

Exhibit 1

Jay Irwin Goodman, Ph.D.

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UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

IN RE: ROUNDUP)
PRODUCTS LIABILITY) MDL No. 2741
LITIGATION)
-----) Case No.
THIS DOCUMENT RELATES) 16-md-02741-VC
TO ALL CASES)
-----)

FRIDAY, SEPTEMBER 22, 2017

The videotaped deposition of JAY IRWIN
GOODMAN, PH.D., called for examination, taken pursuant
to the Federal Rules of Civil Procedure of the United
States District Courts pertaining to the taking of
depositions, taken before JULIANA F. ZAJICEK, a
Registered Professional Reporter and a Certified
Shorthand Reporter, at the offices of
Warner Norcross & Judd LLP, 120 North Washington
Square, Lansing, Michigan, on September 22, 2017, at
9:12 a.m.

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<p>1 PRESENT:</p> <p>2 ON BEHALF OF THE PLAINTIFFS:</p> <p>3 ANDRUS WAGSTAFF</p> <p>4 7171 West Alaska Drive</p> <p>5 Lakewood, Colorado 80226</p> <p>6 303-376-6360</p> <p>7 BY: DAVID WOOL, ESQ.</p> <p>8 david.wool@andruswagstaff.com</p> <p>9</p> <p>10 SILL LAW GROUP</p> <p>11 14005 North Eastern Avenue</p> <p>12 Edmond, Oklahoma 73013</p> <p>13 405-509-6300</p> <p>14 BY: TARA TABATABAIE, ESQ.</p> <p>15 tara@sill-law.com</p> <p>16</p> <p>17 LOCKRIDGE GRINDAL NAUEN P.L.L.P.</p> <p>18 100 Washington Avenue South, Suite 2200</p> <p>19 Minneapolis, Minnesota 55401</p> <p>20 612-339-6900</p> <p>21 BY: ROSA S. TREMBOUR, ESQ. (Telephonically)</p> <p>22 rstrembour@locklaw.com</p> <p>23</p> <p>24</p>	<p>1 I N D E X</p> <p>2</p> <p>3 WITNESS: PAGE:</p> <p>4 JAY IRWIN GOODMAN, PH.D.</p> <p>5 EXAM BY MR. WOOL..... 7</p> <p>6 EXAM BY MS. PIGMAN..... 233</p> <p>7 FURTHER EXAM BY MR. WOOL..... 241</p> <p>8</p> <p>9 *****</p> <p>10</p> <p>11 E X H I B I T S</p> <p>12 EXHIBIT MARKED FOR ID</p> <p>13 No. 25-1 Report by Jay Irwin Goodman..... 8</p> <p>14 No. 25-2 Supplemental Materials</p> <p style="padding-left: 40px;">Considered List..... 9</p> <p>15</p> <p>16 No. 25-3 Retention Letter 12/29/15..... 30</p> <p>17</p> <p>18 No. 25-4 Invoices from Jay Goodman..... 31</p> <p>19</p> <p>20 No. 25-5 Article: "Cytotoxic and</p> <p style="padding-left: 40px;">DNA-damaging properties of</p> <p style="padding-left: 40px;">glyphosate and Roundup in</p> <p style="padding-left: 40px;">human-derived buccal epithelial</p> <p style="padding-left: 40px;">cells," by Koller et al.;</p> <p>21 MONGLY00327331 - 339..... 85</p> <p>22 No. 25-6 Article: "Genotoxic Activity of</p> <p style="padding-left: 40px;">Glyphosate and Its Technical</p> <p style="padding-left: 40px;">Formulation Roundup," by</p> <p style="padding-left: 40px;">Bolognesi et al.;</p> <p>23 WEEDPROD00001252 - 257..... 100</p> <p>24</p>
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<p>1 PRESENT: (Continued)</p> <p>2 THE MILLER FIRM, LLC</p> <p>3 The Sherman Building</p> <p>4 108 Railroad Avenue</p> <p>5 Orange, Virginia 22960</p> <p>6 540-672-4224</p> <p>7 BY: TIMOTHY LITZENBURG, ESQ. (Telephonically)</p> <p>8 tlitzenburg@millerfirmllc.com</p> <p>9</p> <p>10 ON BEHALF OF DEFENDANT MONSANTO:</p> <p>11 HOLLINGSWORTH LLP</p> <p>12 1350 I Street, N.W.</p> <p>13 Washington, DC 20005</p> <p>14 202-898-5800</p> <p>15 BY: HEATHER A. PIGMAN, ESQ.</p> <p>16 hpigman@hollingsworth.com</p> <p>17 ERICA T. KLENICKI, ESQ.</p> <p>18 eklenicki@hollingsworth.com</p> <p>19</p> <p>20 THE VIDEOGRAPHER:</p> <p>21 MR. MARC MYERS,</p> <p>22 Golkow Technologies.</p> <p>23</p> <p>24 REPORTED BY: JULIANA F. ZAJICEK, RPR, CSR.</p>	<p>1 E X H I B I T S (Continued)</p> <p>2 EXHIBIT MARKED FOR ID</p> <p>3 No. 25-7 Article: "Clastogenic Effects of</p> <p style="padding-left: 40px;">Glyphosate in Bone Marrow Cells</p> <p style="padding-left: 40px;">of Swiss Albino Mice," by Prasad</p> <p style="padding-left: 40px;">et al..... 123</p> <p>4</p> <p>5</p> <p>6 No. 25-8 Article: "Biomonitoring of</p> <p style="padding-left: 40px;">Genotoxic Risk in Agricultural</p> <p style="padding-left: 40px;">Workers from Five Colombian</p> <p style="padding-left: 40px;">Regions: Association to</p> <p style="padding-left: 40px;">Occupational Exposure to</p> <p style="padding-left: 40px;">Glyphosate," by Bolognesi et</p> <p style="padding-left: 40px;">al.; MONGLY04882823 - 834..... 200</p> <p>7</p> <p>8</p> <p>9</p> <p>10 No. 25-9 Article: "Evaluation of DNA</p> <p style="padding-left: 40px;">damage in an Ecuadorian</p> <p style="padding-left: 40px;">population exposed to</p> <p style="padding-left: 40px;">glyphosate," by Paz-y-Mio et al.... 209</p> <p>11</p> <p>12 No. 25-10 Article: "Determination of</p> <p style="padding-left: 40px;">glyphosate and AMPA in blood and</p> <p style="padding-left: 40px;">urine from humans: About 13</p> <p style="padding-left: 40px;">cases of acute intoxication"..... 220</p> <p>13</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p>

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1 THE VIDEOGRAPHER: We are now on the record. My
 2 name is Marc Myers. I am a videographer for Golkow
 3 Technologies. Today's date is September 22nd, 2017.
 4 The time is now 9:12 a.m. This video deposition is
 5 being held in Lansing, Michigan, in the matter of In
 6 Regards to the Roundup Products Liability and it's
 7 pending in the United States District Court, Northern
 8 District of California. The deponent is Dr. Jay
 9 Goodman.
 10 And at this time will the attorneys please
 11 introduce themselves and will the court reporter,
 12 Juliana Zajicek, please swear in the witness.
 13 MR. WOOL: David Wool for the Plaintiffs.
 14 MS. TABATABAIE: Tara Tabatabaie for the
 15 Plaintiffs.
 16 MR. WOOL: And do we have anybody on the phone?
 17 MS. TREMBOUR: Good morning. Rosa Trembour,
 18 Lockridge Grindal Nauen.
 19 MS. PIGMAN: Heather Pigman from Hollingsworth
 20 on behalf of Monsanto.
 21 MR. KLENICKI: Erica Klenicki from Hollingsworth
 22 on behalf of Monsanto.
 23 (WHEREUPON, the witness was duly
 24 sworn.)

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1 JAY IRWIN GOODMAN, PH.D.,
 2 called as a witness herein, having been first duly
 3 sworn, was examined and testified as follows:
 4 EXAMINATION
 5 BY MR. WOOL:
 6 Q. Good morning, Dr. Goodman. How are you?
 7 A. Terrific.
 8 Q. Will you please state your name for the
 9 record?
 10 A. Jay Irwin Goodman.
 11 Q. And have you ever given a deposition
 12 before?
 13 A. Yes.
 14 Q. You have, okay. Well, so you probably
 15 know the drill, but I'm going to go over a couple of
 16 ground rules.
 17 A. Okay.
 18 Q. I'm going to be asking you a series of
 19 questions today. Your counsel will -- will object at
 20 certain times, so it's important that you give your
 21 counsel a moment after I ask my question for her to
 22 get her objection in when she does.
 23 Also, it is important that you give
 24 audible answers to all of my questions, so no nodding

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1 yes or shaking your head no.
 2 Does that sound fair?
 3 A. Yes.
 4 Q. Okay. And I assume that if you give me an
 5 answer that you have understood my question. If at
 6 any point you don't understand the question that I've
 7 asked you, just please ask me and -- and I'll repeat
 8 it.
 9 And the last thing is that I tend to talk
 10 fast, so if you want me to slow down or anything in
 11 that respect, just ask me and I'll do my best to
 12 accommodate.
 13 Fair enough?
 14 A. Fair enough.
 15 (WHEREUPON, a certain document was
 16 marked Deposition Exhibit No. 25-1,
 17 for identification, as of
 18 09/22/2017.)
 19 BY MR. WOOL:
 20 Q. Okay. I'm going to hand you what has been
 21 marked as Exhibit 1.
 22 Do you recognize that document?
 23 A. The top page is the -- the top -- the top
 24 page is the top page of the report that I provided,

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1 yes.
 2 Q. Okay. And that document contains your
 3 resume, correct?
 4 A. I don't know. I'd have to look to see.
 5 Q. Okay. Well, take a moment to -- to look,
 6 if you don't mind.
 7 A. I haven't verified every page, but it
 8 certainly looks like my resume is there.
 9 Q. Okay. Do you -- do you remember
 10 submitting your resume along with your expert report?
 11 A. Yes, of course.
 12 Q. And is everything contained in that resume
 13 that you submitted up-to-date?
 14 A. Yes, it is accurate up to and including
 15 today.
 16 (WHEREUPON, a certain document was
 17 marked Deposition Exhibit No. 25-2,
 18 for identification, as of
 19 09/22/2017.)
 20 BY MR. WOOL:
 21 Q. Okay. I'm going to hand you what has been
 22 marked as Exhibit 2. And this document is described
 23 as your supplemental reliance list?
 24 A. It appears to be so.

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1 Q. Okay. I'm going to go back to those in
 2 a -- in a minute.
 3 What is your -- is your specialty?
 4 A. My specialty is -- my specialty is in
 5 toxicology and more specifically in terms of
 6 carcinogenesis, particularly mechanisms underlying
 7 carcinogenesis, rational approaches to evaluating the
 8 carcinogenic potential of chemicals and includes
 9 hypothesis-driven research relative to mechanisms
 10 underlying carcinogenesis.
 11 In terms of specialty, in terms of
 12 teaching, if that -- if -- if that is what you meant
 13 to include?
 14 Q. Sure.
 15 A. In terms of teaching, my responsibilities
 16 for teaching to the medical students, partic- --
 17 typically in the area of chemotherapy, and for
 18 graduate students, typically in the areas of
 19 toxicology related to carcinogenesis, safety
 20 assessment, and basic aspects of toxicology.
 21 Q. Okay. And when you say "safety
 22 assessment," what do you mean by that term?
 23 A. By that term I mean evaluating the
 24 potential of a chemical to -- to cause harm, and with

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1 me it is usually but not always with related --
 2 related to the potential to act as a cancer-causing
 3 agent.
 4 Q. Are you familiar with the term "hazard
 5 assessment"?
 6 A. Yes, of course.
 7 Q. Okay. Is that analogous to what you just
 8 described as a safety assessment?
 9 A. No. Certainly I'm familiar with hazard
 10 assessment. I know what that is, but a hazard -- a
 11 hazard assessment is like night and day different from
 12 a safety assessment.
 13 Q. Are you familiar with the term "risk
 14 assessment"?
 15 A. I am.
 16 Q. Okay. Is that analogous to the term you
 17 just described as safety assessment?
 18 A. You know, sort of, it is. We can say
 19 safety assessment, risk assessment. It's -- it's sort
 20 of whether you are going to look at the side of the
 21 coin in terms of conditions under which this might
 22 cause adverse effects or you are going to look at the
 23 side of the coin under -- certainly with an interest
 24 in whether or not it causes adverse effects -- but

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1 under what conditions might it not cause adverse
 2 effects.
 3 Q. So -- so --
 4 A. So they are very closely related.
 5 Q. Okay. So just so that I'm clear, what are
 6 the differences between a safety assessment and a risk
 7 assessment, as you understand it?
 8 A. First of all, I consider expertise in --
 9 in both, which I should have said, and many times --
 10 many times I use this interchangeably.
 11 Q. Okay.
 12 A. It's -- it's -- it's a nuanced and a bit
 13 from perspective. Again, safety assessment, in terms
 14 of, well, what are the conditions under which this
 15 chemical might -- might not be problematic, risk
 16 assessment, part of the conditions under which it
 17 could be problematic, but the difference is really
 18 nuanced. I -- we can use them interchangeably.
 19 Q. Okay. Have you ever been hired by a -- a
 20 chemical company as a consultant?
 21 A. Yes, I have -- I have been retained by a
 22 chemical company as a consultant.
 23 Q. Now, I don't want you to get anything --
 24 into anything that is -- is confidential, but if you

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1 can, can you tell me what chemical companies you have
 2 done consulting work for?
 3 A. The only chemical company that I can tell
 4 you that I've consulted for, because I do have
 5 confidentiality agreements with them, is -- there is
 6 one chemical company where it -- it is in the public
 7 record, because I was coauthor on a manuscript. At
 8 the time I was a consultant to the company and a
 9 couple of the coauthors worked for the company, and
 10 that is Syngenta.
 11 Q. And can you tell me whether you ever
 12 served as a consultant for Monsanto?
 13 A. Never.
 14 Q. Never.
 15 What was the work that you did for
 16 Syngenta -- or did -- or sorry, strike that.
 17 What -- did your work for Syngenta involve
 18 a specific product?
 19 A. It did.
 20 Q. It did.
 21 What was that?
 22 A. I have a confidentiality agreement with
 23 them and I -- I really cannot talk about the
 24 specifics.

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1 Q. Fair enough.
 2 You said that you produced a -- a
 3 publicly-available manuscript --
 4 A. That is correct.
 5 Q. -- as part of that work?
 6 And what was the title of that manuscript,
 7 if you remember?
 8 A. The title was something about evaluating
 9 the user -- something about using toxicogenomics
 10 relative to evaluating an aspect of carcinogenesis.
 11 If -- if you want, I can quickly thumb through my CV
 12 and --
 13 Q. I -- I don't need you to do that.
 14 A. Okay.
 15 Q. Can you just give me the approximate date
 16 when you performed that consulting work for Syngenta?
 17 A. Oh, gosh. I would say that was more
 18 recent than 10 years ago and probably -- probably
 19 at -- at least two or three years ago and certainly
 20 more recent than 10 years ago.
 21 Q. Fair enough.
 22 Have you ever served as an expert witness
 23 before?
 24 A. I have.

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1 Q. What was the nature of the case for which
 2 you served as an expert witness?
 3 A. First of all, let me say that in terms of
 4 serving as an expert witness before, in terms of being
 5 deposed, this was decades ago. Probably it could be
 6 25 to 35 years ago.
 7 Q. Okay.
 8 A. And since I have -- have done that.
 9 Q. Do you remember what that case was about
 10 or involved?
 11 A. One case involved medical malpractice and
 12 it involved a question of dosing and side effects of a
 13 corticosteroid. And the others -- you know, it is so
 14 far away, the -- the other two or three, which
 15 involved allegations of contamination of groundwater
 16 from in two cases a municipal and in one case a
 17 private landfill.
 18 Q. So if I understand your testimony
 19 correctly, there were two cases, two separate cases
 20 involving groundwater contamination and you served as
 21 an expert witness in both of those cases?
 22 A. Let me be more clear.
 23 As I remember, I think there were three.
 24 Two of them involved landfills owned by a municipality

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1 and one was private.
 2 Q. A private landfill?
 3 A. Privately owned.
 4 Q. A privately-owned landfill.
 5 And did the two involving a -- a
 6 municipality -- strike that.
 7 Did the -- the same municipality own
 8 the -- the landfill in the -- the two cases that you
 9 described as -- as publicly-owned landfills, I guess?
 10 A. No. There was -- there -- they were two
 11 different municipalities.
 12 Q. Okay. Did all three of those cases
 13 involve the same or similar allegations?
 14 A. It was a long time ago. Similar.
 15 Q. Okay. Did they involve a specific
 16 chemical or compound?
 17 A. You know, again, it -- it was a long time
 18 ago and we were dealing in -- in each case with more
 19 than one compound.
 20 Q. Did you testify --
 21 A. Well, with -- with more than one -- more
 22 than one chemical. In some cases they were metals and
 23 those would not be a compound.
 24 Q. And were you retained by the defendants in

Page 17

1 all three of those cases?
 2 A. In those cases, it was for the defense.
 3 Q. Do you regard -- strike that.
 4 Do you remember the -- the allegations
 5 that the plaintiffs were alleging in those cases?
 6 A. In general, the plaintiffs were alleging
 7 contamination of groundwater as a -- from -- from a
 8 particular landfill.
 9 Q. Were they alleging that they had suffered
 10 personal injuries as part of that contamination?
 11 A. In one case the answer is yes, but I -- I
 12 just don't recall the details.
 13 Q. Fair enough.
 14 And there are no other cases that you can
 15 recall as you sit here today for which you testified
 16 as an expert witness?
 17 A. That's correct. There might be another
 18 one, but as I sit here today, that is what I recall.
 19 Q. And the approximate date of those
 20 three cases was sometime, you said, about 25 years
 21 ago?
 22 A. In terms of the four, including the
 23 medical malpractice, this -- this was roughly in the
 24 order of 25, it could be 30 years ago.

Page 18

1 Q. And do you recall the outcome of any of
 2 those -- the three cases involving groundwater
 3 contamination?
 4 A. Any of the three.
 5 I do recall that on one of them the case
 6 was -- on one of them the -- the court's decision was
 7 against the defendant and that was reversed on appeal.
 8 In terms of the other two, I -- I don't recall.
 9 Q. Did you know any -- strike that.
 10 A. And I should tell you that in terms of the
 11 appeal, I participated in -- in -- in -- in that also.
 12 Q. What did you do for the appeal, if you
 13 recall?
 14 A. It was an extension of the original
 15 evaluations that I made.
 16 Q. So would it be fair to say that you
 17 testified to approximately the same opinions that you
 18 gave at the -- at the trial court?
 19 A. In the appeal there was no -- there was no
 20 testimony by me. It is my vague recollection that
 21 this consisted of documents prepared by the attorneys
 22 that were submitted to the court. And I -- I do not
 23 know -- I certainly did not testify during the appeal
 24 or as part of the appeal.

Page 19

1 Q. So if I'm understanding correctly, you
 2 advised the attorneys on -- in the appeal as to the,
 3 say, accuracy of their scientific representations to
 4 the court?
 5 A. Yeah, I was -- I was involved in -- in
 6 providing some toxicology input to that and that's
 7 really the best that I recall.
 8 Q. Now, prior to being retained as an expert
 9 in this case, did you know anybody who is or was at
 10 any time an employee of Monsanto?
 11 A. Yes.
 12 Q. Okay. And who was that? Or who were
 13 those people, I should say?
 14 A. There weren't many. Let me tell you that
 15 I -- I have been in the -- in the toxicology area for
 16 many years and I travel around a lot, fortunately, and
 17 I get to meet a lot of people. So there is the
 18 possibility that I have on a casual occasion met.
 19 Two -- two of them -- three of them that I can recall.
 20 One is James Sherman who I believe no longer works for
 21 Monsanto. Another one, who I've met on brief
 22 occasions, not recently, is a fellow named Larry Kier.
 23 And the third person who I know is a person named
 24 Jerry Hjelle. And it's -- I'm going to mix this up.

Page 20

1 Jerry Hjelle, and it's -- the name is something like
 2 H-I-J-L-E (sic) or -- who I believe is now retired
 3 from Monsanto.
 4 Q. And how did you know Mr. Sherman?
 5 A. I knew Mr. Sherman because I met him at
 6 some scientific meetings that I attended and met him
 7 as -- at some organization I was involved in where he
 8 had some involvement and met -- met him there.
 9 Q. And what was the approximate timeframe
 10 when you met him?
 11 A. We are talking about Jim Sherman?
 12 Q. Sherman, yes.
 13 A. I would say I probably first met Jim
 14 Sherman -- again, we are talking approximate.
 15 Q. Okay. Right, approximately.
 16 A. I -- I guess I first met Jim Sherman
 17 probably 10 or 12 years ago and I have not seen him
 18 for probably two to four years.
 19 Q. Have you communicated him -- with him
 20 since -- strike that.
 21 Have you communicated with Mr. Sherman in
 22 the past two to four years?
 23 A. I have not.
 24 Q. Now, how did you meet Larry Kier?

Page 21

1 A. Basically, the same way that I met -- that
 2 I met Jim Sherman. I probably met him at a Society of
 3 Toxicology meeting or two and also as part of an
 4 organization that I was involved in, he was involved
 5 in that organization, and I see him at some of their
 6 meetings. Not very often. And we did not have
 7 lengthy, deep interactions.
 8 Q. And approximately when did you meet
 9 Mr. Kier?
 10 A. Larry Kier, I -- I met Larry Kier, again,
 11 it probably would be, I want to say, about roughly
 12 15 years ago, and I don't think I've seen him in the
 13 last five years.
 14 Q. Did you ever communicate with Mr. Kier
 15 personally about glyphosate or Roundup?
 16 A. No.
 17 Q. No.
 18 And -- and I -- I know you just answered
 19 this question, so I'm sorry, but when was the last
 20 time you said that you saw Mr. Kier?
 21 A. The last time I saw him must have been
 22 five years ago, roughly.
 23 Q. Okay. And have you communicated with him
 24 in any way within the past five years?

Page 22

1 A. No.

2 Q. And you said you saw him, and maybe I'm --

3 I'm missing this, at a Society of Toxicology meeting

4 or some other sort of -- of meeting of that nature?

5 A. I think -- well, probably once or twice in

6 terms of a hello in passing at an annual Society of

7 Toxicology meeting, and then a particular organization

8 that brings various scientists together is one that

9 both he and I were involved in for a period of time,

10 and I got to meet him in a casual sort of way several

11 times.

12 Q. And what organization was that?

13 A. That would be the International Life

14 Sciences Institute and most -- mostly with one of

15 their subdivisions called the Health and Environmental

16 Sciences Institute -- Institute.

17 Q. And what does that subdivision do?

18 A. All of -- and in the International Life

19 Sciences Institute, if we could use just the acronym

20 ILSI --

21 Q. Okay.

22 A. -- I-L-S-I, I think is the best

23 organization in the world in terms of bringing

24 together scientists from industry, government and

Page 23

1 academia to advance science-based safety assessment.

2 Q. And you were at that meeting as a

3 representative of the -- of Michigan State University?

4 A. No. I -- I -- I -- I -- I cannot

5 represent Michigan State University. That would take

6 approval of probably the president of the university.

7 So any -- any of these activities that I am involved

8 in, it is as -- as Jay Goodman.

9 Q. Okay. So no industry group sponsored

10 your -- your attendance to -- to that meeting?

11 A. That is -- that is not correct. The

12 International Life Sciences Institute is funded to a

13 large extent by contributions they receive from

14 industry.

15 Q. And do you receive any financial

16 compensation from your work for the -- the ILSI?

17 A. No. What -- what they did is they -- they

18 reimbursed me for travel expenses. There was no -- no

19 honorarium involved.

20 Q. Now, the last Monsanto employee that you

21 testified that you were acquainted with is Jerry

22 Hjelle, am I -- I saying that correctly?

23 A. It's some -- it's Jerry Hjelle.

24 Q. Hjelle.

Page 24

1 A. And it's spelled something like H-I-J-L-E.

2 Q. And how do you know Mr. Hjelle?

3 A. Primarily through the International Life

4 Sciences Institute, and there was a period of time

5 when he and I were involved and there was some, excuse

6 me, some overlap.

7 Q. Okay. And to the best of your

8 recollection, those are the only three Monsanto

9 employees that you were acquainted with prior to being

10 retained as an expert in this case?

11 A. To the best of my recollection, that's

12 correct.

13 Q. Okay. Now, are you acquainted with a Sir

14 Colin Barry?

15 A. I am.

16 Q. Okay. And how do you know Sir Colin?

17 A. I know him from seeing him, speaking with

18 him at some scientific meetings, and we are probably

19 talking now about three or four scientific meetings.

20 I know him through some corres- -- e-mail

21 correspondence that we have. And some of that

22 correspondence does relate to a -- a manuscript that

23 we were coauthors on, and -- I think. And then on --

24 I think that's it. And -- and -- and then we -- we

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1 also might be, I'll have to think about that, we might

2 be in the future contributing manuscripts separately,

3 separately, to a special issue of a particular

4 journal. And I think that his name was on the list of

5 possible contributors, but it would be not a

6 coauthored. It would be separate publications.

7 Q. And what is that issue?

8 A. This is a special issue of a journal of

9 the British Toxicology Society. And I'm cringing a

10 little bit, it's coming, coming close to the time when

11 the -- my manuscript is due.

12 Q. And does -- strike that.

13 What does -- what does your manuscript

14 involve? Does it involve a specific chemical or...?

15 A. No. My manuscript in -- in a very broad

16 sense will be some aspects of the -- of the standard

17 rodent bioassay. I haven't really -- I haven't really

18 defined it thoroughly yet.

19 Q. And what manuscript were you coauthors on?

20 A. It was a -- with Colin Barry, there was a

21 manuscript that I'm going to call The Appeal.

