

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

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ILLUMINA, INC.,

Petitioner,

vs.

PATENT OF THE TRUSTEES  
OF COLUMBIA UNIVERSITY IN  
THE CITY OF NEW YORK  
Patent Owner.

-----X

VOLUME II

VIDEOTAPED DEPOSITION OF DR. GEORGE TRAINOR

Wednesday, September 4, 2013

New York, New York

3:56 p.m.

Reported by:  
Maureen Ratto, RPR, CCR, CLR  
Job No: 31222-B

\* \* \*

Videotaped deposition of DR. GEORGE L.  
TRAINOR, held at the offices of Fitzpatrick  
Cella Harper & Scinto, LLP, 1290 Avenue of  
the Americas New York, New York,  
10104-3800, pursuant to notice, before  
Maureen Ratto, Registered Professional  
Reporter, License No. 817125, and Notary  
Public.

\* \* \*

A P P E A R A N C E S:

Counsel for the Petitioner:

FOLEY & LARDNER, LLP

777 East Wisconsin Avenue

Milwaukee, WI 53202-5306

414-297-5782

BY: JEFFREY N. COSTAKOS, ESQ.

jcostakos@foley.com

REINHART BOERNER VAN DEUREN, S.C.

22 East Mifflin Street, Suite 600

Madison WI, 53703

608-229-2219

BY: ROBERT A. LAWLER, ESQ.

rlawler@reinhartlaw.com

Counsel for the Patent Owner:

COOPER & DUNHAM, LLP

30 Rockefeller Plaza

New York, New York, 10112

212-278-0400

BY: JOHN P. WHITE, ESQ.

jwhite@cooperdunham.com

1 A P P E A R A N C E S, continued:

2  
3 Fitzpatrick Cella Harper & Scinto, LLP

4 1290 Avenue of the Americas

5 New York, NY 10104-3800

6 212-218-2100

7 BY: ROBERT S. SCHWARTZ, ESQ.

8 rschwartz@fchs.com

9 SIEW YEN CHONG, ESQ.

10 schong@fchs.com

11  
12 ALSO PRESENT:

13 Marcus Burch, Esq.

14 Illumina Senior Patent Counsel

15 Manuel Abreu, Videographer

16 Kevin Burgess, Texas A&M University

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Do you see that?

A. Yes.

Q. Okay. So Tsien discloses a dNTP analog that is 3'-blocked and has a fluorescent label coupled to the base.

A. Yes. In a general sense, yes, in a general notion of that. It's not a chemical structure at that point, yeah.

Q. But it says it in words, and you agree with that?

A. Yes. I'll agree with that.

Q. If you look at page 21 of Tsien, actually beginning at page 20 of Tsien, which is Exhibit 1002, there is a section entitled "Blocking Groups and Methods for Incorporation."

Do you see that?

A. Yes.

Q. Okay. And then on page 21, at line 12, it says, "The most common 3'-hydroxyl blocking groups are esters and ethers."

Do you see that?

1 TRAINOR

2 MR. COSTAKOS: I move to strike  
3 as none responsive.

4 Q. The allyl ethers are disclosed  
5 in the reference as being "cleaved by  
6 treatment with Mercury 2 and acetone  
7 water," on lines 29 and 30?

8 A. Yes.

9 Q. Am I right?

10 A. Those are the words.

11 THE REPORTER: Those are the --

12 THE WITNESS: -- words.

13 Q. Now, if we look at page 28,  
14 beginning at line 5, Tsien discusses "a  
15 method that uses a fluorescent tag  
16 attached to the base moiety."

17 Do you see that?

18 A. Yes.

19 Q. Okay. So in one of the  
20 embodiments of Tsien it talks about  
21 using a fluorescent tag that is  
22 attached on the base. Fair?

23 A. Yes.

24 Q. And -- and right after that  
25 sentence that I -- I just read it says,

1 TRAINOR

2 "the tag may be chemically cleaved."

3 Do you see that?

4 A. Yes.

5 Q. Okay. And if you look at line  
6 27, of page 28, it discloses that "the  
7 cleavable linkage can be an allyl  
8 ether," agreed?

9 A. No. It says, "allyls can be  
10 cleaved," it doesn't say -- it -- maybe  
11 it says it somewhere else but it says,  
12 "allyls are cleavable by Mercury."

