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

- - - - - X

INARI AGRICULTURE, INC.,
Petitioner,

v.

PGR2023-00022

Patent 11,371,055

CORTEVA AGRISCIENCE LLC,
Patent Owner.

- - - - - X

DEPOSITION of DR. ARON SILVERSTONE, Ph.D.
Thursday, January 11, 2024- 9:02 a.m.

Taken at:

Wolf Greenfield & Sacks, P.C.
600 Atlantic Avenue
Boston, Massachusetts

COURT STENOGRAPHER:

Katherine A. Tevnan, RMR/CSR

Henderson Legal Services

202-220-4158

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I N D E X

Deposition of: Direct Cross Redirect Recross
DR. ARON SILVERSTONE, Ph.D.
By Mr. DeRoo 6

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Corteva Exhibit		98
2007	US Patent No. 8,124,841 B2	
	PGR2023-00022 (30 pages)	
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2008	US Patent No. 8,343,747 B2	
	PGR2023-00022 (251 pages)	
Corteva Exhibit		108
2010	Golden Rice article	
	PGR2023-00022 (8 pages)	

1 Inari Exhibit 18

2 1001 US Patent No. 11,371,055 B2

3 PGR2023-00022 through 00073

4 Inari Exhibit 7

5 1003 Declaration of:

6 Dr. Aron Silverstone, Ph.D.

7 PGR2023-00022 through 00056

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15 *Original exhibits retained by:

16 Henderson Legal Services

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

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3 DR. ARON SILVERSTONE, Ph.D.

4

5 a witness called for examination by counsel for
6 the Patent Owner, being first duly sworn, was
7 examined and testified as follows:

8

9 DIRECT EXAMINATION

10 BY MR. DEROO:

11 Q. Good morning, Dr. Silverstone.

12 A. **Good morning.**

13 Q. I am Pete DeRoo from the law firm
14 Finnegan, counsel for Corteva. You understand
15 that you are testifying in a post grant review
16 proceeding before the U.S. Patent and Trademark
17 Office today, Case Number PGR 2023-00022?

18 A. **Yes, I do.**

19 Q. And you understand that your testimony
20 today will be transcribed and made public in
21 these proceedings?

22 A. **Yes, I do.**

23 Q. And you understand that your answers
24 today are under oath?

25 A. **Yes, I do.**

1 Q. And you understand that's the same oath
2 that would apply in a courtroom before a judge?

3 A. **Yes, I do.**

4 Q. Is there any reason you cannot provide
5 full and truthful testimony today?

6 A. **No, there is not.**

7 Q. Have you been deposed before?

8 A. **I have.**

9 Q. How many times?

10 A. **Once.**

11 Q. Then you are probably familiar with the
12 process. I ask that we just try to help out the
13 court reporter by giving audible answers and not
14 talking over today. Is that acceptable?

15 A. **That is.**

16 Q. So I will start by handing you a document
17 previously marked as Exhibit 1003.

18 (Pause)

19 (Exhibit 1003 premarked
20 for identification)

21 Q. This is your declaration in this
22 proceeding?

23 A. **Yes, it is.**

24 Q. And at the back of your declaration,
25 starting on stamped page 53, you have an

1 Appendix B. Do you see that?

2 **A. Yes.**

3 Q. On Appendix B, you listed the exhibits
4 that you considered in forming your opinions in
5 your declaration, correct?

6 **A. Yes. These are the exhibits I used.**

7 Q. Is that a complete list of materials that
8 you considered?

9 **A. Yes, it is the list of materials I used.**

10 Q. You are saying "used." Were there others
11 that you considered in forming your opinions in
12 this case?

13 **A. No, there weren't others that I**
14 **considered.**

15 Q. And did you review your declaration
16 before you signed it?

17 **A. Yes, I reviewed my declaration.**

18 Q. Would you please turn to original page 43
19 of your declaration. I would just like to
20 confirm that's your signature.

21 **A. Yes, that is my signature.**

22 Q. When you signed Exhibit 1003, you
23 believed it was complete and accurate?

24 **A. Yes. When signed it, I believed it to be**
25 **complete and accurate.**

1 Q. Sitting here today is there anything in
2 your declaration that you believe requires
3 correction?

4 A. At the current time there is nothing that
5 I believe requires corrections.

6 Q. When did you last review your
7 declaration?

8 A. Over the past couple days, I've been
9 reviewing my declaration in preparation for this
10 meeting.

11 Q. And other than reviewing your
12 declaration, what did you do to prepare for this
13 deposition today?

14 A. In addition to reviewing my declaration,
15 of course, and reviewing the patent and meeting
16 with counsel.

17 Q. Did you meet with anyone other than
18 counsel?

19 A. We briefly -- counsel from Inari I met,
20 but we did not discuss the content of it. It was
21 just a -- just to say hello, but not to talk
22 about the proceedings today.

23 Q. And the other counsel that you met with,
24 was that counsel at Wolf Greenfield?

25 A. Yes.

1 Q. And was it Mr. Rutt here?

2 A. It was.

3 Q. Anyone else?

4 A. Also Scott McKeown was on the -- on the
5 phone.

6 Q. For about how long did you meet with
7 counsel in preparation for your deposition?

8 A. Roughly about seven hours.

9 Q. In preparing for your deposition, did you
10 review any documents beyond the -- your
11 declaration and the '055 patent?

12 A. I -- so I didn't make a list of the ones
13 I reviewed, but I reviewed several of the
14 exhibits in -- that are listed in Appendix B.
15 But I don't want -- since I am under oath, I
16 don't want to say exactly this and not that, so.

17 Q. Fair enough. Did you review any
18 documents that were not listed in your table of
19 exhibits in Appendix B?

20 A. No.

21 Q. Would you please turn to paragraph 48 of
22 your declaration?

23 A. Yes.

24 Q. In the very first sentence of
25 paragraph 48, you state that

1 "a-Ketoglutarate-dependent dioxygenase are part
2 of [a] very large superfamily of enzymes..."
3 correct?

4 **A. Yes.**

5 Q. Is it okay if we shorten terminology a
6 little bit today? I was going to propose that we
7 refer to those enzymes as alpha-KG dioxygenases.

8 **A. Yes, that will be fine. I'm sure it is**
9 **easier.**

10 Q. You will understand what I am referring
11 to if we call them alpha-KG dioxygenases?

12 **A. Yes. Alpha-KG dioxygenases, that's fine.**

13 Q. Great. In paragraph 48, you wrote that,
14 [as read] a-KG dioxygenases across the
15 superfamily of enzymes that catalyze a wide range
16 of reactions. Correct?

17 **A. Yeah. I guess there is one thing I**
18 **missed. There should be an S after dioxygenase.**
19 **But yes, they are part of a very large**
20 **superfamily of enzymes.**

21 Q. You listed hydroxylation, dealkylation,
22 desaturation, epoxidation, epimerization,
23 halogenation, cyclization, peroxide formation,
24 and ring expansion/contraction reactions as
25 alpha-KG dioxygenase catalyzed reactions.

1 Correct?

2 **A. Yes, that is correct.**

3 Q. In your declaration, did you identify any
4 enzymes that catalyzed ring expansion/contraction
5 reactions that are within 85 percent sequence
6 identity of Sequence ID Number 2 of the '055
7 patent?

8 **A. Can you restate that?**

9 Q. Yes. In your declaration, did you
10 identify any enzymes that catalyzed ring
11 expansion/contraction reactions that are within
12 85 percent sequence identity of SEQ ID NO:2 of
13 the '055 patent?

14 **A. No. I did not specifically indicate any**
15 **enzymes that have that activity.**

16 Q. In your declaration, did you identify any
17 enzymes that catalyze peroxide formation
18 reactions that are within 85 percent sequence
19 identity or SEQ ID NO:2?

20 **A. No. I did not identify any enzymes with**
21 **those activities.**

22 Q. Did you identify any enzymes that
23 catalyze cyclization reactions that are within 85
24 percent sequence identity of SEQ ID NO:2?

25 **A. No. I didn't identify any enzymes that**

1 **have those activities.**

2 Q. In your declaration, did you identify any
3 enzymes that catalyze halogenation reactions that
4 are within 85 percent sequence identity of SEQ ID
5 NO:2?

6 **A. No. I didn't identify any enzymes with**
7 **that reaction.**

8 Q. Did you identify any enzymes that
9 catalyze epimerization reactions that are within
10 85 percent sequence identity of SEQ ID NO:2?

11 **A. No. I did not identify any enzymes that**
12 **catalyze those activities.**

13 Q. Did you identify any enzymes that
14 catalyze epoxidation reactions that are within 85
15 percent sequence identity of SEQ ID NO:2?

16 **A. No. I did not identify any enzymes that**
17 **have that activity.**

18 Q. Did you identify any enzymes that
19 catalyze desaturation reactions that are within
20 85 percent sequence identity of SEQ ID NO:2?

21 **A. No. I did not identify any enzymes that**
22 **have that reaction.**

23 Q. Do you consider AAD-12 to catalyze
24 hydroxylation or dealkylation reactions?

25 **A. No. I don't consider it to catalyze**

1 **dealkylation.**

2 Q. What about hydroxylation?

3 **A. Or hydroxylation.**

4 Q. So in your declaration did you identify
5 any enzymes that catalyze hydroxylation reactions
6 that are within 85 percent sequence identity of
7 SEQ ID NO:2?

8 **A. No, I did not.**

9 Q. Did you identify any enzymes that
10 catalyze dealkylation reactions that are within
11 85 percent sequence identity of SEQ ID NO:2?

12 **A. No, I did not.**

13 Q. In preparing your declaration, did you
14 search for any enzymes within 85 percent sequence
15 identity of SEQ ID NO:2 that catalyze the list of
16 reactions that you listed in paragraph 48 of your
17 declaration?

18 **A. No, I didn't look -- I did not look for
19 any enzymes that have 85 percent identity and
20 catalyze any of these reactions.**

21 Q. Was there any reason you could not have
22 done that search?

23 **A. Are you asking if there is any limitation
24 as to why I couldn't?**

25 Q. Yes. Is there any limitation or reason

1 why you could not have done that search?

2 **A. No. There is no limitation why I could**
3 **not have done that search.**

4 Q. Would you, please, turn to paragraph 50
5 of your declaration. In the second sentence, you
6 stated that the "presence of the 'AAD-12 motif'
7 alone is insufficient to predict whether a
8 protein of 85% or higher identity would be an
9 a-ketoglutarate-dependent dioxygenase at all..."
10 correct?

11 MR. RUTT: Objection.

12 **A. Could you repeat the question?**

13 Q. In the second sentence of paragraph 50 of
14 your declaration, stated that the "presence of
15 the 'AAD-12 motif' alone is insufficient to
16 predict whether a protein of 85% or higher
17 identity would be an a-ketoglutarate-dependent
18 dioxygenase at all..." correct?

19 **A. I wrote that, yes.**

20 Q. In your declaration did you identify any
21 enzymes within 85 percent sequence identity of
22 SEQ ID NO:2 that are in a different enzyme family
23 than alpha-KG dioxygenase?

24 **A. I did not look to see if any were in**
25 **different enzyme families. But here I am**

1 **referring just to dioxygenase, not to other**
2 **activities.**

3 Q. I'd like to clarify that answer a minute.

4 Are you saying that a protein of
5 85 percent or higher identity might not be an
6 alpha-ketoglutarate dioxygenase activity? Hold
7 on. I will start again.

8 Are you saying that a protein of
9 85 percent or higher identity might not have
10 alpha-ketoglutarate-dependent dioxygenase
11 activity or are you saying that it is possible
12 that enzymes within 85 percent or higher identify
13 might fall into a different enzyme family?

14 A. So what I'm saying is more like the
15 **former, that a protein that has 85 percent or**
16 **higher identity might -- might not be an alpha-KG**
17 **-- well -- dioxygenase or have that activity.**
18 **But I'm not making any judgment on whether it has**
19 **any other of the activities that I listed in the**
20 **previous paragraph.**

21 Q. In your opinion would a skilled artisan
22 expect that proteins within 85 percent or higher
23 identity would fall into other enzyme classes
24 beyond alpha-KG dioxygenases?

25 MR. RUTT: Objection.

1 **A. It's -- it would be considered possible**
2 **that it has other activities or no activity at**
3 **all. A lot would depend on what the -- the**
4 **researcher, the person of skill, is looking at.**

5 Q. In preparing your declaration, you did
6 not identify any enzymes other than alpha-KG
7 dioxygenases that fall within 85 percent sequence
8 identity of SEQ ID NO:2, correct?

9 **A. That is correct.**

10 Q. Please turn to paragraph 72 of your
11 declaration.

12 **A. Okay.**

13 Q. In this paragraph you refer to choosing
14 components of a gene expression cassette and
15 modifying it for different plant species; is that
16 correct?

17 **A. Yes. That's correct.**

18 Q. Do you dispute that the '055 patent
19 discloses examples of expression cassettes that
20 were used to successfully transform plants?

21 **A. Could you repeat?**

22 Q. Do you dispute that the '055 patent
23 discloses examples on expression cassettes that
24 were used to successfully transform plants?

25 **A. Could I ask for the '055 patent to be --**

1 so I can look at it before I answer my -- the
2 question.

3 Q. Yes. I will hand you a copy of the '055
4 patent.

5 A. Thank you.

6 (Exhibit 1001 premarked
7 for identification)

8 Q. For the record, this is Exhibit 1001.

9 A. I don't know if you can -- just to be --
10 I don't know if you can point me to the point,
11 because I know -- of course, I have read it but I
12 don't remember where everything is.

13 Q. If you would turn to paragraph 42,
14 please.

15 A. Column 42?

16 Q. Yes.

17 A. Okay.

18 Q. You see table 8 at the bottom
19 discloses --

20 A. Yes.

21 Q. -- a variety of binary constructs used in
22 transformation of various plant species, correct?

23 A. That is correct. In the patent it
24 discloses gene expression cassettes that were
25 used.

1 Q. And those gene expression cassettes were
2 used to successfully transform plants in the
3 examples of the patent, correct?