22 Q. Okay. I'm -- I'm familiar with that.

23 A. And we were coauthors on that. And with

24 The Appeal there was a -- like a letter, a short

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1 letter to the editor that had probably 200 or so
 2 people who sort of signed and Colin was also one of
 3 the signers of that.
 4 Q. Have you ever communicated with Colin
 5 Barry about glyphosate and/or Roundup?
 6 A. No communication from me to him dealt
 7 with -- dealt with glyphosate or Roundup. On
 8 one e-mail that he sent as part of the underlying
 9 discussions before what I'm going to call The Appeal
 10 manuscript was completed, there is a -- a line at the
 11 bottom of one e-mail -- excuse me -- where -- where he
 12 says something about I am -- I am going to a Monsanto
 13 shareholders meeting. Glyphosate is going to be
 14 discussed. Should be interesting.
 15 Q. And you did not -- strike that.
 16 Did you have any oral communications with
 17 Sir Colin Barry about -- regarding glyphosate?
 18 A. Never.
 19 Q. Same question about Roundup?
 20 A. Never.
 21 Q. Okay. Now, you know a Helmut Greim as
 22 well, is that correct?
 23 A. I do.
 24 Q. And how do you know -- I presume it is

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1 Dr. Greim?
 2 A. It is.
 3 Q. Okay. How are you acquainted with him?
 4 A. I'm acquainted with him because I do --
 5 have seen him on occasion at -- at scientific
 6 meetings. Helmut Greim, Dr. Greim, was also involved
 7 with International Life Sciences Institute, and I
 8 probably first met him through some International Life
 9 Sciences Institute meetings or projects.
 10 Q. Have you ever communicated with Dr. Greim
 11 about Roundup or glyphosate?
 12 A. Never.
 13 Q. Never.
 14 Now, I'm not going to make you flip
 15 through your -- your resume, but at one point you were
 16 President of the Society of Toxicology, is that
 17 correct?
 18 A. That's correct.
 19 Q. Okay. And what is the Society of
 20 Toxicology?
 21 A. The Society of Toxicology is the largest
 22 professional society of toxicologists in the world.
 23 The membership today is probably about 8,000 to 8500
 24 and it was probably 5 or 6,000 when I was -- at the

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1 time I was president.
 2 Q. How does the Society of Toxicology receive
 3 its funding, if you know?
 4 A. The society receives its funding, A, from
 5 member dues. It receives the bulk of its funding from
 6 its annual meeting in terms of registration fees and
 7 as part of the annual meeting there is a very large
 8 presence of -- of exhibitors, in terms of exhibitors
 9 that are in the business of selling scientific
 10 instruments, some of them are some contract
 11 laboratories, some of them are, like, the National
 12 Institute of Environmental Health Sciences has a
 13 booth, and they all pay something for this. And there
 14 are also some donations from industry. The bulk of it
 15 comes -- the bulk of the finances come from the annual
 16 meeting.
 17 Q. Did you receive any compensation --
 18 A. I should say also, they -- they are now
 19 having some, what I will call, freestanding meetings
 20 outside of their annual meeting, but I don't think
 21 that -- I -- I don't think that those are moneymakers.
 22 If they -- if they are, it's very little money that is
 23 made on that. It's really done for the -- to advance
 24 the science.

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1 Q. And were you compensated for your time as
 2 President of the Society of Toxicology?
 3 A. No.
 4 Q. No.
 5 A. Except -- I -- I -- when I -- when I
 6 traveled to -- when I -- when I -- when I traveled to
 7 board meetings, there were times that I did travel on
 8 behalf of the Society of Toxicology, I was reimbursed
 9 for travel expenses, but no -- no salary, no
 10 honorarium, no help in terms of any office-type
 11 expenses.
 12 Q. Okay. And different toxicologists have
 13 different philosophies, is that fair?
 14 A. I would -- I would put it a little bit
 15 different. I would say that different -- different
 16 toxicologists might have different perspectives.
 17 Q. And would you agree that some
 18 toxicologists view their role as to try to find the
 19 poison, so to speak?
 20 MS. PIGMAN: Objection; calls for speculation.
 21 BY THE WITNESS:
 22 A. I -- I don't -- I don't think that that is
 23 correct. There may -- I don't think -- I have not met
 24 toxicologists who have told me that my role is to find

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1 the poison.
 2 BY MR. WOOL:
 3 Q. Okay. So is it fair to say you don't view
 4 that as your role?
 5 A. I do not view that as my role and I can
 6 only speak for a limited number of toxicologists who
 7 I've met and I've never heard any of them articulate
 8 what you just said.
 9 Q. Fair enough.
 10 I'm going to hand you what will be marked
 11 as Exhibit 25-3, and I will represent that this is
 12 your retention letter with the Hollingsworth firm.
 13 (WHEREUPON, a certain document was
 14 marked Deposition Exhibit No. 25-3,
 15 for identification, as of
 16 09/22/2017.)
 17 BY MR. WOOL:
 18 Q. Do you recall receiving this letter?
 19 A. Yes.
 20 Q. And the date on the retention letter is
 21 December 29th, 2015, is that correct?
 22 A. That is correct.
 23 Q. When were you first contacted about
 24 serving as an expert in this litigation?

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1 A. Approximately.
 2 Q. Approximately.
 3 A. The first week of December of 2015.
 4 Q. And who contacted you?
 5 A. Mr. John Kalas.
 6 Q. And let me go ahead and mark Exhibit 4 and
 7 I'll ask you about this in a minute.
 8 (WHEREUPON, a certain document was
 9 marked Deposition Exhibit No. 25-4,
 10 for identification, as of
 11 09/22/2017.)
 12 BY MR. WOOL:
 13 Q. Now, prior to being contacted by
 14 Mr. Kalas, had you performed any research on
 15 glyphosate and/or Roundup?
 16 A. Prior to being contacted by him, I did
 17 read the -- what I'll call the write-up that IARC had
 18 published in a journal called the Lan -- Lancet. And
 19 also a number of years ago I was a member of the Board
 20 of Scientific Counselors of the National Toxicology
 21 Program, and the National Toxicology Program did,
 22 not -- not a bioassay, but they did a 90-day toxicity
 23 study on glyphosate and I was a member of the board at
 24 the time that that 90-day study was reviewed.

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1 Q. Were you involved in -- in the review of
 2 that study?
 3 A. Yes. The Board of Scientific -- this was
 4 for the National Toxicology Program, and it is
 5 typical, not always, that their documents are
 6 submitted to the Board of Scientific Counselors for
 7 review prior to having them made public.
 8 Q. Had you formed an opinion on the
 9 carcinogenicity of Roundup and/or glyphosate after
 10 participating in that review?
 11 A. I did not. That was -- that was not a
 12 carcinogenicity study. It was a -- a 90-day study
 13 which is designed to ask about potential toxicity at
 14 various organ sites but not carcinogenicity, because a
 15 study for a duration of 90 days is certainly not
 16 sufficiently long.
 17 Q. Now, had you formed an opinion about the
 18 genotoxicity of Roundup and/or glyphosate prior to
 19 December 29th, 2015?
 20 (WHEREUPON, there was a short court
 21 reporter clarification.)
 22 BY MR. WOOL:
 23 Q. Had you formed an opinion about the
 24 genotoxicity of Roundup and/or glyphosate prior to

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1 being retained by the Hollingsworth firm in December
 2 of 2015?
 3 A. What I can tell you is that part of this
 4 90-day study did include a -- a separate series of
 5 evaluations of the genotoxic potential of glyphosate
 6 and those evaluations turned out to be negative. And
 7 so, based on that, it appeared to me, but without a
 8 firm conclusion, those -- based on those three, it
 9 appeared that glyphosate is not genotoxic.
 10 Q. And do you recall what tests were
 11 performed in that review?
 12 A. Oh, certainly Ames test was performed. So
 13 I was on the Board of Scientific Counselors roughly
 14 from 1989 to 1992 or so. So we are talking a while
 15 ago. Certainly it was the Ames test. It was probably
 16 one or two of the mammalian tests in vitro and I just
 17 do not recall if an in vivo study was -- was
 18 performed.
 19 Q. Do you believe that you could form a firm
 20 opinion as to the genotoxicity of Roundup based only
 21 on the Ames test or on -- on in vitro tests?
 22 A. My answer to that is no. In my opinion,
 23 in terms of a firm opinion, I think that the inclusion
 24 of some in vivo studies is appropriate. So this

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<p>1 evaluation that the NTP did was -- was somewhat 2 limited, although, again, the -- the thrust of the NTP 3 evaluation was this 90-day toxicity study. 4 Q. And your involvement, and I'm sorry if I 5 asked this, was limited to reviewing that study -- 6 A. My involvement -- 7 Q. -- the entire NTP study? 8 A. My involve -- involvement was limited to 9 reviewing that study. I was not involved in the 10 planning of the protocols. 11 Q. Okay. Now, I marked as Exhibit 4 your 12 invoices. 13 Can you take a look through those really 14 quick? 15 A. Sure. 16 Q. I -- I just want to make sure that those 17 reflect all of the invoices and -- and are accurate, 18 et cetera. 19 A. These are the invoices that I have 20 submitted, yes. 21 Q. And do these accurately reflect all of the 22 time that you have spent on your glyphosate and 23 Roundup opinions up to August 6th -- 6th, 2017? 24 A. As -- as -- as noted on the August 6th,</p>	<p>1 A. Just me. 2 Q. Just you. 3 A. It's just me. 4 Q. Okay. And how much time do you believe 5 that you have spent since July 24th, 2017, working on 6 this case? 7 A. Well, you know, I -- I keep notes. I -- I 8 don't keep a running -- I don't keep a running tally. 9 I would say that it is, in rough ballpark terms, 10 something between 25 and 50 hours. 11 Q. Okay. Now, if you turn to the invoice 12 dated August 23rd, 2016, which I believe is the third 13 page going chronologically. 14 A. I see that. 15 Q. Now, if you look at Item No. 2, it states: 16 "Initial draft report sent to H. Pigman 17 and E. Klenicki on 6/15 of '16," is that correct? 18 A. Correct. 19 Q. Okay. And on June -- so is -- is it 20 accurate to say that on June 15th, 2016, you submitted 21 your first draft report to Ms. Pigman and 22 Ms. Klenicki? 23 A. Yes, that's what I mean by "initial." 24 Q. And at that point in time had you formed a</p>
<p>Page 35</p> <p>1 2017 invoice, right under Invoice it says the period 2 covered is June 7 through July 24. 3 Q. Oh, so my apologies. 4 A. It -- it -- it accurately covered -- 5 accurately represents my invoices up to and including 6 July 24, 2017. 7 Q. And how much time do you believe you've 8 billed since this invoice was submitted? 9 A. I don't know. I'm sorry. 10 Q. And you can approximate. 11 A. Sin- -- since -- since the -- since the 12 one dated August 17th was submitted? 13 Q. Correct. 14 A. I have not billed for any time since then. 15 There -- there have -- there has been some time 16 accruing, if you will, but the most recent invoice 17 that I have received is the one that I have -- the 18 most recent invoice that I have submitted is the one 19 dated August 6th, 2017. 20 Q. And how do you document the time that you 21 spend working on -- on this Roundup case? 22 A. I keep -- I keep notes. 23 Q. Does anybody help you with keeping notes 24 or --</p>	<p>Page 37</p> <p>1 firm opinion as to the genotoxicity of glyphosate 2 and/or Roundup? 3 A. At that point my -- I -- I had not formed 4 a firm opinion, but I was starting to develop a 5 preliminary opinion was starting to gel. 6 Q. And so as of June 15th, 2016, it would be 7 fair to say that you had not formed a definitive 8 opinion as to the genotoxicity of Roundup? 9 A. That is correct. 10 Q. Okay. Now, in performing your work on -- 11 on the Roundup case, did you receive any help from 12 a -- a research assistant or -- or anything like that? 13 A. None. It's all me. 14 Q. It's all you. 15 Did anybody help you summarize articles? 16 A. It's all me. 17 Q. Did anybody from Monsanto send you article 18 summaries or anything like that? 19 A. Never. 20 Q. Okay. I'll ask you to take a look at 21 Exhibit 2. You can probably put Exhibits 3 and 4 to 22 the side for a while. 23 And what is Exhibit 2? 24 A. Exhibit 2 is titled "Supplemental</p>

<p style="text-align: right;">Page 38</p> <p>1 Materials Considered List." Along with my report 2 there was a listing of materials considered. And 3 since my report was submitted, I have not stopped in 4 terms of, if you will, keeping an eye out for 5 glyphosate-related literature. 6 Q. And as you sit here today, does that list 7 in Exhibit 2 represent everything that you have read 8 or relied upon in forming your opinions? 9 A. It does. 10 Q. It does. 11 And have you reviewed everything that's on 12 that list? 13 A. I have. 14 Q. I mean read every article, not read the -- 15 reviewed the entries? 16 A. The -- the -- I -- I have. Now, for some 17 of the articles I spent more time on than -- than some 18 others, but I did review the materials on this 19 Supplemental Materials Considered -- on this Materials 20 Considered List with the supplements added to it. 21 Q. Okay. And in Exhibit 1, your expert 22 report contains an appendix which is a number of EPA 23 tables, is that correct? 24 A. That's correct.</p>	<p style="text-align: right;">Page 40</p> <p>1 A. Currently that's correct. 2 Q. Okay. And what are those journals? 3 A. One is Toxicology where I am a member of 4 the editorial board. The other is Regulatory 5 Toxicology and Pharmacology where I am a -- one of the 6 associate editors. 7 Q. Okay. And for Toxicology, what do you do 8 in your capacity as -- let's see, what did you say -- 9 as an editor on the board? 10 A. As a member of the editorial board, I 11 do -- when -- when a -- when a manuscript is submitted 12 to the journal, the editor, and in the case of 13 Toxicology there is an editor for North America and 14 there is a separate editor for, I think, Europe and 15 the rest of the world. And manuscripts that these two 16 individuals receive, they then send out for review. 17 Often at least one of the reviewers is a member of the 18 editorial board. They do have -- sometimes all of the 19 reviewers -- multiple reviewers review each 20 manuscript. Sometimes they are all members of the 21 editorial board, sometimes it's members of the 22 editorial board and someone who may not be on the 23 editorial board. And so at their decision, they would 24 ask me if I -- if I have the time and feel that I have</p>
<p style="text-align: right;">Page 39</p> <p>1 Q. And did you review all of the studies that 2 are summarized in those tables? 3 A. The answer is yes. The answer is yes. I 4 could have constructed those tables on my own. It 5 would have taken a long period of time. It is my 6 opinion that the EPA's Office of Pesticide Programs 7 tables, which -- which are -- are my appendix here, 8 are -- are very thorough. I think that they did a 9 very good job. And that's why, with proper 10 referencing, I've included their tables. But I did 11 ask the Hollingsworth attorneys if they could send me 12 the references on the tables, and you will see that 13 that is part of this Materials Considered List. 14 So while I have the EPA tables here, in no 15 way did I simply rely on those tables. I -- I did 16 want to -- it was -- it was not -- it was imperative 17 in terms of looking at the underlying references. 18 Q. Okay. Let me go back to -- to Exhibit 1 19 and specifically your resume really quick. 20 A. Sure. 21 Q. So I -- I just wanted to touch briefly 22 upon your role on, I believe you serve as an editor 23 or -- or on the board of two journals, is that 24 correct?</p>	<p style="text-align: right;">Page 41</p> <p>1 the expertise to do a thorough review of a particular 2 manuscript submitted for publication. 3 Q. And what do you do for the -- for the 4 other journal? 5 A. For the other journal -- 6 Q. Similar? 7 A. I -- I do something that is really very -- 8 that is very similar. I think that as an associate 9 editor there are times where I may receive some of 10 the, in quotes, more difficult manuscripts. 11 Q. What do you mean by more difficult 12 manuscripts? 13 A. They may be more complex, they may be 14 more -- more complex, they may be more involved. 15 That -- that is not always -- that is not always the 16 case. 17 Q. Okay. So let me just ask you some basic 18 questions about your expert report -- expert report -- 19 A. Sure. 20 Q. -- in Exhibit 1. 21 Are all of the opinions that you intend to 22 offer at trial confined in that report? 23 A. Yes. 24 Q. As you sit here today, to the best of your</p>

<p style="text-align: right;">Page 42</p> <p>1 knowledge, do you intend to offer only those opinions 2 that appear in that report? 3 A. As of today, this report is -- is my 4 independent report based on my evaluation and as of 5 today the opinions expressed here are what I 6 anticipate presenting, if -- if I am involved in this 7 court proceeding that you are alluding to. 8 Q. Are the opinions contained in your report 9 complete? 10 A. The opinions, the opinions are complete. 11 The report is, in my opinion, is still, if you will, a 12 sort of a -- well, my opinion, I'll -- in a sense sort 13 of a living document because, as I indicated here, 14 since submitting the report I have not stopped in 15 terms of looking at glyphosate-related -- related 16 papers. I -- I cannot see how my opinions here 17 would -- would change, but depending upon what happens 18 in the literature, I can't tell you that something is 19 absolutely 100 percent not possible. 20 Q. Fair enough. 21 As you sit here today, are there any 22 changes or edits that you feel you would need to make 23 to your report to -- to make it complete and accurate? 24 A. No. I think my report -- my -- I think --</p>	<p style="text-align: right;">Page 44</p> <p>1 denied, if that is your question, my answer is no. 2 Q. Okay. So there are no studies that you're 3 aware of that you wanted to see or -- or review that 4 you didn't have access to? 5 A. That is correct. But I would tell you 6 that a -- a large number of the papers referenced in 7 this Materials Considered List are papers that I found 8 or the papers that I knew about that were relevant 9 here. 10 Q. Okay. And the opinions contained in your 11 report, are -- strike that. 12 How would you describe the level of 13 confidence that you have in your opinions as they are 14 represented in your report? 15 A. I describe the level of confidence I have 16 as extremely high. 17 Q. Okay. And you are not offering an opinion 18 in your expert report related to epidemiology? 19 A. You are correct. I -- I am not an 20 epidemiologist. I do not claim expertise in 21 epidemiology. 22 Q. Okay. And you aren't offering an opinion 23 on any of the long-term animal cancer studies, is that 24 correct?</p>
<p style="text-align: right;">Page 43</p> <p>1 I -- I feel that -- I feel that my report today is -- 2 is accurate. On this date the report we -- on this 3 date my current opinion is not -- opinions are no 4 different than the opinions expressed on 31 July of 5 this year. 6 Q. And do you anticipate doing any specific 7 additional work on your report? 8 A. Well, as I -- as I said, I -- I continue 9 to look at the glyphosate-related literature. So 10 there will be some additions to this -- these 11 materials considered. At this point right now I do 12 not -- I do not anticipate revising my report. As I 13 said, the opinions expressed in the report are the 14 opinions that I hold today, but in terms of something 15 happening in the literature, I -- I -- I can't tell 16 you absolutely nothing ever, never will change. Right 17 now these are my opinions. 18 Q. And is there any information that you 19 wanted to form your opinions that you didn't receive? 20 A. If -- if what you're asking is: Was there 21 a time that I requested information, such as when I 22 requested the actual papers that are referenced in the 23 EPA tables, if what you are asking is: Did I make a 24 request for information and then that request was</p>	<p style="text-align: right;">Page 45</p> <p>1 A. I am not offering -- at -- at -- in the 2 early -- in the early, early time of my involvement, I 3 did review a number of the cancer bioassays. I did 4 review a number of the cancer bioassays, I did become 5 familiar with them, and that becomes necessary in 6 terms of placing in context the report that I wrote. 7 Q. Sure. 8 But are -- are there any opinions specific 9 to the animal cancer bioassays that are contained 10 within your report? 11 A. My report does not provide opinions on the 12 cancer bioassays. 13 Q. Okay. And would it be fair to say that 14 your opinions are limited to those involving the 15 genotoxicity and oxidative stress of Roundup 16 glyphosate-based formulations and glyphosate? 17 A. Opinions on that per se and opinions on 18 how that might relate to potential carcinogenicity. 19 Q. And it is your opinion that a substance 20 can be carcinogenic but not be genotoxic, is that 21 accurate? 22 A. Yes. 23 Q. And a substance can be carcinogenic and 24 not promote oxidative stress, is that also accurate?</p>

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1 A. My opinion is that I think that, while
 2 there are a lot of papers in the literature, a lot of
 3 discussion about the role of oxidative stress in
 4 carcinogenesis, I do not believe that the information
 5 that I have seen allows one to then make the leap that
 6 because in some experimental systems some aspect of
 7 oxidative stress was observed, that this means that
 8 carcinogenesis will result.

9 Q. Okay. So am I correct that you do not
 10 intend to offer opinions related to any potential
 11 mechanism for carcinogen- -- genesis other than
 12 genotoxicity and oxidative stress? As it relates to
 13 glyphosate-based formulations and glyphosate?

14 A. Well, if -- if one is going to offer
 15 opinions in terms of genotoxicity, as you just alluded
 16 to, there are some non-genotoxic compounds that are
 17 carcinogenic and I consider my expertise in the -- in
 18 the area of -- area of carcinogenesis. So, but my
 19 opinion is what is presented here.

20 Q. Okay. So -- so, to ask my question again,
 21 so it would be fair to say that you are not offering
 22 any opinions related to any other potential mechanisms
 23 of carcinogenesis in this litigation other than your
 24 opinions related to genotoxicity and oxidative stress?

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1 A. At this point, the answer is yes.

2 Q. Okay. And do you have any reason to
 3 anticipate that changing down the road?

4 A. I have -- as I sit here today, I do not
 5 have reason to believe that that will change. But I
 6 cannot tell you that absolutely, unequivocally it will
 7 not change.

8 Q. Fair enough.

9 So before we really dig into your report,
 10 I -- I want to kind of ask you about some of the --
 11 the definitions and -- and terms that you use just so
 12 that we can be sure that we are on the same page.

13 A. Good idea.

14 Q. All right.

15 Now, you describe a number of studies
 16 as -- as both positive and negative throughout your
 17 report. Fair?

18 A. That is correct.

19 Q. Okay. And what do you mean, just so we
 20 are on the same page, by the term "positive"?

21 A. Well, if we are talking about -- if we are
 22 talking about a genotoxicity study, then when I say
 23 positive, I am saying that in my opinion that this is
 24 a properly-conducted study and the results of the

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1 properly-con -- properly-conducted study provide a
 2 indication that the compound in question was genotoxic
 3 in this particular assay.

4 So what I'm saying is that it is not just
 5 looking at, for example, whether a particular author
 6 said, I observed genotoxicity. But I think one has to
 7 look in a constructive, critical fashion at the study,
 8 at the study design, in terms of the procedures that
 9 we used and -- and make a -- an in-depth evaluation.

10 Q. Okay. So -- so I think I understood your
 11 answer. I just -- I just want to make sure that I am
 12 clear that when a study is described in the body of
 13 Exhibit 1, which is your expert report, as positive,
 14 that means that that description of positive is your
 15 opinion of the -- the study, having completed a
 16 thorough review of -- of the materials?

17 MS. PIGMAN: Objection; vague and
 18 mischaracterizes the portions of the report.

19 BY MR. WOOL:

20 Q. Okay. Let -- let's strike that.

21 So when you characterize a study as
 22 positive in the body of your report, is that your
 23 opinion that -- that it -- the study is positive?

24 MS. PIGMAN: Again, objection; vague. It

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1 mischaracterizes portions of the report.

2 BY THE WITNESS:

3 A. Well, if -- if in the report I said,
 4 Auth- -- Author X in his or her paper said that
 5 compound X was -- was genotoxic, that is me just
 6 reading or saying what the author said. If in the
 7 report I say that my opinion in terms of eval- --
 8 evaluating this is that the study was positive or that
 9 the study was negative, then that's my opinion of the
 10 particular study based on a constructive, in-depth
 11 consideration of experimental protocol, methodology,
 12 et cetera.

13 BY MR. WOOL:

14 Q. Okay. So this isn't meant to be a -- a
 15 trick question or anything. I'm just trying to make
 16 sure that -- that we are on the same page and that I
 17 understand what exactly you are saying. So if -- and
 18 maybe this would be best if we looked at an example.

19 So if you will turn with me to page, let's
 20 see, 18 of your report.

21 A. I'm there.

22 Q. Okay. You described the results of a
 23 number of Ames tests related to glyphosate-based
 24 formulations, correct?