13 Q. Okay. Let -- let's just go by  
14 point.

15 A. A-hum.

16 Q. Okay. Let's look a few lines  
17 above that at line 23 and it says,  
18 "there are several" -- "several  
19 cleavable ethers that permitted  
20 removing the fluorescent group before  
21 the next successive nucleotide is  
22 added."

23 Do you see that?

24 A. Yes.

25 Q. Okay. And then it says, "for

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TRAINOR

example," and it lists three possibilities, one of which is allyl ethers, right?

A. Correct.

Q. And it says, "allyl ethers" -- strike that.

So it says that allyl ethers can be cleavable linkers, agreed?

A. That is the implication, yes.

Q. It also says that "a silo ether can be a cleavable linker on are tether," right?

A. It appears to, yes.

Q. I'll hand you what's been previously marked as Exhibit 1008, the Stemple reference.

THE REPORTER: The which reference?

MR. COSTAKOS: The Stemple.

THE REPORTER: Stemple.

MR. COSTAKOS: Yeah.

(Whereupon, the Deponent reviews the document.)

Q. I think it's known to us as the



1 TRAINOR

2 MR. COSTAKOS: Okay.

3 Q. So I think as we've talked about  
4 Figure 8 shows how to make the various  
5 constituents of the molecule?

6 A. Purports to, yes.

7 Q. Yes. It says that it does at  
8 least. And you see at the top of the  
9 page on Figure 8, it shows a reaction  
10 to attach the fluorescent label to a  
11 photocleavable linker, right?

12 A. That seems to be the case, yes.

13 Q. And if you look at column 24,  
14 you'll see there is one sentence about  
15 that where it says, beginning at line  
16 47, "Linker tam is synthesized by  
17 coupling the photocleavable linker  
18 (Rollaf, 1982) if NHS-tam."

19 A. Yes.

20 Q. Do you see that?

21 A. Yes.

22 Q. So it cites this Rollaf article  
23 for the teaching about how to attach  
24 the fluorescent label to the  
25 photocleavable linker, right?

1 TRAINOR

2 A. I had no opportunities to read  
3 that reference but I'll have to take  
4 that at face value.

5 Q. That is at least what the -- the  
6 --

7 A. Yes.

8 Q. -- the patent is trying to  
9 indicate, right?

10 A. Yes. I presume so. Like I  
11 said, I haven't read that reference and  
12 it's not -- not part of my declaration,  
13 so...

14 Q. Sure. I'm -- I'm not going to  
15 quiz you on the reference. I guess,  
16 I'm just asking you about the patents,  
17 so that the patent suggests it -- it  
18 points to the Rollaf article in  
19 connection with the statement about  
20 synthesizing the linker tam?

21 A. Yeah.

22 Q. Okay. So the first row shows  
23 how to make the photocleavable linker  
24 and then the second and third rows  
25 shows how to attach the photocleavable

1 TRAINOR

2 linker to the dye, right?

3 A. That appears to be what he's  
4 doing.

5 Q. Okay. And then after the label  
6 is added, an NHS ester is added to one  
7 end of the molecule, right?

8 A. You need to be more specific  
9 there.

10 Q. Sure. If you look at the -- in  
11 the third row down --

12 A. Okay.

13 Q. -- in Figure 8, and I guess I'm  
14 using "rows" to mean this sort of  
15 series of molecules. And by the way,  
16 I'm counting there are six rows.

17 Do you understand what I'm  
18 talking about?

19 A. Yes.

20 Q. So in the third row on the  
21 left-hand side of the page it says,  
22 "N'" -- "NN' dye succinimide  
23 carbonate," and IT points over to the  
24 right. Are you with me?

25 A. Yes.

1 TRAINOR

2 A. Fair enough.

3 Q. No, I understand. It's -- it's  
4 meant to be just so we'll all know kind  
5 of what we're looking at here. Okay.  
6 Fair enough.

7 NHS esters are -- or NHS groups  
8 are well-known linkers, aren't they?

9 A. Yes.

10 Q. And among the most common  
11 linkers in nucleotide chemistry? Would  
12 you agree with that?

13 A. It's not a linker, it's a  
14 leaving group, but if you want to be  
15 precise. I'm just addressing the  
16 question. It is a common -- a common  
17 leaving group for coupling complex  
18 pieces, yeah.