4 A. Yes. Well, before -- I know there are a
5 number of cassettes. I don't remember if every
6 single one was successful. I could look through
7 that, but I know that several were successful.
8 So I don't want to say that every single one is
9 without reviewing again today.

10 Q. Yeah. That's fair.

11 So we can at least agree that at least
12 some of the expression cassettes in the '055
13 patent were successful in transforming plants?

14 A. Yes.

15 Q. When working with a set of genes to
16 express in plants, would it be a preferred
17 practice to reuse the same expression construct
18 for each gene?

19 MR. RUTT: Objection.

20 A. So can you clarify a little bit what you
21 mean by working with genes?

22 Q. Yes. If one had a set of genes --

23 A. Yeah.

24 Q. -- different transgenes to express in
25 plants, would it be a common practice to reuse

1 the same expression construct with each of those
2 genes?

3 A. Well, if -- if you are looking at how
4 well a novel transgene you are testing that has
5 not been put in plants before, it would be common
6 to use not just one expression cassette but
7 several expression cassettes in parallel.

8 So if you have several genes, you might
9 have -- for simplicity, three genes, three
10 expression cassettes, there would be nine
11 different expression cassettes.

12 Q. Would it be surprising or unexpected to
13 find that the same expression construct works
14 with each of those three genes, even if the
15 relative optimization might be better with a
16 different expression cassette?

17 MR. RUTT: Objection.

18 A. Can I ask a clarifying question? So you
19 are saying if you have three different genes --

20 Q. Um-hmm.

21 A. -- and you are using the same expression
22 cassette, it's whether it works or works well?
23 So I guess, what's the question about --

24 Q. Let's just start with whether it works.

25 If you had three genes --

1 **A. Yes.**

2 Q. -- and wanted to use the same expression
3 cassette with each of them --

4 **A. Yes.**

5 Q. -- would it be a surprise if all three at
6 least worked to drive some expression?

7 MR. RUTT: Objection.

8 **A. I guess surprise is not the word -- it**
9 **could work or it might not work. It's not always**
10 **predictable.**

11 Q. Okay. Would a skilled artisan seek to
12 reuse the same expression cassette for each
13 gene --

14 MR. RUTT: Objection.

15 Q. -- in the first instance?

16 MR. RUTT: Objection.

17 **A. A person skilled in the art would use --**
18 **would often use multiple expression cassettes**
19 **just because of unpredictability.**

20 Q. And part of the idea of using multiple
21 expression cassettes is to find an optimal one
22 for each gene; is that correct?

23 **A. It could -- it depends on the goal of the**
24 **experiment. It could be optimal or it could be**
25 **looking for proof of concept, which means does it**

1 **work as opposed to does it work well.**

2 Q. Once an expression cassette was
3 demonstrated to work in a dicot species, would a
4 skilled artisan expect to be able to use it in
5 other dicot species?

6 MR. RUTT: Objection.

7 A. **That depends on the expression cassette.**

8 So if the promotor, for example, were
9 specific for a dicot species, it would not
10 necessarily be expected to work in other dicot
11 species.

12 Q. You say not necessarily. If there was an
13 expression cassette using a dicot promotor that
14 was demonstrated to work in dicot species, would
15 there be a reasonable expectation that the same
16 expression cassette would work in other dicot
17 species?

18 MR. RUTT: Objection.

19 A. **It depends on the promotor. For example,**
20 **if -- what I mean is if there is a promotor**
21 **specific from soybean, it might not work in other**
22 **dicot species, even though soybean is a dicot.**

23 Q. For example, if an expression cassette
24 was using a 35S promotor and was demonstrated to
25 work in a dicot species, would there be a

1 reasonable expectation that it would work in
2 other dicot species?

3 **A. Since the 35S promotor is from a virus,**
4 **that infects a wide variety of species. That**
5 **type of promotor is expected to work in different**
6 **dicot species.**

7 Q. Are there monocot promotors that are
8 known to work across a variety of monocot
9 species?

10 **A. There are monocot promotors that are**
11 **species specific. And there are monocot**
12 **promotors that can work in more than one monocot**
13 **species.**

14 MR. RUTT: Peter, can we take a break
15 for one minute to move the phone?

16 MR. DER00: Sure.

17 (Pause)

18 Q. Dr. Silverstone, so I think you had just
19 explained that there are species specific
20 promotors for monocots and also promotors to work
21 in more than one monocot species, correct?

22 **A. That is correct.**

23 Q. Once an expression cassette with a more
24 general monocot promotor was demonstrated to work
25 in a monocot species, would there be a reasonable

1 expectation it would work in other monocot
2 species?

3 MR. RUTT: Objection. Form.

4 A. A clarifying question, please. By what
5 do you mean by work in other species?

6 Q. Well, I think we had --

7 A. You can have -- sorry.

8 Q. I think we had sort of established a
9 little bit of a distinction between optimized
10 expression or just establishing that it works to
11 drive expression, even if not at an optimal
12 level. So I am asking about the later. Let me
13 re-ask the question here so the transcript is
14 clear.

15 Once an expression cassette with a more
16 general monocot promotor was demonstrated to work
17 in a monocot species, would there be a reasonable
18 expectation that it would work in other monocot
19 species?

20 MR. RUTT: Objection. Form.

21 A. So -- sorry. Let me start again.

22 I know we are talking about monocot
23 species and there are very many monocot species.
24 And you can -- a researcher can expect if it
25 works in one species, it would have to be tested

1 to make sure it works in another species but that
2 only says about the other species -- and the
3 reason I ask about -- sorry -- about the
4 clarification about works, is that there are
5 several levels in -- when the promotor only
6 drives expression of the messenger RNA and that
7 doesn't inform anything about -- I shouldn't say
8 inform anything, that's not the only step
9 required for protein production.

10 Q. I can understand that, but at a higher
11 level, once an expression cassette with a general
12 monocot promotor was demonstrated to work in a
13 monocot species, would there be a reasonable
14 expectation that you would see at least some
15 expression in other monocot species by reusing
16 that cassette?

17 MR. RUTT: Objection. Form.

18 A. If you tested in -- let me step back.

19 It depends on what the promoter is. If
20 it is closely related to what's in the second
21 species, there would be a higher expectation but
22 if you've tested it in one species even though it
23 is a monocot, you have to test it in your second
24 species. Or any other species before making that
25 conclusion.

1 **(Recess taken)**

2 Q. Welcome back, Dr. Silverstone.

3 A. **Thank you.**

4 Q. Did you discuss your testimony with
5 counsel during our short break?

6 A. **No, I did not.**

7 Q. I would like to return to our discussion
8 about monocot and dicot promoters. Just in
9 summary, I think we discussed a skilled artisan
10 would have had access to species-specific dicot
11 promoters, correct?

12 A. **Yes. They would have access to**
13 **species-specific dicot promoters.**

14 Q. A skilled artisan would have had access
15 to promoters that worked in multiple dicot
16 species as well, correct?

17 A. **They would have access to promoters that**
18 **work in more than one dicot species.**

19 Q. The same is true for monocot promoters --
20 a skilled artisan would have had access to
21 species-specific monocot promoters as well,
22 right?

23 A. **Yes. There would be species-specific**
24 **monocot promoters.**

25 Q. And skilled artisans would have had

1 access to promoters that had been established to
2 work in multiple monocot species as well,
3 correct?

4 MR. RUTT: Objection. Form.

5 A. There would be promoters that an artisan
6 could use that would work in more than one dicot
7 species. I'm sorry. Monocot?

8 Q. Monocot.

9 A. Sorry. An artisan would have access to
10 promoters that work in more than one monocot
11 species.

12 Q. Do you still have Table 8 in front of
13 you?

14 A. I do have Table 8.

15 Q. Table 8 of the '055 patent, and I wanted
16 to start with monocots.

17 Do you see Construct pDAB 4101 about
18 halfway down Table 8?

19 A. pDAB. 4101, yes, I see that.

20 Q. For reference there is a bit of a key or
21 legend on the next page. My question --

22 A. Okay.

23 Q. -- for you is that Table 8 discloses --
24 let me start again.

25 So pDAB 4101 is a construct that used the

1 maize Ubi-1 promoter with the AAD-12 gene,
2 correct?

3 **A. Yes. The AD -- AAD-12 gene and the**
4 **promoter is the maize Ubi-1.**

5 Q. Table 8 discloses in the third column
6 that the same expression construct, pDAB 4101 was
7 used to transform both corn and rice, correct?

8 **A. Yes. It was used -- it was used in corn**
9 **and rice.**

10 Q. And corn and rice are both monocot
11 species?

12 **A. They are both monocots.**

13 Q. At the top of Table 8 do you see
14 construct pDAB 724?

15 **A. Yes, I see 724.**

16 Q. Construct pDAB 724 used the dicot
17 promoter Arabidopsis Ubi-10?

18 **A. Yes, I see the promoter is Arabidopsis**
19 **Ubi-10.**

20 Q. pDAB 724 was used as transform
21 Arabidopsis, cotton and soybeans, correct?

22 **A. Yes. It was used for Arabidopsis, cotton**
23 **and soybean.**

24 Q. Keep a finger on Table 8, but could we
25 turn to Column 101 for a second. Let me know

1 when you are there.

2 **A. Okay. I am at Column 101.**

3 Q. Do you see in line 27 there is a header
4 "Tobacco Cell Transformation with AAD-12 (v1) and
5 2,4-D Selection"?

6 **A. I see that.**

7 Q. And line 34 of Column 101 states that
8 "The plasmid DNA vector used was pDAB724,"
9 correct?

10 **A. Yes. It says they used pDAB724.**

11 Q. In addition to Arabidopsis, cotton and
12 soybean, pDAB724 was used to transform tobacco
13 cells. Example 24 on Column 101, correct?

14 **A. Yes. It was used for expression in
15 tobacco cells.**

16 Q. Please return to Table 8. Let me know
17 when you are there.

18 **A. Okay. I am at Table 8.**

19 Q. Actually I have one follow-up question.
20 Arabidopsis, cotton, tobacco, and soybeans are
21 dicot species, correct?

22 **A. Arabidopsis, cotton, tobacco and soybean
23 are all dicots, yes.**

24 Q. Table 8, do you see Construct pDAB3759?

25 **A. Yes. I see 3759.**

1 Q. It used -- I will start again.

2 Construct pDAB3759 used the Cassava vein
3 mosaic virus promoter. CsVMV, correct?

4 A. Yes. It used the CsVMV promoter.

5 Q. The expression construct pDAB3759 was
6 used to transform Arabidopsis, canola, and
7 soybeans, correct?

8 A. Yes. It was used for Arabidopsis,
9 canola, and soybean.

10 Q. Arabidopsis, canola, and soybeans are
11 dicot species?

12 A. Arabidopsis, canola, and soybean are all
13 dicot species, yes.

14 Q. So with pDAB724, pDAB4101, and pDAB3759,
15 you would agree with me that the '055 patent
16 discloses at least three expression constructs
17 that were used across multiple monocot species or
18 across multiple dicot species?

19 MR. RUTT: Objection. Form.

20 A. These constructs were used across two or
21 three or four monocot or dicot species, yes.

22 Q. Could we turn back to your declaration,
23 please, Exhibit 1003. If we could turn to your
24 CV, which is Appendix A to your declaration,
25 correct?

1 **A. Yes. My CV is Appendix A.**

2 Q. Is your CV still accurate and up to date?

3 **A. It is accurate and up to date.**

4 Q. Did you tailor your CV in any way for
5 this case?

6 **A. No. It's not tailored for this case.**
7 **This is my standard CV.**

8 Q. So your CV accurately reflects how you
9 hold yourself out in the agriculture industry?

10 **A. Yes. It reflects my experience and work**
11 **and education.**

12 Q. At the top of your CV, you have a section
13 titled "Skills and Expertise," correct?

14 **A. Yes.**

15 Q. And in this section you listed your areas
16 of expertise?

17 **A. I listed particularly areas of expertise**
18 **that I highlighted, yes.**

19 Q. The biology-related areas of expertise
20 are molecular genetics and plant physiology; is
21 that correct?

22 **A. As well as biotechnology and crop**
23 **protection, product development at the top of my**
24 **area there.**

25 Q. Um-hmm. And within the fields of

1 biotechnology and crop protection, your expertise
2 is in plant physiology and molecular genetics,
3 correct?

4 **A. Those are two areas of my expertise, but**
5 **I do have experience in other areas.**

6 Q. What are the other areas that you have
7 not listed?

8 **A. I have not included biochemistry,**
9 **enzymology, field biology. Those are off the top**
10 **of my head. I wasn't prepared to go through my**
11 **full -- everything I've experienced. There are a**
12 **number of other areas that I've -- I limited the**
13 **space here to not be comprehensive, but just a**
14 **few of the areas since I was -- because my --**
15 **because I didn't want this area to be too long.**

16 Q. Of the 16 items that you listed in the
17 bullet points under Skills and Expertise, are
18 these areas in which you have experience or in
19 which you hold yourself out as having expertise?

20 MR. RUTT: Objection. Form.

21 **A. I would -- they are pretty broad areas,**
22 **but I consider myself to have expertise in each**
23 **of these.**

24 Q. Let's turn to your educational
25 background. After your undergraduate studies,

1 you obtained a Ph.D. in plant physiology at the
2 University of California, Davis?

3 **A. Yes. That was the -- it was a plant**
4 **physiology program.**

5 Q. Then you did a postdoctoral fellowship at
6 Duke University?

7 **A. Yes. That -- following my Ph.D. I went**
8 **to Duke for postdoctoral research.**

9 Q. And after your post doc you spent your
10 entire career as Syngenta up until February 2023,
11 correct?

12 **A. Yes. After working at Duke, I joined**
13 **Syngenta, though the first year it was Novartis,**
14 **which is a parent company that Syngenta formed**
15 **from a merger a year later. But -- so I worked**
16 **with Syngenta until I left.**

17 Q. Your final role in residue science at
18 Syngenta appears to have had a regulatory
19 component to it; is that right?

