill 32:7, 32:13, 32:18 skilled 47:2, 76:16 small 7:10, 23:22, 24:2, 111:8, 113:12 smaller 23:15 solvent 112:14, 112:17, 114:3, 114:11, 119:9, 119:15, 119:18, 121:2 solvent" 119:11 solvents 23:12 some 9:7, 12:19, 13:11, 13:12, 13:14, 15:6, 15:7, 21:6, 34:5, 34:17, 35:20, 36:17, 36:22, 37:1, 38:4, 39:8, 43:2, 44:13, 46:12, 46:21, 48:8, 48:12, 48:14, 59:16, 68:6, 69:3, 70:8, 71:19, 71:21, 72:7, 74:1, 74:19, 74:20, 86:12, 90:19, 102:9, 105:19, 116:4, 116:6 somebody 47:1, 74:8, 75:21 someone 35:17, 41:19,	42:9, 43:10 something 10:8, 10:9, 15:21, 17:8, 21:4, 23:7, 23:9, 35:18, 38:2, 38:6, 38:7, 40:1, 40:2, 40:4, 40:17, 41:1, 41:4, 41:14, 42:18, 45:1, 45:16, 46:2, 47:10, 50:5, 53:1, 55:13, 62:17, 66:9, 68:22, 75:18 sometimes 6:12, 31:21, 32:10, 33:2, 36:2 sorry 14:13, 31:20, 39:22, 44:2, 53:3, 54:20, 72:4, 72:5, 88:9, 91:1, 92:22, 111:10 sort 5:20, 15:7, 23:12, 25:17, 30:10, 44:13, 46:21, 68:6, 78:5 sought 40:4, 40:7, 40:16, 40:20, 41:17, 49:22, 51:9, 58:10, 82:5 spanning 10:18 spans 88:19 speak 7:5, 11:9 special 108:12
---	---	---	--

species 58:1, 58:22, 61:3, 67:14 specific 7:20, 11:13, 13:4, 15:13, 16:5, 16:15, 18:13, 20:20, 28:6, 45:19, 49:12, 50:3, 51:4, 54:6, 63:19, 88:19, 96:3, 96:4, 96:8, 96:12, 96:13, 103:17, 109:16 specifically 15:16, 18:12, 44:10, 51:14, 56:7, 57:18, 59:4, 66:3, 70:22, 76:12, 77:20, 86:17, 87:14, 91:22, 99:19, 100:19 specification 18:10, 18:13, 38:22 specifications 16:16, 102:13 specificity 86:12 spell 95:2 spoke 104:7 squiggly 106:2 stand 86:14 stands 65:17 start 5:9, 38:10, 57:4, 80:11, 109:3 started 94:6	starting 57:4, 61:18 starts 57:7, 57:14, 76:13, 76:15 state 2:12, 2:14, 24:15, 41:10, 123:4, 124:14 stated 17:2, 17:8, 26:21 statement 18:9, 30:20, 42:19, 52:2, 60:2, 72:17, 73:18, 75:15, 78:4, 84:18, 120:14, 120:21, 121:8 statements 96:11 states 1:1, 91:16 stating 5:9 stepping 20:22 still 43:15, 45:17, 46:3, 47:5, 51:9, 61:11, 67:15, 68:14, 82:16, 88:8, 94:10, 95:19, 118:12 straus 66:4 straws 46:10 street 3:6 strong 47:22, 110:11, 114:3 strongly 81:20 structural 19:4	structure 4:15, 4:17, 4:19, 24:7, 78:8, 79:3, 89:9, 91:21, 97:3, 97:5, 113:1, 113:2, 119:21, 120:11 structures 76:17, 97:7 studying 68:15 subject 7:22, 8:17 subset 36:17, 37:1, 38:10, 38:12 substance 77:18 substituents 76:18, 76:19 subtle 34:18, 35:4, 68:20 sufficiently 44:20, 73:2 suggest 58:13, 77:11 suite 3:6 sulfone 8:21, 9:3, 9:11, 9:17, 13:6, 19:9, 19:16, 20:2, 20:4, 20:10, 24:11, 24:12, 24:18, 24:19, 25:1, 25:4, 25:10, 26:3, 26:11, 26:12, 27:17, 28:17, 29:4, 29:10, 29:18, 30:18, 31:2, 78:17, 79:2, 