<p style="text-align: right;">Page 50</p> <p>1 A. Yes.</p> <p>2 Q. Okay. And you state: "All of the studies</p> <p>3 were negative" at the end of the first paragraph,</p> <p>4 correct?</p> <p>5 A. Yes.</p> <p>6 Q. Okay. And that statement is your opinion,</p> <p>7 not the -- not a reflection of -- of the description</p> <p>8 of the reports by the authors?</p> <p>9 A. Correct. That statement -- that statement</p> <p>10 is based upon my reading and evaluation of the</p> <p>11 particular report or study.</p> <p>12 Q. Okay. And -- and so would I be -- strike</p> <p>13 that.</p> <p>14 Would -- would it be fair to assume that</p> <p>15 but for those instances where you described the</p> <p>16 conclusion as that of the author of the study that --</p> <p>17 that when I see the word "positive," that means that</p> <p>18 that is your opinion as it relates to the -- to the</p> <p>19 study?</p> <p>20 MS. PIGMAN: Objection; vague and out of</p> <p>21 context. It misstates his report.</p> <p>22 BY THE WITNESS:</p> <p>23 A. It would be helpful to me if you could</p> <p>24 clarify a bit and point to an example of -- of what</p>	<p style="text-align: right;">Page 52</p> <p>1 into the protocol, but if I did review them, it --</p> <p>2 it -- then it means that there was sufficient</p> <p>3 information for me to -- to reach a conclusion.</p> <p>4 Q. Okay. And do you include studies that you</p> <p>5 might describe as inconclusive within the -- the term</p> <p>6 "negative" as it is presented throughout your report?</p> <p>7 MS. PIGMAN: Objection; vague.</p> <p>8 BY THE WITNESS:</p> <p>9 A. I -- I look at the -- I mean, I -- just in</p> <p>10 isolation, I -- I look at the term "in" --</p> <p>11 "inconclusive" does not have, to me, the same meaning</p> <p>12 as positive or negative. In -- to me, inconclusive</p> <p>13 means, in this context, based upon the data presented,</p> <p>14 that one cannot draw a firm opinion in terms of plus</p> <p>15 or minus.</p> <p>16 BY MR. WOOL:</p> <p>17 Q. Fair enough.</p> <p>18 Now, you use the -- the term "underlying</p> <p>19 study report" fairly frequently throughout your expert</p> <p>20 report.</p> <p>21 What -- when you use that phrase, what do</p> <p>22 you mean by "underlying study report"?</p> <p>23 A. Could you give me an example so that --</p> <p>24 Q. Yeah.</p>
<p style="text-align: right;">Page 51</p> <p>1 you are talking about.</p> <p>2 BY MR. WOOL:</p> <p>3 Q. Okay. We'll get to that in a minute.</p> <p>4 So just really quickly, I don't want to</p> <p>5 spend too much time on this, when you describe a study</p> <p>6 as negative, what do you mean by that term?</p> <p>7 A. Well, when I describe the study as</p> <p>8 negative, what I mean is that the results of the study</p> <p>9 indicate that the compound in question did not produce</p> <p>10 genotoxicity in that particular test system. And if I</p> <p>11 said that, then it is -- it means that I have reviewed</p> <p>12 aspects of the experimental protocol and reviewed the</p> <p>13 study overall and -- and did more than just look at</p> <p>14 the author's bottom-line conclusion.</p> <p>15 Q. Okay. So would it be fair to say you</p> <p>16 reviewed the experimental protocol in all of the</p> <p>17 studies that you describe as negative in your expert</p> <p>18 report?</p> <p>19 A. I would say that I reviewed the -- I</p> <p>20 reviewed the information that was available to me. In</p> <p>21 some of the Monsanto, I'll call them, internal</p> <p>22 studies, I reviewed them as best I could based upon</p> <p>23 the information provided. And there was some, some</p> <p>24 variability in terms of the depth to which they went</p>	<p style="text-align: right;">Page 53</p> <p>1 A. I just -- I really want to be clear when I</p> <p>2 respond to you.</p> <p>3 Q. So -- so at the top of Page 18, in</p> <p>4 describing the -- the 38 Ames tests, the first line</p> <p>5 reads: "I have reviewed the underlying study</p> <p>6 reports" --</p> <p>7 A. Yes, yes.</p> <p>8 Q. So --</p> <p>9 A. What that -- what that means is -- what</p> <p>10 that means is that I -- I did not simply look at a</p> <p>11 table, like, for example, one of the EPA Office of</p> <p>12 Pesticide Programs table and just read across in terms</p> <p>13 of what was on the table and -- and -- and accept that</p> <p>14 without looking at the reference for it. And that's</p> <p>15 what I mean by "the underlying report."</p> <p>16 Q. So -- so I -- I feel like you sort of told</p> <p>17 me what you didn't do when you say you reviewed the</p> <p>18 underlying study report. I -- I'm just trying to --</p> <p>19 to get a sense as to does -- does that include the, I</p> <p>20 guess, all of the underlying data for -- for those</p> <p>21 studies or --</p> <p>22 A. It includes the underlying data that --</p> <p>23 that were -- it includes the underlying data that were</p> <p>24 available to me.</p>

<p style="text-align: right;">Page 54</p> <p>1 Q. Okay. Now, would you say that you 2 employed a -- a specific methodology in reaching your 3 opinions, such as weight of the evidence, for example? 4 A. Just -- just to clarify, when you are 5 talking about in terms of reach my opinion, for 6 example, my opinion relative to genotoxicity and 7 glyphosate-based formulations? 8 Q. Correct. 9 A. I would say what I did was I reviewed a -- 10 a very large body of -- of information and came to a 11 conclusion based on that. What I did not do was say 12 that here is a stack of pluses and here is a stack of 13 minuses and somehow put them on a balance. It -- it's 14 based on an overall review of the body of literature. 15 Q. Okay. And would you agree that -- that 16 some tests -- or strike that. 17 Did you afford some of the -- the various 18 tests that you describe as genotoxicity tests or tests 19 for oxidative stress, did you afford some of those 20 tests greater weight than others? 21 A. In general it's my opinion that the -- in 22 general, it's my opinion that the in vivo studies 23 trump the in vitro studies. So I do give more weight 24 to in vivo studies.</p>	<p style="text-align: right;">Page 56</p> <p>1 of genotoxicity or oxidative stress relative to in 2 vivo and in vitro studies? 3 A. By human studies, am I correct that you 4 are talking about living human beings? 5 Q. Correct. 6 A. As opposed to human cells and culture. 7 Q. Correct, living human beings. 8 A. Yeah, I -- I -- again, I -- I -- I think 9 that in vivo studies, in -- in my opinion, in general 10 trump in vitro studies. 11 Q. Right. So -- so I guess I'm asking, if 12 you found a -- a study that you considered to be 13 reliable and methodolog- -- methodologically sound 14 that measured genotoxicity in living humans, would 15 that be afforded more weight than an in vitro study or 16 in vivo, or I guess that would be an in vivo study, 17 that -- that's how you would characterize it? Strike 18 that question. 19 A. You know, I -- I -- I'm a little confused. 20 Could you please rephrase? 21 Q. So I'm saying, would you consider -- 22 let -- let me ask this: 23 Would you consider a study measuring 24 genotoxicity in living humans to be an in vivo study?</p>
<p style="text-align: right;">Page 55</p> <p>1 Q. Okay. Now, if -- if we take this outside 2 of the context of -- of your report, just looking at 3 if you were evaluating anything within the -- the 4 context of genotoxicity, would it -- would that be the 5 same approach that you would take? 6 A. Yes. Yes. I mean, the approach that I 7 took in terms of evaluating the data that forms the 8 basis for this report is an approach that's taken 9 over -- over decades -- over my decades in -- in terms 10 of working, researching in this area. 11 And so when I review this literature, in 12 a -- in a sense this is really not different than my 13 role as a editor for a journal reviewing a manuscript. 14 It is not different than my role in reviewing a grant 15 application submitted to a particular grantor. It is 16 not different than the approach I take when a 17 colleague of mine comes to me and says, Jay, I'm 18 drafting this manuscript. Could you take a look at it 19 and -- and give me opinions. 20 Q. Sure. 21 Now -- now, again, outside of the context 22 of your report, and I know that you have quarrels with 23 the -- the -- the human studies, how would you 24 prior -- prioritize human studies evidencing evidence</p>	<p style="text-align: right;">Page 57</p> <p>1 A. Yes. 2 Q. Okay. And if you were evaluating the 3 ultimate question of whether a chemical caused 4 genotoxic or genotoxicity in humans, would you 5 prioritize an in vivo human study above an in vivo 6 animal study, for example? 7 A. First that would depend, again, on a -- a 8 review of the study and the methodology. 9 Q. Right, assuming it was reliable and 10 methodologically sound. 11 A. But in -- in -- in general, again, I -- I 12 think that studies in vivo trump studies in -- in 13 vitro. That doesn't mean that the in vitro studies 14 are worthless. That doesn't mean that the in vitro 15 studies are automatically discounted, but I would tend 16 to give more weight to the in vivo. 17 On the other hand, if you have a situation 18 where you have one in vivo study, do I think that that 19 is going to erase a whole host of well done in vitro 20 studies and well done in vivo studies in rodents, the 21 answer is -- the answer is no. But I still, in 22 general, would give more weight to the in vivo study. 23 Q. And it's fair to say that you give more 24 weight to the mammalian studies versus non-mammalian</p>

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1 studies?

2 A. The answer -- the answer is -- is yes.

3 You know, in all of what we are talking about is

4 context related, and -- and -- and it really depends

5 on -- on the particular -- on the particular context.

6 Q. Okay. So in the context of your report,

7 do you believe that any of the non-mammalian tests

8 should be afforded any weight?

9 A. I do think that the -- I do think that

10 what we'll call the Ames test, which is -- involves

11 bacteria in in vitro is something that certain --

12 that's something that should be certainly afforded

13 some weight, that it -- it is valuable. And if you

14 want to mention another non-mammalian test system,

15 then we can -- we can talk about that.

16 Q. I -- I guess we'll get to that soon

17 enough.

18 Okay. So let's talk about the Ames test.

19 So you can turn to Page 18 of Exhibit 1.

20 A. I'm there.

21 Q. You are there already.

22 Okay. So first, I guess, let's -- let's

23 make sure that we are on the same page as far as

24 definitions can -- go.

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1 You use the acronym GBF, which I take to

2 mean glyphosate-based formulations, is that correct?

3 A. That is correct.

4 Q. Okay. And what do you mean by

5 glyphosate-based formulations?

6 A. I mean formulations that contain

7 glyphosate along with other chemicals.

8 Q. Are there any specific chemicals that --

9 that you consider to be contained within

10 glyphosate-based formulations or are you just talking

11 about it's glyphosate and -- and something else?

12 A. Well, I'm -- first, I'm talking about it

13 is glyphosate and something else. Among the something

14 else are some chemicals that are called surfactants.

15 Q. Okay. So when you use glyphosate-based

16 formulation throughout your report, does that include

17 formulations that contain surfactants?

18 A. Yes.

19 Q. And what is a surfactant, so we are clear

20 on that?

21 A. Surfactant is a chemical that tends to

22 adhere to surface of cells.

23 Q. And so what are the surfactants that --

24 that you are aware of that are contained within

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1 glyphosate-based formulations?

2 A. You know, I can't really give you the

3 chemical names. These are long, convoluted chemical

4 names and I -- I can't give you the -- the specific

5 names.

6 Q. Okay. So what is the Ames test designed

7 to tell us?

8 A. The Ames test is a test that is designed

9 to tell us whether a mutation has occurred.

10 In the Ames test -- in the Ames test what

11 one is doing is monitoring for what we would call a

12 reverse mutation. That is, the Ames test consists of

13 bacteria that have a mutation in a gene that encodes a

14 product which is involved in synthesis of a chemical

15 that the organisms require for growth.

16 The amino acid histidine is -- is one of

17 these. And so these bacteria have been selected

18 because they contain a particular mutation in a

19 crucial gene. And then, in the Ames test, what we are

20 looking for is a mutation that reverses this and

21 mutates the mutated gene so that it is back to normal.

22 Q. So do you believe it's possible that a

23 substance can be genotoxic in humans and not promote a

24 mutation in bacteria in the Ames test?

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1 A. Yes.

2 Q. Okay. How many strains of bacteria are

3 typically used in an Ames test?

4 A. There are at least four strains of

5 Salmonella typhimurium and then there can be several

6 strains of another bacteria and it just slips my mind.

7 Q. I'm sorry?

8 A. It just slips my mind.

9 Q. Okay.

10 A. These proceedings are rather foreign to me

11 and it just slips my mind.

12 Q. When you say, "These proceedings are

13 rather foreign to" you, are you talking about the

14 deposition --

15 A. Yes.

16 Q. -- or the -- okay.

17 A. Yes.

18 Q. I figured it wasn't the Ames test.

19 A. I'm talking about the deposition. So --

20 so it's -- no, no, no. So excuse me. That's all

21 right.

22 And so each of these strains contains a

23 different type of mutation. So one may contain what

24 we call a point mutation, which means a switch in a

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1 particular base pair, one may contain an addition or
 2 deletion, which leads to what we call a frame shift.
 3 And so what one is doing, really, in the
 4 Ames test is you're able to evaluate, for example,
 5 whether it was a point mutation or whether it was an
 6 addition or deletion that caused a frame shift
 7 mutation. It is really rather elegant.
 8 Q. Okay. So, in the first line on Page 18,
 9 you say that you: "have reviewed the underlying study
 10 reports for 38 Ames tests as well as the relevant
 11 study summaries for at least 12 additional Ames
 12 tests."
 13 Is that correct?
 14 A. Yes.
 15 Q. Okay. And if I look at Appendix 1, which
 16 is Page 45 of your report.
 17 A. Just one moment, please, and I'll -- I'll
 18 be there.
 19 Q. Okay. I -- I'm just trying to make sure
 20 I -- I have a grasp on all of the -- the studies that
 21 you've looked at.
 22 A. I'll -- I'll be there quickly.
 23 Q. Okay. I think that -- so by my count
 24 there are 31 tests listed in Appendix 1. And then --

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1 A. I'm sorry. Excuse me. We are on Page 45?
 2 Q. Correct.
 3 A. Okay.
 4 Q. And then you Count 12 -- sorry. Strike
 5 that.
 6 So when you say re -- you reviewed the
 7 underlying study reports for 38 Ames tests, are all of
 8 the results contained in Appendix 1 within that
 9 38-study-report number that you report on Page 18?
 10 A. Should be.
 11 Q. Okay.
 12 A. Are you saying that there is --
 13 Q. No, no. I -- what I'm -- I'm just trying
 14 to -- to ask is, so -- and a better way of asking it,
 15 I -- I guess, is that you reviewed the underlying
 16 study reports for all of the test results contained in
 17 Appendix 1, is that correct?
 18 A. That is correct. I did receive the -- the
 19 references which are listed under the Reference column
 20 and -- and I -- I certainly did look at and consider
 21 those. So my evaluation is not, not simply based on
 22 looking at the table.
 23 Q. Right. Okay. And so my question is, by
 24 my count there are 31 tests reported in Appendix 1.

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1 So I'm curious, if you know, what the other seven
 2 tests were for which you reviewed the underlying study
 3 reports?
 4 MS. PIGMAN: I'm sorry. Are you asking him to
 5 compare Appendix 1 to his Materials Considered List --
 6 MR. WOOL: I'm just asking him if -- if he --
 7 MS. PIGMAN: -- and figure out which ones are
 8 not there or --
 9 MR. WOOL: Yeah, I'm just -- right. So what I'm
 10 asking is just if he knows or if he has a way to, I
 11 guess, possibly quickly -- quickly direct me to what
 12 additional seven Ames tests he -- he reviewed the
 13 underlying study reports for.
 14 BY MR. WOOL:
 15 Q. And if you can't, if you don't know,
 16 that's fine. It is not a big deal. I am not fixated
 17 on that.
 18 A. Well, let me...
 19 It will take me a little time to --
 20 Q. Okay.
 21 A. -- try -- to -- to try to reconcile this.
 22 Q. Okay. So I -- I'm not really that hung up
 23 on -- on that.
 24 Okay. So do all of the underlying study

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1 reports that you reviewed comply with OECD guidelines?
 2 A. Some of the -- some of the -- some of the
 3 reports were performed quite a while ago and some of
 4 them were probably performed before there were OE --
 5 OECD guidelines, that could be, and some of them were
 6 probably performed before the most current OECD
 7 guidelines.
 8 Q. Okay. For -- are you aware of any that
 9 were performed after the most current OECD guidelines
 10 that do not comply with OECD guidelines?
 11 A. I'm not.
 12 Q. Okay. And you state you reviewed 12
 13 additional study summaries.
 14 So -- so what do you mean by a study
 15 summary in this context?
 16 A. The additional studies, the additional
 17 study summaries were summaries from Monsanto.
 18 Q. Okay. So as a -- a peer reviewer on
 19 either of the two journals that you serve on, would it
 20 be enough for you to review a study summary in your
 21 review of articles submitted for publication?
 22 A. In -- in -- in this particular context
 23 where there is so much of a genotoxicity data, the --
 24 the answer would -- the answer is yes.

<p style="text-align: right;">Page 66</p> <p>1 Q. Okay. Let's see. So your conclusion is 2 that: 3 "All of these studies indicate that GBFs 4 do not cause mutations in bacterial-based systems." 5 A. Yes. 6 Q. Is that correct? 7 A. Yes. 8 Q. And can you -- strike that. 9 And is your opinion that this data set is 10 conclusive? 11 MS. PIGMAN: Object. Objection; vague. 12 I'm sorry. Go ahead, you can answer. 13 BY MR. WOOL: 14 Q. You can answer. 15 A. It is my opinion that this data set is -- 16 it is my opinion that this data set is -- is highly 17 convincing. I'm not sure exactly what you mean by the 18 word "conclusive." 19 Q. I'm -- 20 A. I think the data set is highly persuasive. 21 Q. Okay. 22 A. I think it's convincing. 23 Q. Yeah, that -- that's a good enough answer. 24 Are there any studies contained within</p>	<p style="text-align: right;">Page 68</p> <p>1 Okay. So for the studies that were 2 provided to you, were there any occasions where you 3 found the provided data insufficient or you needed 4 more information for this Ames test data set that we 5 are discussing? 6 A. I did not find the data -- the studies 7 that were provided to me contained sufficient 8 information for me to -- for me to draw a conclusion. 9 Q. Okay. Do you mind if we take a quick -- 10 MS. PIGMAN: I was going to ask the same 11 question, if you were ready to -- 12 MR. WOOL: Yeah. No, I'm -- 13 MS. PIGMAN: -- take a quick break. 14 MR. WOOL: Need a quick bathroom break. 15 MS. PIGMAN: It sounds great. 16 THE VIDEOGRAPHER: Off the record at 10:45 a.m. 17 (WHEREUPON, a recess was had 18 from 10:45 to 10:53 a.m.) 19 THE VIDEOGRAPHER: This the beginning of Disk 20 No. 2 and we are back on the record at 10:53 a.m. 21 BY MR. WOOL: 22 Q. Okay. Dr. Goodman, I believe I was asking 23 you about the Ames tests as they relate to -- or 24 the -- the glyphosate-based formulation results of the</p>
<p style="text-align: right;">Page 67</p> <p>1 this data set of glyphosate-based formulations that 2 have -- or Ames tests regarding glyphosate-based 3 formulations that you did not consider due to 4 methodological flaws? 5 A. I considered the studies that were -- were 6 provided to me and I did not -- I did not exclude any 7 of them. 8 Q. Okay. And out of this data set, do you 9 know how many, if any, of the studies were publicly 10 available? 11 A. The -- the ones that were received from 12 Monsanto, I think that some of them are publicly 13 available in that glyphosate has been on the market a 14 long time and, for example, the Environmental 15 Protection Agency as well as in Europe periodically 16 review and re-review chemicals that -- that they 17 permit. It's not -- it's not that we approve this 18 chemical and it's approved for eternity. And so I 19 think that in either the initial reports or subsequent 20 ones that there are genotoxicity data and that if one 21 looked at, for example, the EPA report as they 22 reviewed and re-reviewed, that you would find -- find 23 these. 24 Q. Okay. I think that's probably enough.</p>	<p style="text-align: right;">Page 69</p> <p>1 Ames test. Before we move off of Ames test, let me 2 just ask you really quickly about the -- the results 3 of the Ames test related only to glyphosate. 4 For any of the tests related to 5 glyphosate, did you discount any of the studies due to 6 methodological flaws? 7 A. No. 8 Q. Did you discount any of those studies due 9 to noncompliance with OECD guidelines? 10 A. No. 11 Q. Okay. So let's talk about the in vitro 12 studies with glyphosate-based formulations, which I 13 believe began on Page 19 of your report. 14 A. I am there. 15 Q. Okay. So in your own words, what does 16 this test tell us? 17 A. Well -- well -- 18 MS. PIGMAN: Objection; vague. Which -- which 19 test? 20 BY MR. WOOL: 21 Q. No, no, I'm not talking about a specific 22 test. I'm just asking in general, an in vivo 23 chromosomal aberration or -- or a test for chromosomal 24 damage in mammalian cells, what is that?</p>

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<p>1 A. Excuse me. Maybe I didn't hear you right.</p> <p>2 I thought you said in vivo. Here we are talking about</p> <p>3 in vitro.</p> <p>4 Q. I'm sorry. I meant in vitro. You caught</p> <p>5 me.</p> <p>6 A. That's fine.</p> <p>7 Q. What does an in vitro test for chromosomal</p> <p>8 damage tell us?</p> <p>9 A. Well, first of all, in vitro means cells</p> <p>10 in culture. And actually the original meaning was --</p> <p>11 for in vitro is in -- in glass, and we don't use glass</p> <p>12 anymore, but we keep the -- keep the name.</p> <p>13 So in vitro test means we are evaluating</p> <p>14 cells in --</p> <p>15 Q. And -- and to be clear, I'm -- I'm just</p> <p>16 sort of asking for what the -- the results of an in</p> <p>17 vitro test for chromosomal damage reveal to you as</p> <p>18 a -- as a genotoxicologist?</p> <p>19 A. What it reveals to me is whether there was</p> <p>20 damage to -- to the cell -- the chromosomes of the</p> <p>21 cell.</p> <p>22 Q. Okay. And are these typically performed</p> <p>23 in rodent and human cells, is that accurate?</p> <p>24 A. The vast, vast majority that I have seen</p>	<p>1 definition of genotoxicity. In my opinion, a compound</p> <p>2 that is genotoxic -- a genotoxic compound, a compound</p> <p>3 that is genotoxic is where the compound itself or a</p> <p>4 metabolite damages -- can damage the genetic material</p> <p>5 in terms of is that compound genotoxic. One can have</p> <p>6 genotoxicity, that is damage to the genetic material,</p> <p>7 that might occur secondarily or tertiary to an event</p> <p>8 that the compound produces. And under those</p> <p>9 conditions, in my opinion, it is not appropriate to</p> <p>10 label the compound as being genotoxic.</p> <p>11 Q. Okay. And -- and so I'm asking in Koller,</p> <p>12 can you definitively rule out that the</p> <p>13 glyphosate-based formulation caused the positive -- or</p> <p>14 sorry. Strike that.</p> <p>15 Can you definitively rule out that the</p> <p>16 glyphosate-based formulation caused chromosomal damage</p> <p>17 that was not secondary to cytotoxicity?</p> <p>18 A. What I can say is that the cytotoxicity</p> <p>19 observed is a very large confounding effect and based</p> <p>20 upon that it -- in my opinion, it would be</p> <p>21 inappropriate to use Koller et al.'s results to claim</p> <p>22 that glyphosate is a genotoxic compound.</p> <p>23 Q. Okay. So the other test that you looked</p> <p>24 at within this data set is Holeckova, if I'm saying</p>
Page 71	Page 73
<p>1 are in -- in rodent and/or human cells.</p> <p>2 Q. Okay. And so there are two tests that you</p> <p>3 evaluated within this data set, one positive and one</p> <p>4 negative, correct?</p> <p>5 A. Um-hum.</p> <p>6 Q. Okay. And the Koller, am I pronouncing</p> <p>7 that correctly, test was reported as positive,</p> <p>8 correct?</p> <p>9 A. One moment, please.</p> <p>10 Q. By -- by the author, I mean.</p> <p>11 A. Correct.</p> <p>12 Q. Okay. And your conclusion for Koller, as</p> <p>13 I understand it, is that the positive results seen in</p> <p>14 the test were secondary to cytotoxicity?</p> <p>15 A. Yes, the -- the -- it is -- it is -- it is</p> <p>16 based upon the Koller et al. publication that there</p> <p>17 was damaged cell membranes, an aspect of cytotoxicity,</p> <p>18 even at the lowest concentration employed.</p> <p>19 Q. And did the test also show chromosomal</p> <p>20 damage?</p> <p>21 A. It did.</p> <p>22 Q. Okay. And can you definitively rule out</p> <p>23 genotoxicity as a cause for that damage?</p> <p>24 A. The issue here now revolves around the</p>	<p>1 that correctly?</p> <p>2 Is that correct? It is at the top of or</p> <p>3 the kind of the main body paragraph on Page 19.</p> <p>4 A. Yes.</p> <p>5 Q. Okay.</p> <p>6 A. In terms of the pronunciation, I -- I</p> <p>7 don't know the individual.</p> <p>8 Q. Right.</p> <p>9 A. So I'm not sure what the correct</p> <p>10 pronunciation is.</p> <p>11 Q. And you don't provide any criticisms of</p> <p>12 the -- the study design -- design in Holeckova,</p> <p>13 correct, in your expert report?</p> <p>14 A. That is correct.</p> <p>15 Q. Now, at the bottom -- okay. So, in the --</p> <p>16 in the middle of the paragraph, you stated that:</p> <p>17 "The author reported a slight but</p> <p>18 statistically significant increase in polyploidy...at</p> <p>19 only one of the concentrations tested, the 56 molar</p> <p>20 concentration," correct?</p> <p>21 MS. PIGMAN: Objection. You read only part of</p> <p>22 the sentence.</p> <p>23 BY MR. WOOL:</p> <p>24 Q. I guess I didn't read the -- the</p>