20 **A. So it is -- I know each company has**
21 **different terms for different types of regulatory**
22 **research or science or filings. So yes, the**
23 **residue science supports regulatory filings.**

24 Q. What is your understanding of what
25 residue science is?

1 A. I realize residue science, as I say this
2 may be a more specific term for Syngenta, but
3 residue science looks at what chemical species
4 are remaining on crops or processed materials, or
5 depending on the use of a pesticide, other
6 surfaces or places and it looks at what -- it is
7 looking for what is -- take a step back.

8 It's looking for either the pesticide
9 directly or breakdown products that are required
10 to be identified for regulatory filings.

11 Q. And you say in the second bullet point
12 that you supported the product development of new
13 active ingredients, correct?

14 A. Sorry. Yes. So the regulatory -- the
15 residue science team supported both new active
16 ingredients as well as existing pesticides on new
17 crops or new uses.

18 Q. What does it mean to expand the use of
19 registered pesticides? Could you explain that at
20 a high level?

21 A. It -- it has a couple of different uses,
22 but a couple simple ones are using a pesticide
23 that has been approved in one country in another
24 country where it has not yet been approved. So
25 doing the work to get approval in a second

1 country or region.

2 Another is to use a pesticide that has
3 been approved for one crop in that -- in one
4 country or region on another crop in that same
5 country or region for which it did not have
6 approval originally.

7 Q. Would Syngenta have to obtain regulatory
8 approval on a registered herbicide for a new use
9 on a different crop or in a different country?

10 A. So -- and of course, for countries you
11 always follow whatever the rules are for that
12 country. And there's so many countries in the
13 world. Each one has its own rules.

14 But in general, yes, if you are using
15 a -- if you are using a pesticide on a new crop
16 in one country or taking it to another country
17 where it does not have approval, there is an
18 approval process that is required.

19 Q. So let me simplify this a minute.

20 So let's take the United States, for
21 example. I assume you are familiar with the
22 regulatory process in the U.S.?

23 A. Yes.

24 Q. Okay. If you had a registered pesticide
25 and wanted to market it for a new use on a

1 different crop, you would have to go through the
2 regulatory process to get approval for that crop,
3 correct?

4 **A. Yes. You would need to go through the**
5 **process for expanding the use to a new crop.**

6 Q. Among the categories of pesticides that
7 are regulated by the USDA, does that include
8 herbicides?

9 **A. So, we worked with -- so I try to**
10 **remember back to all my -- because it can be more**
11 **complicated, depending on the use -- EPA is the**
12 **primary pesticide approval agency for all of the**
13 **U.S. but, of course, states also have their own.**
14 **Then -- yeah. So that's the main national**
15 **regulator.**

16 Q. Understood.

17 So to register an herbicide for a new
18 use, you may have to go through the USDA, the EPA
19 and also some state governmental authorities?

20 **A. Yes. Once again, depends on the**
21 **pesticide and use.**

22 Q. In your experience does Syngenta develop
23 and commercialize transgenic crop seeds?

24 **A. Syngenta does develop transgenic crops.**

25 Q. Have those transgenic crop seeds included

1 recombinant herbicide resistance genes?

2 **A. Yes. Syngenta has worked on developing**
3 **herbicide -- can I take a quick definition here?**
4 **Is that appropriate?**

5 Q. Sure.

6 **A. So my experience is that herbicide**
7 **tolerance is for crops and resistance is for**
8 **weeds. Is that okay to use that terminology?**

9 Q. Yes. Let me ask the question using your
10 terminology.

11 Have Syngenta transgenic crop seeds
12 included recombinant herbicide tolerance genes?

13 **A. Yes. Syngenta has worked on developing**
14 **crops that are tolerant to herbicides.**

15 Q. Has Syngenta commercialized any of those
16 crops?

17 **A. So -- just thinking. So Syngenta has**
18 **commercialized products that have herbicide**
19 **tolerance genes in them, yes.**

20 Q. Thank you. That wasn't intended to be a
21 tough question.

22 **A. I know. I know. I just --**

23 Q. And are farmers the customers for
24 Syngenta's transgenic herbicide tolerance seeds
25 in your experience?

1 MR. RUTT: Objection. Scope.

2 A. So Syngenta has -- let me ask a -- ask a
3 clarifying question before I answer.

4 Are you talking about U.S. or other
5 countries?

6 Q. We can stick with the U.S., that's fine.

7 A. Okay.

8 Syngenta has several different modes of
9 marketing, and it may be to farmers directly or
10 it may go through middlemen to farmers. So the
11 customers may be middlemen or they may be the
12 farmers directly.

13 Q. But to be clear, the end consumer is the
14 farmer, correct?

15 A. The end consumer is the farmer.

16 Q. After purchasing herbicide tolerance
17 seeds, farmers are capable of spraying their
18 fields with the recommended herbicides to kill
19 weeds while avoiding damage to their crops,
20 correct? Is that the idea?

21 A. Yes. So the farmers can use any of the
22 approved herbicides. They are not obviously
23 required to, depending on their need.

24 Q. When did you stop working at Syngenta?

25 A. February of 2022.

1 Q. Why did you leave?

2 A. I left because -- as you asked, I had
3 worked my entire post-academic life at Syngenta,
4 and I was ready to make a change personally in my
5 work and time.

6 Q. You state in your declaration that you
7 accepted a position at AgStone Research LLC,
8 correct?

9 A. That is correct.

10 Q. Is AgStone Research a single member LLC?

11 A. It is a single member LLC.

12 Q. You started AgStone?

13 A. I did start AgStone.

14 Q. So did you accept a position from
15 yourself?

16 A. I guess, yes.

17 Q. Okay.

18 I am looking at your CV, Dr. Silverstone.
19 At Cal Davis you performed research on
20 biosynthesis of the plant hormones ethylene and
21 auxin?

22 A. Yes. As part of my thesis and work in
23 the lab, I worked on ethylene and auxin.

24 Q. Then in your post doc you performed
25 research on signal response pathway of the plant

1 hormone gibberellin?

2 **A. Excuse me, yes. I worked on gibberellin**
3 **research -- even I can misspell it --**
4 **mispronounce it. Gibberellin research and**
5 **biosynthesis. Signal response in biosynthesis.**

6 Q. And your gibberellin research was carried
7 out in what you referred to as the model plant
8 Arabidopsis, correct?

9 **A. Yes. My work was in Arabidopsis.**

10 Q. What did you mean by referring to
11 Arabidopsis as a model plant?

12 **A. In basic research, which was the type of**
13 **work I was doing in my post-doctoral research, we**
14 **wanted to work on a plant that is easy to**
15 **manipulate in the lab, does not take up a lot of**
16 **space, but what you see as far as response and**
17 **development could be applied to other plants,**
18 **much like flies are used or mice.**

19 **So that's what I meant by --**

20 Q. Once you joined Syngenta in 1999, first
21 as Staff Scientist I, then Staff Scientist II,
22 you worked on expression constructs and promoters
23 for transforming plants, correct?

24 **A. Yes. Part of my work was working on**
25 **expression constructs and promoters.**

1 Q. What were your other roles at that time?

2 A. So in addition to -- so in addition to
3 designing the expression constructs, I also
4 analyzed transgenic plants for their performance.
5 Then I have listed here the external collaborator
6 working on -- we worked on a project that was
7 geared towards animal feed, improving soybean for
8 animal feed.

9 Q. What aspect of the soybean was being
10 improved?

11 A. I can't really talk about that. Sorry.

12 Q. In 2003 you transitioned to the position
13 of project leader, correct?

14 A. Yes.

15 Q. You stayed in that role until 2007?

16 A. That particular project leader role, yes.

17 Q. And were you still doing benchtop
18 research as a project leader or was this a shift
19 to a managerial role?

20 A. There was a shift. I won't say it was
21 immediate from June of 2003, but during that time
22 period there was a shift from doing the wet bench
23 to working with scientists on the wet bench.

24 Q. Do you know roughly about what year that
25 would have been?

1 **A. I don't remember exactly. It was a**
2 **gradual but over the first couple of years is my**
3 **best recollection.**

4 Q. As project leader in the 2003 to 2007
5 time period, the first project you listed was the
6 Raw Starch Project, correct?

7 **A. That is the first one listed here. But**
8 **these are -- can be thought of as concurrent. It**
9 **is not perfectly concurrent but yes, that's --**

10 Q. That's fine. It's listed first under the
11 heading on the resume.

12 **A. Okay. Sorry. Yeah. Yes. That's first**
13 **listed under --**

14 Q. The Raw Starch Project that you listed
15 involved generating, analyzing transgenic plants
16 to express starch hydrolytic enzymes; is that
17 right?

18 **A. Yes. We were working on starch**
19 **hydrolytic enzymes.**

20 Q. Did those enzymes include alpha-amylases?

21 **A. Those -- yes. I'm just thinking about**
22 **what has been revealed to the public. So I know**
23 **we have revealed that. So yes, those did include**
24 **alpha-amylases.**

25 Q. Are there any other starch hydrolytic

1 enzymes that you used?

2 **A. There are others, I can mention**
 3 **glucoamylases, but I can't talk about others**
 4 **because they have not been revealed, to my**
 5 **knowledge.**

6 Q. Next on your CV in this timeframe was the
 7 Golden Rice Project, correct?

8 **A. That is correct.**

9 Q. The Golden Rice Project involved testing
 10 phytoene synthase genes from different plant
 11 species in rice, correct?

12 **A. Yes.**

13 Q. Then the third project listed was the
 14 Enogen Project; is that right?

15 **A. Yes. It is listed -- Enogen is a trade**
 16 **name, brand name for one of Syngenta's products.**

17 Q. The Enogen Project related to industrial
 18 ethenol production, correct?

19 **A. The initial work was focused on ethenol,**
 20 **industrial ethenol production. That's correct.**

21 Q. What else did that project involve other
 22 than working on industrial ethenol fermentation
 23 processes, for example?

24 **A. It -- there was a little bit at that time**
 25 **but much more later is Enogen is also being**

1 **marketed for animal feed, but the initial focus**
2 **was industrial ethenol production.**

3 Q. Would it be essentially the spent grain
4 from the fermentation process would then be used
5 as animal feed?

6 A. **No. It is for -- actually, the whole**
7 **grain that's -- yes, for the whole grain that's**
8 **used in typical cattle soy grain diets, as well**
9 **as for dairy cows, which, of course, consume the**
10 **whole plant.**

11 Q. In 2007, looks like you were then
12 promoted to senior project leader which was your
13 role until about 2010, correct?

14 A. **That is correct.**

15 Q. In this role you were still in the
16 managerial role rather than doing wet bench
17 research?

18 MR. RUTT: Objection. Form.

19 A. **My role is primarily as a managerial**
20 **role.**

21 Q. Were you still doing some wet bench
22 research between 2007 and 2010?

23 A. **No. At that point I was not doing any**
24 **wet bench work.**

25 Q. Next you became global project manager

1 for soybean trades from 2010 to 2014, correct?

2 **A. That is correct. I was global project**
3 **manager.**

4 Q. At this time you were in a managerial
5 role rather than doing wet bench research?

6 MR. RUTT: Objection. Form.

7 **A. Yes. I was also a manager and -- as a**
8 **project manager coordinator-type role.**

9 Q. And you listed an Herbicide Tolerance
10 Soybean Project during the 2010 to 2014
11 timeframe, correct?

12 **A. Yes. I led a Syngenta Herbicide Tolerant**
13 **Project for soybeans.**

14 Q. This was a next generation HPPD-tolerant
15 soybean that was being developed, correct?

16 **A. Yes. That's probably a contraction of**
17 **terms, of course. So it's a next generation on**
18 **herbicide tolerance product where the soybean**
19 **would be tolerant to herbicides that are HPPD**
20 **inhibitors. HPPD is an enzyme in plants.**

21 Q. You state that you oversaw field biology,
22 regulatory, product safety, marketing, IP and
23 legal. Is that right?

24 **A. Yes. I oversaw project team that**
25 **included all these areas and coordinated the**

1 **efforts on these different --**

2 Q. Starting with field biology, what were
3 your responsibilities in the HPPD Soybean Project
4 for field biology?

5 A. So field biology is -- covers a lot of
6 ground. So we were doing work on proof of
7 concept, which is -- does something, work or not.
8 More a yes, no. As well as testing under
9 rigorous commercial conditions, but using
10 scientific protocols so that you have robust data
11 that the statistical design of the studies
12 indicate you can say whether something works or
13 how much.

14 So my role involved contributing to the
15 design of the studies and then when we got the
16 data back, working on the analysis of what does
17 this mean. Because you are looking not just at
18 one location, but multiple locations, multiple
19 years on multiple treatments. So it is quite a
20 complex protocol.

21 Q. That was all aimed at furthering the
22 commercial development program for the HPPD
23 soybean?

24 A. Yes. That was all for the commercial --
25 that was all with the target of developing a

1 commercial product for HPPD soybean.

2 Q. And for the next item, regulatory, what
3 were your responsibilities in HPPD soybean
4 product for regulatory?

5 A. So one of the challenges -- well, it's
6 for biotech, it's for crop protection. And then
7 jointly when you have biotech and crop protection
8 is when you launch a product, obviously it has to
9 work, which I just talked about. The field
10 biology is, do you have something that works?

11 But in this regulatory heavy environment,
12 that's -- to the scientist, that's the most
13 important. But to the product development, that
14 is just one step. So for regulatory we need to
15 get regulatory approvals in -- we need regulatory
16 approvals for the transgenic crop in every
17 country it will be grown, and then in every
18 country where the grain developed from that crop
19 will be sold, imported and sold.

20 Then, of course, since this is not just a
21 transgenic plant project, there is a herbicide
22 involved. You also have whatever herbicide
23 approvals are needed on top of that.

24 And if these all worked at the same time,
25 it would be great, but each country's regulatory

1 system is unique. And the commercial people want
2 a product developed and so you have all these
3 regulatory pieces that are required to be in
4 place before you have the commercial product.

5 So my role was not to do the regulatory
6 work but to help coordinate to make sure all the
7 regulatory pieces are in place on the timeline
8 because the project manager is owner of the
9 timeline. On the timeline, we need for product
10 or hope for product launch. That's a lot. But I
11 hope that explains.