79:18, 80:16, 81:15, 82:16, 82:18,	83:15, 83:16, 83:17, 85:13, 87:3, 87:6, 87:16, 87:20, 88:1, 88:3, 88:20, 91:17, 91:22, 92:9, 92:12, 92:13, 93:20, 93:21, 94:7, 94:11, 95:7, 95:10, 95:19, 95:22, 97:17, 107:19, 107:20, 108:4, 108:8, 108:9, 108:11 sulfoxide 91:17 sulfur 98:5 sullivan 2:5, 3:13, 123:19 supplying 69:13 supposed 7:21, 32:22 sure 5:19, 7:11, 9:15, 11:8, 19:14, 24:17, 28:7, 29:15, 42:6, 51:22, 52:15, 59:22, 63:11, 64:1, 68:22, 74:17, 82:20, 95:4, 95:17, 100:11, 104:22, 107:4, 118:15, 118:19, 118:21, 119:15, 119:17, 119:18 surface 37:5, 37:9, 37:10, 37:15, 45:11, 54:11, 75:11, 85:9 surfaces 85:11
---	--	---	--

surrounding 32:4, 57:6 survive 21:5 switch 114:12 sworn 5:4, 123:9 synaffix 1:4, 86:11, 113:5 synaffix's 32:6, 32:17 synonymous 34:13, 59:14, 60:4, 60:9 synonymously 34:16, 35:6, 59:20 system 67:5, 73:3 systems 34:4	talked 30:22, 50:10, 115:20 talking 12:11, 59:4, 63:3, 66:7, 74:2, 79:8, 79:9, 103:13 talks 11:2 target 50:3 technical 45:2, 110:10 technique 45:5, 79:17 techniques 66:1 technology 74:6 tell 11:6, 53:12, 67:7 temperature 23:12, 110:20, 120:17 ten 109:8 term 15:22, 33:17, 33:20, 34:12, 34:13, 40:19, 46:3, 47:22, 55:16, 59:8, 59:9, 59:19, 60:3, 60:10, 60:13, 60:21, 61:6, 62:14, 62:16, 63:13, 68:4, 69:3, 80:6, 100:19, 100:20, 100:22 terminal 8:21, 9:2, 19:9, 19:15, 92:11, 93:21, 94:6, 114:19 terminology 11:8, 60:17,	60:19, 60:20 terms 35:3, 41:13, 48:21, 59:22, 68:3, 80:9, 96:10, 100:16, 109:6, 109:9, 116:22 tertiary 110:3 test 52:5 tested 74:10 testified 5:5, 16:4, 74:18 testifying 8:13 testimony 8:1, 8:6, 39:7, 116:3, 118:4, 122:4, 122:6, 123:11 text 57:6 th 33:7, 123:21 thank 12:20, 17:17, 64:11, 69:22, 115:7, 121:11 themselves 20:9 therapeutic 43:14, 50:22, 51:2, 51:5, 53:2, 53:5, 54:11, 54:17, 73:9, 73:22 therapeutically 37:19, 38:3, 38:8, 38:9, 38:11, 39:3, 40:7, 40:11, 40:14, 41:7, 41:20, 42:10, 42:20, 43:3,	43:11, 44:3, 46:13, 49:22, 50:11, 51:17, 52:7, 52:10, 53:21, 54:2, 58:10, 66:10 thing 7:7, 23:13, 58:6, 62:19, 78:21, 79:10, 81:9, 81:10 things 8:5, 9:22, 34:14, 34:20, 40:22, 46:10, 46:17, 63:4, 72:2, 81:7, 84:22, 103:20 think 7:12, 17:2, 17:5, 18:11, 28:9, 29:11, 30:22, 34:8, 38:6, 38:14, 39:19, 39:20, 45:18, 47:13, 47:17, 50:7, 57:6, 57:12, 62:18, 64:2, 69:3, 71:15, 71:19, 72:16, 73:11, 74:5, 82:16, 85:10, 86:22, 89:1, 93:12, 96:2, 100:9, 102:2, 102:9, 109:6, 109:9, 115:8, 118:6, 118:7, 118:9, 118:15, 120:7, 120:20 thinking 18:8, 20:21, 21:1, 35:17, 103:16, 118:14 thiol 9:3, 9:11, 9:17, 20:14,
T			