<p style="text-align: right;">Page 74</p> <p>1 parentheses, but is that the -- the gist of what you 2 were saying? 3 A. Yeah, there were three different 4 concentration -- three different concentrations listed 5 here and there was no chromosomal damage reported at 6 any of those three concentrations. 7 Q. Okay. And is it your opinion as you sit 8 here today that statistical tests were performed for 9 the other concentrations? 10 A. You know, I've reviewed so much in terms 11 of this. I would -- I would have to look at the 12 actual Holeckova paper before opining. 13 Q. Okay. Is -- well, strike that. 14 Okay. Let's go to the in vivo mammalian 15 gene mutation assay. It's on Page 25 and I'm not 16 going to ask you too many questions on this. 17 You state that you reviewed the underlying 18 study reports or relevant study summaries for four in 19 vitro mammalian gene mutation assay studies on 20 glyphosate. 21 Is that correct? 22 A. Yes. 23 Q. Okay. Do you know which study summaries 24 you reviewed for this data set?</p>	<p style="text-align: right;">Page 76</p> <p>1 in respect to sort of importance or weight? 2 MS. PIGMAN: Objection to the form and assumes 3 facts not in evidence. 4 BY THE WITNESS: 5 A. Where it fits. 6 In general, in terms of evaluating the 7 genotoxicity of compounds, there are several tests 8 that are employed, if you will, as a battery of tests. 9 One of them includes the Ames test, and recognizing 10 that the Ames test with different test strains had a 11 lot of sub tests, but one is the Ames test. Another 12 would be to use a test in terms of mammalian cells in 13 culture in vitro, looking for indications of 14 mutagenicity. Another would be to use mammalian cells 15 in vitro looking for indications of chromosomal 16 damage. And another would be in vivo looking for an 17 aspect of genotoxicity, and -- and typically what one 18 is looking for are a question of whether or not there 19 is an increase in micronuclei in bone marrow. 20 BY MR. WOOL: 21 Q. Okay. So if you look on page -- 22 A. That -- that would be the general -- the 23 basic general approach in terms of saying, here is a 24 compound, is it genotoxic.</p>
<p style="text-align: right;">Page 75</p> <p>1 A. Right now, right now at this moment, I 2 cannot tell you. If I go back and have time to go 3 through the materials considered, I could eventually 4 dig that out. 5 Q. Did you discount any studies in this data 6 set due to perceived methodological flaws? 7 A. No. 8 Q. No. Did you discount -- 9 A. By -- by discount, meaning just toss it 10 aside? 11 Q. Did you -- did you say that they were 12 unreliable and -- and afford them no weight, for 13 example? 14 A. No. 15 Q. Did you review the studies in this data 16 set to ensure that they were OECD compliant? 17 A. I reviewed them in terms of whether I 18 thought that it was a properly conducted study. I did 19 not take it and lay it down side by side with the OECD 20 guidelines. 21 Q. Okay. So going down now to C, which is 22 the in vitro tests for chromosomal aberrations in 23 mammalian cells, can you sort of describe where this 24 test fits within the hierarchy of -- of tests -- in --</p>	<p style="text-align: right;">Page 77</p> <p>1 Q. Sure. 2 So, now, if you look on Page 26, and this 3 is just a housekeeping question, you cite to Matsumoto 4 1995 as a reported negative study. 5 A. One moment, please, so I can get there. 6 Q. It is in the sort of second paragraph. 7 A. Okay. I see it. 8 Q. And I'm just asking about this study -- 9 A. Sure. 10 Q. -- because I don't believe it appeared on 11 your reliance list and we weren't able to find it on 12 PubMed, so I just wanted to ask if you had a copy of 13 the study and ask where you -- where you got the 14 study? 15 A. Matsumoto is not on the list? 16 Q. I do not believe so. 17 A. Can I take a really fast look? 18 Q. Yeah, you can take a quick look. 19 A. You know, there are hundreds of these. I 20 apologize. It is not on the list. 21 Q. Right. So I -- so I guess my second 22 question is just if -- if you recall where you got the 23 study? 24 A. Sitting here today, I can't recall where</p>

<p style="text-align: right;">Page 78</p> <p>1 I -- where I -- I can't recall where I got the study. 2 I would -- 3 Q. Fair enough. 4 A. Well, I -- it's -- I -- it's -- it's 5 concerning to me that it's in the report and not on 6 the list. I will have to look into that. 7 Q. Well, if -- if you want to amend later, we 8 won't object. 9 Okay. So, now, in the last paragraph 10 before we get to Point D, you discuss the Lioi 1998 11 study? 12 A. I do. 13 Q. Okay. And the criticism that you have of 14 this study, if I'm correct, is that the author should 15 have conducted a cytotoxicity evaluation at 72 hours. 16 Is -- is that accurate? 17 A. Yes. And the reason is the 72-hour time 18 point was the time point that was used to ask the 19 question of whether there was an indication of 20 genotoxicity. 21 Q. Okay. Now, just so I'm clear, if you go 22 to Appendix 8, there are two Lioi studies that are 23 listed, both from 1998, I believe, and -- and both 24 positive.</p>	<p style="text-align: right;">Page 80</p> <p>1 but the OECD -- OECD regulations do very clearly talk 2 about the importance of a cytotoxicity evaluation. 3 Q. Okay. But in -- in this test it looks 4 like they evaluated for cytotoxicity at six hours, 5 correct? 6 A. It does. 7 Q. Okay. So what do you believe indicates 8 that cytotoxicity would have been present at the 9 72-hour interval? 10 A. The fact that it wasn't evaluated means 11 that I don't know. What we do know is that as -- as 12 cells are cultured with a chemical, there can be 13 progressive changes over time. And the difference 14 between six hours and 72 hours is a rather substantial 15 period of time and, therefore, we just don't know 16 whether there was cytotoxicity, cytotoxicity at 17 72 hours. 18 Q. Would measuring the mitotic index indicate 19 whether there was cytotoxicity? 20 A. That could be a -- that could be an -- an 21 indication, for example, if mitotic index decreased 22 markedly. 23 Q. Okay. So if glyphosate was cytotoxic in 24 this study, would you expect to see a significant</p>
<p style="text-align: right;">Page 79</p> <p>1 Is this criticism for both of the -- the 2 studies, both Lioi 1998 A and B, or is it confined 3 to -- 4 A. What -- 5 Q. -- to one of them? 6 A. Tell me which -- 7 MS. PIGMAN: I'm sorry. What appendix, please? 8 BY THE WITNESS: 9 A. -- appendix, please? 10 MR. WOOL: Appendix 8. 11 MS. PIGMAN: 8, thank you. 12 MR. WOOL: Page 59. 13 BY THE WITNESS: 14 A. One second, please. 15 It is -- it is 1998 A, because 1998 A Lioi 16 is looking at human lymphocytes and in 1998 B they are 17 looking at bovine lymphocytes. 18 BY MR. WOOL: 19 Q. Okay. Would -- strike that. 20 Do OECD regulations or other regulations 21 that you are aware of require testing for cytotoxicity 22 at the 72-hour interval? 23 A. The OECD regulations, as best I can 24 recall, do not specify the -- do not specify 72 hours,</p>	<p style="text-align: right;">Page 81</p> <p>1 decrease in the mitotic index? 2 A. It doesn't have to be necessarily, but it 3 could -- it could happen, that is a decrease at 4 72 hours would be -- could be indicative of 5 cytotoxicity and... 6 Q. If there was no decrease at 72 hours, 7 would that provide evidence of the absence of 8 cytotoxicity? 9 A. It would provide some evidence of the 10 absence of cytotoxicity. Here and -- here they -- 11 I -- I do think they should have, again, done the same 12 viability evaluation at 72 hours as they did at 13 six hours. 14 Q. Is it plausible that the results of these 15 studies were due to the genotoxicity -- genotoxic 16 properties of glyphosate? 17 A. I can't rule that out and I can't rule 18 that in without having them have done their cell 19 viability evaluation. 20 Q. Okay. For -- and I'm just referring to 21 the in vitro tests for chromosomal aberration in 22 mammalian cells as that -- those test results relate 23 to glyphosate. 24 Were there any negative tests that you</p>

<p style="text-align: right;">Page 82</p> <p>1 decided not to consider due to methodological flaws in 2 the study design? 3 MS. PIGMAN: Objection; vague. Are we -- is it 4 just glyphosate or both glyphosate and 5 glyphosate-based formulations? 6 MR. WOOL: It -- I haven't specified. It -- it 7 is just glyphosate. 8 MS. PIGMAN: Okay. 9 BY THE WITNESS: 10 A. Not that I can recall. 11 BY MR. WOOL: 12 Q. Okay. Did you discount or afford less 13 weight to any of the studies due to -- any of the 14 negative studies just within the glyphosate in vitro 15 tests for chromosomal aberrations, did you afford any 16 of the negative tests less weight due to noncompliance 17 with OECD guidelines? 18 A. I did not, but I did not take these tests 19 and lay them down next to the OECD guidelines and 20 compare point by point. I did evaluate them. I -- I 21 did ask whether or not that they in general appeared 22 to follow the OECD guidelines, but, again, I did not 23 lay them down and see that they followed it point by 24 point.</p>	<p style="text-align: right;">Page 84</p> <p>1 A. We have talked about Koller et al. 212 2 before. 3 Q. Okay. And micronuclei induction is 4 evidence of genotoxicity, is that fair? 5 A. Yes, micronuclei induction is evidence of 6 genotoxicity. 7 Q. Okay. And so you discount the results of 8 this study due to cytotoxicity, fair? Or strike that. 9 You discount this study because you -- 10 your opinion is that the genotoxicity -- genotoxic 11 effects observed are secondary to cytotoxicity? 12 MS. PIGMAN: Objection; form. 13 BY THE WITNESS: 14 A. Once you see -- once you -- once -- once 15 you observe cytotoxicity at the concentration used to 16 evaluate genotoxicity, this is a major confounding 17 event. And once that -- once that happens, the -- 18 BY MR. WOOL: 19 Q. No, no. I'm just telling her -- 20 A. -- and one -- and once that happens I 21 think that one cannot use the results of the study to 22 talk about that genotoxicity was a direct result of 23 the chemical in question. 24 Q. Okay. So I'm going to mark, I believe we</p>
<p style="text-align: right;">Page 83</p> <p>1 Q. Okay. So let's move on to the in vitro 2 tests for micronu- -- micronuclei induction in 3 mammalian cells. You see I have a pretty difficult 4 time with some of these words. 5 A. It's -- it's understood. It is a lexicon 6 all to its own. 7 Q. Okay. And out of this data set, you 8 report six studies, four positive, two equivocal, is 9 that correct? 10 MS. PIGMAN: I'm sorry. What -- we are still on 11 Page 26? 12 MR. WOOL: Well, it -- it goes on to -- 13 MS. PIGMAN: Okay. 14 MR. WOOL: -- 26 to 27. 15 MS. PIGMAN: Oh, thank you. 16 MR. WOOL: So I guess to the top of 27. 17 MS. PIGMAN: Thank you. Sorry. 18 BY THE WITNESS: 19 A. Yeah, what you said is correct. 20 BY MR. WOOL: 21 Q. Okay. And the first positive study that 22 you describe is the -- the Koller study, which I 23 believe we -- we've talked about a little bit before, 24 is that correct?</p>	<p style="text-align: right;">Page 85</p> <p>1 are on 5, Exhibit 5, which is the study by Koller et 2 al., and this one has a Bates number which is 3 MONGLY00327331. 4 (WHEREUPON, a certain document was 5 marked Deposition Exhibit No. 25-5, 6 for identification, as of 7 09/22/2017.) 8 BY MR. WOOL: 9 Q. Okay. I'm handing you that study. 10 MS. PIGMAN: Thank you. 11 BY MR. WOOL: 12 Q. Okay. Now, I'll ask you to turn to 13 Page 808 of this study, please. 14 A. I'm there. 15 Q. Okay. Now, if you look at the bottom, you 16 will see Figures -- or it is described as Figure 1. C 17 and D are the bottom two graphs. 18 A. Correct. 19 Q. Okay. So what are Figures C and D showing 20 us? And you can take a minute to... 21 A. C and D are looking at -- C and D are 22 looking at two parameters that could be involved in 23 terms of cytotoxicity. It will take me a minute to 24 see what they mean exactly by SRB and NR. I just</p>

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<p>1 don't want to say something without seeing the --</p> <p>2 Q. Sure, take -- take your time.</p> <p>3 A. -- seeing their definition of the acronym.</p> <p>4 Q. Yeah, so -- so I think the acronyms are on</p> <p>5 the first page. If you look, it says abbreviations.</p> <p>6 A. Okay.</p> <p>7 Q. Okay. So now having seen the</p> <p>8 abbreviations, what are Figures C and D telling us?</p> <p>9 A. These are some evaluations for</p> <p>10 cytotoxicity and what they are telling us in Figure C</p> <p>11 is that we are seeing some cytotoxicity at</p> <p>12 100-milligrams per liter of concentration, and in</p> <p>13 Figure D, some aspect of cytotoxicity, again, at</p> <p>14 100-milligrams per liter of concentration.</p> <p>15 Q. Okay. And for which compound are we</p> <p>16 seeing evidence of cytotoxicity in Figure C?</p> <p>17 A. Let me look at the method to be sure.</p> <p>18 Q. Okay. And if you look under --</p> <p>19 A. I'm just not sure here whether it's</p> <p>20 glyphosate or glyphosate-based formulation.</p> <p>21 Q. Right. So in -- in Figure 1 sort of</p> <p>22 under the -- the graphs -- the legend, I believe it</p> <p>23 describes what the -- the two respective symbols</p> <p>24 indicate. If I'm not mistaken, the triangle with the</p>	<p>1 pronounced cytotoxic effects in human-derived buccal</p> <p>2 epithelial cells."</p> <p>3 Did I read that correctly?</p> <p>4 A. You did.</p> <p>5 Q. Okay. And -- and it also goes on to say:</p> <p>6 "Furthermore, the genotoxicity tests show</p> <p>7 that the herbicide as well as its formulation induces</p> <p>8 strand breaks that lead to formation of comets as well</p> <p>9 as nuclear anomalies that reflect DNA instability</p> <p>10 including chromosomal damage."</p> <p>11 Did I read that correctly?</p> <p>12 A. You did.</p> <p>13 Q. Okay. So, I guess, do you disagree with</p> <p>14 that conclusion?</p> <p>15 A. Well, if we could look at Figure 1 in</p> <p>16 terms of the portion of it in the upper left,</p> <p>17 Figure 1-A, here we are looking at lactate</p> <p>18 dehydrogenase release from the cells. Release of</p> <p>19 lactate dehydrogenase from the cells is an indication</p> <p>20 of damage to the cell membrane, such as it becomes</p> <p>21 leaky and cell contents can leak out of the cell. And</p> <p>22 what we are seeing is with the formulation you are</p> <p>23 seeing evidence of cytotoxicity at 10 milligrams per</p> <p>24 liter.</p>
<p>Page 87</p> <p>1 cross line is glyphosate and Roundup is the circle</p> <p>2 with the cross line.</p> <p>3 A. Okay.</p> <p>4 Q. Okay. So let's look at -- at Figure D,</p> <p>5 for example. The line with the -- the triangle in the</p> <p>6 cross line appears to be more or less straight across.</p> <p>7 Is that an accurate description?</p> <p>8 A. Yes.</p> <p>9 Q. Okay. And the -- and the other line</p> <p>10 appears to -- to plummet downwards, is -- is that an</p> <p>11 accurate description?</p> <p>12 A. Correct.</p> <p>13 Q. So what does the straight across line</p> <p>14 on -- with the triangles indicate?</p> <p>15 A. Straight across, a cross line, would be by</p> <p>16 this parameter that cellular integrity was intact.</p> <p>17 Q. Okay. Okay. Now, if you -- okay. Now I</p> <p>18 would ask you to turn to the next page, Page 809.</p> <p>19 A. Okay.</p> <p>20 Q. Okay. And in the Discussion section, the</p> <p>21 first line reads:</p> <p>22 "Our results show that R," which I'll</p> <p>23 represent is Roundup, "but not its active principle</p> <p>24 G," which I'll represent is glyphosate, "causes</p>	<p>Page 89</p> <p>1 Q. Okay. And what about with glyphosate?</p> <p>2 A. One is not seeing that with glyphosate</p> <p>3 until getting to higher concentrations.</p> <p>4 Q. All right. Now, within this same data</p> <p>5 set, so you can put that exhibit aside --</p> <p>6 A. I'm sorry. I can put -- put No. 5 aside?</p> <p>7 Q. Yes.</p> <p>8 A. Okay.</p> <p>9 Q. Okay. You talk about the Roustan 2014</p> <p>10 study and you note that:</p> <p>11 "Roustan et al. 2014 failed to demonstrate</p> <p>12 the dose-response relationship which is anticipated if</p> <p>13 induction of micronuclei were due to treatment with</p> <p>14 glyphosate," correct?</p> <p>15 A. Yes.</p> <p>16 Q. Okay. And you don't provide any other</p> <p>17 opinions for discounting this study in your expert</p> <p>18 report, is that correct?</p> <p>19 A. Yes. I think dose -- dose-response is</p> <p>20 a -- is an important consideration.</p> <p>21 Q. And sitting here today, it is your belief</p> <p>22 that Roustan did not show a clear dose-response,</p> <p>23 correct?</p> <p>24 A. Correct.</p>

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1 Q. Okay. All right. So for the in vitro
 2 micronuclei induction in mammal cells data set as it
 3 relates only to glyphosate, you're not aware of
 4 negative studies, is that correct?
 5 MS. PIGMAN: Objection; vague.
 6 BY THE WITNESS:
 7 A. Well, I -- I was not clear as to the
 8 question. Please rephrase that.
 9 BY MR. WOOL:
 10 Q. Okay. Within this data set, are there any
 11 studies that you would consider to be negative?
 12 A. Such as -- the "this" refers to which data
 13 set please?
 14 Q. The -- in Number E, the in vivo -- wait.
 15 Did I -- hold on. Sorry, I -- I clipped the wrong
 16 page.
 17 The in vitro tests for micronuclei
 18 induction in mammalian cells for glyphosate only.
 19 MS. PIGMAN: So this is Section D of his report,
 20 just to be clear?
 21 MR. WOOL: Correct.
 22 MS. PIGMAN: Okay.
 23 MR. WOOL: On Page 26.
 24 BY THE WITNESS:

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1 A. Okay. So what are you asking now?
 2 BY MR. WOOL:
 3 Q. So -- so there are no negative tests that
 4 you note within this data set, am I correct?
 5 A. Yeah, correct. I -- I think the four --
 6 four were possibly suggestive and there were two that
 7 were equivocal.
 8 Q. Okay. So if you'll look on page --
 9 A. As reported by the authors.
 10 Q. But you performed an independent
 11 evaluation?
 12 A. That's correct.
 13 Q. Okay. I just wanted to be clear about
 14 that.
 15 Okay. So now let's move on to for
 16 glyphosate only the in vivo test for chromosomal
 17 aberrations in mammals, which is on Page 27.
 18 A. I see it.
 19 Q. E of your report.
 20 So I've asked you this question several
 21 times, but you report that you read some of the
 22 underlying study reports or the relevant study
 23 summaries for three of the chromosomal aberration
 24 tests and two rodent dominal -- dominant lethal tests

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1 and all were negative, which in parentheses you write,
 2 "(no indication of genotoxic potential.)"
 3 Is that correct?
 4 A. Yes.
 5 Q. Okay. And do you recall which summaries
 6 you reviewed and which underlying study reports you
 7 reviewed for this data set?
 8 A. I -- excuse me. I cannot tell you that
 9 today.
 10 Q. Okay. Would you have a -- well, I -- I
 11 guess strike that. I -- I don't need to know.
 12 Okay. So let's go to Page 29, if you
 13 will, which is --
 14 A. I'm there.
 15 Q. -- in vivo tests for micronuclei induction
 16 tests in mammals related to glyphosate.
 17 And by your count there are 19 total
 18 tests, three positive and 16 negative, correct?
 19 A. That's what the first paragraph says.
 20 Q. Okay.
 21 A. And -- and what this is, the -- this is as
 22 reported by the author.
 23 Q. Did you discount any of the negative
 24 studies due to method -- methodological flaws --

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1 A. No.
 2 Q. -- in study design?
 3 Did you discount any of the negative
 4 studies due to noncompliance with the OECD guidelines?
 5 A. No, but, again, I did not lay down each
 6 study and look at it in parallel to the OECD
 7 guideline.
 8 Q. Okay. This is just a -- a quick sort of
 9 housekeeping question. If you will turn to Page 6 --
 10 Pages 64 and 65 of your report, which is Appendix 11.
 11 A. Okay. Let me -- let me just straighten
 12 this out so I don't get myself confused.
 13 Appendix which page, please?
 14 Q. 11. 64 and -- and really 65 is -- is what
 15 I'm asking about.
 16 A. I'm on 64 now. Okay.
 17 Q. So if you just look at the top of Page 65,
 18 there is a blank for the test endpoint and -- and a
 19 lot of blanks for the -- for various data points in --
 20 in this test. I was just curious if you knew what --
 21 what this top row on Page 65 in Appendix 11 was
 22 referring to?
 23 A. Yeah. I think that the top row in
 24 Appendix 11, I think, is really -- belongs to --

<p style="text-align: right;">Page 94</p> <p>1 should be a continuation of the bottom row on Page 64.</p> <p>2 Q. Okay. Perfect. That -- that's what I</p> <p>3 thought. I just wanted to -- to make certain of that.</p> <p>4 A. Well --</p> <p>5 Q. Well, maybe not certain, but best guess?</p> <p>6 A. No, the confusion was on my part. I -- I</p> <p>7 should have broken the table in a more clear fashion.</p> <p>8 Q. That's fine.</p> <p>9 Okay. So I -- I just wanted to clear that</p> <p>10 up and -- and make sure I wasn't missing anything.</p> <p>11 A. Under -- understood.</p> <p>12 Q. You can -- you can turn back to -- to</p> <p>13 Page 29 now.</p> <p>14 A. I'm there.</p> <p>15 Q. Okay. Now, one of the positive in vivo</p> <p>16 tests for micronuclei induction in mammals for the</p> <p>17 glyphosate-only data set was Bolognesi study in -- in</p> <p>18 1997, is that correct?</p> <p>19 A. Bolognesi, yes.</p> <p>20 Q. Okay.</p> <p>21 A. Bolognesi is one -- is one of those we are</p> <p>22 talking about, yes.</p> <p>23 Q. And you criticized the study because of</p> <p>24 the IP route of administration, correct?</p>	<p style="text-align: right;">Page 96</p> <p>1 physiological route of absorption, within the -- the</p> <p>2 context of your report, what are you considering to be</p> <p>3 a physiological route of absorption?</p> <p>4 A. Physiological --</p> <p>5 Q. A physiologically relevant route of</p> <p>6 absorption?</p> <p>7 A. Physiologically relevant would be from</p> <p>8 oral absorptions, it could be from inhalation and</p> <p>9 could be from dermal absorption, that is, absorption</p> <p>10 from something that landed on our skin.</p> <p>11 Q. Okay. And going back to Bolognesi for a</p> <p>12 minute, you are critical of the study because IP</p> <p>13 administration, as you say, might result in toxicity</p> <p>14 that would not be observed following a more</p> <p>15 physiological route of administration, correct, that's</p> <p>16 one of the criticisms?</p> <p>17 A. That is one of the criticisms. And the</p> <p>18 other is that one of the things that we are trying to</p> <p>19 do in our experiments is to ask about the potential</p> <p>20 human, human relevance here. And if one is using a</p> <p>21 route of administration that is unphysiological, as</p> <p>22 I've discussed before, it is not giving you a</p> <p>23 reflection of what can happen from -- from real-world</p> <p>24 exposure.</p>
<p style="text-align: right;">Page 95</p> <p>1 A. Correct.</p> <p>2 Q. And just so we are clear, what is the IP</p> <p>3 route of administration?</p> <p>4 A. The IP route of administration is when the</p> <p>5 material of interest is put into a syringe fitted with</p> <p>6 a hypodermic needle and injected into the abdominal</p> <p>7 cavity. So it would be injected into the abdominal</p> <p>8 cavity which is -- has a very, very rich blood supply</p> <p>9 and typically what is injected in this fashion gets</p> <p>10 very, very rapidly absorbed as compared to a more -- a</p> <p>11 more slow, if you will, more physiological absorption</p> <p>12 as if one ingested material containing the compound.</p> <p>13 Q. When you say "a more physiological</p> <p>14 absorption," what -- what do you mean by that?</p> <p>15 A. Well, if -- if I could, please, first, I</p> <p>16 called the IP a highly non-physiological route of</p> <p>17 administration, and that is, we do not get exposed to</p> <p>18 compounds by having them injected into our peritoneal</p> <p>19 cavity.</p> <p>20 Q. Okay.</p> <p>21 A. And it gives a very, very rapid absorption</p> <p>22 in a sense something similar to if you administer the</p> <p>23 compound intravenously.</p> <p>24 Q. Okay. But when you say a -- a</p>	<p style="text-align: right;">Page 97</p> <p>1 Q. Right.</p> <p>2 And but, so your criticism related to the</p> <p>3 IP route of administration is that it doesn't reflect</p> <p>4 real-world -- world exposure. You are -- you are not</p> <p>5 saying, if I understand it correctly, that the IP</p> <p>6 administration itself is resulting in cytotoxicity, am</p> <p>7 I correct about that?</p> <p>8 MS. PIGMAN: Objection. Sorry. Let him finish</p> <p>9 his question. Sorry to interrupt.</p> <p>10 MR. WOOL: Okay. Sorry, sorry.</p> <p>11 BY MR. WOOL:</p> <p>12 Q. No. And I'm just trying to understand</p> <p>13 that you -- I mean, you do have a secondary criticism</p> <p>14 that cytotoxicity cannot be ruled out. But are you</p> <p>15 saying that the IP route of administration can result</p> <p>16 in -- in cytotoxicity?</p> <p>17 MS. PIGMAN: Objection; misstates the report and</p> <p>18 the testimony.</p> <p>19 BY THE WITNESS:</p> <p>20 A. I believe that -- that because of what I</p> <p>21 just described, that the IP route of administration</p> <p>22 by -- by giving you a very rapid absorption and very</p> <p>23 high blood level very quickly can result in adverse</p> <p>24 effects that might not be seen if the same dose was</p>