12 Q. I know there is a lot at issue here, but
13 I think what I was hearing was that the herbicide
14 tolerant crop and the matching herbicide are
15 essentially a crop protection system; is that
16 right? They work today.

17 A. They -- so yes, they work together and
18 nothing is ever simple in agriculture, of course.
19 But you can launch -- you can get approval for
20 the crop. You do get approval for the crop
21 separately for the approval for the -- but they
22 are -- but the idea is that you have a crop
23 system -- right? -- that is herbicide plus seed.

24 Q. Right.

25 So you get approval for the seeds, then

1 you get approval for the herbicides intended to
2 be used with the seeds?

3 **A. If you don't have it already, yes.**

4 **Q. For product safety, what were your**
5 **responsibilities in the HPPD Soybean Project for**
6 **product safety?**

7 **A. That's good question because, once again,**
8 **I should refer to Syngenta-specific terminology.**

9 **So product safety means the lab work,**
10 **field work, any data or analysis that is used for**
11 **regulatory filings. Some companies call it**
12 **regulatory science. Syngenta calls it product**
13 **safety.**

14 **So the work of the product safety**
15 **teams -- and I talked about the regulatory**
16 **approvals we need in each agency and each region**
17 **or country -- the product safety team are**
18 **developing the data or data packages that the**
19 **regulatory team needs to be able to file for the**
20 **regulatory approvals.**

21 **So it's -- so the work is then making**
22 **sure, once again looking at that timeline,**
23 **looking backwards, what the deadlines of**
24 **regulatory groups need for the data, the product**
25 **safety studies or analysis has been completed to**

1 be able to give to the regulatory teams.

2 Q. And for marketing, what were your
3 responsibilities for marketing in the HPPD
4 Soybean Project?

5 A. So marketing is important because
6 whatever we are developing needs to be sold, of
7 course.

8 And so the marketing team is helping
9 to -- you know, getting at what's going to be
10 sold, they are the drivers on the product
11 description at the end. And so - and of course
12 it is not as simple as they write on a black
13 board and everything flows.

14 The idea is there's this -- what we are
15 doing, when I talked about field biology,
16 regulatory product safety is then working with
17 marketing to make sure whatever is happening,
18 whatever we are learning fits to the product
19 description or product specifications that
20 marketing will be selling.

21 Q. So the marketing description has to
22 reflect the product safety and the regulatory and
23 the field biology work that was going on?

24 A. Yes. The marketing has to -- they have
25 to reflect where your approvals are, how it is

1 safe to use, how the regulatory agencies allow
2 it, saying it is safe to use and how the
3 performance is in the field.

4 Q. For IP and legal, what were your
5 responsibilities in the HPPD Soybean Project?

6 A. So IP, of course in a company like
7 Syngenta or any company, of course, but certainly
8 in Syngenta, anything we do has to be either with
9 IP that we have generated and captured or, of
10 course, proprietary is -- kind of fits in that,
11 too, or that we have patents or all the work.
12 So -- or we have licenses, too. Obviously
13 Syngenta does license in IP.

14 So in that product we are developing the
15 transgenes or any components or plant
16 transformation technologies or all of the work we
17 are doing, we have either secured the IP. And
18 so we are working with our IP lawyers, making
19 sure that either we have secured the work or it's
20 our own work or we have licensed it, or whatever
21 we are doing, we are not violating anyone's
22 intellectual property.

23 Legal is more about having the right --
24 we work with a lot -- when I was working in
25 Syngenta, we work with a lot of third parties.

1 **You need to have the right -- you know, obviously**
2 **the right legal structures, depending on what**
3 **you've done. So it's all very important.**

4 Q. So in the HPPD Soybean Project, is it
5 kind of fair to say you were quarterbacking the
6 overall roles of how field biology, regulatory,
7 product safety, marketing, IP and legal kind of
8 came together in this project?

9 A. Yeah. It was a -- yeah, a quarterback
10 **coordinating role. Understanding what's**
11 **happening in every area and bringing everyone**
12 **together.**

13 Q. Who contributed to the HPPD inhibitor
14 tolerance gene? Was it Bayer or Syngenta on this
15 project?

16 A. So the main gene we were working on was a
17 **Syngenta gene.**

18 Q. Did you work on the development of the
19 HPPD inhibitor tolerance gene?

20 A. I joined the project when the gene had
21 **already been identified. So I was working -- my**
22 **stage of the project was on a -- it was on what**
23 **could be generally termed product development.**

24 Q. What was Bayer Crop Science's role in
25 this development project?

1 MR. RUTT: Objection. Form.

2 A. It was a -- give me a second to think
3 about what I can reveal that's published.

4 Q. Yeah. Why don't we take this in two
5 steps.

6 In the last bullet point in your CV for
7 the HPPD project, you wrote "Oversaw co-
8 development project with Bayer Crop Science."
9 Correct?

10 A. That is correct.

11 Q. What was Bayer Crop Science's role, at a
12 high level.

13 A. At a high level Bayer Crop Science was
14 also very interested in a soybean that was
15 tolerant to HPPD herbicides. And because of that
16 joint interest, for a period of time, because
17 Bayer has HPPD inhibitor herbicides as does
18 Syngenta, there was seen an opportunity to work
19 together to have a joint co-development project.

20 Q. In 2014 you became the North America
21 biology lead for Abiotic Stress Management,
22 correct?

23 A. That is correct. I was Abiotic Stress
24 Management lead.

25 Q. This was another management role rather

1 than wet bench research?

2 MR. RUTT: Objection. Form.

3 **A. Yes. This role was mainly field**
4 **research, what we call in Syngenta. So it was a**
5 **role overseeing field biologists or the**
6 **scientists who work in the field on farms, on**
7 **plots. So yeah, it was a managerial role, a**
8 **project managerial role of field research, as**
9 **well as some limited lab and greenhouse research.**

10 Q. Abiotic stresses are things like drought
11 or high or low temperature extremes; is that
12 right?

13 **A. Yes. So a biotic stress is organisms**
14 **like insects or disease, and abiotic stress is**
15 **environmental stresses.**

16 Q. In 2019 you transitioned from North
17 American lead to product safety operations,
18 correct?

19 **A. Yes, I became the product safety**
20 **operations lead.**

21 Q. And then in 2020 you transitioned to
22 technical leader for residue science, which we
23 previously talked about, correct?

24 **A. Yes. We talked about my role as the**
25 **leader for residue science.**

1 Q. So your wet bench work occurred generally
2 in your Ph.D. program, your post doc, and then at
3 Syngenta from 1999 until there was a transition
4 when you were project leader between 2003 and
5 2007; is that right?

6 MR. RUTT: Objection. Form.

7 A. That is correct. That is when I
8 primarily was working on the bench.

9 Q. And since about 2007 you were generally
10 in managerial roles?

11 A. Yes. My role was more managerial.

12 Q. In your wet bench laboratory work, did
13 you ever make any enzyme variants?

14 MR. RUTT: Objection. Form.

15 A. I will have to keep this at a high level
16 because of proprietary reasons, but yes. I
17 worked on a number of different protein variants.

18 Q. Did you make those protein variants or
19 were you involved in testing those protein
20 variants?

21 MR. RUTT: Objection. Form.

22 A. Both.

23 Q. Can you explain at a high level the work
24 that you did in making enzyme variants?

25 A. Yeah. Give me a minute to think about --

1 **once again, a number that involved proprietary**
2 **work.**

3 **So it involved using the technologies at**
4 **the time to make changes to proteins that we**
5 **hoped would be -- would improve them and then**
6 **testing those in planta, in the plant.**

7 Q. Would you personally select the changes
8 that were made to the proteins that you hoped
9 would improve them?

10 MR. RUTT: Objection. Form.

11 A. **For some of those I selected specific**
12 **changes and for some of them it was a technique**
13 **to generate a larger number of changes.**

14 Q. At a high level how did you go about
15 selecting specific changes to make to an enzyme
16 sequence?

17 A. **We looked for targets that would**
18 **stabilize activity, which means the enzyme would**
19 **not be degraded so you're -- you have a better**
20 **performance. Or we looked for techniques that**
21 **might through screening give us better activity.**

22 Q. In looking for targets that would
23 stabilize activity, what sequence information or
24 other information would you look at to guide
25 those selections?

1 A. We would look at the protein structure
2 and for stabilization we looked for signals that
3 were involved in localization or degradation of
4 the protein and try to change those.

5 Q. When you looked at protein structure,
6 were you looking at a sequence or at a crystal
7 structure?

8 A. Well, of course, you start with sequence
9 but these were not novel proteins we were working
10 on. So there is -- I will say a fair amount,
11 they are not the best studied proteins, but there
12 is information known about them. So we know --
13 depending on the proteins, we know something
14 about their structure and signals. So we were
15 driven by, I'll say, structural information.

16 Q. That was a combination of sequence, as
17 well as structures that were understood from
18 other family members?

19 MR. RUTT: Objection. Form.

20 A. It's from -- from sequence and then
21 structure, either other family members or these
22 proteins that other labs -- specific proteins
23 other labs have studied.

24 Q. Can you tell me what protein family you
25 were working within?

1 **A. So there's some I can't. Some are the**
2 **glycolytic proteins are the ones I can talk**
3 **about.**

4 Q. They were not alpha-KG dioxygenases?

5 **A. For this project, no, they were not**
6 **alpha-KG dioxygenases.**

7 Q. Other than -- I will start again.

8 Did you make any enzyme variants outside
9 of the scope of the starch hydrolytic enzyme
10 project at Syngenta?

11 MR. RUTT: Objection. Form.

12 **A. I did, but I can't talk about those,**
13 **because they are research projects that never**
14 **developed.**

15 Q. They were at Syngenta?

16 **A. They were at Syngenta.**

17 Q. Aside from selecting particular sequence
18 modifications to make, you also referred to
19 techniques for generating a larger number of
20 variants; is that right?

21 **A. Yes.**

22 Q. Can you tell me at a high level what
23 those techniques were?

24 **A. Those -- yeah. Once again, thinking**
25 **about what I can say.**

1 Those techniques would be similar to gene
2 shuffling techniques.

3 Q. So --

4 A. I can't say the specific technique that
5 was used, but you can think of them like gene
6 shuffling techniques.

7 Q. About how many variants were made using
8 the gene shuffling technique in the starch
9 hydrolytic enzyme project?

10 MR. RUTT: Objection. Form.

11 A. I don't -- it has been a long time, but
12 it would be on the order of thousands.

13 Q. And looking back at your CV, what role
14 were you in at the time that this work was going
15 on? Was it Staff Scientist I?

16 MR. RUTT: Objection. Form.

17 A. So at this stage it was during my project
18 leader where I was -- yeah, some of that work was
19 in our lab and some with collaboration.

20 Q. And when you were project leader, did you
21 have enzymologists as part of your team to help
22 generate these enzyme variants?

23 A. So we had -- yeah. So in my project team
24 there were enzymologists, as well as people with
25 molecular biology expertise to do this work and

1 **contribute to the work.**

2 Q. And how much of the enzyme variant design
3 did you contribute as opposed to the team members
4 working under you --

5 MR. RUTT: Objection. Form.

6 Q. -- at that time?

7 MR. RUTT: Objection. Foundation.

8 **A. So at this stage I was primarily**
9 **contributing to the design, although as a team**
10 **leader we did have group discussions. So it was**
11 **also in collaboration with team members.**

12 Q. So would team members come to you with
13 proposed designs or were you sort of top down
14 proposing designs to the team to generate for
15 enzymes?

16 **A. Yeah -- sorry. Didn't want to talk over**
17 **you.**

18 It was the top down. So I was the
19 **designing of the product -- project. But if**
20 **someone had a good idea, obviously I would listen**
21 **to them.**

22 Q. I'd just like to distinguish between
23 designing the product or the project versus like
24 who was actually selecting mutations to make
25 within the enzyme. Was that you or was that

1 someone else on this Raw Starch Project team?

2 MR. RUTT: Objection. Form.

3 A. Thank you for the clarification.

4 So yes, on this I was designing the
5 changes we wanted to make on the -- on the
6 protein.

7 Q. When you say you were designing the
8 changes, was that identifying the profile or the
9 properties you wanted or was that literally going
10 through and specifying particular amino acids
11 that needed to be changed?

12 MR. RUTT: Objection. Form.

13 A. So it was a combination of activities.
14 So certainly the profile and activity as the
15 output, but then the strategy because -- because
16 it -- a lot of this was not specific changes in
17 amino acids. We were developing a library. So a
18 lot of that activity was carried out by skilled
19 technicians.

20 Does that answer your question?

21 Q. I just want to understand.

22 Were you suggesting or identifying
23 specific amino acid mutations to make to generate
24 the variants or would that work have been
25 performed by the enzymologists working under your

1 project leader direction?

2 MR. RUTT: Objection. Asked and
3 answered.

4 A. So I was specifying the type of changes
5 we wanted.

6 Q. And what types -- what do you mean by
7 types of changes?

8 A. So if we wanted to change a section of
9 the protein, or an amino acid, that was my
10 direction or in a gene shuffling, obviously, you
11 are not making one change, you are making a
12 library of changes.

13 So I was designing the gene shuffling
14 strategy, but the output is a -- is -- random is
15 not the right word, because it is a strategy, but
16 it's a diverse output. You are not specifying
17 every single output.

18 Q. So can you tell me sitting here today
19 under oath if you picked any specific amino acid
20 residues to change within the starch hydrolytic
21 enzyme or would those have been proposed to you
22 by your team members?

23 MR. RUTT: Objection. Form.

24 A. I don't want to say no one ever proposed
25 changes to me, because that -- because we took

1 the team approach. And as I have said, if
2 someone has a good idea on the team, I would
3 listen to it and if it makes sense, accept it.

4 I can't tell you today that every single
5 change we made was my idea.

6 Q. But even though you had enzymologists on
7 your team, it was you who was proposing, for
8 example, change leucine to isoleucine at position
9 X? That's what I want to know.