19 Q. All right. So for the purpose  
20 -- the purposes of the NHS group, is to  
21 couple molecules together?

22 A. It's a leaving group that  
23 facilitates the joining of two pieces.  
24 Let's put it that way. That's fair.

25 Q. Okay. And they're commonly used

1 TRAINOR

2 in nucleotide chemistry because they're  
3 versatile. Is that right?

4 A. I use them myself, in my own  
5 work.

6 Q. Okay. So then in the next row  
7 down, after showing how to attach the  
8 label to the photocleavable linker, it  
9 shows the reaction of how to make the  
10 nucleotide molecule itself, so it --  
11 it's sort of a separate reaction from  
12 the one we just went through on the  
13 first three rows.

14 Do you see that?

15 A. Yes.

16 Q. So that's in the -- by the way I  
17 count the fourth and fifth rows in the  
18 molecule --

19 A. Yeah.

20 Q. -- in the -- in the drawing?

21 A. Yes.

22 Q. Okay. And now, if you look at  
23 column 24, there's a line about the  
24 creation of this particular molecule,  
25 so if you look at line 45 and through

1 TRAINOR

2 protecting groups and the deazaguanine  
3 unlike the other nucleosides is never  
4 brought in as a guanine to start it's  
5 -- it's prepared by synthesis from a  
6 different heterocycle. So the order in  
7 which you create, turn the heterocycle  
8 into guanine versus the other steps you  
9 must carry out is a matter of  
10 experimentation. And would probably be  
11 somewhat different for a dideoxy and  
12 dideoxy guanine in my opinion.

13 Q. So when you say you suspect he  
14 was talking about -- Dr. Ju was talking  
15 about the attachment of the linker when  
16 he was referring to your article and  
17 patent --

18 A. By attaching, by creating the  
19 bond between the acetylene and the  
20 7-carbon, because that was a step --  
21 that was a step for which there was no  
22 chemistry previous to our work.

23 Q. And -- and you don't dispute,  
24 obviously that it says that the  
25 molecule is prepared using

1 TRAINOR

2 well-established procedures and points  
3 to your article and patent?

4 A. Well, certainly in the year 2000  
5 that coupling was well established  
6 because every company that -- the  
7 companies that were selling dye  
8 terminators were all using that  
9 coupling reaction and there were  
10 additional scientists who had -- who  
11 were taking our terminators and putting  
12 different dyes and they would have to  
13 do that work to make those compounds,  
14 so that I think that coupling was well,  
15 well understood.

16 Q. The use of ddNTP that were --  
17 that had fluorescent labels attached to  
18 the 7-deazapurine position, that was  
19 common by the year 2000?

20 A. For Sanger sequencing, yes.

21 Q. Applied Bio-Systems was the  
22 largest company in the Sanger  
23 sequencing market, vaguely -- roughly,  
24 you agree with that?

25 A. Yes. They -- they licensed our

1 TRAINOR

2 technology.

3 Q. Right. And the -- the products  
4 they were selling had fluorescent dyes  
5 attached to the 7-deazapurine position?

6 A. Of the dideoxy position, yes.

7 Q. Is it shown in anywhere in the  
8 Ju patent how to make a dNTP of a form  
9 that is on the left-hand side of the  
10 fourth Figure 8 that has an iodine in  
11 that position?

12 A. I don't believe he gives  
13 explicit experimental detail for that.  
14 Again, he may have been referring to  
15 our work and the question is which  
16 order do you do the steps in and he  
17 doesn't certainly tell you that in  
18 here, but I presume that a person  
19 skilled in the art would figure out how  
20 to do that. It would take sometime and  
21 this was a 20-step synthesis in our --  
22 in our work, so -- but that information  
23 was available to the person.

24 Q. So it would have been within the  
25 level of skill of one of ordinary skill



1 TRAINOR

2 would be a person of ordinary skill in  
3 the art, it would be there.

4 Q. And is that because the linker  
5 tam was created with the -- with this  
6 NHS leaving group that facilitated the  
7 coupling of that linker tam to the  
8 7-deaza GTP? -

9 A. Yeah. As I mentioned before,  
10 NHS ester carbonate, carbamate  
11 couplings are carried out because  
12 they're -- they are mild couplings. It  
13 can be carried out in aqueous solution  
14 and that's why you do it.

15 Q. Now, if you look back at the  
16 Hobbs patent --

17 A. A-hum.

18 Q. So at the top of column 9 --  
19 sorry. Let -- let me ask you a  
20 question about the coupling of the --  
21 of the dye to the nucleotide through  
22 this NHS.