<p style="text-align: right;">Page 98</p> <p>1 administered by a physiological route of 2 administration. 3 BY MR. WOOL: 4 Q. And when you say "adverse effects," are 5 you talking about adverse genotoxic effects? 6 A. Geno- -- genotoxicity would be an adverse 7 effect, an example of an adverse effect, yes. 8 Q. Okay. So, this particular quarrel about 9 the route of administration is not related to whether 10 or not the -- the test shows genotoxicity, it is that 11 the test is -- is not physiologically relevant, if I'm 12 understanding correctly? 13 MS. PIGMAN: Object. Objection; misstates the 14 testimony and the report. 15 BY THE WITNESS: 16 A. There is a difference between having an 17 observation under some experimental conditions -- 18 BY MR. WOOL: 19 Q. Right. 20 A. -- and then whether that observation has 21 some relevance to the in vivo situation, to the human 22 in vivo situation, and using a non-physiological -- a 23 highly non-physiological route of administration has 24 the possibility to be a -- a very, very real</p>	<p style="text-align: right;">Page 100</p> <p>1 material, when the cell is stained, these clusters can 2 show up as highly stained spheres. And so, but 3 polychromatic meaning that instead of having the 4 uniform staining that you would expect from the normal 5 genetic material, you have some heterogeneity in the 6 staining. 7 Q. So what does a measure of -- of that ratio 8 reveal? 9 A. That is an indication of micronuclei -- 10 that is taken as an indication that micronuclei have 11 been present. 12 (WHEREUPON, a certain document was 13 marked Deposition Exhibit No. 25-6, 14 for identification, as of 15 09/22/2017.) 16 BY MR. WOOL: 17 Q. Okay. So I'm going to hand you what's 18 marked as Exhibit 25-6. This has a Bates number which 19 is WEEDPROD00001252. And this is the Bolognesi 1997 20 study. 21 Okay. So I just want you to turn to 22 Page 1959 of the study. And if you look at -- 23 A. I'm there. 24 Q. -- Table 1.</p>
<p style="text-align: right;">Page 99</p> <p>1 confounding factor. 2 Now, if Bolognesi et al. did do -- did do 3 some evaluations for cytotoxicity and that these were 4 bona fide, good, well-characterized, well-performed 5 studies for cytotoxicity, and they were negative, then 6 my criticism of the route of administration would not 7 be as severe as it is. 8 Q. Okay. 9 A. And so that's why in about the middle of 10 that paragraph I point out that there was no 11 evaluation of cytotoxicity in the study. 12 Q. Okay. And can you tell me what -- what is 13 the PCE/NCE ratio? 14 Does -- does that mean anything to you? 15 A. Well, it's a -- polychromatic 16 erythrocytes -- 17 Q. And -- 18 A. -- versus -- 19 Q. Go ahead. 20 A. -- versus non-chromatic. 21 Q. And what is that a measure of? 22 A. That is -- polychromatic would be an -- an 23 indication of micronuclei. That is because you have 24 these micronuclei which are clusters of genetic</p>	<p style="text-align: right;">Page 101</p> <p>1 I -- I just want to know what Table 1 is 2 telling us with respect to the PCE/NCE column? 3 A. Well, it is telling us whether there was 4 an increase in these polychromatic erythrocytes versus 5 the -- those that appear normal in the -- in the -- in 6 the saline. 7 Q. Okay. And that's really probably all I 8 wanted to ask about this one for right now. We might 9 come back to it later. 10 Okay. So now within this in vivo test for 11 micronuclei induction in mammals as it relates to 12 glyphosate, I believe for Appendix 11 I counted nine 13 studies by IP injection. 14 And you can turn to Appendix 11, which is, 15 I think, on 64 and 65 again, and you can just verify 16 if I was correct about that. 17 I guess it starts on -- on Page 62. 18 A. Okay. All of them on -- all four on 62 19 are IP administration. All four of them on Page 63 20 were IP administration. And one out of six on Page 64 21 is IP administration. 22 Q. Okay. And did you discount any of the 23 negative studies due to perceived methodological 24 errors or shortcomings?</p>

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1 MS. PIGMAN: Objection; vague.
 2 BY THE WITNESS:
 3 A. The -- the answer is no. And so -- the
 4 answer is no, I did not.
 5 BY MR. WOOL:
 6 Q. And -- and to clarify, I was just speaking
 7 about the -- the negative IP injection studies.
 8 A. Okay.
 9 Q. Same -- same answer?
 10 A. Same answer.
 11 Q. Okay. Now, what is the importance, if
 12 any, you'll note on that some of the -- the tests
 13 utilized two treatments, it seems like some only one.
 14 What is the significance, if any, to you
 15 of multiple doses versus a single dosing in any -- in
 16 this particular test?
 17 A. Overall I think that the multiple dosing
 18 is a more -- multiple dosing I think is -- is a
 19 somewhat more -- more thorough test, if you will.
 20 Q. And why is that?
 21 A. It is because one is pushing the system in
 22 terms of using more dosing as compared to using less
 23 dosing.
 24 Q. Do you think multiple dosing is more

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1 physiologically relevant?
 2 A. It depends on -- it depends on -- on --
 3 on -- on -- on route of administration and depends on
 4 amount of compound -- of compound used. I do think
 5 that under -- under appropriate conditions of the test
 6 system that those tests that are using multiple doses,
 7 reasonable tests, I think is providing a more
 8 stringent evaluation.
 9 Q. And what do you mean by "a more stringent
 10 evaluation," just so I'm clear?
 11 A. More sensitive.
 12 Q. Okay. And -- and if you look at the top
 13 of Page 62 at the Bolognesi study and the, I believe
 14 it's pronounced Maas study, directly underneath it,
 15 this table indicates that both of those studies
 16 utilized two treatments.
 17 Am I reading that correctly?
 18 A. You are.
 19 Q. All right. Okay.
 20 A. Two intraperitoneal treatments.
 21 Q. Right, right.
 22 Do you distinguish between two -- strike
 23 that. We can just move on.
 24 If you want to turn back to -- to Page 29,

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1 I think I have one more question or a quick line of
 2 questions related to this data set.
 3 A. I'll get there.
 4 Okay. I'm on Page 29.
 5 Q. Okay. And you state:
 6 "In one study, a significant" -- and I'm
 7 reading the -- the second sentence.
 8 "In one study, a significant" --
 9 A. Ex -- excuse me, the second sentence?
 10 Q. Of the -- sorry. Of the bottom paragraph.
 11 A. Okay.
 12 Q. "In one study, a significant increase was
 13 reported to occur in female mice following treatment
 14 with a dose of 500" -- I mean, "5,000 milligrams per
 15 kilogram," and that's in parentheses, "(Suresh
 16 1993a)."
 17 And you go on to state: "This is in
 18 contrast to two studies," which are "(Jensen 1991; Fox
 19 and Mackay 1996) which reported negative results when
 20 glyphosate doses of 5,000 milligrams per kilogram were
 21 used."
 22 The next sentence: "To place this
 23 extremely high dose into perspective, it should be
 24 noted that the US EPA estimates that the exposure of

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1 the US population to glyphosate by food and water is
 2 .08 milligrams per kilogram a day," which is citing to
 3 "(Solomon 2016) and US EPA considers children 1 to
 4 2 years old the most highly exposed subpopulation with
 5 an estimated combined exposure of 0.47 milligrams per
 6 kilogram a day," cited to the "(EPA 2016) making a
 7 5,000 milligram per kilogram dose to the mice
 8 equivalent to 56,818 and 10,638 times higher than the
 9 human daily dose, respectively."
 10 Did I read that correctly?
 11 A. You did.
 12 Q. Okay. So what is the -- the relevance to
 13 you of the EPA estimate that you cite on Page 29?
 14 A. Well, the relevance of this is that we are
 15 looking at a -- an estimate of real world -- an
 16 estimate, and I think it is a -- EPA typically makes
 17 conservative estimates, of a -- a real-world exposure
 18 and this value is the EPA estimate for children. And
 19 they are making -- it's -- it's -- it's really a
 20 pretty high number, but it's a conservative number.
 21 Q. So do you believe that exposure to
 22 glyphosate through food and water is relevant to the
 23 claims asserted by the -- the Plaintiffs in this
 24 lawsuit?

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1 A. Could you, just to be sure we are on the
 2 same page, what -- what claims are you talking about?
 3 Q. Well, let me -- let me ask you this:
 4 What is your understanding of the
 5 exposures that -- that Plaintiffs in this lawsuit --
 6 strike that.
 7 What -- what is your understanding of the
 8 exposure claims that are being asserted by Plaintiffs
 9 in this lawsuit?
 10 A. My understanding is that the claim is that
 11 people who are exposed to glyphosate through
 12 glyphosate-based formulations contracted cancer
 13 because of that and more specifically non-Hodgkin's
 14 lymphoma.
 15 Q. And what is your understanding of the --
 16 the mechanism through which they are alleging they
 17 were exposed to glyphosate and glyphosate-based
 18 formulations?
 19 A. I do not know that.
 20 Q. Is that relevant in determining whether a
 21 mechanism of exposure is -- is physiologically
 22 relevant or not?
 23 A. Well, help me a little bit. What routes
 24 of exposure are they?

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1 Q. Well, I'll -- I'll probably ask you
 2 about -- about this again --
 3 A. Sure.
 4 Q. -- but we can -- we can move on. Let's
 5 see. Okay. Let me just finish this up and then I
 6 guess lunch might be here, maybe, hopefully.
 7 Okay. So your conclusion, which is
 8 stated -- okay. Sorry.
 9 So would I be fair in characterizing your
 10 conclusion of the in vivo tests for micronuclei
 11 induction in mammals related only to glyphosate is
 12 that this data set demonstrates that glyphosate is not
 13 genotoxic?
 14 A. By the -- by the particular test used, the
 15 test did not show glyphosate genotoxic by this
 16 particular test, and I can think that that consider --
 17 is factored into the overall evaluation.
 18 And -- and furthermore, you know, with --
 19 with this EPA estimated combined -- combined exposure
 20 of .47-milligram per kilogram per day, which is really
 21 the highest estimated exposure that I have -- have
 22 seen, you know, one can really take this a -- a step
 23 further to gain more insight.
 24 And so, for example, one can say, Well,

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1 rather than just children, what if people in general
 2 were exposed to this .47-milligram per day, which is
 3 the highest estimated exposure, and you could say,
 4 Well, if we're interested in what is happening in the
 5 body, what does -- what could this represent in terms
 6 of what the cells are -- are bathed in, if you will.
 7 And so if you look at .47-milligram per
 8 kilogram per day and we take our average person, the
 9 typical is that the average person weighs
 10 70 kilograms, which would be 100 and -- 154 pounds.
 11 So we can multiply .47 by 70 and say this is the
 12 amount in milligrams that a person would take in per
 13 day.
 14 We know that of the body weight, about
 15 60 percent is fluid. And so we can say for a
 16 70-kilogram person, this is about 42 -- that may not
 17 be right -- 42 liters of fluid. So we can say we have
 18 .47-milligram per kilogram per day times 70 is the
 19 total intake in 42 liters of fluid. And that comes
 20 out to about 780-milligrams per liter or 0 point --
 21 .78-milligrams per liter or .78 micrograms per
 22 milliliter.
 23 And then we can then say in terms of any
 24 of these dosing scenarios, let us say that a person

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1 exposed -- was exposed to 5,000 milligram per kilogram
 2 and we can multiply this by -- by -- by 70, go through
 3 the body water, and then say, Well, if we look at what
 4 the result is from the EPA high level exposure, what
 5 is the ratio of that to what these doses might have
 6 produced, if we assume that all of it is absorbed and
 7 we have some blood level.
 8 And it turns out to be -- in this case it
 9 will turn out to be hundreds of thousands of times
 10 higher than what one could estimate under a very
 11 conservative scenario for an individual who was
 12 exposed to EPA's high estimate.
 13 Q. And -- and you stated in your report, sort
 14 of a basic maxim of toxicology is that the dose makes
 15 the poison?
 16 A. Correct.
 17 Q. And would you consider sort of the
 18 effective dose, as in the amount that is actually
 19 absorbed or amount of a substance that is absorbed to
 20 be more relevant than the amount of administered dose?
 21 In -- in --
 22 A. Yes, I -- I -- yes, I do think that if --
 23 I do think that it -- when we have data on blood level
 24 or plasma level of a particular -- particular chemical

<p style="text-align: right;">Page 110</p> <p>1 that this is important because we really don't have a 2 situation where 100 percent of the dose is absorbed, 3 and that's why in the calculations I referred to 4 earlier I made this conservative assumption that all 5 of it is absorbed. 6 Q. Okay. And -- and that sort of calculation 7 that's -- that you just detailed, is -- is it fair for 8 me to -- to assume that that is part of how you 9 calculated physiological relevance as it's described 10 throughout your expert report? 11 A. Well, I talk about physiological relevance 12 in terms of -- in terms of route of administration, I 13 do talk about it in terms of dosing, I try to make 14 some estimate in terms of the dosing used versus 15 real-world exposure and with the most recent example I 16 gave you tried to make some estimate of what you were 17 just alluding to, and that is the internal dose and 18 what might be the ratio, if you will, between the 19 internal dose for a person who had this EPA-estimated 20 combined exposure very high of .47-milligrams per 21 kilogram versus what we are seeing here in some of the 22 experimental situations. 23 Q. And you considered that EPA dose to be 24 very high for the purposes of your expert report?</p>	<p style="text-align: right;">Page 112</p> <p>1 Q. I've probably got three more questions and 2 then we can break for lunch. 3 A. It's -- it's all right. 4 Q. Okay. So is it plausible that the 5 positive results in Bolognesi, Suresh and -- and Maas 6 were due to genotoxicity? 7 A. Because of the confounding effect -- 8 because of the confounding situations that I pointed 9 out, I think that we -- you just cannot say that the 10 results shed light -- the -- the -- you cannot say 11 that the results are an indication of genotoxic 12 potential of the compound. When we have these 13 confounding situations, I think that you cannot draw a 14 conclusion from the paper. 15 Q. Okay. So you -- you cannot definitively 16 rule out genotoxicity as a -- a cause of the -- 17 genotoxicity in glyphosate as a cause of the results, 18 fair? 19 A. Not quite. 20 Q. You can rule it out? 21 A. I -- I -- I'm -- you know, there are very 22 few and maybe no circumstances where -- where 23 something is absolutely definitive, and so -- there is 24 no absolutely definitive.</p>
<p style="text-align: right;">Page 111</p> <p>1 A. I considered the EPA estimate to be high 2 because there really -- there really are three, I 3 think three numbers that I've seen around. One is 4 this estimate of combined food and water of 5 .088-milligram per kilogram per day. A second is in 6 terms of applicators at the 90th percentile, meaning 7 looking at the high exposure applicators, and there I 8 think this was in the Solomon 2016, it was estimated 9 at point -- point -- 0.02-milligram per kilogram per 10 day. And the third number that I see is this 11 0.47-milligram per kilogram per day. That is the most 12 conservative number. And so that is the number that I 13 used in my -- in my example. 14 Q. Okay. Fair enough. 15 Okay. So we kind of got off track for a 16 minute. So let's kind of -- I just want to make sure 17 that -- that we are on the same page because I'm going 18 back to the in vivo micronuclei data set as it relates 19 to glyphosate and this is what I -- 20 A. So which -- which page are we on, please? 21 Q. We are on Page 29 -- 22 A. Okay. 23 Q. -- to 30. 24 A. I'm there.</p>	<p style="text-align: right;">Page 113</p> <p>1 What I can say is that I think that these 2 studies should be interpreted as not providing 3 evidence for glyphosate being genotoxic. 4 Q. Okay. And within this data set that we've 5 just been discussing, did you discount any of the 6 negative studies due to methodologic -- methodological 7 flaws? 8 A. I did not. 9 Q. Did you discount any of the negative 10 studies due to noncompliance with OECD guidelines? 11 A. I did not. And, again, I did not line 12 them up with the OECD guidelines and go line by line 13 down the list. 14 Q. Okay. Fair enough. 15 MR. WOOL: And I'm -- I'm ready for a break if 16 everyone else is. 17 THE VIDEOGRAPHER: Going off the record at 18 11:57 a.m. 19 (WHEREUPON, a recess was had 20 from 11:57 to 12:50 p.m.) 21 THE VIDEOGRAPHER: This is the beginning of Disk 22 No. 3 and we are back on the record at 12:50 p.m. 23 BY MR. WOOL: 24 Q. How was your lunch, Dr. Goodman?</p>

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<p>1 A. Terrific.</p> <p>2 Q. Awesome. What sandwich did you have?</p> <p>3 A. Turkey Tom, No. 4.</p> <p>4 Q. Not the Gargantuan.</p> <p>5 If you can, could you please turn to</p> <p>6 Page 20 of your expert report, which is the in vivo</p> <p>7 test for chromosome aberrations in mammals.</p> <p>8 A. I'm there.</p> <p>9 Q. Okay. Now, you report three tests, two</p> <p>10 positive and one negative, correct?</p> <p>11 A. That's correct.</p> <p>12 Q. And -- and to be clear, the -- the</p> <p>13 positive test, I'm not saying that's your conclusion,</p> <p>14 that's indicated to be the author's conclusion.</p> <p>15 A. That is right.</p> <p>16 Q. Okay. So do you believe that the Dimitrov</p> <p>17 test that you cite to provides evidence that</p> <p>18 glyphosate-based formulations are not genotoxic?</p> <p>19 A. Yes.</p> <p>20 Q. Okay. So can you describe how the</p> <p>21 Dimitrov study was designed for me, please?</p> <p>22 A. I reviewed so many papers that I can't</p> <p>23 recall this specific one in detail, but if you have a</p> <p>24 copy of it, we can talk about it.</p>	<p>1 A. For all of the -- for all of the papers in</p> <p>2 the EPA's tables, I -- I did look at the underlying</p> <p>3 study. I did not base my opinion simply on the -- on</p> <p>4 the table.</p> <p>5 Q. Fair enough.</p> <p>6 And so I'm correct that Dimitrov involved</p> <p>7 one oral dose of the glyphosate-based formulation?</p> <p>8 A. I don't see that. I see .05, .01, .5 and</p> <p>9 1.</p> <p>10 Q. Okay. And the test material stated in the</p> <p>11 EPA table is Roundup, correct?</p> <p>12 A. Correct.</p> <p>13 Q. Okay. So in a test like this, would you</p> <p>14 agree that it's important that the authors use a</p> <p>15 sufficient dose to ensure that the compound reaches</p> <p>16 the bone marrow of the animal?</p> <p>17 A. I think that -- I think one does have to</p> <p>18 have sufficient dosing. It is really -- really --</p> <p>19 certainly, certainly not routine in these studies that</p> <p>20 actual measurements of the compound in bone marrow are</p> <p>21 made.</p> <p>22 Q. So looking at a negative study like --</p> <p>23 like Dimitrov, and -- and maybe this is my fault for</p> <p>24 not giving you the study, is there a way that you can</p>
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<p>1 Q. I -- I think this is one that we --</p> <p>2 take -- take a look, I might go into something else,</p> <p>3 but unfortunately I feel like this might be one</p> <p>4 that -- that we don't have a copy of, so I'll just ask</p> <p>5 some basic questions about this.</p> <p>6 So do you know whether Dimitrov measured</p> <p>7 cytotoxicity?</p> <p>8 A. I can't -- I cannot -- I cannot recall</p> <p>9 offhand.</p> <p>10 Q. Okay. And I would assume the same answer</p> <p>11 for whether Dimitrov involved one or -- or multiple</p> <p>12 doses of the glyphosate-based formulation?</p> <p>13 A. As I said, I reviewed a lot a lot of</p> <p>14 different studies and I really need to see the -- see</p> <p>15 the paper in order to opine.</p> <p>16 Q. Okay. And let's just take a look at</p> <p>17 Appendix 3 really quick, which is on Page 50 of your</p> <p>18 report.</p> <p>19 A. I'm there.</p> <p>20 Q. Okay. And do you recall, I can't remember</p> <p>21 if your report says, is this one of the -- the studies</p> <p>22 that you reviewed the -- the underlying study for?</p> <p>23 A. For -- for all --</p> <p>24 Q. For Dimitrov?</p>	<p>1 measure that the compound actually reached the bone</p> <p>2 marrow?</p> <p>3 A. I cannot.</p> <p>4 Q. For any of the negative studies, whether</p> <p>5 they are glyphosate or involve glyphosate-based</p> <p>6 formulations, can you definitively say whether the</p> <p>7 compound reached the bone marrow?</p> <p>8 A. Well, you know, we can turn this around,</p> <p>9 because there are some studies using Roundup that are</p> <p>10 reported as positive.</p> <p>11 Q. Right, right.</p> <p>12 A. And -- and so in -- in none of these</p> <p>13 studies can I definitively tell you that it reached</p> <p>14 the bone marrow. In the positive study, it certainly,</p> <p>15 certainly appears that way because there -- because</p> <p>16 there is a -- a positive result.</p> <p>17 I also think that in terms of their all</p> <p>18 data, and I can't put my finger on it right now, in</p> <p>19 terms of showing that following the oral</p> <p>20 administration that there is some absorption of</p> <p>21 Roundup into the blood. If it is in blood, then</p> <p>22 certainly it is getting to the bone marrow, but I</p> <p>23 can't tell you in this specific study how much.</p> <p>24 Q. After Roundup is absorbed to the blood,</p>

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1 what is the time interval at -- at which you would
 2 expect it to reach the bone marrow?
 3 A. Very quickly. Bone marrow is one of the
 4 tissues in the body that has a -- a very rich -- a
 5 very rich blood supply. By very rich, I mean there is
 6 a lot of blood that is flowing through bone marrow.
 7 Q. But sitting here today for any individual
 8 negative study, whether with glyphosate or
 9 glyphosate-based formulation, you wouldn't be able to
 10 definitively tell me whether or not the active
 11 ingredient or -- or compound reached the -- the bone
 12 marrow, correct?
 13 A. I would have to reason by analogy and say
 14 that there are -- but I can't put my finger on it --
 15 studies that show that following oral administration
 16 that one does get Roundup, glyphosate levels in the
 17 blood. If there is a level in the blood, then one is
 18 going to have it appear in bone marrow.
 19 Q. So after it appears in -- in bone marrow,
 20 how long would you expect to -- strike that.
 21 How long after the -- the whatever
 22 compound we are talking about reaches the bone marrow
 23 would you expect to see measurable results?
 24 A. I'd say it has to be -- I -- I -- I think,

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1 I think that it has to be in terms of multiple hours,
 2 because -- but I can't -- I can't tell you -- I can't
 3 tell you the exact number. In other words, I don't --
 4 I don't think it was -- it would be something that
 5 would happen in a matter of moments, but I can't tell
 6 you how many hours that would take.
 7 Q. So sitting here today for Dimitrov, for
 8 the Dimitrov study, or any study, really, that -- that
 9 involves bone marrow, you could not definitively say
 10 that the negative result observed was due to an
 11 absence of genotoxic activity without knowing
 12 definitively whether or not the -- the substance
 13 reached the bone marrow, fair?
 14 A. No. Again, reasoning by analogy,
 15 administration of Roundup or glyphosate results in
 16 measurable blood levels of the compounds of interest.
 17 If it is in the blood, it is going to get to the bone
 18 marrow. And the fact that we also have some other
 19 studies that purport to be -- to be positive might be
 20 an indication of getting to bone marrow, but one has
 21 to, again, review the studies. In sum -- in summary,
 22 because glyphosate was not measured in bone marrow, I
 23 cannot tell you how much glyphosate was there.
 24 Because there are data in the literature about

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1 absorption of glyphosate into the blood following oral
 2 administration, I can say that following oral
 3 administration one will get some glyphosate in the --
 4 in the -- in the bone marrow.
 5 Q. And how long after oral administration
 6 would you expect the compound to reach the bone
 7 marrow?
 8 A. I would expect that -- I would expect that
 9 it might take more than just a couple of minutes. I
 10 certainly think that by the time we get to 15 minutes
 11 to two hours it should have reached the bone marrow.
 12 Probably quicker than 15 minutes.
 13 Q. So is it your testimony sitting here today
 14 that for any of the tests measuring bone marrow, that
 15 an oral dose of glyphosate definitively reached the
 16 bone marrow?
 17 A. I think that with a high degree of
 18 certainty I can tell you that it reached the bone
 19 marrow and this is based on reports that I can't put
 20 my finger on right now that following oral
 21 administration one does get blood levels of the
 22 compound. Again, if it is in the blood, there is a
 23 very large, heavy, rich blood supply to bone marrow
 24 and so what is in the blood, some of it is certainly

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1 going to get to the bone marrow.
 2 Q. So for -- in of the -- any of the oral
 3 studies looking at bone marrow, are you aware or can
 4 you point me to a source that measures peak
 5 concentrations of glyphosate in the blood?
 6 A. You know, offhand I cannot do that. I am
 7 not an -- offhand I cannot point you to a study where
 8 they included what I'm going to call toxicokinetics,
 9 absorption, distribution, metabolism, along with the
 10 evaluation of chromosome aberrations in this case.
 11 Q. Is it your belief that -- that there are
 12 some of the negative -- or there are some negative
 13 studies out there that did take that measurement of
 14 peak concentrations in the blood for the negative bone
 15 marrow studies where glyphosate or Roundup was
 16 administered orally?
 17 A. I cannot recall seeing such studies.
 18 Q. Okay. For the Dimitrov study, do you know
 19 or -- or did you look to see whether that study
 20 complied with OECD guidelines?
 21 A. Again, I did not lay them down side by
 22 side, but I will tell you that the methodology,
 23 procedure that I used here was -- used here was the
 24 same in terms of all of the studies that I evaluated.