10 A. Yes. The people on my team were -- doing
11 that work were for the most part technician
12 level. This is not in a pejorative, as I said,
13 anyone can have a good idea. But the role --
14 their role was primarily to carry out the
15 experiments.

16 Q. Okay. What was the educational
17 background for these technicians?

18 A. They were mainly BA/BS or some may have
19 had masters.

20 Q. Did you also have technicians working in
21 plant transformation laboratories?

22 A. So Syngenta like many companies has a lot
23 of different teams. So my work -- so the plant
24 transformation work occurred in the plant
25 transformation team, which has a variety of

1 **scientists. Does that --**

2 Q. Yeah, that's fine.

3 Since the Raw Starch Project, did you
4 personally work on the design of enzyme variants
5 while you were at Syngenta?

6 MR. RUTT: Objection. Form.

7 A. Sorry if I am hesitating. I am thinking
8 about some of the proprietary work we did in our
9 insect control project.

10 So I worked on protein variants in the
11 insect control project.

12 Q. What did that work entail?

13 A. This I need to be at high level because
14 it is proprietary work that did not get developed
15 into products.

16 But that involved directing team members
17 to work on proteins and variants of proteins that
18 we wanted to test for insect toxicity when
19 expressed in plants.

20 Q. So this was a managerial role?

21 A. Yes.

22 MR. RUTT: Objection. Form.

23 Q. You were not doing the hands-on design of
24 the enzyme variants, correct?

25 MR. RUTT: Objection. Foundation.

1 **A. For this, I was not designing the protein**
2 **variants.**

3 Q. Your testimony is that in the Raw Starch
4 Project you were doing hands-on design of the
5 enzyme variants; is that right?

6 **A. Yes. In raw starch I was doing hands-on**
7 **design.**

8 Q. That Raw Starch Project, that occurred
9 between 2003 and 2007.

10 Is that the last time you did hands-on
11 enzyme variant design research?

12 MR. RUTT: Objection. Form.

13 **A. That's the last time I was making the**
14 **decisions myself, but I was involved with --**
15 **whenever I was working on a project, I**
16 **understood -- my -- I always understood what was**
17 **the science and activity going on in my projects.**

18 Q. I can understand that, but under your
19 skills and expertise section of your CV, you
20 don't list enzyme engineering as one of your
21 areas of expertise, do you?

22 **A. No. I don't list enzyme engineering**
23 **because I could not -- I had to list -- well, I**
24 **chose to limit the list of skills and expertise**
25 **and retain some higher level descriptions.**

1 Q. So in other words, enzyme engineering
2 didn't make the top 16 list for your skills and
3 expertise section of your CV, correct?

4 MR. RUTT: Objection. Form.

5 A. I chose to emphasize my managerial skills
6 in the skills and expertise.

7 Q. I think we previously agreed that your CV
8 accurately reflects how you hold yourself out in
9 the agricultural industry, correct?

10 MR. RUTT: Objection. Form.

11 A. My CV accurately reflects my educational
12 and professional experience in the agricultural
13 field and in the research field.

14 Q. Just a couple more questions about your
15 CV. You have a list of publications that begins
16 on page 50?

17 A. Yes.

18 Q. Is this still a complete list of your
19 publications?

20 A. To the best of my knowledge, it is a
21 complete list.

22 Q. Do you have any publications that relate
23 to the HPPD Inhibitor Tolerant Soybean project?

24 A. I don't have any publications related to
25 that project.

1 Q. Do you have any publications that relate
2 to the Insect Control Soybean Project that you
3 did at Syngenta?

4 A. No, because that project was entirely
5 proprietary. We did not publish any results.

6 Q. Do you have any publications that relate
7 to the Raw Starch Project that you performed at
8 Syngenta?

9 A. Besides patents, I don't have any
10 research publications related to raw starch.

11 Q. Have you published any research on plants
12 engineered for resistance to phenoxy herbicides?

13 A. I have not published any research on
14 plants resistant to phenoxy herbicides.

15 Q. Have you published any research on plants
16 engineered for resistance to pyridyloxy
17 herbicides?

18 A. I have not published any research on
19 plants resistant to pyridyloxy herbicides.

20 Q. Have you published any research on plants
21 engineered for resistance to any type of
22 herbicide?

23 A. No. I have not published any work on
24 plants resistant to herbicides.

25 Q. Have you published any research on

1 alpha-KG dioxygenase?

2 **A. I have not published any research on**
3 **alpha-KG dioxygenase.**

4 Q. Have you published any research on making
5 enzyme variants?

6 **A. I have not published any peer-reviewed**
7 **research on making enzyme variants.**

8 Q. I see a new clarification on peer
9 reviewed. Have you published any research at all
10 on making enzyme variants?

11 **A. No. Sorry, I have not published any**
12 **research on making enzyme variants.**

13 MR. DER00: Why don't we take a short
14 break.

15 (Recess taken)

16 BY MR. DER00:

17 Q. Welcome back, Dr. Silverstone.

18 I have one further question about your
19 CV. You have an Invited Talks section. Do you
20 see that?

21 **A. I do, yes.**

22 Q. Have you given any invited talks about
23 making enzyme variants?

24 **A. I am just -- the pause is I am going**
25 **through each of these to remember what I**

1 discussed at each of these meetings.

2 (Pause)

3 A. I have not given a specific subject of
4 invited talk on enzyme, creating enzyme variants.

5 Q. Your Ph.D. was in plant physiology,
6 correct?

7 A. My Ph.D., the general -- sorry, the
8 department -- the program is plant physiology.
9 Most of my work was biochemistry-related.

10 Q. You do not have a degree in protein
11 engineering or enzymology, do you?

12 A. My degree is in plant physiology.

13 Q. Would you please turn in your declaration
14 to paragraph 39. Are you there?

15 A. I am at 39, yes.

16 Q. In your paragraph 39, you reproduce
17 Independent Claim 1 and also cite Independent
18 Claim 32 and 33, correct?

19 A. Yes. I cite Independent Claim 1 and 32
20 and 33.

21 Q. Did you specifically address any other
22 claims of the '055 patent in your declaration?

23 A. I am trying to remember in that context.
24 Right now I'm not mapping what I said on to
25 specific claims, but --

1 Q. Sitting here right now, you can't point
2 me to any other claims that you addressed in your
3 declaration, correct?

4 MR. RUTT: Objection.

5 A. At this minute without going through and
6 mapping on -- on the spur, no, I can't.

7 Q. You did review your declaration in
8 preparation for the deposition today?

9 A. I did review my declaration.

10 Q. What is your understanding of what an
11 independent claim is?

12 A. In what context? You kind of -- so I'm
13 not sure what the question is.

14 Q. So I see reproduction of Claim 1 in your
15 declaration. I wasn't seeing discussions of
16 other claims. I would just like to understand
17 what you believe an independent claim is as
18 opposed to a dependent claim.

19 MR. RUTT: Objection. Form.

20 A. Well, I will be the first to admit I'm
21 not a lawyer. My understanding is that a
22 dependent claim, I guess I could define what a --
23 a dependent claim requires the claim that it's
24 dependent on an independent claim sits alone is a
25 novel claim. But I'm not a lawyer.

1 Q. So sitting here today, you don't recall
2 specifically addressing any of the dependent
3 claims of the '055 patent; is that right?

4 A. So once again, I'm not a lawyer. I know
5 that a number of items in my declaration, at
6 least from my nonlegal view, would -- could apply
7 to some of the dependent claims. But I'm not an
8 expert on whether my argument is on the
9 independent claim or the dependent claims.

10 Q. Sitting here today, you don't recall if
11 you directed any of your argument specifically to
12 the dependent claims?

13 A. Only in my generic statements addressing
14 the claims as a group.

15 Q. Do you hold yourself out as an expert in
16 the legal interpretation of patent claims?

17 A. I am an expert scientist and not a legal
18 expert.

19 Q. In your declaration do you provide any
20 opinions on the proper interpretation of the '055
21 patent claims?

22 A. From a -- I provide my opinion from a
23 subject matter expert on the claims.

24 Q. You are not providing opinions on the
25 proper legal interpretation of the '055 patent

1 claims?

2 MR. RUTT: Objection. Form.

3 A. My opinion is as an expert scientist.

4 Q. Did you offer any particular
5 interpretation of the '055 patent claims from a
6 scientific perspective?

7 MR. RUTT: Objection. Form.

8 A. Yes. My declaration contains my expert
9 scientific opinion on the claims.

10 Q. As I am looking at the table of contents,
11 I see that you provided an opinion on written
12 description and enablement, but I don't see a
13 section on claim construction, for example, or
14 how the claim should be interpreted. That's what
15 I'm getting at.

16 A. Once again, in Section 8, I don't know
17 the correct legal structure these fall, whether
18 this is what you are asking about or not.

19 Q. Okay. If you could turn back to
20 paragraph 39, I will give you an example.

21 In your declaration, looking at Claim 1,
22 you didn't call out any particular terms from
23 Claim 1 to say that they had a particular
24 meaning. Like you didn't offer a definition of
25 recombinant or polynucleotide.

1 **A. Let me get to that. Continue.**

2 Q. Looking at Claim 1, you didn't call out
3 any of the particular terms in Claim 1 as having
4 a specific meaning to one skilled in the art.

5 You didn't call out recombinant or
6 polynucleotide for definition, did you?

7 **A. I did not call out any specific terms.**

8 Q. Would you please turn to paragraph 75 of
9 your declaration.

10 In paragraph 75, you indicate that, "The
11 scientist needs to be skilled in protein and
12 nucleic acid analytic techniques to confirm the
13 presence of the transgene, number of copies,
14 intactness of the inserted DNA, its location in
15 the genome, and the expression of the protein,"
16 correct?

17 **A. That is correct.**

18 Q. You also stated that, "The plants need to
19 be propagated for several generations to produce
20 homozygous seed for testing of the herbicide
21 tolerance in planta," correct?

22 **A. Yes. I wrote that, correct.**

23 Q. In your experience were the types of
24 tasks that you describe in paragraph 75 important
25 in your commercial crop development work at

1 Syngenta?

2 **A. Can you rephrase the question, please?**

3 **Q. Yeah.**

4 In your experience, were the types of
5 tasks that you described in paragraph 75 among
6 the types that you used in commercial crop
7 development work at Syngenta?

8 **A. Yes. These techniques I have listed in**
9 **75 are used in commercial crop development.**

10 **Q. Would you please turn to the claims of**
11 **the '055 patent. Do the '055 patent claims**
12 **require inserting any particular number of copies**
13 **of a recombinant ADD-12 gene into the genome of a**
14 **plant?**

15 **A. I have to read through to see if there is**
16 **any.**

17 **(Pause)**

18 **A. In Claim 1 it describes a plant cell**
19 **comprising a recombinant polynucleotide that**
20 **encodes an AAD-12 protein. A implies to the**
21 **scientific that -- once again, this is not a**
22 **legal opinion, but when I read that as a**
23 **scientist that implies one.**

24 **Q. So we can agree that the '055 patent**
25 **claims don't require inserting more than one copy**

1 of a recombinant ADD-12 gene into the genome of
2 the plant?

3 MR. RUTT: Objection. Form.

4 A. It doesn't require more than one but it
5 describes one.

6 Q. Do the '055 patent claims require any
7 particular location in the genome to insert an
8 ADD-12 gene?

9 MR. RUTT: Objection. Form.

10 A. It does not require a location in the
11 genome but continuing on Claim 1 it says that --
12 it goes on to say, "an ADD-12 protein that
13 exhibits aryloxyalkanoate dioxygenase activity
14 wherein said activity enzymatically degrades a
15 phenoxy auxin herbicide."

16 So it is then indicating that this
17 polynucleotide is expressed, and going back to
18 the location, we know that there are areas of the
19 genome that are what -- are called silent because
20 genes in that region are not expressed.

21 So once again, it doesn't say a specific
22 place, but the implication is in a
23 transactionally active region of the genome.

24 Q. In other words, the '055 patent claims
25 don't require a particular location, but if it is

1 working, then it's in a sufficient location to
2 see expression?

3 MR. RUTT: Objection. Form.

4 **A. So, yeah. I don't know if sufficient is**
5 **the right word, but it requires a location where**
6 **you have active transcription. So it's**
7 **expressed.**

8 Q. If you see expression, then you know it's
9 in a locations where it is being expressed,
10 correct?

11 **A. Yes. If you do have expression, it is in**
12 **an active location.**

13 Q. Do the '055 patent claims require any
14 particular level of expression of an ADD-12
15 protein?

16 MR. RUTT: Objection. Form.

17 **A. So it doesn't specify a level of**
18 **expression, but there are a number of different**
19 **claims that indicate either a cell or a plant**
20 **that is resistant to -- there are different**
21 **herbicides listed. I won't read them all, but to**
22 **different herbicides. And from my experience on**
23 **herbicide tolerant plants, you need to have a**
24 **minimum level of expression, not just to produce**
25 **the protein but to get a level of expression that**

1 **when you treat a plant with a herbicide, it is in**
2 **the terms of the patent resistant.**

3 Q. So in other words, if a plant is
4 resistant, then you are seeing expression above
5 that minimum threshold; is that right?

6 A. **Yes. If you see resistance, you have**
7 **above a certain level of expression.**

8 I want to add that resistance is a very
9 general term, too, because it does not indicate a
10 level of resistance. So that minimum expression
11 depends on your definition of resistance.

12 Q. Claim 1 of the '055 patent recites a
13 transgenic plant cell. Do you see that?

14 A. **I see that.**

15 Q. It does not require homozygous seed
16 propagated for several generations after the
17 original plant transformation, does it?

18 MR. RUTT: Objection. Form.

19 A. **It does not. It only claims that**
20 **transgenic plant cell.**

21 Q. Would you look at Claim 28, please. Let
22 me know when you are there.

23 A. **I see Claim 28.**

24 Q. It recites, "a seed comprising a
25 plurality of the plant cell of Claim 1," correct?

1 **A. Yes. I see that.**

2 Q. It does not require propagating for
3 several generations to produce homozygous seed,
4 does it?

5 MR. RUTT: Objection. Form.

6 **A. It does not require propagating for**
7 **several generations.**

8 Q. Would you look at Claim 4 of the '055
9 patent, please.

10 **A. I see Claim 4.**

11 Q. Claim 4 recites, "A transgenic plant
12 comprising of plurality of the plant cell of
13 Claim 1, wherein expression of said
14 polynucleotide renders said plant tolerant to an
15 aryloxyalkanoate herbicide," correct?