table 89:5, 89:6, 89:9, 89:20, 90:4 take 7:3, 7:9, 9:22, 12:15, 14:8, 27:16, 50:8, 55:1, 55:19, 56:18, 56:19, 61:8, 67:13, 73:6, 75:4, 96:14, 97:6, 97:13, 98:20 taken 74:6, 123:10 taking 8:11, 22:2 talk 6:10, 6:14, 7:22, 13:4, 40:18, 42:20, 79:13, 96:10			

20:16, 21:10, 21:12, 21:16, 22:5, 22:17, 22:21, 23:15, 24:2, 24:12, 24:19, 25:2, 36:8, 36:13, 36:16, 36:18, 70:13, 70:16, 92:14, 93:22, 97:16, 97:17 thiol-ether 9:4, 9:9, 9:16, 13:7, 13:17, 13:21, 80:14, 81:5 thiols 13:7, 21:2, 23:4 thought 31:19, 38:9, 38:12, 39:3, 39:18, 42:18, 78:9, 86:20 three 61:4, 89:10, 106:1 through 9:10, 9:12, 9:16, 9:18, 10:2, 12:15, 18:11, 21:6, 30:22, 42:18, 71:4 throughout 60:1 thrown 48:14 time 8:7, 10:15, 19:13, 24:16, 29:14, 33:1, 36:11, 42:8, 52:3, 55:1, 60:21, 89:2, 98:20, 99:15, 111:1, 117:18, 121:14	times 60:17 tissue 68:5 tissues 68:7 titled 28:15 today 6:2, 6:19, 7:12, 7:16, 8:12, 10:8, 114:14 today's 5:13 together 9:22, 15:20, 47:8 took 14:1 top 34:7, 76:10, 102:2 topics 70:1 topmost 28:11 towards 11:3 trademark 1:1 transcript 119:7 transcription 122:5 transition 23:2 trial 1:2, 24:8 trick 100:11 tried 97:10, 97:13, 97:19 triethylamine 109:13 trip 93:11, 101:11	trombetta 1:21, 2:11, 123:3, 124:13 trouble 59:8 true 61:4, 122:4, 123:11 trust 48:11 truthfully 8:14 try 6:1, 6:10, 6:21, 7:3, 7:6, 37:14, 40:22, 53:16, 55:2, 92:19, 109:14 trying 6:8, 12:7, 12:10, 53:9, 55:4, 55:5, 57:12, 57:16, 59:11, 64:10, 78:13, 84:6, 84:8, 85:19, 86:3, 86:4, 93:11, 95:6, 100:11, 101:11, 103:15 tuesday 1:16, 123:21 tumey 1:14, 2:1, 4:3, 5:11, 5:12, 5:15, 8:11, 8:20, 10:3, 10:16, 28:4, 55:5, 61:11, 83:10, 96:21, 99:8, 112:4, 114:13, 115:11, 122:2, 123:7, 123:18 turn 31:11, 38:15, 61:14, 64:12, 64:14, 74:14,	76:6, 76:8, 88:11, 88:22, 89:3, 90:21 tweak 71:18 two 9:22, 15:19, 18:22, 20:10, 20:12, 25:17, 47:8, 53:7, 56:12, 63:3, 77:21, 78:12, 81:7, 95:16, 96:22, 97:7, 102:2, 102:17, 115:10 type 6:1, 6:5, 6:8, 15:14, 23:1, 70:21, 72:20, 87:15 types 11:13, 49:3, 49:16, 72:9 typical 21:22 typically 9:6, 13:9, 21:20, 21:21, 23:3, 34:8, 45:1, 48:4, 50:2, 66:20, 82:1 tz 26:14 U ultimate 30:11 ultimately 12:17 unactivated 23:5 under 13:12, 20:18, 21:3, 21:12, 21:19, 22:13, 30:8, 30:19,
--	---	---	---

31:3, 41:5, 41:14, 43:5, 43:16, 49:17, 49:20, 50:21, 51:7, 54:6, 82:1, 86:13, 93:3, 94:10, 94:22, 95:19, 95:21, 96:4, 96:5, 99:4, 99:13, 99:17, 99:19, 100:20, 114:1, 117:13, 117:22 undergo 12:8, 15:6 undergoes 11:17, 11:21 understand 5:20, 6:6, 6:16, 6:20, 6:22, 7:15, 8:8, 17:7, 17:11, 27:16, 29:16, 34:1, 50:13, 55:5, 57:13, 57:16, 59:12, 63:11, 64:1, 66:18, 67:4, 68:22, 71:2, 71:7, 85:4, 85:17, 