23 You said that the reaction would  
24 be trivial but that you might have to  
25 do a little bit of work but that it

1 TRAINOR

2 would be within the skill of one of  
3 ordinary -- of ordinary skill in the  
4 art.

5 A. A-hum.

6 Q. Would that be the case whether  
7 it was a dNTP that you were attaching  
8 it to or the ddNTP?

9 A. I think if you look at the  
10 synthesis as a whole those couplings  
11 would certainly be less risky,  
12 regardless of what the nucleoside was.

13 Q. Okay. So whether it was a --

14 A. There would be other problems  
15 with the synthesis that you'd have to  
16 cope with but that would not be -- my  
17 anticipation would be that that would  
18 not be -- that a person of ordinary  
19 skill in the art would look at that  
20 scheme and say, I probably won't have  
21 trouble with that part.

22 Q. Okay. Whether it was a dNTP or  
23 a ddNTP?

24 A. That is correct. I don't think  
25 that it would be -- that any person

1 TRAINOR

2 several of the elements we described in  
3 Dr. Ju but not all of the elements.

4 Q. Well, he also says that the  
5 label can be attached by a tether,  
6 right?

7 A. It does.

8 Q. And he says that the tether can  
9 be cleavable?

10 A. Yes. In -- in his general terms  
11 he speaks to the possibility of  
12 cleavable tether, but I have seen an  
13 example of that, but that's okay, yeah.

14 Q. But he talks about using  
15 chemically cleavable silyl ethers or  
16 allyl ether tethers, right?

17 A. Yes. And I go through the  
18 specifications looking for what his  
19 chemically cleavable base linker is and  
20 I guess I don't see it, a base linker  
21 that -- that's cleavable in there.

22 Q. Well, I --

23 A. That's explicitly instructed you  
24 to put the label on the base, via a  
25 cleavable linker. I think he gives a

1 TRAINOR

2 very nice set of reagents on page 30.

3 It actually doesn't have the same dye  
4 but that is okay, that's -- it's not  
5 for unique labels but he actually gives  
6 you four nucleotides.

7 And, you know, I was looking at  
8 this -- this figure and trying to  
9 determine whether this was a figure  
10 that was disclosing teaching someone in  
11 the art to perform the -- Dr. Ju's  
12 invention and, yes, it -- it's base  
13 labeled and we can agree on that.  
14 Certainly, it's not cleavable, and  
15 certainly there is no deaza on this.  
16 So, you know, and also the specific  
17 example here has no 3' reversible cap  
18 and it's certainly implied by a number  
19 of people in the field and -- and, in  
20 fact, I believe later demonstrated that  
21 you don't need a 3'-cap to terminate,  
22 okay? That that is one strategy, one  
23 of many strategies.

24 So I think a person of ordinary  
25 skill in the art would look at this

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Q. Okay. And then, he describes the labeling on the base through the use of a tether, beginning at line 19 on page 28, right?

A. Line 19? Are you sure it's 19 -- yes, and another remote label, yes.

Q. Okay. So it says, "another remote labeling of the fluorescent moiety or other innocuous label can be attached to the dNTP through a spacer or a tether," right?

A. Yes.

Q. And then he says "the tether can be cleavable," right?

A. He does.

Q. And then he says "there are several cleavable tethers that can be used on that," in the sentence beginning on line 23, correct? Yes?

A. I'll take a look.

(Whereupon, the Deponent reviews the document.)

A. Yes. He says that.

Q. And then he identifies

1 TRAINOR

2 specifically silyl ethers or allyl  
3 ethers on lines 26 and 27. Agreed?

4 A. Sure.

5 Q. Let's turn to page 14. So at  
6 page 14, if you look beginning at line  
7 12, there is a statement that says,  
8 "The labels present in the blocked  
9 dNTPs can be incorporated in one of  
10 several manners."

11 Do you see that?

12 A. Yes.

13 Q. And then goes on to describe  
14 those manners. So it says, "First,"  
15 beginning at line 13, "they can be  
16 incorporated directly and irremovably  
17 in the deoxy nucleotide triphosphate  
18 unit itself." Right?