16 **A. Correct. I see that.**

17 Q. Claim 4 does not require waiting for any
18 particular duration of time before tolerance can
19 be assessed, does it?

20 MR. RUTT: Objection. Form.

21 **A. It does not require waiting for a period**
22 **of time.**

23 Q. Would you turn to paragraph 93 of your
24 declaration, please. In the first sentence you
25 state that transgenic plants must be tested for

1 tolerance to the herbicides sprayed at commercial
2 levels, correct?

3 **A. Yes. I wrote that in paragraph 93 that**
4 **it must be tested for tolerance to herbicides**
5 **sprayed at commercial levels.**

6 Q. At the bottom of the page you state in
7 paragraph 93 that "for robust herbicide tolerance
8 testing, the plants need to be tested for
9 germination in the presence of the herbicide, as
10 well as sprayed different times during the growth
11 season," correct?

12 **A. Yes. I wrote that about the description**
13 **that typically is done for robust herbicide**
14 **tolerance testing.**

15 Q. You further state that the plant must be
16 tested at levels two to six times greater than
17 the commercially recommended treatment for weeds,
18 correct?

19 **A. So that is correct, because for**
20 **commercial plant herbicide tolerance levels two**
21 **to six times greater than the commercially**
22 **recommended treatment for the weeds is considered**
23 **the level of tolerance needed.**

24 Q. At the end of paragraph 93 you state that
25 "In the event that the desired herbicide

1 resistance is not seen at commercially-relevant
2 levels, the entire process would need to be
3 reviewed, analyzed, and assessed for potential
4 steps to take to achieve the desired result,"
5 correct?

6 **A. That is correct. I wrote that sentence.**

7 Q. So after all of the commercial level
8 herbicide tolerance testing that you refer to in
9 paragraph 93, it's possible that even if
10 herbicide tolerance is seen, it might not be at a
11 commercially relevant level, and at that point
12 you would have to restart the process.

13 Do I understand that correctly?

14 **A. You are correct in that it might not**
15 **achieve -- the plant being tested might not have**
16 **the commercially relevant levels, and I do write**
17 **"the entire process would need to be reviewed,**
18 **analyzed, and assessed" because there could be**
19 **many different reasons that you don't see it.**

20 **I don't say you need to restart the**
21 **process, because there are many different things**
22 **that could contribute -- factor that could**
23 **contribute to what you observe in the field.**

24 Q. Looking at Claim 4 of the '055 patent --
25 you previously looked at this, but it does not

1 define any particular level of tolerance, does
2 it?

3 MR. RUTT: Objection. Form.

4 A. It does not indicate a level of
5 tolerance.

6 Q. You also state in paragraph 93 that crop
7 damage and crop yield must be assessed, correct?

8 A. Let me see where I wrote that. Can you
9 point to the sentence so I make sure I address
10 that?

11 Q. I'm on page 42, and there's a sentence
12 that begins six lines up, you wrote that, "For
13 all of these, crop damage at different time
14 points, looking at initial damage, if any, and
15 recovery, and finally crop yield needs to be
16 assessed."

17 Do you see that?

18 A. I see that. I wrote that because in the
19 patent, herbicide resistance is not defined -- it
20 is critical to define what you mean by herbicide
21 tolerance resistance.

22 So that's why I wrote that, because the
23 typical -- what a typical researcher would look
24 at -- well, they look at several things, but crop
25 damage as well as recovery, as well as yield, are

1 all factors that would go into defining herbicide
2 resistance or tolerance.

3 Q. Are crop damage and crop yield important
4 considerations in commercial crop development?

5 A. Crop damage, meaning seeing damage to
6 leaves, yellowing, death of leaves, as well as
7 ultimate yield of the crop are important
8 measurements of herbicide tolerance for product
9 development. Especially -- yes.

10 Q. Do Claims 1 or 4 of the '055 patent refer
11 anywhere to particular levels of crop damage or
12 crop yield?

13 A. They don't refer to levels. They only
14 use -- let me look what it says exactly.

15 Claim 1 only talks about in activity that
16 degrades a phenoxy auxin herbicide and a
17 pyridyloxy auxin herbicide. It doesn't indicate
18 how much that activity or how much herbicide, so
19 it's vague.

20 Claim 4 similarly says a plant tolerant
21 to an aryloxyalkanoate herbicide. So there is no
22 indication of the level of herbicide treatment.

23 Q. Claims 1 or 4 don't mention crop damage
24 or crop yield, do they?

25 A. Well, they don't mention crop damage or

1 crop yield, but it only mentions plant tolerance.
2 So crop damage and crop yield are typical
3 measurements of plant tolerance and without a
4 specific definition can only go with what a
5 researcher will typically use.

6 Q. The definition you used was drawn from
7 your experience in commercial crop development
8 rather than what the patent described with
9 respect to tolerance, correct?

10 MR. RUTT: Objection. Foundation.

11 A. So what I used was my extensive
12 experience testing herbicide-tolerant crops and
13 identifying herbicide tolerance, not just in the
14 commercial crops but being able to screen
15 different plants because there is a lot of
16 uncertainty for each transgenic plant, how much
17 tolerance it may or may not have.

18 Q. Do you hold yourself out as an expert
19 with respect to the written description
20 requirement?

21 MR. RUTT: Objection. Form.

22 A. Could you define for me "the written
23 description requirement"?

24 Q. On Section VIII of your declaration, you
25 state that "Claims 1-33 lack proper written

1 description support."

2 That's in the heading, correct?

3 **A. That is correct.**

4 Q. Do you hold yourself out as an expert
5 with respect to compliance with the written
6 description requirement under the patent laws?

7 MR. RUTT: Objection. Form.

8 **A. As an expert scientist, I am not an**
9 **expert in the patent law. And for this wording,**
10 **I relied on counsel for proper legal reference.**

11 Q. Is your answer the same for the
12 enablement requirement?

13 **A. Yes. It is same for the enablement**
14 **requirement, I relied on counsel's advice.**

15 Q. Would you please turn to paragraph 73 of
16 your declaration. In the third sentence, you
17 stated that "Plant transformation is not
18 completely predictable."

19 Do you see that?

20 **A. Yes. I wrote that "Plant transformation**
21 **is not completely predictable."**

22 Q. Is it your understanding that written
23 description requires complete predictability?

24 **A. My understanding -- and I will preface**
25 **and say I am not a legal expert -- is that the**

1 written description requires enough information
2 for one skilled in the art to follow.

3 Q. So complete predictability is not
4 required, correct?

5 A. Is not -- sorry. Complete predictability
6 for plant transformation is not --

7 Q. Sure.

8 A. -- required. But because there is so
9 much uncertainty associated with plant
10 transformation, that's why I go on to explain how
11 it takes a lot of work to analyze a transgene
12 expressed in a plant.

13 Q. You didn't say it's so unpredictable or
14 enormously unpredictable. You just said it is
15 not completely unpredictable, correct?

16 A. Yes. It is not completely -- it's not
17 unpredictable, but there are a lot of variables
18 that impact under expression, which I list a few.

19 Q. Is your answer the same for enablement?
20 Enablement doesn't require complete
21 predictability of plant transformation?

22 A. Enablement of the patent? It doesn't
23 require complete predictability, but my
24 understanding -- once again, this is as an expert
25 scientist, not a lawyer -- is that there needs to

1 **be enough to address the uncertainty to give**
2 **guidelines.**

3 Q. What is your understanding of the
4 relevant point in time for evaluating written
5 description and enablement?

6 A. Can you -- what do you mean "point in
7 time"?

8 Q. Is there any particular date, to your
9 understanding, when the written description and
10 enablement requirements must be met?

11 A. For this patent?

12 Q. For the patent.

13 A. Yes. It's in 2017, is the date that I
14 used.

15 Q. Could we turn to paragraph 28 of your
16 declaration, please.

17 A. You said paragraph 28?

18 Q. Yes.

19 A. Yes, okay.

20 Q. You state that "I have been informed that
21 the assessment of undue experimentation is based
22 on the state of the art as of the earliest filing
23 date of the applications on which the '055 patent
24 claims priority." Correct?

25 A. That is correct.

1 Q. Next you state in paragraph 28, "In this
2 case, I have been informed that date is March 24,
3 2017, the filing date of nonprovisional
4 application 15/468,494." Correct?

5 **A. Yes, that is correct.**

6 Q. Counsel informed you of that date,
7 correct?

8 **A. Yes, counsel informed me of this date.**

9 Q. Would you please turn to the cover of the
10 '055 patent.

11 **A. Okay. I'm looking at the cover.**

12 Q. The earliest application to which the
13 '055 patent claims priority is actually the
14 provisional application filed on October 28,
15 2005, correct?

16 **A. I see it. Line 60, it lists the**
17 **provision application filed on October 28, 2005.**

18 Q. In your declaration do you ever
19 acknowledge October 28, 2005, as a relevant date
20 for assessing written description or enablement?

21 **A. I was advised that the March 24, 2017,**
22 **date was the appropriate date to use for my**
23 **evaluation.**

24 Q. On the cover of the '055 patent, a couple
25 of lines higher, you see there is a PCT

1 application listed that was filed on October 27,
2 2006?

3 **A. Hold on.**

4 **Okay. I see. You mean the line right**
5 **above line 60 -- or not line 60, but next to**
6 **what's marked 60?**

7 **Q. Yes.**

8 **A. Yes. I see that PCT filed on October 27,**
9 **2006.**

10 **Q. In your declaration do you ever**
11 **acknowledge October 27, 2006, as a relevant date**
12 **for assessing written description or enablement?**

13 **A. No. I used March 24, 2017, as the date**
14 **for my evaluation.**

15 **Q. That's what you were instructed to use by**
16 **counsel, correct?**

17 **A. That is correct. Counsel advised me to**
18 **use that date.**

19 **Q. Dr. Silverstone, we previously discussed**
20 **your work on the Raw Starch Project that was**
21 **listed in your CV, correct?**

22 **A. Yes, we talked about raw starch.**

23 **Q. That involved transgenic plants**
24 **expressing starch hydrolytic enzymes, correct?**

25 **A. Yes.**

1 Q. How many types of starch hydrolytic

2 enzymes exist, to your knowledge?

3 A. It's been a little bit of time so I can't
4 have an exhaustive list, but I know there are at
5 least a half dozen different ones that we focused
6 on but there are others outside of that.

7 Q. Are alpha-amylases starch hydrolytic
8 enzymes?

9 A. Yes. Alpha-amylases are starch
10 hydrolytic enzymes.

11 Q. And alpha-amylase acts on alpha-1,4
12 glucosidic linkages in the amylose and the
13 amylopectin components of starch; is that right?

14 A. Yes. That is -- the alpha-amylase works
15 on those linkages.

16 Q. There are different classes of
17 alpha-amylases that exist; is that right?

18 A. Yes.

19 Q. So there are acid alpha-amylases?

20 A. Yes.

21 Q. Are there fungal alpha-amylases?

22 A. Alpha-amylases are found in a very wide
23 range of organisms.

24 Q. Including fungus?

25 A. Including fungus, yes.

1 Q. There are bacterial alpha-amylases?

2 A. There are bacterial alpha-amylases.

3 Q. Are there other sources?

4 A. Of course plants themselves have
5 alpha-amylases.

6 Q. Are beta-amylases starch hydrolytic
7 enzymes?

8 A. Beta-amylases can work on starch as well
9 as smaller oligosaccharides.

10 Q. Are there multiple classes of
11 beta-amylases as well?

12 A. It's been a while since I worked on
13 beta-amylases, but I am sure that there are
14 multiple, almost sure there are multiple classes.
15 But I don't remember. I didn't work on those
16 very much, so I'm not as familiar with all of the
17 varieties.

18 Q. Glucose amylases are starch hydrolytic
19 enzymes?

20 A. Glucose amylases can work on starch as
21 well as smaller oligosaccharides, which are more
22 common, but these enzymes can work on a variety
23 of substrates.

24 Q. That includes, for example, converting
25 dextrans into fermentable sugars?

1 **A. Yes.**

2 Q. Are there multiple classes of
3 glucoamylases?

4 **A. Yes, there are multiple classes of**
5 **glucoamylases.**

6 Q. And they come from a variety of organisms
7 like fungus and bacteria?

8 **A. Glucoamylases can be found in a number of**
9 **different organisms.**

10 Q. Are maltogenic amylases starch-degrading
11 enzymes?

12 **A. I am not -- I didn't work on the**
13 **maltogenic enzymes, but from their name, I assume**
14 **they are genic creating maltose from hydrolyzing**
15 **oligosaccharides from --**

16 THE COURT REPORTER: Hold on.

17 THE WITNESS: Sorry. Thank you for
18 stopping. Want me to repeat?

19 THE COURT REPORTER: Yeah, sure.

20 **A. So I'm not as familiar with maltogenic**
21 **enzymes, but they can create -- I assume from the**
22 **name, they create maltose by breaking down starch**
23 **or oligosaccharides.**

24 Q. We discussed alpha-amylases,
25 beta-amylases, glucoamylases, maltogenic

1 amylases.

2 Are there any other categories of starch
3 hydrolytic enzymes you are aware of?

4 **A. There are -- the main enzymes that I**
5 **worked on were amylases and glucoamylases. So**
6 **that's where I had most of my experience and**
7 **time, but I know there are other enzymes in**
8 **cleaving some of the branches in some of the more**
9 **exotic less common like alpha-1,2 linkages in**
10 **starch.**

11 Q. We haven't exhausted the list, though, of
12 starch hydrolytic enzymes?

13 **A. No.**

14 Q. Okay. Turning to your CV, you have a
15 list of patents on which you are an inventor,
16 correct?

17 **A. Yes.**

18 Q. As an inventor would you agree it is
19 important to be truthful and accurate to the
20 patent office in your patents?