85:19, 85:20, 90:9, 92:19, 95:17 understanding 12:14, 30:16, 31:6, 55:21, 59:8, 62:4, 67:22, 83:20, 86:10, 94:15, 98:1 understood 37:3, 70:5, 70:8, 70:12, 70:15, 70:18 unique 102:14 united 1:1	units 70:9 unless 121:13 unmodified 63:7 until 41:1, 118:16 unusual 25:16 urquhart 2:5, 3:13, 123:19 usage 60:1 use 23:17, 24:1, 32:11, 34:16, 35:5, 41:7, 45:1, 46:3, 48:4, 49:21, 50:2, 50:3, 52:22, 58:20, 59:8, 60:13, 60:17, 60:19, 60:20, 68:13, 72:10, 73:8, 75:16, 78:15, 80:6, 109:22, 117:6 useful 74:3, 77:20, 77:22, 78:5, 79:2, 79:20, 80:19 useless 38:3 uses 58:9 using 17:12, 22:4, 41:6, 41:19, 41:22, 42:9, 42:12, 42:13, 43:12, 43:16, 47:22, 59:19, 68:11, 71:10, 71:13, 72:8,	73:1, 73:5, 74:10, 76:8, 95:19, 109:18 usually 22:1, 68:4, 109:6 v variety 76:18 various 35:3, 77:7, 104:6 varying 44:16, 45:5 vehicle 53:1 versus 15:12, 34:19, 56:2, 59:9, 67:9, 67:13 via 12:22, 15:13, 16:5, 62:12, 62:21, 79:17, 80:13 view 75:15, 103:1 vinyl 8:21, 9:2, 9:10, 9:17, 13:6, 19:9, 19:16, 20:1, 20:4, 20:10, 20:13, 20:16, 21:3, 21:10, 21:11, 21:15, 22:5, 22:16, 22:20, 23:5, 23:14, 24:2, 24:11, 24:13, 24:18, 24:20, 25:2, 25:5, 25:10, 26:3, 26:10, 26:12, 27:17, 28:16, 29:4, 29:10, 29:17, 30:18,	31:1, 78:17, 79:2, 79:18, 80:16, 81:15, 82:16, 82:18, 83:15, 83:17, 85:13, 87:3, 87:6, 92:12, 92:13, 93:21, 94:7, 94:11, 95:7, 95:10, 95:19, 95:21, 97:16, 103:6, 103:11, 104:8, 104:18, 104:19, 106:6, 106:7, 107:10, 107:12, 107:20, 107:21, 108:7, 111:12, 112:10, 112:18, 112:20, 113:13, 114:5, 119:3 vitamin 23:15, 111:9, 113:12, 114:7 vitamins 77:1, 119:20, 120:10, 120:17, 121:1 vitro 67:1, 67:4, 67:9, 67:13, 68:2, 68:10, 68:11, 73:3, 73:15, 74:11 vivo 66:16, 66:18, 66:20, 67:9, 67:10, 67:20, 68:1, 68:4, 68:16, 68:19, 73:14, 73:15, 74:11 w w-h-y 17:12 wait 88:14
--	---	---	--

waiting 118:12, 118:16 want 11:6, 14:9, 17:3, 21:21, 27:19, 46:19, 46:21, 48:3, 56:6, 56:14, 56:15, 59:21, 63:11, 63:22, 65:2, 68:22, 70:21, 74:16, 75:7, 76:12, 78:13, 90:19, 92:8, 93:18, 95:17, 96:2, 96:8, 98:11, 100:11, 101:14, 106:9, 109:19, 109:21, 110:11, 110:13, 118:16 wanted 119:13 warning 70:4 way 6:22, 8:17, 9:12, 9:18, 12:2, 18:20, 25:14, 34:6, 34:7, 38:3, 41:11, 44:4, 50:1, 59:16, 60:13, 66:15, 67:7, 73:11, 82:8, 87:17, 87:18, 93:20, 97:22, 109:15, 124:5 ways 12:1, 12:2, 12:4, 12:5, 38:5, 72:18 we'll 92:6, 96:14, 98:15, 104:22, 105:1 we're 12:11, 22:1,	22:4, 23:8, 23:14, 65:12, 66:19, 67:16, 68:6, 74:17, 81:19, 91:10, 93:6, 100:12 we've 50:10 weak 45:16, 45:20, 46:2, 46:5, 46:16, 46:17, 47:3, 47:4, 47:5, 47:14, 47:15, 47:22 weaker 48:10 weakly 45:8, 45:10 