19 A. Yes. It does.

20 Q. And then in the next paragraph,  
21 it says, "Alternatively, and in many  
22 cases preferably, the label is  
23 incorporated within the blocking group  
24 or is otherwise incorporated in a way  
25 which allows it to be removed between

1 TRAINOR

2 But certainly it was clear it  
3 was not for DNA sequencing and that we  
4 didn't know whether this would work for  
5 DNA sequencing. Just that we -- this  
6 compound could be made and we asserted  
7 it would be a polymerase substrate.

8 Q. Okay. And so -- but the point  
9 of -- was to show that this compound,  
10 which is a 7-deaza DATP labeled with  
11 biotin or fluorescent label, could be  
12 made?

13 A. Well, yeah, we said a  
14 fluorescent, it shows a biotin, of  
15 course, but we -- we extrapolated you  
16 might be able to -- if you wanted a  
17 fluorescent DNA probe.

18 Q. Okay. And -- and this is meant  
19 to show that this particular molecule  
20 could be made, right?

21 A. That's the implication. I don't  
22 even know if we made that or if that  
23 was just prophetic at that time, but  
24 the assertion was that one could  
25 imagine the technology into the Dave

1 TRAINOR

2 Ward space.

3 Q. And in the -- in the context of  
4 this translation the molecule would be  
5 incorporated by polymerase, right?

6 A. Right. Without -- without  
7 termination, of course.

8 Q. Okay. Let's go back to the  
9 Tsien reference. If you look at page  
10 20 of Tsien?

11 A. This is in reference to which  
12 declarations, so I know I have my notes  
13 for that?

14 Q. You know, I don't know that I  
15 can draw a connection to any particular  
16 paragraph.

17 A. Okay. I'll -- I'll pull out my  
18 declaration for that, for Tsien --

19 Q. I'm not saying it's unconnected  
20 but I don't have a --

21 A. Well, certainly, , you know, the  
22 onus is on the reference I'm making or  
23 -- are outlined in the declarations, so  
24 I'm going to refer to them when I -- I  
25 answer your questions.



1 TRAINOR

2 A. Okay.

3 Q. Okay. The first column, second  
4 paragraph, third sentence, you see it  
5 says, "The linker is attached to the 5  
6 position in the pyrimidines and to the  
7 7 position in the deazapurines."  
8 Right?

9 A. Yes.

10 Q. So in your reference, your  
11 article, the preferred place to attach  
12 the label in the purines was at the  
13 7-deaza position, right?

14 A. Yeah. That was in my article,  
15 apparently. Yeah. Dr. Tsien didn't  
16 feel the same way.

17 Q. And then in your article if you  
18 look on page 338 there is a figure  
19 that's referred to on page 337, Figure  
20 2A, and it actually shows the molecule,  
21 ddNTPs with the label at the  
22 5-pyrimidine position and the  
23 7-deazapurine position?

24 A. Yes. Okay.

25 Q. Okay. And so, you thought, at

1 TRAINOR

2 least, that the 7-deaza position was an  
3 ideal location to attach a label,  
4 right?

5 A. Well, I didn't know if it was  
6 ideal. I was -- we were one of the  
7 first people to ever do this so it was  
8 a way to do it that worked, that is  
9 fair to say.

10 Q. But it's the only way that you  
11 disclose in this particular article,  
12 right?

13 A. Yes, a-hum.

14 Q. Okay. So I presume that was  
15 your preferred way of doing it?

16 A. That was our preferred  
17 embodiment. It was certainly in our  
18 patents, yes.

19 Q. Right. And, in fact, that was  
20 the way that was eventually  
21 commercialized by Applied Bio-Systems,  
22 right?

23 A. For Sanger sequencing only,  
24 yeah.

25 Q. Yeah. But that -- that was the

1 TRAINOR

2 way it was commercialized for Sanger  
3 sequencing by Applied Bio-Systems?

4 A. Yes.

5 Q. So when they were actually  
6 selling the products they were selling  
7 a 7-deaza labeled purine?

8 A. Yeah. No reason to change that  
9 for Sanger sequencing.

10 Q. Okay. And, in fact, in your  
11 Prober article, right after the portion  
12 I read before on page 337, you explain  
13 the reason that the 7-deaza is  
14 preferred, right, you say "The 7  
15 deazapurines were used to facilitate  
16 stable linker arm attachments at that  
17 site," right?

18 A. Yes. We made that statement.

19 Q. Now, if we look at the Hobbs  
20 reference, and the Hobbs reference, and  
21 -- and, again -- again, it's the same  
22 inventive group -- well, strike that.