21 **A. It is important to be truthful, of**
22 **course.**

23 Q. I will hand you a document marked as
24 Exhibit 2006.

25 (Exhibit 2006 premarked

1 for identification)

2 MR. RUTT: I object. These are the
3 first time he is being shown these.

4 Q. Dr. Silverstone, this is U.S. Patent No.
5 7,914,993 listing you as an inventor and a
6 scientist of Syngenta, correct?

7 A. That is correct.

8 Q. You listed it in your CV?

9 A. Let me make sure I have this in my CV.
10 Yes, this is listed on my CV.

11 Q. I assume this relates to your starch
12 hydrolytic enzyme work at Syngenta?

13 A. Yes. This relates to the projects on
14 starch hydrolysis that I worked on.

15 Q. Would you turn to Claim 1 of your '993
16 patent.

17 A. Yes, Claim 1.

18 Q. Claim 1 recites a method of reducing the
19 viscosity of a mash and Step A is milling plant
20 material comprising between about 0.5 percent to
21 about 100 percent admix of a transgenic plant
22 expressing at least one starch-digesting enzyme,
23 correct?

24 A. Yes.

25 MR. RUTT: Just make a standing

1 objection. Scope objection to this whole line of
2 inquiry.

3 Q. Does Claim 1 of your patent require any
4 particular amino acid sequence for the starch-
5 degrading enzyme?

6 **A. Claim 1 does not identify a specific**
7 **starch-degrading enzyme.**

8 Q. Does Claim 1 of your patent require any
9 particular active site residues for the starch-
10 degrading enzyme?

11 **A. Claim 1 is not claiming any active site**
12 **residues or particular starch-degrading enzyme.**

13 Q. Does Claim 1 of your patent require any
14 three-dimensional structural coordinates for the
15 starch-degrading enzyme?

16 **A. Claim 1 doesn't include any**
17 **three-dimensional information about the starch-**
18 **degrading enzyme.**

19 Q. Does Claim 1 exclude any of the various
20 classes or sub classes of starch-degrading
21 enzymes that we discussed such as alpha-amylase,
22 beta-amylases, glucoamylase or maltogenic
23 amylase?

24 **A. Claim 1 does not exclude a class of**
25 **starch-degrading enzyme.**

1 Q. In contrast to the standard you have
2 applied and in criticizing the sequence
3 limitation of the '055 patent claims, isn't it
4 correct that in your own work you've obtained
5 claims encompassing the use of any starch
6 hydrolytic enzyme having any amino acid sequence
7 in any active site?

8 MR. RUTT: Objection. Form.
9 Foundation.

10 A. I, once again, won't be an expert on
11 patent law, but this -- this claim is not about
12 specific enzymes. It's about a transgenic plant
13 expressing an enzyme.

14 Q. Turning to Claim 1 of the '055 patent,
15 the item claimed as a transgenic plant cell; is
16 that correct?

17 A. Sorry. Let me turn to -- so in the '055
18 patent, the claim is for a transgenic plant cell
19 but in my '993 patent, this is -- the claim is
20 for a method of reducing the viscosity of a mash
21 comprising the steps of listed in A, B, C. So it
22 is specifically aimed at -- a mash for -- the
23 definition of a mash is ground up corn and water.

24 So this is -- what is claimed is not the
25 plant but a method of reducing viscosity of a

1 **mash using the plant material described in A.**

2 Q. So your method does not include use of a
3 transgenic plant expressing at least one starch-
4 digesting enzyme that's listed in step A; is that
5 your understanding?

6 A. **No. So it's a method using the**
7 **transgenic -- using a transgenic plant expressing**
8 **a starch-digesting enzyme, but it's not a claim**
9 **on the transgenic plant. It's a claim on the use**
10 **of the transgenic plant expressing a starch-**
11 **digesting enzyme.**

12 Q. So is it your understanding that a
13 written description in enablement do not require
14 describing or enabling the transgenic plant
15 expressing at least one starch-digesting enzyme
16 if a method is claimed rather than those plants?

17 MR. RUTT: Objection. Form.
18 Foundation.

19 A. **So yes, in writing this patent, of course**
20 **we're truthful but we worked with Syngenta IP**
21 **attorneys to correctly -- well, to write what**
22 **they advised was the appropriate wording.**

23 Q. I think you mentioned that mash is ground
24 up corn, correct?

25 A. **That's the prime -- there are other**

1 components added to it but --

2 Q. Is Claim 1 of your patent limited to the
3 use of corn or does it encompass any transgenic
4 plant?

5 A. I probably was being a little too
6 simplistic, because I was thinking about --
7 because our work was on -- was on corn expressed
8 enzyme in there. There is a lot of description
9 in here of that, and I would have to read the
10 whole patent to see if there is more about mash.

11 But whether mash is -- I don't remember
12 if mash was defined specifically in this patent,
13 but a mash can include other grains. But I don't
14 know for this patent if -- without reviewing the
15 whole patent again, if we were talking about
16 other grains or just corn.

17 Q. Dr. Silverstone, the only type of
18 transgenic plant used in the examples of your
19 '993 patent was transgenic corn; isn't that
20 correct?

21 MR. RUTT: Objection. Form.

22 A. That is correct that the transgenic
23 plants described in this patent are corn
24 transgenic plants. But what was -- what could be
25 envisioned in Claim 1A, it talks about milling

1 plant material comprising between .5 percent to
2 about 100 percent, admix of a transgenic plant,
3 and the rest of the admix is from a
4 non-transgenic plant which, once again, I don't
5 remember on this patent if we were only talking
6 about corn, but other cereal grains contain
7 starches that can be degraded and can be
8 converted into ethanol.

9 Which -- and so that other plant
10 material, which we don't specify in this patent,
11 could have included like wheat or barley, which
12 are grains that contain starch that can be broken
13 down by amylolytic enzymes.

14 Q. But you didn't disclose any transgenic
15 wheat or barley plants, did you?

16 MR. RUTT: Objection to form.

17 A. This patent only -- only talked about
18 transgenic corn, because my reference was to the
19 non-transgenic material. It might not be limited
20 to corn.

21 Q. I will hand you a document that's been
22 marked as Exhibit 2007.

23 (Exhibit 2007 premarked
24 for identification)

25 MR. RUTT: Again, I make a standing

1 objection. This is the first time he has been
2 shown this. Objection to scope. This is outside
3 the whole line of inquiry.

4 Q. Dr. Silverstone, Exhibit 2007 is U.S.
5 Patent No. 8,124,841 naming you as an inventor
6 and scientist of Syngenta, correct?

7 A. That is correct.

8 Q. This patent is listed on your CV,
9 correct?

10 A. Let me verify that is correct. Yes, that
11 is correct.

12 Q. This isn't the first time you have seen
13 this patent, is it?

14 A. No. When you ask the question, I am
15 going to make sure.

16 Q. This '841 patent also relates to your
17 work on transgenic corn plants that express
18 alpha-amylases?

19 A. It does relate to the work on transgenic
20 corn that had starch-degrading enzymes.

21 Q. Would you please turn to column 3, line
22 39 of your '841 patent.

23 A. Yes. Starting "In yet another"?

24 Q. Yes. And in this paragraph you describe
25 a process for getting recombinantly-produced

1 alpha-amylase, correct?

2 MR. RUTT: Objection. Form.

3 **A. Let me read through again.**

4 **(Pause)**

5 **A. Can you repeat the question?**

6 Q. Yeah. In this paragraph you describe a
7 process for transforming plant tissue or plant
8 cells, correct?

9 **A. I talk about -- yeah. In this section it**
10 **talks about transforming plant cells with alpha-**
11 **amylase enzyme.**

12 Q. It looks like there are three steps here.
13 There is transforming plant tissue or plant cells
14 comprising the truncated alpha-amylase enzymes of
15 the present invention. Then you have selecting
16 for the transformed plant tissue or cell. Third
17 you have growing the transformed plant tissue or
18 cell into a transformed plant. Correct?

19 **A. That is correct.**

20 Q. At that point you have a transformed
21 plant expressing recombinant alpha-amylase,
22 right?

23 **A. Yes. At the end you would have a plant**
24 **with the -- expressing the alpha-amylase.**

25 Q. Would you please turn to Example 1 of

1 your '841 patent in column 20.

2 **A. Sorry. You said column 20, Example 1; is**
3 **that correct?**

4 Q. Yes. Are you there?

5 **A. Yes.**

6 Q. The first paragraph is titled Constructs.
7 Do you see that?

8 **A. Yes, I see that.**

9 Q. Your patent states that three expression
10 constructs were prepared, correct?

11 **A. Yes. Three constructs were generated.**

12 Q. All three constructs used the same maize
13 gamma zein promoter, ER retention sequence, a
14 PEPC intron and the 35S terminator from
15 cauliflower mosaic virus, correct?

16 **A. Yes, that is correct.**

17 Q. This construct was used with the three
18 transgenes described in the second paragraph of
19 Example 1, correct?

20 **A. Let me look at the second paragraph.**

21 **(Pause)**

22 **A. Can you repeat the question? I want to**
23 **make sure I understood it correctly.**

24 Q. The construct -- my question is that the
25 construct was -- I will start again.

1 Dr. Silverstone, is this an example where
2 the same construct was reused with the three
3 different genes?

4 A. Yes. This -- for this -- in this
5 description, we had three different genes that
6 used the same regulatory expression components.

7 Q. And the second paragraph of Example 1
8 describes the three transgenes that were used in
9 the expression construct?

10 A. Yes. It describes the three different
11 transgenes.

12 Q. Then the third paragraph of your Example
13 1 seems to skip ahead a little bit and refers to
14 T1 seed from several events that were generated;
15 is that right?

16 A. So -- yes. So it describes the -- it
17 talks about T1 seeds from several events of each
18 of those three constructs.

19 Q. Is there any description in your
20 Example 1 of the '841 patent of the type of
21 transformation method that was used?

22 MR. RUTT: Objection. Form.

23 A. In these, there is not a description of
24 the transformation technique in Example 1. And I
25 would have to read through the rest of the patent

1 to see if there is a description of
2 transformation technique.

3 Q. Is there any description in your
4 Example 1 of the selection method used to
5 identify transformed plants or plant cells?

6 MR. RUTT: Objection. Form.

7 A. In Example 1 there is not a description
8 of the selection method. Once again, I would
9 need to read -- refamiliar- -- I mean, obviously
10 I read more than once, but refamiliarize myself
11 with this patent to see if we described a
12 selection method.

13 Q. Is there any description in your
14 Example 1 of how the corn plants were regenerated
15 after transformation?

16 A. In Example 1 there is no description of
17 regeneration of corn plants, but I would reread
18 this patent to see if there are other sections
19 that describe regeneration of plant, corn plants.

20 Q. Was it unnecessary to identify the
21 particular type of transformation method, the
22 selection method, the regeneration method because
23 plant transformation was routine at the time that
24 your patent was filed?

25 MR. RUTT: Objection. Foundation.

1 Form.

2 A. Without reading the rest of the patent, I
3 can't say that we did not talk about plant
4 transformation and regeneration in this patent.
5 So I can't -- without rereading the whole patent,
6 I can't answer your question.

7 Q. Would you turn to Column 19?

8 A. Yes.

9 Q. We are on the same page.

10 A. Same page.

11 Q. Lines 29 to 30.

12 A. 29 to 30.

13 Q. You state that "Transformation of most
14 monocotyledon species has now also become
15 routine." Correct?

16 MR. RUTT: Objection.

17 A. Yes. Yes. It says that.

18 Q. If you turn to Column 18, lines 35, 36.

19 A. Okay. Let me get to 35, 36. Okay.

20 Q. Your patent also states that
21 "Transformation techniques for dicotyledons are
22 well known in the art." Correct?

23 MR. RUTT: Objection. Form.

24 A. It does say "Transformation techniques
25 for dicotyledons are well known in the art."

1 Q. We previously agreed it was important to
2 be truthful and accurate to the patent office,
3 correct?

4 A. Yes.

5 Q. As an inventor you had the opportunity to
6 review or revise those statements about
7 transforming dicots and monocots if they weren't
8 true, correct?

9 A. Yes. I could -- I reviewed this patent
10 and could update if there was anything that at
11 that time I thought was incorrect.

12 Q. I will hand you a document marked as
13 Exhibit 2008.

14 (Exhibit 2008 premarked
15 for identification)

16 Would you like to take a break?

17 A. Yeah. Is it okay if we take a break for
18 lunch?

19 (Discussion off the record)

20 (Recess taken)

21 BY MR. DEROO:

22 Q. Dr. Silverstone, I will hand you a
23 document marked Exhibit 2008.

24 A. Yes.

25 MR. RUTT: I make a standing scope

1 objection because it wasn't previously shown to
2 him.

3 Q. This is U.S. Patent No. 8,343,747 naming
4 you as an inventor and assigned to Syngenta,
5 correct?

6 **A. That is correct.**

7 Q. Your '747 patent is listed on your CV,
8 correct?

9 **A. It is listed on my CV.**

10 Q. This is not the first time you have seen
11 this patent, is it?

12 MR. RUTT: Objection. Foundation.

13 **A. I have seen it before, but I have not**
14 **reviewed it in a long time.**

15 Q. And your patent here relates to amylase
16 and glucoamylase enzymes, correct?

17 **A. That is correct.**

18 Q. Please turn to Column 48 and line 55.
19 Let me know when you are there.

20 **A. Line 55?**

21 Q. Um-hmm.

22 **A. I am there.**

23 Q. Here in your patent you use the phrase
24 "substantially identical," correct?

25 **A. It has the phrase "substantially**

1 **identical," yes. It is there.**

2 Q. As it states here in the patent,
3 substantially identical for two or more sequences
4 refers to at least about 50 percent and up to 99
5 percent or more sequence identity, correct?

6 A. It says, yes, that it can refer to two or
7 more sequences that have, for example, at least
8 50, up to 99 percent or more nucleotide or amino
9 acid residue identity.