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1 So there was not a unique set of criteria applied to
 2 positive studies and a unique set of criteria applied
 3 to studies that reported negative results.
 4 Q. All right. So you go on to discuss the
 5 Prasad 2009 study?
 6 A. Excuse me, are we back on Page --
 7 Q. We are back on Page 20 --
 8 A. -- 20? Okay.
 9 Q. -- if you'll follow me.
 10 A. Sure, sure.
 11 Q. And let's see, I believe your first
 12 criticism is that the GBF used was cytotoxic to the
 13 bone marrow, correct?
 14 A. Yes.
 15 Q. Okay. And we talked about the mitotic
 16 index before?
 17 A. Yes.
 18 Q. Okay. And do you believe that based on,
 19 was it a -- was it a decrease or an increase in this
 20 one in the mitotic in- -- index -- a decrease in the
 21 mitotic index -- that you could, therefore, attribute
 22 the results of that study to cytotoxicity?
 23 Am I following you?
 24 A. The decrease in -- the decrease in mitotic

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1 index -- back up.
 2 Mitotic index is a -- is a -- a -- a
 3 measure of cell proliferation. The decrease in the
 4 mitotic index of cell proliferation is an indicator of
 5 cytotoxicity. And under conditions where there is
 6 evidence of cytotoxicity, I think that that is a major
 7 confounding factor that does not let you draw a
 8 conclusion from the study that the compound in
 9 question is genotoxic, because the genotoxicity might
 10 have occurred, might likely have occurred secondary to
 11 the cytotoxicity.
 12 Q. Let's take a look at the Prasad study real
 13 quick. I just want to make sure that I didn't write
 14 on the --
 15 A. Is that in one of the exhibits you gave
 16 me?
 17 Q. No, no, I'm about to --
 18 A. Oh, okay.
 19 Q. -- hand it to you.
 20 A. Okay.
 21 Q. I'm marking it as Exhibit 25-7.
 22 (WHEREUPON, a certain document was
 23 marked Deposition Exhibit No. 25-7,
 24 for identification, as of

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1 09/22/2017.)
 2 BY THE WITNESS:
 3 A. Thank you.
 4 MS. PIGMAN: Thank you.
 5 BY MR. WOOL:
 6 Q. Okay. And I believe if you look -- let's
 7 just go to Page 4, if you will.
 8 I'll note, if you look at Table 2, I
 9 believe that's measuring the effect of -- of the
 10 glyphosate on the mitotic index.
 11 Am -- am I correct?
 12 A. That's what it says.
 13 Q. Okay. And if you look at what is
 14 described as Group 2 --
 15 A. Excuse me. Okay. So Group 2 you are
 16 talking about the benzo(a)pyrene (BAP)?
 17 Q. Correct. And is that what you would call
 18 a positive control?
 19 A. Yes.
 20 Q. And what is the purpose of a positive
 21 control?
 22 A. The purpose of a pos- -- positive control
 23 is to ask, Is my system working? So in this case you
 24 have a test system, excuse me, that is designed to

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1 evaluate an aspect of genotoxicity. We are taking
 2 a -- a -- a known genotoxic compound and saying, Do we
 3 have -- is -- is this known genotoxic compound giving
 4 a positive result. If the answer is yes, then you
 5 say, Well, my -- my system is -- is working.
 6 Q. Okay. And if you look at Group 2, it says
 7 (B)AP.
 8 A. Which stands for benzo(a)pyrene.
 9 Q. And that's a known genotoxin, correct?
 10 A. Correct.
 11 Q. And if I am reading the table correctly,
 12 which I -- I might not be, so correct me if I'm wrong.
 13 A. Well, let's discuss it.
 14 Q. Well -- so, it -- it appears to me that
 15 benzo(a)pyrene is showing a even more pronounced
 16 effect in the mitotic index, am I correct?
 17 A. More pronounced than what, please?
 18 Q. Than either Group 3 or 4.
 19 A. That's correct.
 20 Q. So you would not conclude from these
 21 results that -- that benzo(a)pyrene is not a
 22 genotoxin?
 23 A. No. 1, benzo(a)pyrene is a -- is well
 24 known from a variety, a variety of studies as being

<p style="text-align: right;">Page 126</p> <p>1 genotoxic. If I were doing and I were designing this 2 particular study, I would have done a dose-response 3 with benzo(a)pyrene, a concentration response with 4 benzo(a)pyrene to ask about cytotoxicity versus 5 genotoxicity. And if I was designing this study, I 6 would have selected a -- emphasized a concentration of 7 benzopyrene that did not produce cytotoxicity. 8 One of the potential problems here is that 9 benzopyrene itself is not genotoxic. It has to be 10 metabolized to a form that is genotoxic. And it is 11 possible -- I don't know the specifics -- it is 12 possible that Swiss albino mice may -- I don't know 13 what their capacity is to metabolically activate it, 14 from the -- but the main point is that if I was doing 15 this study, I would have done a benzopyrene 16 dose-response evaluating cytotoxicity and genotoxicity 17 and picked from my marker of is the system working a 18 concentration of benzopyrene that did not produce 19 cytotoxicity. 20 Q. For either Groups 3 or 4, are the 21 decreases in the mitotic index statistically 22 significant? 23 A. According to the author, the superscript -- 24 superscript -- superscripted symbol after 4.12</p>	<p style="text-align: right;">Page 128</p> <p>1 administration, that is something that I think is -- 2 indicates that while the result reported by the author 3 might be true, that is -- this is, the author did this 4 and the author saw that. 5 Q. Right. 6 A. The biological relevance or significance 7 for humans be -- is -- is highly questionable. 8 Q. Okay. So to -- to answer my question, 9 the -- the issue of physiological relevance goes to 10 whether you can extrapolate the results to humans, not 11 to the question of genotoxicity generally, correct? 12 MS. PIGMAN: Objection; misstates his testimony. 13 BY THE WITNESS: 14 A. Now, I -- I think that if one is seeing 15 genotoxicity under these particular circumstances that 16 one cannot say that the genotoxicity observed is a 17 direct effect of the chemical itself. 18 Again, I am considering a genotoxic 19 compound as one where the compound itself or a 20 metabolite can -- can bind to damage the genetic 21 material. And while the author under their 22 experimental conditions observed what they report to 23 be as a genotoxic effect, it very likely, in my view, 24 could be something secondary to the compound of</p>
<p style="text-align: right;">Page 127</p> <p>1 plus/minus .05 and 3.54 plus/minus .01 says that the 2 p-value is less than .05 and the author says this 3 represents a significant decrease compared to 4 untreated control. 5 Q. Okay. Now, is it your opinion that -- 6 that the results of this Prasad study could indicate 7 genotoxicity in glyphosate-based formulations? 8 A. That it could indicate genotoxicity? 9 Q. Right. Can you definitively say that the 10 observed results are due to cytotoxicity? 11 A. What I can say to you is that because of 12 the cytotoxicity in combination with the highly 13 unphysiological IP route of administration, that 14 the -- these -- this -- this -- these represent 15 serious confounding factors, and based on that, I 16 think that one cannot interpret the results of these 17 studies as indicating that the compound in question is 18 genotoxic. 19 Q. Okay. So the -- the physiological 20 relevance of the route of administration, does -- do 21 you believe that goes to the question of whether the 22 substance being tested is genotoxic or whether the 23 results are relevant for humans? 24 A. In terms of the non-physiological route of</p>	<p style="text-align: right;">Page 129</p> <p>1 interest rather than a primary effect of the compound 2 of interest. 3 BY MR. WOOL: 4 Q. But that is due to cytotoxicity, correct, 5 that -- that's your testimony? 6 A. Yes, I think that would be, with the 7 unphysiological route of administration, that you can 8 have cytotoxicity and genotoxicity secondary to that. 9 On top of that, in the Prasad et al. 2009 10 paper you actually have evidence of cytotoxicity in 11 the relevant cell population. 12 Q. Right. So -- so my -- my question is, 13 which I don't think you've answered, is much simpler. 14 So your issue with the route of 15 administration, as -- as I understand it, what -- what 16 I'm trying to determine is whether this is -- the 17 quarrel that you have with IP route of administration 18 just goes to whether you can extrapolate the results 19 to humans. Like let's say for a minute that humans 20 were only exposed to glyphosate-based formulations via 21 IP injection. 22 MS. PIGMAN: Objection; form and misstates his 23 testimony, asked and answered. 24 BY THE WITNESS:</p>

<p style="text-align: right;">Page 130</p> <p>1 A. So I apologize if I -- if I have not been 2 clear. 3 BY MR. WOOL: 4 Q. Sure. 5 A. So let me please try once more. 6 I think that with the IP route of 7 administration one might get cytotoxicity which then 8 could lead to genotoxicity and under those 9 circumstances I would not -- I would not consider the 10 compound itself to be genotoxic, because I believe 11 that the appropriate definition of a genotoxic 12 chemical is where the chemical itself or a metabolite 13 directly interacts with, binds with, damages the 14 genetic material. So I think that the result might be 15 a, what could be called a genotoxic endpoint, but that 16 it could be very likely occurring secondary rather 17 than as a primary effect of the chemical. 18 Q. So is your testimony that administering 19 glyphosate-based formulations via the IP route, that 20 that route of administration itself has an effect on 21 cytotoxicity? 22 MS. PIGMAN: Objection; asked and answered. 23 BY MR. WOOL: 24 Q. You -- you can answer.</p>	<p style="text-align: right;">Page 132</p> <p>1 the test indicate that glyphosate is a genotoxic 2 compound. 3 Q. Would it also be inappropriate to conclude 4 that the effects that we are seeing in Prasad are 5 definitively due to cytotoxicity? 6 Would that be a scientifically-reliable 7 conclusion? 8 A. I -- you know, I -- I think we are sort 9 of -- 10 Q. I'm just asking you if you can -- 11 A. -- passing -- 12 Q. -- if you can -- 13 A. -- passing each other. 14 Q. Sure. 15 So, and -- and again, so, can -- would it 16 be scientifically reliable for me to say that the 17 observed effects in Prasad are due to cytotoxicity? 18 A. But that's not the way I think -- 19 Q. But -- 20 A. -- one should evaluate this. 21 Q. Sure. 22 A. I said one could -- 23 Q. But that's not the question. 24 A. -- say that there is a serious confounding</p>
<p style="text-align: right;">Page 131</p> <p>1 A. I'm saying that -- that I think -- I'm 2 saying that I think that it very well could, and if we 3 could please go back to some of my comments this 4 morning, I indicated that in terms of IP injection it 5 leads to a -- a very high, very quick, very rapid 6 blood level and that the effects from this could be 7 cytotoxicity. And, again, in this particular Prasad 8 et al. 2009 publication, we actually have empirical 9 data saying that there was cytotoxicity in the 10 relevant cell population being evaluated. 11 Q. Okay. So going to my question from a 12 minute ago, and I know that -- that cytotoxicity can 13 have genotoxic-like effects, but -- but are you able 14 to definitively say that the effects that you were 15 observing in Prasad, for example, are due to 16 cytotoxicity? 17 Can you make that definitive conclusion 18 due to the increases that you see -- 19 A. My -- my -- 20 Q. -- or decreases in the mitotic index? 21 A. My -- my answer is that in light of the 22 cytotoxicity observed, that this is a serious 23 confounding phenomenon and that that makes it, in my 24 view, not appropriate to conclude that the results of</p>	<p style="text-align: right;">Page 133</p> <p>1 issue here, which means that this, the results of this 2 test are not -- are not valid with regard to 3 evaluating genotoxic potential. 4 Q. And, again, you haven't answered my 5 question. I -- I understand that -- that you're 6 disregarding the tests and -- and that -- that's not 7 something that -- that I'm quarreling with you on. 8 I am simply trying to -- to get at the -- 9 what I believe was my original question, which is that 10 it appears to me that you cannot definitively rule out 11 genotoxicity as a result, as a cause of the results 12 that you see in -- in Prasad? 13 MS. PIGMAN: Objection; asked and answered, 14 form, and misstates his testimony. 15 BY THE WITNESS: 16 A. I think what you're proposing -- what 17 you're -- what you're proposing is really not the way 18 to evaluate these genotoxicity tests. If the -- if 19 the -- if -- if there are some serious confounding 20 aspects here that one cannot draw the conclusion that 21 the reported observation of genotoxicity is related to 22 the compound of interest. 23 BY MR. WOOL: 24 Q. Okay. Right.</p>

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1 But -- but so we would agree that the
 2 positive control demonstrated a -- a decrease in the
 3 mitotic index as well, correct?
 4 A. That is correct.
 5 Q. Okay. And the conclusion that you would
 6 draw from that is not necessarily that the positive
 7 control -- strike that.
 8 And the -- the -- the conclusion that you
 9 would draw from that is not that benzo(a)pyrene is not
 10 genotoxic, correct, can we agree on that?
 11 A. Only -- we can agree on that only because
 12 there is such a wealth of information in the
 13 literature with regard to benzo(a)pyrene being
 14 genotoxic. And what we can -- can conclude from here
 15 is that they really should not have simply used one
 16 concentration of benzo(a)pyrene, that there should
 17 have been a dose-response consideration and they
 18 should have chosen to focus on doses, concentrations
 19 that did not cause cytotoxicity.
 20 Q. Okay. We can move on.
 21 So let me ask you about the Helal and
 22 Moussa art -- article.
 23 A. Excuse me. Excuse me. Let me -- let
 24 me -- let me just --

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1 Q. Put it away.
 2 A. -- put this one away.
 3 Q. And I think you are already there. It is
 4 at the bottom of Page 20.
 5 A. I'm there.
 6 Q. Okay. And you state that -- that Helal
 7 and Moussa might be positive, that's your ultimate
 8 conclusion, correct?
 9 A. Yes.
 10 Q. And if you turn the page, you state that,
 11 in effect, that you give the study less weight because
 12 it didn't comply with the OECD guidelines.
 13 MS. PIGMAN: Objection; misstates the report.
 14 BY MR. WOOL:
 15 Q. Okay. Why -- why don't you tell me how
 16 much weight you gave Helal and Moussa.
 17 MS. PIGMAN: Objection; misstates his testimony.
 18 BY MR. WOOL:
 19 Q. Okay. Well, did you give Helal and Moussa
 20 any weight?
 21 A. I did. I said -- I -- I did. I said
 22 that -- I said that -- that I consider their study as
 23 might -- as might be positive.
 24 Q. Okay.

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1 A. So I -- I did give it weight.
 2 Q. And am I fair in saying that you gave it
 3 less weight because it didn't comply with the OECD
 4 guidelines?
 5 MS. PIGMAN: Objection; vague.
 6 MR. WOOL: I'm asking it.
 7 BY THE WITNESS:
 8 A. I think it's fair to say that I gave it
 9 less weight because in my opinion they should have
 10 used -- they should have evaluated more cells. And
 11 while I reference the OECD guidelines for -- for 200,
 12 but I think -- I think, basically, my concern is that
 13 they used too -- too few cells.
 14 Q. Okay. Let's move on to the in vivo tests
 15 for micro -- micronuclei induction in glyphosate-based
 16 formulations which should be in the middle of Page 21
 17 on --
 18 A. I'm there.
 19 Q. -- your report.
 20 All right. Now, if you look at
 21 Appendix -- well, first, you state that you reviewed
 22 20 studies and essentially all were negative, correct?
 23 A. Well, I -- that I reviewed 20 studies
 24 reported to be negative, yes.

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1 Q. Okay. And if we look at Appendix 4 in
 2 your report, which is on Page 51.
 3 A. I'm there.
 4 Q. Okay. So the -- the first study is the
 5 Bolognesi study, which this table reports as positive.
 6 Is your description of all 20 being
 7 negative an indication that you believe that the --
 8 the Bolognesi study is negative?
 9 A. No, I think we -- we -- we had discussed
 10 the Bolognese study and I -- I do not think that it's
 11 positive.
 12 Q. Okay. Would you describe the Bolognesi
 13 study as negative for micronuclei induction in
 14 mammals?
 15 A. I would describe the study as being --
 16 being very compromised because of the intraperitoneal
 17 route of administration and because they -- they did
 18 not evaluate cytotoxicity. So I would consider it
 19 as -- as compromised, as confounded, and I would not
 20 use this as evidence that glyphosate is a genotoxic
 21 compound.
 22 Q. Okay. And -- and I'm not -- this isn't
 23 a -- a tricky question, but so I will represent to you
 24 that I believe there -- there are 20 studies listed in

<p style="text-align: right;">Page 138</p> <p>1 Appendix 4. 2 So your opinion should be that -- that you 3 reviewed the 20 studies and that 19 were negative, 4 maybe one equivocal, fair? 5 MS. PIGMAN: Objection; misstates his report. 6 BY MR. WOOL: 7 Q. So, and I'm just trying to -- to correct. 8 So -- so you would agree that there are not 20 9 negative studies? 10 A. I would agree that -- I would agree -- I 11 would agree that there are not 20 studies where the 12 author reports a negative effect. 13 Q. Okay. And I believe the Prasad study that 14 we just looked at also measured micronuclei 15 inductions. 16 And do you have that? I'm not going to 17 ask you about the study. I just want to know because 18 I -- I don't think that's included, and I believe that 19 suggested a positive result for micronuclei induction. 20 A. For Prasad? 21 Q. Yes. 22 A. Let's see. 23 Q. I think that it's -- 24 A. Yeah.</p>	<p style="text-align: right;">Page 140</p> <p>1 with is that I think that the Bolognese study, which 2 is in the table, I think that one, based on what I 3 said previously, cannot conclude that it is positive. 4 I think that at best one can say that this is 5 inconclusive because of the confounding factors. And 6 I would say the same for the Prasad 2009 paper that 7 you just showed me. 8 Q. For Bolognese, do you believe that a 9 reasonable scientist could reach a different 10 conclusion about the -- the Bolognese study? 11 A. If you -- if you want to say in terms of 12 a -- a reasonable scientist in the broad sense, they 13 might, but I would disagree with them. 14 Q. Fair enough. 15 A. For the -- for the reasons that I 16 present -- 17 Q. Right. And -- 18 A. -- excuse me, for the reasons that I 19 presented. 20 Q. And I'm just asking because the EPA, I'm 21 assuming, based on this table result, viewed it 22 differently than -- than you? 23 A. Well, I think that what the EPA is doing 24 here is they have reported the result as reported by</p>
<p style="text-align: right;">Page 139</p> <p>1 Q. -- that study. 2 A. That is not included. 3 Q. Okay. So, and, again, not a trick 4 question, so the numbers should be 19 negatives and we 5 can describe Prasad and -- and Bolognese however we 6 want, but you would agree that both of those studies 7 are not negative for micronuclei induction? 8 MS. PIGMAN: Objection; misstates his report and 9 the testimony. 10 BY THE WITNESS: 11 A. Could you repeat that, please? 12 BY MR. WOOL: 13 Q. Would -- would you agree that the 14 Bolognese study and Prasad study are not properly 15 characterized as negative studies for in vivo 16 induction of micronuclei and glyphosate-based 17 formulations? 18 A. Well, first of all, in terms of -- in 19 terms of these 20 studies, with all of these data 20 somehow I missed the Prasad. 21 Q. Fair, yeah. 22 A. Okay. I missed the Prasad. 23 Q. I'm not... 24 A. What I would agree -- what I would agree</p>	<p style="text-align: right;">Page 141</p> <p>1 the author of the manuscript. 2 Q. Okay. And we had talked about 3 cytotoxicity and Prasad. I can't remember if we spoke 4 about it specifically to micronuclei formation, so if 5 I asked you this already, I apologize. 6 But is it your testimony that cytotoxicity 7 would -- would increase the number of observed 8 micronuclei? 9 A. My -- my -- it is my testimony that 10 cytotoxicity likely can increase the number of 11 micronuclei. 12 Q. Can cytotoxicity decrease the number of 13 micronuclei? 14 A. If you get cytotoxicity to the point that 15 you are killing the cells and the cells totally 16 fragment, then you won't see micronuclei. 17 Q. So is it possible that cytotoxicity can 18 mask the results of a genotoxic compound in -- in that 19 regard? 20 A. If you -- if you did have -- if you did 21 have a massive amount of cytotoxicity, then it could 22 mask this and that's why I am saying, that when you 23 see cytotoxicity, it is a major confounding issue and 24 that this makes the study inconclusive. But you --</p>

<p style="text-align: right;">Page 142</p> <p>1 you are correct. Massive cytotoxicity could mask. 2 Q. Okay. Now, you single out a Kier 1992 3 article that evaluated the ability of RODEO to cause 4 formations of micronuclei. 5 A. I did. 6 Q. Okay. Why did you single out that study? 7 A. Well -- 8 Q. Kier, I mispronounced his name. 9 A. It's -- it's all right. 10 Well, there is -- there is such a massive 11 amount of literature that we are trying to get our 12 hands around, and I decided that what I should do is 13 not restrict myself to just the studies that the 14 Environmental Protection Agency looked at. And I 15 thought it best to go a bit beyond what they did. And 16 going a bit beyond what they did, I picked out another 17 study. And there came Larry Kier 1992. 18 Q. And earlier we had talked about the 19 definition of glyphosate -- 20 A. But -- but -- but in terms of the Kier 21 paper, if I could, please. 22 Q. Sure. 23 A. I think -- I think that the Kier paper 24 is -- is really rather -- rather important in terms of</p>	<p style="text-align: right;">Page 144</p> <p>1 Q. Would you agree that -- that the presence 2 of surfactants or absence thereof is an important 3 consideration in determining whether a 4 glyphosate-based formulation is, in fact, genotoxic? 5 A. Well, if one wants to evaluate 6 genotoxicity of glyphosate-based formulations, this 7 has been done, there are many, many studies that have 8 been done on this. It is -- it is -- it is -- it is 9 my understanding, I might be wrong, my understanding 10 that all of the glyphosate-based formulations do 11 contain one or more surfactants. 12 Q. Okay. Okay. And now, within the data set 13 which we just discussed, which to be clear are the in 14 vivo tests for micronuclei induction in animals using 15 glyphosate-based formulations, are there any studies 16 that you discounted due to methodological flaws? 17 A. Any studies I discounted? 18 Q. Any negative studies, I should clarify. 19 A. The answer -- the answer to that question 20 is no, but let me please remind you of my earlier 21 comment that the -- the overall criteria that I used 22 in looking at these studies was, was/is consistent and 23 there was not a, a set of criteria for positive 24 studies and a separate set of criteria for negative</p>
<p style="text-align: right;">Page 143</p> <p>1 this is one that used male and female mice, this is 2 one that used -- really, upped some doses that were -- 3 were very high, it did use a positive control that 4 worked, and the highest dose used is close to the 5 lethal dose and one did not see micronuclei. 6 Now, to your point before, is it possible 7 that there was a massive amount of cytotoxicity -- 8 Q. I'm -- I'm not asking that. 9 A. But you still have the lower doses, the 10 lower doses here, and the lower doses that Kier used 11 are still high doses. 12 Q. Sure. 13 Now, earlier when we talked about the 14 definition of glyphosate-based formulations, I believe 15 your definition included a surfactant, am I correct? 16 A. Yes, to the -- to the best of my 17 knowledge, the glyphosate formulations -- 18 glyphosate-based formulations include one or more 19 surfactants. 20 Q. And sitting here today, do you know if the 21 RODEO formulation that was tested contained a 22 surfactant? 23 A. The answer is that I do not know this for 24 a fact.</p>	<p style="text-align: right;">Page 145</p> <p>1 studies. It was measured against one set of criteria. 2 Q. Okay. Let's go to the next section, which 3 is at the bottom of 21, which are other assays for 4 detecting DNA damage. 5 Are you following me? 6 A. I am. 7 Q. And am I correct that you did not consider 8 any of -- or you did not put any weight on any of 9 these studies within this category? 10 A. I think that -- I did not put any weight. 11 I -- I think that as -- as stated in my -- as stated 12 in my report, I do think that there are some issues 13 associated with these other studies as enunciated 14 in -- in my report. 15 Q. Sure. 16 So do you give any evidentiary weight 17 to -- to studies outside of the confines of the -- the 18 four types that -- that you outline as -- as being the 19 most reliable? 20 A. I did not -- I did not call them -- the 21 four that you are talking about, I did not call them 22 the most re- -- the most reliable. 23 What I did say is that typically when 24 hand -- when, metaphorically speaking, handed a</p>

<p style="text-align: right;">Page 146</p> <p>1 compound and asked to evaluate its genotoxic 2 potential, that typically one would do, one, an Ames 3 test which involves multiple sub tests, one would do, 4 two, a test in mammalian cells and culture that -- 5 that reports -- can -- can report evidence of 6 genotoxicity, and this would be either the mouse 7 lymphoma test which tests at the thymidine kinase 8 locus, or using Chinese hamster ovary cells which 9 tests at the HGPRT locus, hypoxanthine-guanine 10 phosphoribosyltransferase, that one would use a 11 mammalian test system in in vitro either for 12 chromosome aberrations or micronuclei in vitro. So we 13 are looking in vitro for an indication of mutation and 14 for an indication of, if you will, larger scale damage 15 to the genome, and then a study in vivo, typically, 16 which would be the bone marrow micro -- micronucleus 17 evaluation. 18 Q. Okay. So, let -- let me ask it like this, 19 I guess. 20 Do you consider the Sister Chromatid 21 Exchange assay to be fundamentally unreliable? 22 MS. PIGMAN: Objection; misstates his report. 23 MR. WOOL: I'm asking him if he considers it to 24 be.</p>	<p style="text-align: right;">Page 148</p> <p>1 A. I'll be right there. 2 Okay. I'm there. I'm on Page 30. 3 Q. In the first two lines of the last 4 paragraph on Page 30, it appears you state that the: 5 "Positive results using the Comet assay 6 were reported by Maas et al. 2009b and Alvarez-Moya 7 et al. 2014. However, neither of these studies 8 included an evaluation of glyphosate-induced 9 toxicity." 10 And, in effect, you go on to say that 11 because a positive result in the Comet assay can be 12 secondary to cytotoxicity, you cannot view the results 13 as evidence of genotoxicity. 14 Fair enough? 15 A. Not quite. 16 Q. Okay. 17 A. Because I also say there was a lack of 18 dose-response. 19 Q. Okay. So is it your opinion sitting here 20 today that these tests did not show a clear 21 dose-response? 22 A. Yes. 23 Q. Okay. And is it your opinion sitting here 24 today that they did not evaluate for cytotoxicity?</p>
<p style="text-align: right;">Page 147</p> <p>1 BY THE WITNESS: 2 A. I -- I -- the -- the problem I have with 3 the Sister Chromatid Exchange assay, where I was 4 happy, happy, happy to see that it has been -- that 5 OECD dropped it is, you know, frankly, I always had 6 difficulty in trying to understand the underlying 7 basis for that assay. And -- and so I think that -- I 8 think OECD was right. I wish that it happened a few 9 years earlier in terms of dropping this for -- from 10 consideration. I just -- I just don't have a good 11 feeling if -- if it comes to using a particular assay 12 where I can't really get my hands around, if you will, 13 what's going on. 14 Q. So that I think in a roundabout way you 15 might have answered my question, but so to be clear, 16 do you consider this assay to be unreliable? 17 A. I consider that this assay should not be 18 used because of a lack of understanding of, if you 19 will, what it -- what is going on. 20 Q. Okay. Now, if we look at your opinions on 21 Page 30, which is still other assays -- 22 A. I'll -- I'll be right there. 23 Q. -- for evaluating DNA damage, but this is 24 just limited to glyphosate.</p>	<p style="text-align: right;">Page 149</p> <p>1 A. Yes. 2 Q. Okay. Were it for not -- strike that. 3 But for those shortcomings, would you have 4 given weight to these two studies? 5 A. Well, but that's a -- that's a big but. 6 Q. Sure. 7 A. That's a big but. If -- if -- if these -- 8 if these -- if these studies were conducted 9 properly -- well, let me -- let me -- let me try to be 10 clear on both of these. 11 In my opinion a properly-conducted Comet 12 assay is a, one, a very appropriate way to estimate, 13 evaluate potential genotoxicity. 14 Q. And to be proper, it must evaluate for 15 cytotoxicity and show dose-response, fair? 16 A. I think that in -- that in terms, those 17 are two -- those are two very important criterion, 18 yes. 19 Q. Okay. And -- and the absence of those two 20 criterion in -- in these two studies which we just 21 described, which are Maas 2009b and Alvarez-Moya 22 2014, is what renders those tests unreliable in your 23 opinion, correct? 24 A. In -- in my opinion that is -- that pro --</p>

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1 those are confounding issues and in my opinion that
 2 precludes drawing a conclusion from these studies.
 3 Q. What is the trypan blue test? Have you
 4 heard of that before?
 5 A. I have.
 6 Q. And what is that?
 7 A. Try -- trypan blue is a -- is a dye and
 8 typically when cells are -- are viable, they do not
 9 take up -- they do not transport this dye from the
 10 outside of their cell membranes to the inside.
 11 Q. Is the trypan blue test a measure of
 12 cytotoxicity?
 13 A. It can be.
 14 Q. It can be.
 15 Do you consider it a reliable measure of
 16 cytotoxicity?
 17 A. I con -- I consider it a measure of
 18 cytotoxicity.
 19 Q. If somebody had measured cytotoxicity in a
 20 study that they submitted to you in your capacity as a
 21 reviewer for the journals that you serve on, would you
 22 consider that adequate in -- in testing for
 23 cytotoxicity --
 24 A. Yes.