23 A. Yes.

24 Q. It -- it's the same group of  
25 people that were working on the work

1 TRAINOR

2 Q. Okay. So in between the  
3 publication of Tsien in 1991, and the  
4 invention date of October of 2000,  
5 there's nearly a decade, agree?

6 A. Yes.

7 Q. Okay. So here in this article  
8 that's from 1995, Seela and his group  
9 are saying there's been work that's  
10 been done within the past few years and  
11 I think you alluded to that even in  
12 your own answer, right?

13 A. A-hum.

14 Q. Okay. And then it says, if you  
15 look at the third sentence, "In this  
16 respect it has" -- "it was shown that  
17 the 5 substituents of pyrimidines which  
18 are located in the major groove of  
19 B-DNA can stabilize the duplex's  
20 structure."

21 Do you see that?

22 A. Okay.

23 Q. And you've talked before about  
24 the 5 position of pyrimidine was your  
25 preferred attachment point as well,

1 TRAINOR

2 right?

3 A. Yes.

4 Q. Okay. And for exactly the same  
5 reason, it would be located within the  
6 major groove and it would stabilize the  
7 structure, right?

8 A. Could you repeat that?

9 Q. Sure.

10 A. I -- I'm not sure I got that  
11 right.

12 Q. Sure. The reason you preferred  
13 5 pyrimidines was the same reason, in  
14 other words, it would fit nicely within  
15 the major groove and it would help to  
16 stabilize the duplex structure?

17 A. There was nothing to do with  
18 stabilizing duplex structure.

19 Q. Okay. It would just fit nicely  
20 within the groove?

21 A. It would fit within the groove  
22 -- the -- the substituent would stick  
23 out in a the major groove such that  
24 apparently, we discovered, it does not  
25 impair polymerase recognition of the

1 TRAINOR

2 wants in this case and hope that he's  
3 given that scope in the claim.

4 But certainly a person of  
5 ordinary skill in the art who is not  
6 looking at this in -- from a  
7 patentability standpoint, but is saying  
8 what does this teach me? He's probably  
9 saying, Boy, he's just -- this is, you  
10 know, he's laundry-listing this and  
11 putting everything that he could  
12 imagine would work but yet doesn't tell  
13 me much about it. He doesn't tell me  
14 how to make it and he doesn't tell me  
15 how to use them, except for the limited  
16 case that he actually did do and when  
17 he commercialized the reagents which  
18 was the Bio dUTP agents.

19 Q. I'm sorry. So we were going to  
20 look at column 10 of Ward. And line 49  
21 you see it says, "Because of the ease  
22 of preparation it has been found  
23 preferable to use NHS esters for probe  
24 addition." Do you see that?

25 A. Yes.

1 TRAINOR

2 Q. All right. And that's sort of  
3 along the lines of what you testified  
4 about earlier about the use of NHS  
5 esters as a lead-in group for coupling  
6 molecules together?

7 A. Yes. I think that's pretty  
8 standard in the art and certainly was  
9 to me.

10 Q. Okay.

11 (Exhibit 1045, article entitled  
12 "Synthesis of nucleosides designed for  
13 combinatorial DNA sequencing", was  
14 received and marked on this date for  
15 identification.)

16 (Whereupon, the Deponent reviews  
17 the document.)

18 Q. Dr. Trainor, I've handed you  
19 what's been marked as Exhibit 1045 for  
20 your deposition.

21 A. Right.

22 Q. You testified earlier about --

23 MR. WHITE: I'm going to object,  
24 again -- once again that this is an  
25 exhibit that was not previously

1 TRAINOR

2 Weinstock declaration. We've  
3 maintained our objection to referring  
4 to it.

5 Q. Okay. So the Herman reference,  
6 Exhibit 1029, is entitled Chemically  
7 Cleavable Linkers -- excuse me. It's  
8 entitled Chemically Cleavable  
9 Nucleotides. Do you see that?

10 A. That's correct.

11 Q. And if you turn to column 5 and  
12 6, you see that in the figure, the  
13 reaction figure that is shown in  
14 columns 5 and 6 here that Herman  
15 discloses attaching a biotin molecule  
16 to the amine group of a linker as  
17 attached to the base of a nucleotide  
18 using a linker?

19 A. I believe so, yes.

20 Q. And you see by looking at the  
21 Herman, the molecule that is shown  
22 there, that it shows a disulfide  
23 linkage?