10 Q. Can you please turn to Column 89 of your
11 '747 patent.

12 A. I see Column 89.

13 Q. At the bottom you see Table 1 that lists
14 some sequences and EC numbers. Do you see that?

15 A. Table -- yes, I am looking at Table 1.

16 Q. What is your understanding of what an EC
17 number is?

18 A. It's been awhile since I read the exact
19 definition, but all enzymes are classified by an
20 EC number and the EC number is a type of -- is a
21 classification system indicating different
22 families and related enzymes.

23 Q. EC numbers generally have four digits; is
24 that right?

25 A. I don't remember if that's the case.

1 Q. Do you know what each of the four digits
2 of an EC number indicates?

3 A. I don't remember. It's been a long time
4 since I used them, so I don't remember what each
5 category is.

6 Q. Do you know how many options there are
7 for the first digit in an EC number?

8 A. I don't know how many options there are.
9 I don't remember.

10 Q. Do you know what the last digit in an EC
11 number signifies?

12 A. I do know that the last is the specific
13 family that is --

14 Q. Is that a specific family or a substrate
15 for an enzymatic reaction?

16 MR. RUTT: Objection. Form.

17 A. I don't remember exactly.

18 Q. Dr. Silverstone, I will hand you a
19 document marked as Exhibit 2010.

20 (Exhibit 2010 premarked
21 for identification)

22 MR. RUTT: Objection to this as
23 beyond the scope. He has never seen this before.

24 Q. Dr. Silverstone, is this your Golden Rice
25 2 paper published in "nature biotechnology" in

1 April 2005?

2 **A. This is my Golden Rice paper published in**
3 **April 2005. It has been a long time since I**
4 **reviewed it -- but since I've reviewed it, since**
5 **I read it.**

6 Q. But you have seen this before?

7 **A. Yes, I have seen it before.**

8 Q. The research in this paper relates to a
9 humanitarian project for improving the
10 nutritional content of rice; is that right?

11 **A. The research is -- yes, it's for a**
12 **project to improve the nutritional value of rice,**
13 **that's right.**

14 Q. It was important to get the science done
15 correctly in support of the Golden Rice Project;
16 is that correct?

17 **A. Could you define what you meant by "the**
18 **science done correctly" specifically?**

19 Q. I mean, follow appropriate scientific
20 protocols to transform rice to improve its
21 nutritional content?

22 **A. Yes. It was important to follow the**
23 **proper protocols to do this work.**

24 Q. The research described in Exhibit 2010
25 related to the use of genes encoding phytoene

1 synthase from a variety of different plant
2 species; is that correct?

3 **A. That is correct.**

4 Q. The proteins are -- the phytoene synthase
5 proteins are also called PSY proteins, P-S-Y?

6 **A. We call it PSY. We never used the -- it**
7 **was all referred to as PSY proteins, yes, for**
8 **phytoene synthase.**

9 Q. In Figure 1(a), do you see the depiction
10 of two gene expression cassettes that were used,
11 I believe in the transformation of maize?

12 **A. Yes. I see that the two different**
13 **cassettes that were used to transform maize.**

14 Q. And the first cassette used the Ubi1
15 promoter and NOS terminator, correct?

16 **A. Yes. Ubi1 promoter and a NOS terminator,**
17 **N-O-S.**

18 Q. And that cassette with the Ubi1 promoter
19 and NOS terminator was used with each of the
20 seven PSY genes, correct?

21 **A. Yes. That is correct.**

22 Q. This is another example of where you
23 reused the same expression construct with a
24 variety of different genes, correct?

25 MR. RUTT: Objection. Foundation.

1 **A. So, yes, this -- that is correct in this**
2 **published paper. I want to add that this**
3 **published paper is not the entirety of our work**
4 **on Golden Rice as part of this project.**

5 Q. The second cassette included a PAT gene
6 as a selectable marker and a GUS gene, correct?

7 **A. That is correct. There is a PAT gene and**
8 **then the GUS gene.**

9 Q. For the PAT and GUS genes, the Ubi1
10 promoter and NOS terminator were used again,
11 correct?

12 **A. Yes. They use Ubi1 promoter and NOS**
13 **terminator.**

14 Q. So the Ubi1 promoter was used with PSY
15 gene, PAT gene, and a GUS gene, correct?

16 **A. That is correct in the published work**
17 **here.**

18 Q. The NOS terminator was used with the PSY
19 genes -- I'm sorry, the PSY genes, the PAT gene,
20 and the GUS gene, correct?

21 **A. Yes, they all use the NOS terminator.**

22 Q. These cassettes were used in the
23 transformation of maize callus, correct?

24 **A. Yes. They were used to test the**
25 **constructs in maize callus.**

1 Q. Was Agrobacterium or biolistics
2 transformation used?

3 A. I would need to read that section of the
4 paper to remember, because it has been a while
5 since I have read this paper.

6 Q. I didn't see it. I was just wondering if
7 you knew.

8 A. I know we used GUS -- sorry. We used
9 Agrobacterium for almost everything. But since
10 it is a long time ago, I don't want to ever
11 mischaracterize. And -- let me see if there is a
12 section on transformation specifically that we --

13 (Pause)

14 A. Yeah, I'm almost -- well, I won't say
15 almost 100 percent. My expectation was that we
16 used Agrobacterium. I don't see anything on
17 normalization, but I will -- but I will also say
18 that it's possible another method was used.

19 Q. In Figure 1(b) there is a picture of
20 transformed maize callus plate shown side by side
21 of the control, correct?

22 A. Let me make sure. Yes. It shows
23 transformed callus and control.

24 Q. The transformed callus tissues appear
25 smaller than the control tissues, don't they?

1 A. They do look smaller.

2 Q. Is that due to using a selection agent?

3 A. Well -- let me make sure before I say
4 something.

5 (Reading to self.)

6 Empty factor on control.

7 Let me look at the -- once again, I don't
8 remember the specifics. Usually the empty vector
9 would include a selectable marker. It is also
10 possible this experiment was done differently.
11 But if I saw that -- without knowing all the
12 details and the times and also whether they were
13 actually grown side by side in the incubator, I
14 don't know if it were -- the presence of a
15 selectable agent or not.

16 Q. So -- but it is possible that the use of
17 glufosinate and the PAT gene as a selectable
18 marker would be responsible for some of the maize
19 calli --

20 MR. RUTT: Objection. Form.

21 Q. -- being smaller than the control?

22 A. If -- using selectable markers, you kill
23 off the nontransformed cells. So that's going to
24 mean you are starting with a fewer number of
25 cells to start growing. So you would have more

1 **cells growing from a time point if you don't have**
2 **a selectable marker.**

3 Q. That's one possible explanation.

4 A. **That's one explanation.**

5 Q. The selectable marker would be used on
6 the cells shortly after transformation?

7 MR. RUTT: Objection. Foundation.

8 A. **Use of the selectable marker is you allow**
9 **the cells to recover and then you apply a**
10 **selectable marker -- you apply a selection agent.**

11 Q. And the selection agent was applied
12 before the maize cells had been regenerated into
13 maize plants in this case, correct?

14 MR. RUTT: Objection. Foundation.

15 A. **In -- in -- I will say regular, because**
16 **in science I know you say always someone points**
17 **out sometime -- but in regular transformation**
18 **procedures, you always apply a selectable marker**
19 **on your transfam cells before you start**
20 **regeneration.**

21 Q. Will you please turn to Figure 2. It is
22 on page 483 of Exhibit 2010.

23 A. **Yes. I see.**

24 Q. This figure relates to the transformation
25 of rice with PSY genes from rice, maize, pepper,

1 tomato and daffodil species, correct?

2 **A. That is correct.**

3 Q. And Figure 2(a) shows the expression
4 cassette used, correct?

5 **A. Yes. That is correct. It shows the**
6 **expression cassette that we used.**

7 Q. You used the rice glutelin promoter, GLU,
8 with each of the five PSY genes, correct?

9 **A. Yeah. I would have to review to -- I**
10 **don't remember all the specifics. I would review**
11 **it to make sure that that is what we used.**

12 Q. You could look at the description of
13 Figure 2(a) on the right. Just let me know.

14 **A. Let me look.**

15 Q. Describes using the rice glutelin
16 promotor with phytoene synthase from each of five
17 plant species, correct?

18 **A. Yes. From each of the five, yes. Thank**
19 **you for pointing me to that section. So yes, we**
20 **did use the rice glutelin promotor for each of**
21 **those species.**

22 Q. And the results shown in Figure 2(c)
23 showed that the rice and maize PSY genes worked
24 best out of the five that were tested, correct?

25 **A. That is correct, that the performance in**

1 these tested were the events where the rice and
2 maize genes.

3 Q. And this is another example where the
4 same expression cassette was reused with
5 different PSY genes, correct?

6 MR. RUTT: Objection. Form.

7 A. Yes, to answer your question. I think it
8 also shows the uncertainty when you do work,
9 because we didn't know that -- there wasn't an
10 obvious reason why these would perform
11 differently. We know in this construct they do,
12 but we don't know why.

13 So that shows -- we did use it for -- for
14 -- in this testing protocol. But you can see the
15 uncertainty that we didn't know beforehand
16 results in some work better than others but we
17 don't know why.

18 Q. So some of the genes, specifically the
19 rice and maize, worked better than others,
20 correct?

21 A. That's correct.

22 Q. Will you please turn to page 484 of
23 Exhibit 2010?

24 A. Okay.

25 Q. About halfway down the right column you

1 see a sentence that begins "perhaps not
2 surprisingly."

3 **A. Yeah. Sorry. You are talking about**
4 **which sentence?**

5 Q. "Perhaps not surprisingly."

6 **A. Okay. I see it.**

7 Q. And regarding why rice and maize PSY
8 genes performed better, your paper states,
9 "Perhaps not surprisingly, the two best
10 performing PSY proteins (from rice and maize) are
11 more similar to each other in primary sequence
12 (89% identical) than to any of the other PSYs
13 used in the study." Correct?

14 **A. Yes. That is what it says.**

15 Q. That was the explanation given for the
16 reason why those two might be the best
17 performing, correct?

18 MR. RUTT: Objection. Foundation.
19 Form.

20 **A. That was our speculation, because we**
21 **didn't have a better reason, and we also didn't**
22 **have the resources and nor was the intent to do**
23 **an exhaustive study as to why. So we put that**
24 **explanation to have one suggestion, but we**
25 **knew -- and we say "perhaps", there could be**

1 **other explanations.**

2 Q. The next sentence states that structure-
3 function modeling was performed but did not
4 reveal convincing reasons for the rice and maize
5 genes outperforming the others, correct?

6 MR. RUTT: Objection. Form.

7 **A. That is correct, that it didn't look like**
8 **it was -- and that was based on our modeling at**
9 **the time, that that would explain the difference.**

10 Q. So the reason that was given was
11 similarity and primary sequence, that 89 percent
12 identity, correct?

13 MR. RUTT: Objection. Form.
14 Foundation.

15 Q. That's what it states, right?

16 **A. That is what we hypothesized as a**
17 **possibility, but that wasn't a certainty.**

18 Q. At the end of that sentence, do you see
19 it refers to putative rice PSYs in the databases?

20 **A. I'm sorry. In which sentence?**

21 Q. At the end of the "perhaps not
22 surprisingly" sentence.

23 **A. Yes. I see that "and to other putative**
24 **rice PSYs in the databases."**

25 Q. What makes these putative rice PSY

1 proteins as opposed to known or established PSY
2 proteins?

3 A. We refer to them as putative rice PSYs,
4 because at that time we did the work, there was
5 homology to the one that we knew based on its
6 identity, was -- based on research we knew was a
7 PSY, and we hypothesized that they were PSYs,
8 which is why we called them putative, but we did
9 not have any experimental evidence that they were
10 indeed PSYs.

11 Q. Okay. So they were hypothesized or
12 expected to be PSYs based on sequence homology to
13 a protein that you knew was a PSY?

14 MR. RUTT: Objection. Foundation.

15 A. Yes. That's why we referred to it as
16 putative PSYs. I don't remember the homology
17 cutoff.

18 MR. DEROO: Thank you, Dr.
19 Silverstone.

20 I don't have any further questions at
21 this time.

22 MR. RUTT: No questions.

23 THE COURT REPORTER: You have a
24 standing order (indicating).

25 MR. DEROO: We have a standing order,

1 three days? Two days. Okay, we have a deadline.

2 MR. RUTT: That's fine with us too,
3 Monday.

4 THE COURT REPORTER: Monday.

5 And I know you get the rough today. Do
6 you need a rough today?

7 MR. RUTT: That will be great.

8 (Whereupon the deposition was concluded
9 at 12:39 p.m.)

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C E R T I F I C A T E

I, DR. ARON SILVERSTONE, Ph.D., do hereby
certify that I have read the foregoing transcript
of my testimony, and further certify that said
transcript is a true and accurate record of said
testimony (with the exception of the following
corrections listed below):

Page	Line	Correction
------	------	------------

DR. ARON SILVERSTONE, Ph.D.

Sworn to and subscribed before me this
day of , 2024.

Notary Public
My commission expires:

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1 COMMONWEALTH OF MASSACHUSETTS)

2)

3 SUFFOLK, SS.)

4 I, Katherine A. Tevnan, Registered Merit
 5 Reporter, Certified Shorthand Reporter No. 129093
 6 and Notary Public in and for the Commonwealth of
 7 Massachusetts, do hereby certify that DR. ARON
 8 SILVERSTONE, Ph.D., the witness whose deposition
 9 is hereinbefore set forth, was duly sworn by me
 10 and that such deposition is a true record of the
 11 testimony given by the witness.

12 I further certify that I am neither related
 13 to or employed by any of the parties or counsel to
 14 this action, nor am I financially interested in
 15 the outcome of this action.

16 In witness whereof, I have hereunto set my
 17 hand and seal this 15th day of January, 2024.

18
 19 Katherine A. Tevnan

20 Katherine A. Tevnan,
 21 Registered Merit Reporter
 22 CSR # 129093

23 Notary Public

24 My commission expires March 10, 2028

25

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