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1 Q. -- in your decision to publish it?
 2 A. Yes.
 3 Q. Okay.
 4 Let's go back to Page 22 of your report,
 5 which is still the other assay section, but this time
 6 looking at glyphosate-based formulations.
 7 A. I'm there.
 8 Q. Okay. And -- okay. Let me ask you some
 9 questions about the Peluso study which is detailed at
 10 the bottom of Page 22.
 11 So, first of all, is evaluating DNA
 12 adducts in mice using the 32-P-postlabeling technique
 13 a valid way for assessing genotoxicity?
 14 A. When the 32-P-postlabeling technique is --
 15 is -- is performed -- performed properly, it -- it
 16 is -- it is a way -- it is -- it is a way of
 17 evaluating genotoxicity in terms of evaluating
 18 reaction of the chemical in question or adducts of the
 19 chemical in question with a DNA base.
 20 Q. Okay. And you discount this study.
 21 The -- I guess the only criticism that I see is that
 22 it utilized the IP route.
 23 Is -- is that correct?
 24 A. Yes, yes.

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1 Q. And --
 2 A. And -- and -- and -- and -- and also as
 3 I -- as I recall, although not right in here, as I
 4 recall they did not do an evaluation for cytotoxicity.
 5 Q. And your criticism that -- that they did
 6 not do an evaluation for cytotoxicity for the Peluso
 7 et al. 1998 study utilizing the 32 post -- the
 8 32-P-postlabeling technique, that opinion is not
 9 contained within this paragraph at the bottom of
 10 Page 22, am I correct?
 11 A. The comment about cytotoxicity?
 12 Q. Correct.
 13 A. That is correct.
 14 Q. So as you sit here today, it is your
 15 belief that -- that they did -- that Peluso et al.
 16 1998 did not measure for cytotoxicity?
 17 A. As -- as I -- as I recall. And, again,
 18 there have been a lot of, a lot of lot of studies that
 19 are reviewed. As I recall, Peluso et al. did -- did
 20 not evaluate for cytotoxicity.
 21 Q. Okay. And we've discussed the IP route of
 22 administration, so you don't have to explain your --
 23 your opinions about it again, but as it relates to the
 24 32-P-postlabeling technique, is -- is there any reason

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1 that that particular test would make the IP route of
 2 administration less reliable?
 3 A. I think, I -- I think that in terms of
 4 the -- if -- if -- if there is cytotoxicity produced
 5 in any of these genotoxicity evaluations, then I think
 6 that that is a major confounding issue.
 7 Q. So what is DNA adduct formation?
 8 A. A adduct is a covalent binding of the
 9 chemical of interest or a metabolite with DNA,
 10 typically with one of the DNA bases. So you actually
 11 have a covalent bond formed.
 12 Q. And is -- is that adduct formation
 13 evidence of genotoxicity?
 14 A. Correct.
 15 Q. And how does cytotoxicity impact that DNA
 16 adduct formation, or how does it confound the DNA
 17 adduct formation, I should say?
 18 A. Well, in terms of -- in term -- in terms
 19 of cytotoxicity, as you have cells that are damaged
 20 and -- and -- and possibly moribund, the -- one of the
 21 things that happens is that some internal components
 22 of the cell can release enzymes which degrade DNA and
 23 this can lead to potential artifacts, if you will, or
 24 call it potential spots that one sees in the P-32

<p style="text-align: right;">Page 154</p> <p>1 postlabeling. 2 So once you start releasing enzymes, they 3 have a chance to start chewing up the DNA, this can 4 possibly be reflected as a positive in the 5 postlabeling. 6 So do you want me to describe... 7 Q. All right. Is that -- is that true for 8 both necrotic and apoptotic cell death? 9 A. Is what true, please? 10 Q. That -- right, what you just described, 11 that -- that the internal components can release 12 enzymes which degrade the DNA? 13 A. Yes, I believe so. 14 Q. Okay. And let's go back to the Bolognese 15 2007 study, because I believe they -- they touch on 16 some of the DNA damage that we are discussing in this 17 section. 18 A. Would you -- which page are you on -- are 19 you on, please? 20 Q. Let me -- let me grab it first and then I 21 will tell you. 22 So it's the 1997 Bolognese study. And 23 let's see. And in your report on Page 23. 24 A. I'm there.</p>	<p style="text-align: right;">Page 156</p> <p>1 have occurred by chance, among the very numerous tests 2 for genotoxicity, these are far outweighed by the 3 overwhelmingly negative results." 4 Correct? 5 A. Yes. 6 Q. Okay. 7 A. That's what I wrote and that's what I 8 believe today. 9 Q. Okay. That accurately reflects your 10 opinion? 11 A. Correct. 12 Q. Okay. And when you say it should be 13 viewed as non-genotoxic, just so I am clear, are you 14 saying that the evidence indicates that it is 15 definitively not genotoxic or that there is not 16 sufficient evidence to conclude that it is genotoxic? 17 Do you understand the -- the distinction 18 that I'm drawing? 19 A. Okay. So you are asking me what I 20 conclude. 21 What I conclude is based upon this -- 22 based upon my independent and thorough evaluation of 23 this big body of -- of data is that after all of this 24 due consideration, that glyphosate should be viewed as</p>
<p style="text-align: right;">Page 155</p> <p>1 Q. Okay. So Bolognese also evaluated DNA for 2 oxidative damage, correct, accurate description of the 3 '97 study? 4 A. Yes. 5 Q. Okay. And am I correct that the two 6 reasons that you give for discounting the study are 7 the lack of evaluation of cytotoxicity again and the 8 IP route of absorption? 9 A. The IP route -- the IP route of 10 administration, yes. 11 Q. Of administration. I'm sorry. Okay. 12 So let's turn now, I want to address your 13 conclusions regarding glyphosate and then 14 glyphosate-based formulations. 15 So -- so you conclude on Page 20 -- oh, 16 wait, I'm looking at glyphosate-based formulations. 17 Okay. So you conclude on Page 31 -- 18 A. I'm almost there. 19 I'm there. 20 Q. Okay. 21 -- that: "Based on the data and 22 discussion presented above, I conclude that glyphosate 23 should be viewed as a non-genotoxic compound. While 24 there were occasional positives, some of which might</p>	<p style="text-align: right;">Page 157</p> <p>1 a non-genotoxic -- as a non-genotoxic compound based 2 upon all of these data. 3 Q. And -- and so I guess -- I don't know that 4 that answers my question. 5 I guess, do you view the -- the data that 6 you reviewed regarding glyphosate as conclusively 7 showing that it is not genotoxic? 8 A. In my opinion the re -- my review of this 9 large body of data leads me to conclude that 10 glyphosate should not be viewed, should not be 11 characterized as a -- as a genotoxic compound. This 12 is a huge, huge data set. 13 Q. All right. And you go on to note that 14 your conclusion is consistent with a number of 15 agencies and -- and a couple of articles. 16 A. That is correct. 17 Q. Okay. And let's see. So why, if you go 18 to page -- or I guess let me ask this: Do you believe 19 that the European -- the European Food Safety 20 Authority is an authoritative source of information as 21 it relates to the genotoxicity of glyphosate? 22 A. I would not use the word "authoritative." 23 In my mind, the European Food Safety Administration is 24 a -- a very -- is a well -- is a highly-regarded</p>

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<p>1 organization. And -- and I'm using the word 2 "organization" loosely because I'm not sure if it's 3 actually a... In my -- in my opinion, EFSA is a 4 highly-regarded organization. I think EFSA has a 5 great degree of credibility in my opinion. I have not 6 done a scientific survey, but generally I think EFSA 7 is viewed as a credible organization.</p> <p>8 Q. Is that why you put that your conclusion 9 is consistent with EFSA in your report?</p> <p>10 A. Is that why?</p> <p>11 Yeah, what -- what I did is I made an 12 independent, in-depth, constructively critical 13 evaluation of this large body of data here related to 14 genotoxicity and reached my conclusion and then I 15 said, like, And by the way, it's consistent with.</p> <p>16 So if the EFSA report did not exist, if 17 there was no EFSA report, not one word of my 18 conclusion would change.</p> <p>19 Q. Did EFSA's conclusion impact your opinions 20 at all?</p> <p>21 A. Impact my opinion?</p> <p>22 Q. Did you believe that it bolstered your 23 opinion?</p> <p>24 A. No. I made -- I -- I made my opinion</p>	<p>1 Gary Williams?</p> <p>2 A. That is correct.</p> <p>3 Q. Okay. Do you know Gary Williams?</p> <p>4 A. I do.</p> <p>5 Q. How do you know him?</p> <p>6 A. Gary Williams is a well-known, 7 well-respected pathologist. He is a human 8 pathologist, M.D., pathologist and toxicologist.</p> <p>9 Q. What do you mean by "well-respected"?</p> <p>10 A. I think that there are many people who -- 11 who read and -- his -- his publications, who read 12 them, evaluate them and think highly of his -- of his 13 publications. In addition to presentations that he 14 has made at -- at meetings.</p> <p>15 Q. So you would say his name carries a lot of 16 weight within the genotoxological community?</p> <p>17 A. I'd say that -- I -- I would say that I 18 think that he is a -- a -- a well-respected 19 scientist --</p> <p>20 Q. Does that mean --</p> <p>21 A. -- in the area of toxicology.</p> <p>22 Q. Does that mean -- or strike that.</p> <p>23 Now, this article, the 2000 article was 24 published in Regulatory Toxicology and Pharmacology?</p>
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<p>1 based upon my review of the literature. The EFSA 2 report did not bolster my opinion. And I put in that 3 "my conclusion is consistent with" in terms of naming 4 a number of different organizations and some review 5 articles that reached a -- a similar conclusion.</p> <p>6 Q. Okay. So next you talk about the joint 7 Food and Agricultural Organization, FAO, of the 8 United States World Health Organization.</p> <p>9 A. Excuse me. I don't think it is the 10 United States.</p> <p>11 Q. I'm sorry. You're right. You're right.</p> <p>12 A. It is just World Health Organization.</p> <p>13 Q. United Nations. Good -- good catch.</p> <p>14 Okay. Now, the joint FAO/WHO conclusion 15 was limited to expose -- exposures via the oral route, 16 correct?</p> <p>17 A. Yes, yes. WHO limits itself to -- to 18 food.</p> <p>19 Q. Okay.</p> <p>20 A. The -- not the WHO. Excuse me. JMPR 21 limits its consideration to residues on -- on food.</p> <p>22 Q. Okay. Now, let's go down to No. 5. You 23 cite that your conclusion is consistent with Williams 24 et al. 2000, which I believe is an article by -- is it</p>	<p>1 A. It was.</p> <p>2 Q. Is that -- remind me, is that the journal 3 that you served on the board of or as an editor for?</p> <p>4 A. As an associate editor for, you are 5 correct.</p> <p>6 Q. Okay. Did you serve -- did you work 7 for -- or work on that journal in any capacity in 2000 8 when this article was published?</p> <p>9 A. Thinking back, I could have been on the 10 editorial board at that -- I -- I don't remember if I 11 was on the editorial board 15 years ago.</p> <p>12 Q. Fair.</p> <p>13 A. 17 years ago. Possibly not.</p> <p>14 Q. Is it possible that you were a reviewer 15 for this article?</p> <p>16 A. You know, when --</p> <p>17 Q. I'm not asking you if you remember 18 specifically. I'm just asking if it's -- if it's 19 possible.</p> <p>20 A. I do not recall specifically.</p> <p>21 Q. Okay. What -- and you currently serve as 22 an editor for Regulatory Toxicology and Pharmacology, 23 correct?</p> <p>24 A. I currently serve as an associate</p>

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1 editor --

2 Q. An associate.

3 A. -- for the -- for this journal, you are

4 correct.

5 Q. And does that mean that you have some --

6 MR. WOOL: It is really hot in here.

7 BY MR. WOOL:

8 Q. -- have some decision-making authority in

9 terms of what articles are or are not published?

10 A. Some decision-making authority is -- is

11 correct. All of my -- what I do is I -- I make

12 recommendations to the editor and the editor has the

13 ultimate authority.

14 Q. Does Regulatory Toxicology and

15 Pharmacology require that all authors who contribute

16 significantly to a work be acknowledged?

17 A. For Regulatory Toxicology and

18 Pharmacology, and for other journals, I do not think

19 the instructions for authors explicitly say what you

20 are saying. What they do ask is for individual

21 authors, they ask questions about potential conflicts

22 of interest and there are -- Regulatory Toxicology and

23 Pharmacology now uses, which many other journals use,

24 a sort of generally-accepted form that they ask

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1 authors to fill out which relates to conflict of

2 interest. Whether or not that form was used in 2000,

3 I don't know. In other words, I -- I -- I -- that

4 form might have come into being after 2000.

5 Q. If I wrote an article and gave it to you

6 and asked you to put your name on it to try to -- and

7 pretending you weren't an editor, and we submitted

8 that to Regulatory Toxicology and Pharmacology with

9 your name on it, would it be improper for the journal

10 to publish that article?

11 MS. PIGMAN: Objection; form.

12 BY THE WITNESS:

13 A. No. What -- what would be improper, of

14 course, is if I were the reviewer of an article that I

15 submitted. That would never happen because it is the

16 editor who determines the reviewers and the editor

17 would never send a manuscript submitted by Individual

18 X to Individual X to be reviewed.

19 BY MR. WOOL:

20 Q. So you are telling me that if -- if I

21 wrote an article, just gave it to you to slap your

22 name on and we took my name off, that that would be

23 proper for publication in Regulatory Toxicology and

24 Pharmacology?

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1 A. Absolutely not. That is -- that is

2 absolutely not what I said.

3 Q. Okay. Is -- is the situation that I just

4 described -- strike that.

5 Would the situation that I just described

6 be acceptable to you as an editor for Regulatory

7 Toxicology and Pharmacology?

8 A. Just to be clear, are you asking me if an

9 individual who made substantial contributions to a

10 manuscript should be considered an author, or the

11 other way around, if an individual made substantial

12 contributions to a manuscript, would it be wrong not

13 to consider him or her as an author?

14 Is -- is that basically what you are

15 asking me?

16 Q. No, what I'm asking is if I made

17 substantial contributions to the article and then,

18 essentially, asked somebody who did not contribute to

19 the article to put their name on it and remove my name

20 so that the article would either get published or

21 carry more weight, would that be improper?

22 A. That would be highly, highly improper.

23 Q. Okay. And if you as an editor on that

24 journal -- on Regulatory Toxicology and Pharmacology

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1 discovered an instance of -- of that sort of

2 impropriety, what sort of action would you take?

3 MS. PIGMAN: Objection; beyond the scope of the

4 report, calls for speculation.

5 BY MR. WOOL:

6 Q. You -- you can answer.

7 A. Well, I could tell you that we're talking

8 hypothetically now. I can tell you that at the very

9 least I would go to the author, assuming that we have

10 solid evidence that what you said is true, is go to

11 the authors, at the very least, and say that you have

12 to issue a correction saying that Individual X should

13 have been listed as an author. At -- at the very

14 least that's what I would do.

15 Q. You said "at the very least." What would

16 you do at the very most?

17 MS. PIGMAN: Objection; be call -- beyond the

18 scope of his report and calls for speculation.

19 BY THE WITNESS:

20 A. At the very most I suppose there could be

21 consideration for having the manuscript withdrawn,

22 but, but this really is context dependent. It is a

23 case-by-case consideration and one would have to have

24 a lot of specific detail.

<p style="text-align: right;">Page 166</p> <p>1 BY MR. WOOL: 2 Q. Okay. So kind of just because we are on 3 this -- the topic and I think you mentioned that part 4 of your criteria in evaluating some of these articles 5 was what you would do in -- in your capacity as -- as 6 an editor on -- on various journals, if somebody 7 submitted to you for publication an article that was 8 not compliant with OECD guidelines, is that a reason 9 that you would consider in not publishing the article? 10 MS. PIGMAN: Objection; misstates his testimony. 11 BY THE WITNESS: 12 A. No. No. Because I think that when you 13 look at the, what I'll call the research community, 14 particularly the academic research community, there is 15 not a need for them, in terms of if they are doing a 16 genotoxicity evaluation, to follow the letter of the 17 OECD guidelines. There is a need for them to be very 18 careful and very thorough in terms of performing what 19 I will call a -- a credible study. So if it is a 20 study that involves a genotoxicity evaluation, it is 21 in my mind imperative that there be some evaluation of 22 cytotoxicity, that there be some questions and some 23 evaluations of dose and/or time response, that there 24 be some real consideration given to the rationale</p>	<p style="text-align: right;">Page 168</p> <p>1 BY MR. WOOL: 2 Q. All right. Dr. Goodman, I believe before 3 we went off the record I had asked you about your 4 conclusions regarding the genotoxic -- toxicity tests 5 performed on glyphosate. And so I wanted to ask you 6 some similar questions about your conclusions 7 regarding glyphosate-based formulations. 8 So if you can, will you turn to Page 24 of 9 your expert report. 10 A. I'm there. 11 Q. Okay. And your conclusion as stated in 12 your expert report is, quote: 13 "I conclude that GBFs are not genotoxic. 14 It is important to note that the results of the 15 reliable, reproducible guideline studies indicate that 16 GBFs are not genotoxic. The few non-guideline studies 17 which report that GBFs are genotoxic have 18 methodological faults." 19 Did I read that correctly? 20 A. You did. 21 Q. And does that accurately state your 22 opinion regarding glyphosate-based formulations? 23 A. Yes. 24 Q. Now, you mention in there "reproducible</p>
<p style="text-align: right;">Page 167</p> <p>1 for -- for dose selection. These are the sorts of 2 things that we would look for. 3 BY MR. WOOL: 4 Q. And would you reject an article for 5 publication because it utilized the IP route of 6 administration in evaluating genotoxicity, say, in an 7 in vivo test for micronuclei induction, 8 hypothetically? 9 A. For that one, for that one piece, again, 10 this is all context related, so I cannot tell you, 11 given that one piece of information, what I would do 12 in terms of -- a re -- review articles are on a -- on 13 a case-by-case basis. 14 MS. PIGMAN: David, when you have a moment, can 15 we take a quick break? 16 MR. WOOL: Yeah, and if we can turn -- I don't 17 know if we can do anything about the -- we -- we can 18 go off the record now. 19 THE VIDEOGRAPHER: Going off the record at 20 2:13 p.m. 21 (WHEREUPON, a recess was had 22 from 2:13 to 2:23 p.m.) 23 THE VIDEOGRAPHER: This is Disk No. 4. We are 24 back on the record at 2:23 p.m.</p>	<p style="text-align: right;">Page 169</p> <p>1 guideline studies," correct? 2 A. I do. I -- I mean, when I say, "it's 3 important to note and talk about guideline studies," 4 this paragraph, what I say, "I conclude that GBFs are 5 not genotoxic," this is based on the whole body of 6 relevant literature that I reviewed and is not limited 7 to these guideline studies. 8 Q. Okay. Fair -- fair enough. 9 A. I just added a sentence about the 10 guideline studies. 11 Q. And what is the importance of 12 reproducibility in the -- the scientific community? 13 A. Well, it -- it -- it -- it is -- it is 14 very important even if experiments are -- are very 15 well and very thoroughly performed, there is always a 16 chance that a hiccup happened and so re -- the 17 question of reproducible -- reproducibility is an 18 important aspect. 19 Q. And of these studies that you reviewed 20 pertaining to glyphosate-based formulations, would you 21 agree that a significant number are not publicly 22 available? 23 A. I -- you know, with -- without -- without 24 quibbling as to what does a significant number mean,</p>

<p style="text-align: right;">Page 170</p> <p>1 many, many of them are not available publicly.</p> <p>2 Q. Do you believe that the different</p> <p>3 compositions of glyphosate-based formulations could</p> <p>4 have an effect on the reported results of any of the</p> <p>5 studies?</p> <p>6 A. That -- that is -- that is possible.</p> <p>7 Q. Did all of the studies that you reviewed</p> <p>8 clearly identify their component parts? And, again,</p> <p>9 I'm talking about glyphosate-based formulations.</p> <p>10 A. They did not fully identify the component</p> <p>11 parts. Some of them, but not all of them, referred to</p> <p>12 a particular formulation. So some of them referred</p> <p>13 to -- to Roundup. I think there was one in terms of</p> <p>14 it may have been one with Larry Kier who talked about</p> <p>15 a formulation called RODEO, but beyond that, in terms</p> <p>16 of them saying, And this Roundup product contained</p> <p>17 this and this and this and this and this, the answer</p> <p>18 is no.</p> <p>19 Q. Is it possible in your view that</p> <p>20 glyphosate could interact with a surfactant to produce</p> <p>21 a result not seen in glyphosate alone?</p> <p>22 A. Yeah, it is -- as you worded, it is -- it</p> <p>23 is possible that as part of a mix -- that with any</p> <p>24 chemical, that when it is part of a mixture one might</p>	<p style="text-align: right;">Page 172</p> <p>1 Q. But do you believe that, let's say, two</p> <p>2 different compounds, both with the same chemicals but</p> <p>3 with different concentrations of each, so a different</p> <p>4 percentage of -- of Roundup and surfactant in one</p> <p>5 versus the other can have different genotoxic effects?</p> <p>6 A. Well, excuse me. In terms of different</p> <p>7 concentrations of -- of Roundup, I think you meant</p> <p>8 different concentrations of glyphosate?</p> <p>9 Q. Right, so -- so different -- yes,</p> <p>10 you're -- good catch.</p> <p>11 Yes, so I -- I guess my question is: In</p> <p>12 evaluating the genotoxic potential of a</p> <p>13 glyphosate-based formulation, is it important to you</p> <p>14 to know not only the chemical composition of -- of</p> <p>15 that formulation, but also the amounts of -- of each</p> <p>16 chemical contained therein?</p> <p>17 MS. PIGMAN: Objection; form, asked and</p> <p>18 answered.</p> <p>19 BY THE WITNESS:</p> <p>20 A. Well, it -- yeah. If the objective of a</p> <p>21 study is to ask, in our case, about genotoxic</p> <p>22 potential of Product X, one can evaluate that mixture</p> <p>23 as a mixture and make a conclusion in terms of what</p> <p>24 was or was not -- what were or were not the effects of</p>
<p style="text-align: right;">Page 171</p> <p>1 get, in our case, toxicological results that are not</p> <p>2 quite the same as when the chemical is evaluated as a</p> <p>3 pure chemical.</p> <p>4 Q. So sitting here today, how can you state</p> <p>5 conclusively that any of the positive tests -- or</p> <p>6 strike that.</p> <p>7 So is it -- do you believe that it's</p> <p>8 important to identify all of the component parts of</p> <p>9 any given glyphosate formulation?</p> <p>10 A. You know, I think I'd say to you that you</p> <p>11 have to be specific in terms of "identify all of the</p> <p>12 components." The analytical chemist these days has</p> <p>13 a -- a very powerful telescope and we can start</p> <p>14 measuring smaller and smaller and smaller quantities.</p> <p>15 Q. Is it important to know the relative</p> <p>16 concentrations of all of the glyphosate-based</p> <p>17 formulations?</p> <p>18 A. Important to know for what reason?</p> <p>19 Q. In measuring the genotoxic effects or lack</p> <p>20 thereof of glyphosate-based formulations?</p> <p>21 A. Evaluation of the genotoxic potential can</p> <p>22 be done without -- without knowing the individual</p> <p>23 components, because what we are evaluating is the</p> <p>24 effect of the mixture.</p>	<p style="text-align: right;">Page 173</p> <p>1 this mixture without knowing the individual</p> <p>2 components.</p> <p>3 BY MR. WOOL:</p> <p>4 Q. Can you extrapolate the results of -- the</p> <p>5 results as they relate to that one mixture to</p> <p>6 glyphosate-based formulations on the whole?</p> <p>7 A. Well, you know, mixtures toxicology is --</p> <p>8 I don't want to cop out now -- is a tough, tough</p> <p>9 issue. It is a tough, tough issue. It seems that</p> <p>10 there is a -- a lot of similarity but not identity</p> <p>11 between these different glyphosate-based formulations.</p> <p>12 And within the studies that I have reviewed, a number</p> <p>13 of different glyphosate-based formulations have been</p> <p>14 used. So, in terms of my conclusions, my conclusions</p> <p>15 are certainly based primarily -- are based on this</p> <p>16 evaluation of some different formulations.</p> <p>17 Q. And so, as I understand it, the -- the</p> <p>18 results on the whole that you've looked at regarding</p> <p>19 glyphosate-based formulations are that the results are</p> <p>20 negative, more or less fair, negative for genotoxic</p> <p>21 potential?</p> <p>22 MS. PIGMAN: Objection; form, it misstates his</p> <p>23 testimony.</p> <p>24 BY THE WITNESS:</p>

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1 A. My conclusion is that the glyphosate-based
 2 formulations should not be viewed as genotoxic, that
 3 they are not genotoxic, that they should not be
 4 considered as genotoxic.
 5 BY MR. WOOL:
 6 Q. And how many different Roundup
 7 formulations do you believe exist on -- on the market
 8 or -- or have been avail -- made available to
 9 consumers?
 10 A. I do not know.
 11 Q. Okay. Do you know the number of different
 12 formulations that were considered in the tests that
 13 we've talked about today?
 14 A. I did not -- I did not segregate the --
 15 the information in that fashion.
 16 Q. Is it possible that glyphosate-based
 17 formulation components other than the active
 18 ingredient itself could have genotoxic properties?
 19 A. By "the active ingredient," we mean
 20 glyphosate --
 21 Q. Right.
 22 A. -- is involved?
 23 THE COURT REPORTER: I'm sorry. I didn't hear
 24 that.