week 68:18 weights 77:7 welcome 57:5 whatever 22:3, 58:4, 79:10, 79:17, 84:5, 84:6, 84:8, 107:11 whereas 15:21, 68:17, 102:6 wherein 16:1 whereof 124:8 whether 26:12, 27:17, 34:18, 39:20, 41:13, 44:14, 50:21, 51:1, 51:10, 51:14, 55:22, 79:6, 84:6, 85:17, 87:11, 87:12, 87:14, 96:11, 108:3	whole 57:8 wide 76:18 within 55:11, 86:12, 102:10, 116:12, 123:4 without 56:10, 96:13, 98:15 withstand 120:17, 121:1 witness 4:2, 5:3, 99:9, 105:4, 111:19, 123:8, 123:12, 124:8 witnesses 7:21 word 26:6, 49:21, 56:13, 56:14, 58:10, 58:20, 60:12, 101:5, 101:12, 102:16 words 40:9, 41:10, 60:15, 79:8 work 25:7, 41:3, 44:1, 44:6, 94:15, 110:2 world 81:18 wouldn't 68:15, 96:12, 110:1 wrap 55:2 writers 60:18 written 65:11, 101:15 wrong 98:13 wrote 30:20	x x ----- -- 4:1 y yeah 24:10, 38:5, 39:20, 54:18, 54:21, 56:5, 63:22, 82:12, 84:10, 86:18, 86:19, 88:13, 88:15, 100:13, 103:13, 111:4, 118:8, 118:12 yep 80:18 york 1:15, 2:7, 2:14, 3:15, 123:4, 123:20, 124:14 yourself 81:5 . .4500 3:8 .7000 2:8, 3:16 0 01531 1:10 07 1:17, 123:22 1 1 99:17, 121:14, 123:22 10 119:22, 120:11 10,131,682 1:11 100 111:2, 120:18
---	--	--	--

1001 57:1 10016 2:7, 3:15, 123:20 1007 76:3 101 83:5 105 4:20 1059 4:10, 27:22, 28:1 1060 4:14, 97:1, 97:2, 97:14, 97:15, 99:16, 100:14 1061 4:16, 97:1, 97:4, 97:10, 97:14, 97:19, 99:3 1062 4:20, 105:9, 105:10, 105:12, 107:19, 108:15, 112:5, 119:1, 121:4, 121:5 108 89:4 112 4:6 115 4:7 118 14:4, 14:6, 14:9, 14:14 12 58:2 120 19:1, 19:19 124 1:20, 90:21, 91:3, 91:7 126 38:15, 55:16	14 57:3, 57:13, 58:9, 61:16 14647 1:22 16 28:10 170 64:14, 64:17, 64:18 18 31:18, 31:19, 31:20, 76:10, 88:12, 88:14, 88:15, 88:18 19 88:19 1960 68:14 2 20 1:16, 76:8, 123:21 2011 86:19 2012 33:7, 65:11, 72:14, 72:18 2022 1:10 2025 1:16, 123:21, 124:9 209 82:21, 83:13, 84:15, 86:1 212.849 2:8, 3:16 23 27:9, 27:11 24 33:7 25 1:16, 123:21 28 4:10 295 2:6, 3:14,	123:20 2nd 124:9 3 3000 3:6 31 76:14 312.832 3:8 321 3:6 39 57:7, 57:13, 61:18, 61:20 4 40 61:20 42 57:4 43 33:8, 74:15, 75:3 44 31:11, 31:19, 31:20, 33:12, 57:7 45 121:14, 123:22 49 58:2 5 50 111:2, 120:18 52 89:3, 89:5 53 10:11, 10:16, 11:1, 11:4, 11:12 5313 3:7 572186 1:19 58 14:3, 14:6	5th 2:6, 3:14, 123:20 6 60654 3:7 682 8:17, 10:20, 14:16, 16:14, 16:21, 17:22, 18:4, 18:6, 18:7, 22:6, 33:6, 39:14, 41:5, 41:15, 43:16, 48:17, 49:18, 49:20, 57:13, 61:12, 65:6, 65:10, 66:7, 66:11, 67:1, 67:20, 86:21, 89:14, 89:20, 90:5, 90:8, 99:5, 100:6, 117:5, 117:20 8 83 64:15, 64:18 84 64:15, 64:18, 65:3 9 9 1:17, 123:22 90 119:18 91 75:3, 75:8 97 4:14, 4:16, 4:18 98 21:8
---	---	--	--