24 A. I believe so.

25 Q. Okay. And if you look at column



1 TRAINOR

2 7, under the section called "Materials  
3 and Methods." Do you see that?

4 A. This page is upside down. I got  
5 get it.

6 Q. Sorry about that. If you look  
7 where it says, "Materials and Methods,"  
8 are you with me?

9 A. Yes, I am.

10 Q. At line 57, beginning at line  
11 57, it describes that "the disulfide  
12 linkage was added using NHS coupling."

13 A. Yes.

14 Q. And that disulfide linkage in  
15 this sort of NHS package was something  
16 that was commercially available at that  
17 time period, you remember that, right?

18 A. Likely. I -- I didn't  
19 investigate that. I wasn't presented  
20 information on that.

21 Q. Disulfide linkages were well  
22 known?

23 A. Yes.

24 Q. And they're known to be  
25 cleavable, right?

1 TRAINOR

2 A. I agree.

3 Q. Turn to page 28, and beginning  
4 at line 2, right after that he talked  
5 about attaching the fluorescent group  
6 to a remote position, such as the base,  
7 he says, "This dNTP can be incorporated  
8 in the fluorescence measured and  
9 removed according to the methods  
10 described below."

11 Do you see that?

12 A. Okay.

13 Q. And then, he goes on and he  
14 describes some methods for  
15 incorporating the dNTP and measuring  
16 and removing the fluorescence. Do you  
17 see that?

18 A. Okay.

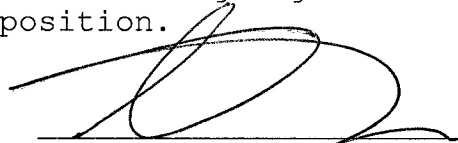
19 Q. Do you agree with that?

20 A. Okay.


21 Q. If you look at page 29, you see  
22 at line 16 it says, "the synthetic  
23 routes have great flexibility and that  
24 the linker can be varied with respect  
25 to length or functionality." Do you

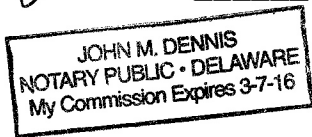
J U R A T

I do hereby certify that I have  
read the foregoing transcript of my  
deposition.

  
\_\_\_\_\_  
GEORGE L. TRAINOR

Sworn and subscribed  
before me  
this 21 day of  
Sept, 2013

  
\_\_\_\_\_  
a Notary Public of  
the State of Delaware



## C E R T I F I C A T E

I, MAUREEN M. RATTO, a  
Registered Professional Reporter, do  
hereby certify that prior to the  
commencement of the examination, GEORGE  
L. TRAINOR was sworn by me to testify  
the truth, the whole truth and nothing  
but the truth.

I DO FURTHER CERTIFY that the  
foregoing is a true and accurate  
transcript of the proceedings as taken  
stenographically by and before me at  
the time, place and on the date  
hereinbefore set forth.

I DO FURTHER CERTIFY that I am  
neither a relative nor employee nor  
attorney nor counsel of any of the  
parties to this action, and that I am  
neither a relative nor employee of such  
attorney or counsel, and that I am not  
financially interested in this action.

---

MAUREEN M. RATTO, RPR

License No. 817125

I N D E X

WITNESS:

GEORGE L. TRAINOR	469
REDIRECT EXAMINATION BY	469
MR. O'MALLEY	

E X H I B I T S

Exhibit 2092, rough	469
transcript of Dr. Trainor	
from September 4, 2013,	
Exhibit 2093, excerpt of the	483
1999 edition of Green and	
Wuts,	

1 INSTRUCTIONS TO WITNESS  
2

3 Please read your deposition over  
4 carefully and make any necessary  
5 corrections. You should state the  
6 reason in the appropriate space on the  
7 errata sheet for any corrections that  
8 are made.

9 After doing so, please sign the  
10 errata sheet and date it.

11 You are signing same subject to  
12 the changes you have noted on the  
13 errata sheet, which will be attached to  
14 your deposition.

15 It is imperative that you return  
16 the original errata sheet to the  
17 deposing attorney within thirty (30)  
18 days of receipt of the deposition  
19 transcript by you. If you fail to do  
20 so, the deposition transcript maybe  
21 deemed to be accurate and maybe used in  
22 court.  
23  
24  
25