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1 BY THE WITNESS:
 2 A. I said by the -- by the act -- excuse
 3 me -- by the active component, I presume that you mean
 4 glyphosate, and now you are talking about other --
 5 BY MR. WOOL:
 6 Q. Well, you -- you changed it a little bit.
 7 You said "active component." I said "active
 8 ingredient."
 9 A. Active ingredient.
 10 MS. PIGMAN: Well, why don't we just have a
 11 clean record, David --
 12 MR. WOOL: Right.
 13 MS. PIGMAN: -- if you could ask your question
 14 again, and we'll --
 15 MR. WOOL: Sure.
 16 BY MR. WOOL:
 17 Q. Okay. So is it possible that components
 18 of glyphosate-based formulations other than the active
 19 ingredient can have genotoxic properties?
 20 A. You know, on -- on a -- on a theoretical,
 21 hype -- hypothetical basis, the answer might be yes.
 22 Q. Okay.
 23 A. But among the key components of the
 24 glyphosate-based formulations are surfactants. There

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1 are a variety of reports from the Environmental
 2 Protection Agency where they have evaluated a number
 3 of different -- of different surfactants and have not
 4 expressed concern with regard to genotoxicity and in
 5 many cases with regard to potential carcinogenicity.
 6 There was one, which I can't put my finger on right
 7 now, where they did say that for this particular
 8 component, it's -- and now I'm paraphrasing --
 9 reasonable to use as long as the concentration does
 10 not exceed 30 percent. But I can't put my finger on
 11 that particular report right now.
 12 Q. And to the best of your recollection --
 13 A. 30 percent is a lot.
 14 Q. Right. And to the best of your
 15 recollection, what did they say happened if -- if you
 16 exceeded 30 percent?
 17 A. They didn't. They didn't -- they -- they
 18 didn't. They -- they -- they talked about evaluating
 19 it, and I do not recall. I do not know if they did.
 20 I do not recall what they said would happen if you
 21 exceeded 30 percent.
 22 Q. And so did you believe that a surfactant
 23 combined with glyphosate could have an effect not --
 24 not seen in either -- a genotoxic effect that would

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1 not be present in studies involving either of those
 2 two components alone?
 3 MS. PIGMAN: Objection; form.
 4 BY THE WITNESS:
 5 A. Well, first of all, we have a wealth of
 6 data on genotoxicity evaluation of glyphosate-based
 7 formulations, and I think, when evaluating this, it is
 8 proper to say that the GBFs, glyphosate-based
 9 formulations, are -- are not -- are not genotoxic.
 10 BY MR. WOOL:
 11 Q. Okay. So I don't think you -- you've
 12 really ask -- answered my question, so maybe I'll ask
 13 it a different way.
 14 A. Okay.
 15 Q. As an a genotoxicologist, if you were
 16 asked to evaluate the genotoxicity of a formulation,
 17 not a glyphosate formulation, just that you know there
 18 is an active ingredient and different component parts,
 19 would you rather test the formulation or would you
 20 prefer to test the component parts individually?
 21 A. Well, I think the component parts should
 22 be evaluated and I think some evaluation should be
 23 done on the formulation, as was -- as was done here.
 24 Q. So your answer is that they should both be

<p style="text-align: right;">Page 178</p> <p>1 tested, both the component parts and the formulation?</p> <p>2 A. I think that I would qualify my answer,</p> <p>3 though, and that is if you have multiple, multiple,</p> <p>4 multiple different formulations, then I -- I really</p> <p>5 think that it becomes problematic if you are going to</p> <p>6 ask for every test to be done on every formulation.</p> <p>7 Q. Do you believe that the data set regarding</p> <p>8 glyphosate-based formulations and their relationship</p> <p>9 to genotoxicity is robust enough to reach a definitive</p> <p>10 conclusion that glyphosate-based formulations are --</p> <p>11 are not genotoxic?</p> <p>12 A. I think it's robust enough to reach the</p> <p>13 conclusions that I have reached in my report. This is</p> <p>14 based upon the large, large body of information that</p> <p>15 I -- that I have reviewed and including -- including</p> <p>16 more than one glyphosate-based formulation.</p> <p>17 Q. Did you review any of the genotoxicity</p> <p>18 tests involving any of the alleged inert ingredients</p> <p>19 in glyphosate-based formulations?</p> <p>20 A. The only other data that -- I did review</p> <p>21 information available from the Environmental</p> <p>22 Protection Agency on surfactants, but -- but in terms</p> <p>23 of getting into what other components might be</p> <p>24 present, the answer is no.</p>	<p style="text-align: right;">Page 180</p> <p>1 we've talked about.</p> <p>2 Q. And -- and the tests involving chemical</p> <p>3 structure relationships, can you reliably infer</p> <p>4 genotoxicity or the absence thereof from a -- a</p> <p>5 chemical structure --</p> <p>6 A. Structure activity.</p> <p>7 Q. Activity, yeah.</p> <p>8 A. I think that it's certain -- it is</p> <p>9 certainly not definitive. I think it provides a -- an</p> <p>10 indication, but it is -- it is -- it is -- it is not</p> <p>11 definitive.</p> <p>12 Q. Do you recall if any of the reports that</p> <p>13 you reviewed involved the surfactant POEA?</p> <p>14 A. I do not recall.</p> <p>15 Q. Have you heard the term "POEA" before?</p> <p>16 A. The answer is yes. I'm trying to think</p> <p>17 where. The answer is yes and it -- it might be one on</p> <p>18 that -- it might be one of those that the EPA</p> <p>19 reviewed.</p> <p>20 Q. Do you have an opinion on whether POEA is</p> <p>21 genotoxic?</p> <p>22 A. I know right now I cannot tell you because</p> <p>23 I don't remember if POEA was in the EPA report.</p> <p>24 Q. Have you heard of the chemical</p>
<p style="text-align: right;">Page 179</p> <p>1 Q. If there were genotoxicity tests involving</p> <p>2 various surfactants used in glyphosate-based</p> <p>3 formulations, would you want to review those tests?</p> <p>4 A. Well, I did review some EPA reports on a</p> <p>5 variety of surfactants and I -- at this point, again,</p> <p>6 I -- I -- I cannot tell you the names of those</p> <p>7 surfactants.</p> <p>8 Q. Are those reports listed on your reliance</p> <p>9 list, your supplemental reliance list?</p> <p>10 A. Yes. Yes.</p> <p>11 Q. Approximately, if you can, how many</p> <p>12 surfactants did you review reports for?</p> <p>13 A. I, roughly now, I -- I think that we're</p> <p>14 talking about six or eight -- somewhere between six</p> <p>15 and nine reports and each of the reports involved more</p> <p>16 than one surfactant.</p> <p>17 Q. Did those reports run the surfactants</p> <p>18 through all or any number of the -- the four tests</p> <p>19 that you highlight as being the most reliable?</p> <p>20 A. A number of them did involve the Ames</p> <p>21 test, some of them involved some other tests, some of</p> <p>22 them involved looking at what we'll call chemical</p> <p>23 structure activity relationships, but I can't recall</p> <p>24 if all of the reports involved all of the studies that</p>	<p style="text-align: right;">Page 181</p> <p>1 1,4-dioxane?</p> <p>2 A. Yes.</p> <p>3 Q. Do you have an opinion on whether</p> <p>4 1,4-dioxane is genotoxic?</p> <p>5 A. I don't know.</p> <p>6 Q. Do you have an opinion on whether it's</p> <p>7 carcinogenic?</p> <p>8 A. I don't know.</p> <p>9 Q. In what context did you hear about</p> <p>10 1,4-dioxane?</p> <p>11 A. It was probably in some paper or papers</p> <p>12 that I've read. Years ago there were times when one</p> <p>13 would sometimes mistakenly consider 1,4-dioxane with</p> <p>14 an environmental contaminant called dioxin and they</p> <p>15 are two very, very, very different molecules. But I</p> <p>16 really do not have anything -- I have nothing</p> <p>17 approaching in-depth knowledge of dioxane.</p> <p>18 Q. Of 1,4-dioxane?</p> <p>19 A. Of 1,4-dioxane.</p> <p>20 Q. Okay. All right. Let's talk about AMPA</p> <p>21 very briefly. I'm probably not going to spend too</p> <p>22 much time.</p> <p>23 A. Excuse me. Are we on a particular page</p> <p>24 or --</p>

<p style="text-align: right;">Page 182</p> <p>1 Q. No, no, no, no. I was just trying to 2 think of where I'm going to go next. 3 So I believe if you go to Page 9 of your 4 report. 5 A. I'm there. 6 Q. Okay. At the very bottom you note that: 7 "Importantly, a genotoxicity evaluation is 8 one screening tool that can be employed when 9 considering the potential of a chemical to cause 10 toxicity (e.g., cancer) and the results of this should 11 be viewed within a context that can include rodent 12 cancer bioassay and epidemiological data." 13 Did I read that correctly? 14 A. You did. 15 Q. And that accurately reflects your opinion? 16 A. It does. 17 Q. Okay. And so -- so my question to you is: 18 Is it possible to infer causality with rodent cancer 19 bioassay data alone? 20 MS. PIGMAN: Objection; form, vague, outside the 21 scope of his report. 22 BY MR. WOOL: 23 Q. You can answer. 24 A. The rodent bioassay is a qualitative test</p>	<p style="text-align: right;">Page 184</p> <p>1 Okay. 2 Q. Okay. And in the middle paragraph, you 3 discuss the findings of an article by Maas et al. 4 2009, correct? 5 A. I do. 6 Q. Okay. And that report demonstrated a 7 statistically significant increase in micronuclei 8 following treatment with doses of 200 and 9 400-milligrams per kilogram using the IP injection 10 method, correct? 11 A. Yes. 12 Q. Okay. And so is it your belief as we sit 13 here today that Maas didn't show a dose-response 14 relationship in that study? 15 A. Yes. 16 Q. Do you believe that dose-response is a 17 necessary prerequisite to -- to show genotoxicity? 18 A. I think it is a -- I think it is a 19 important -- a important aspect in terms of whether or 20 not one -- one sees dose-re -- dose-response. I think 21 it is an important aspect. However, it is certainly 22 possible as long as we are staying below doses in 23 concentrations that cause cytotoxicity, it is possible 24 that in a hypothetical particular test system, perhaps</p>
<p style="text-align: right;">Page 183</p> <p>1 which asks whether or not, under the particular 2 conditions of the test, which are typically very high 3 doses that are employed, does the chemical in question 4 cause cancer at one or more particular sites in male 5 and female rats and male and female mice, and it can 6 be various strains involved, or stocks involved. 7 Q. In the context of determining 8 carcinogenicity, is it possible to infer causality 9 with genotoxicity evidence alone? 10 A. No. I think that genotoxicity data is one 11 piece of the -- is one piece of the evaluation. 12 Q. Now, the -- the same question, is it 13 possible to infer causality on the basis of 14 epidemiological data alone? 15 A. I am not an epidemiologist. 16 Q. Fair. 17 A. I am not an expert in epidemiology. What 18 I do know is that what epidemiology can tell us is 19 whether there is an association between A and B. If 20 indeed there is an association between A and B, that 21 in no way means that A causes B. 22 Q. Okay. That's fine. 23 Let's go to Page 35, which should be -- 24 A. Almost there.</p>	<p style="text-align: right;">Page 185</p> <p>1 they use three doses and the low and the middle dose 2 did not produce a positive result and the high dose 3 did. Under those conditions, as long as we did not 4 have genotox- -- have cytotoxicity and cytotoxicity 5 was evaluated, then I would probably consider that as 6 a valid test. 7 Q. Is it possible for a substance to be 8 genotoxic in certain lower doses but -- but not -- but 9 have a different effect at higher doses or have no 10 dose at a higher -- or have no effect at a higher 11 dose? 12 A. The answer is -- the -- the -- the answer 13 is that -- that that is correct. And, again, I think 14 that this points to a need for a cytotoxicity 15 evaluation. 16 So, for example, one can have adduct 17 formation with DNA and adduct formation with DNA is 18 not a mutation. It takes a few rounds of replication 19 to, quote, fix that into a mutation. So if you have a 20 very, very high dose and you have adduct formation but 21 you've killed the cells, then you are not going to see 22 mutation. 23 Q. Now, you said that you have adduct 24 formation, but it takes a couple of rounds of</p>

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<p>1 replication -- of --</p> <p>2 A. Of cell replication.</p> <p>3 Q. -- to fix it?</p> <p>4 A. Correct.</p> <p>5 Q. So --</p> <p>6 A. By -- by -- excuse me. By "fix," I don't</p> <p>7 mean "fix" in the sense of repair. But what I mean</p> <p>8 "fix" in the sense of translate that into a mutation.</p> <p>9 Q. Okay. So I'm -- I'm just trying to</p> <p>10 understand. So a couple of rounds of improper</p> <p>11 replication can lead to a mutation, is -- is that?</p> <p>12 A. No, no, no, no.</p> <p>13 Q. No?</p> <p>14 A. So -- that is -- that is not correct.</p> <p>15 Q. Okay.</p> <p>16 A. So one can have a, for example, an add --</p> <p>17 with DNA we are dealing with what I'll call DNA bases</p> <p>18 and there are antiparallel strings and the bases base</p> <p>19 pair with each other, so -- in a specific way. One</p> <p>20 can have adduct formation that results in what I will</p> <p>21 call mispairing, that is, the base doesn't pair with</p> <p>22 what it normally does. And if that's the case, then</p> <p>23 one round of replication can put in a base that didn't</p> <p>24 belong there. The second round of replication could</p>	<p>1 Q. You don't believe somebody could be</p> <p>2 exposed to AMPA through dermal absorption from -- from</p> <p>3 spraying glyphosate-based pro -- formulations?</p> <p>4 A. Not -- not -- not directly. It is -- it</p> <p>5 is my understanding that it's microbes in soil that do</p> <p>6 the degradation. So if what you are saying is that</p> <p>7 glyphosate could be sprayed, land on the ground, some</p> <p>8 of the microbes in the soil do degrade some of its</p> <p>9 AMPA, and I, for example, happen to walk barefoot over</p> <p>10 that spot, perhaps there would be a small amount</p> <p>11 absorbed through my skin.</p> <p>12 Q. Okay. And your conclusion is that the</p> <p>13 results of the four mammalian-based AMPA genotoxicity</p> <p>14 assays are inadequate for use in making a decision</p> <p>15 regarding whether or not AMPA is a genotoxic compound?</p> <p>16 A. Yes, based on the -- based on the</p> <p>17 rationale as presented.</p> <p>18 Q. And this conclusion differs somewhat from</p> <p>19 the conclusions regarding glyphosate-based</p> <p>20 formulations and glyphosate, correct?</p> <p>21 A. Yeah, yeah, yeah, it -- it -- it -- it --</p> <p>22 it differs -- it differs a bit because I do think that</p> <p>23 in these studies there are confounding effects and</p> <p>24 that because of those -- and those confounding effects</p>
<p>Page 187</p> <p>1 put in the base that pairs with the base that didn't</p> <p>2 belong there and now you have an inheritable mutation.</p> <p>3 Q. Okay. So your third criticism of the</p> <p>4 Maas study is that the doses were extremely high and</p> <p>5 then you note that:</p> <p>6 "Since AMPA is a biodegradation product of</p> <p>7 glyphosate which is sometimes found in the soil, it is</p> <p>8 reasonable to assume that exposure to it is much less</p> <p>9 than exposure to glyphosate."</p> <p>10 I guess, why do you believe it's fair to</p> <p>11 assume that -- that there is less exposure to AMPA</p> <p>12 than glyphosate?</p> <p>13 A. Well, first because it is a biodegradation</p> <p>14 product. Not all of the glyphosate is degraded to</p> <p>15 AMPA. And second, because it is sometimes found, not</p> <p>16 always found, and so because it is a degradation</p> <p>17 product and because it is sometimes found in soil, I</p> <p>18 think that there would be much less exposure. In</p> <p>19 other words, because it's found in soil, I mean, the</p> <p>20 only way you are going to be exposed is if you -- if</p> <p>21 you step on it barefoot, if you happen to pick up the</p> <p>22 soil in your hand, if you happen to eat the soil, or</p> <p>23 if you throw dry soil in the air and inhale it. These</p> <p>24 are really rather unlikely scenarios.</p>	<p>Page 189</p> <p>1 rise to a level that make interpretation of the study</p> <p>2 into a yes or a no, not possible.</p> <p>3 Q. Fair enough.</p> <p>4 So let's talk about your opinions related</p> <p>5 to oxidative stress really quick. I believe that</p> <p>6 starts on Page 37 of your report.</p> <p>7 A. Could be.</p> <p>8 I'm there.</p> <p>9 Q. Okay. Now, would you describe yourself as</p> <p>10 an expert in oxidative stress?</p> <p>11 A. I think I describe myself as someone who</p> <p>12 has expertise in oxidative stress as it relates to</p> <p>13 the, what I will call the -- the cancer problem or to</p> <p>14 carcinogenesis, because in order to -- to be an expert</p> <p>15 in carcinogenesis, one has to gain substantial</p> <p>16 knowledge about factors that might or might not</p> <p>17 contribute to carcinogenesis.</p> <p>18 Q. Now, can I use the acronym ROS to describe</p> <p>19 what you would know as reactive octave -- oxygen</p> <p>20 species?</p> <p>21 A. Please do that.</p> <p>22 Q. Okay. Thank you.</p> <p>23 Are you of the opinion that ROS formation</p> <p>24 and oxidative stress can only be involved in carc- --</p>

<p style="text-align: right;">Page 190</p> <p>1 carcinogenicity when a compound has been found to be 2 genotoxic? 3 A. I think that the -- the role of oxidative 4 stress in carcinogenicity is really unclear. It is a 5 fascinating body of literature. There is a lot of 6 indication and talk that it may play some role, but 7 what we really lack is we really lack studies that 8 really do a thorough job in terms of dose-response and 9 temporal relationships relative to carcinogenicity. 10 Q. So fair to say there isn't conclusive 11 evidence that genotoxicity is a necessary prerequisite 12 to show that oxidative stress can be involved in 13 carcinogenesis? 14 A. Oxidative stress might produce a genotoxic 15 event. It might do it directly, it might do it 16 indirectly. That -- that -- that is theoretically 17 possible. 18 Q. So do you believe that oxidative stress 19 can cause cancer? 20 A. I don't believe that we have the data that 21 would permit me to make that conclusion. I -- I think 22 the, if you will, no -- no pun intended, I think the 23 jury is out on this. There is a need for a -- a 24 considerable more research in this area. It's a</p>	<p style="text-align: right;">Page 192</p> <p>1 hour, hopefully. 2 So I have a couple of more questions for 3 you about IP injection studies and -- and 4 physiological routes of exposure. 5 Do you know if the EPA uses IP injection 6 studies to measure genotoxicity? 7 A. I -- I do -- I do not know. If -- if they 8 do, then I hope that they are including a cytotoxicity 9 evaluation. 10 Q. Does the European Food Safety Authority 11 use IP injection studies to measure genotoxicity? 12 A. I don't know. If they do, then they 13 should be using -- in -- incorporating an evaluation 14 of cytotoxicity. 15 Q. Does -- do you know if Monsanto uses IP 16 injection studies to measure genotoxicity? 17 A. I don't know. 18 Q. Do you believe that IP injection studies 19 are a generally-accepted methodology to measure 20 genotoxicity? 21 A. If -- if one is doing this and evaluating 22 cytotoxicity, then I think that it -- in my opinion, 23 it is less than ideal and could -- could be deemed 24 acceptable.</p>
<p style="text-align: right;">Page 191</p> <p>1 fascinating area and should be researched. 2 Q. So as you sit here today, to the -- to the 3 best of your knowledge, it's possible that oxidative 4 stress could promote carcinogenesis regardless of 5 whether there is concurrent genotoxic activity? 6 A. You know, I cannot tell you with regard to 7 oxidative stress or anything else that something is 8 absolutely, totally, completely impossible. I -- I -- 9 I -- I -- I cannot -- I cannot tell you that. 10 Q. Fair enough. 11 MR. WOOL: Do you guys want to take a quick 12 break? 13 MS. PIGMAN: Okay. 14 THE WITNESS: Sure, if I can get out where it is 15 a little cooler. 16 THE VIDEOGRAPHER: Going off the record at 17 3:01 p.m. 18 (WHEREUPON, a recess was had 19 from 3:01 to 3:11 p.m.) 20 THE VIDEOGRAPHER: We are back on the record at 21 3:11 p.m. 22 BY MR. WOOL: 23 Q. All right. Dr. Goodman, I'm going to try 24 and get us out of here sometime in the -- in the next</p>	<p style="text-align: right;">Page 193</p> <p>1 Q. Now, you are not an industrial hygienist, 2 correct? 3 A. Correct. 4 Q. Do you have any expertise in measuring or 5 calculating exposure? 6 A. No. Except -- except in terms of some of 7 the calculated examples, which are really rather 8 simplistic, in my report and the -- the way I expanded 9 on it this morning in terms of calculating what 10 hypothetically could be a body fluid level and 11 comparing the highest daily dose that EPA talks about 12 with a in vitro concentration or in vivo dose. 13 Q. Okay. Now -- now, that leads me to sort 14 of my next point. You talked about the highest daily 15 dose that the EPA calculated, and I believe -- 16 A. Excuse me. I'm not sure if calculate -- 17 it is either calculated or estimated. 18 Q. Oh, okay. Fair enough. 19 And I believe the other source that you 20 provided for human dose was from Solomon 2016, is that 21 correct? 22 A. That is correct. Solomon 2016 certainly 23 was the one I referred to with regard to the 24 applicator exposure.</p>

<p style="text-align: right;">Page 194</p> <p>1 Q. And --</p> <p>2 A. I did talk about -- I'm sorry.</p> <p>3 Q. No, no. You -- you can go ahead.</p> <p>4 A. I did talk about -- and I should say</p> <p>5 the -- the .47 milligram per kilogram a day for</p> <p>6 children was summed -- was EPA said was summed up for</p> <p>7 multiple routes of exposure. I did also say that from</p> <p>8 food and water, I think it is EPA that made the</p> <p>9 estimate of .088 milligram per kilogram per day.</p> <p>10 Q. Now, aside from Solomon 2016 and the EPA</p> <p>11 article that you referenced, are you aware of any</p> <p>12 publications or articles that measure exposure among</p> <p>13 humans?</p> <p>14 A. I am not. The estimated -- estimated</p> <p>15 exposures are the three that I -- that I talked about</p> <p>16 and I -- I did not go further than that.</p> <p>17 Q. Okay. And the -- the estimated exposure</p> <p>18 in Solomon 2016 was based upon measuring the amount of</p> <p>19 glyphosate excreted in the urine of the applicator</p> <p>20 surveyed, is that correct?</p> <p>21 A. It's been a while since I've looked at</p> <p>22 that publication. I'd really like to see it before</p> <p>23 saying yes or no. I am confident that in terms of</p> <p>24 the -- at the 90th percent level, the higher level of</p>	<p style="text-align: right;">Page 196</p> <p>1 depends what they did. If they said, Well, we</p> <p>2 measured it in urine, we found some in urine, and so</p> <p>3 there was some exposure. If they left it like that,</p> <p>4 okay.</p> <p>5 If, on the other hand, they want to relate</p> <p>6 what is in urine in a more quantitative sense as to</p> <p>7 exposure, then it would have been, in my view,</p> <p>8 incumbent upon them to show that they're cognizant of</p> <p>9 a large amount being excreted in feces and, if you</p> <p>10 will, make a correction, in other words, to say, If we</p> <p>11 see such and such amount in urine, then we know there</p> <p>12 is such and such amount in feces, and assuming the</p> <p>13 data are there to support that.</p> <p>14 Q. And without knowing that correlation,</p> <p>15 would it then be inaccurate to rely solely on the</p> <p>16 amount of a chemical excreted in urine to infer total</p> <p>17 exposure?</p> <p>18 MS. PIGMAN: Objection; this is all far beyond</p> <p>19 the scope of his report.</p> <p>20 BY THE WITNESS:</p> <p>21 A. I -- I'm not an exposure, exposure expert.</p> <p>22 I think, again, that if one wanted to say, ask whether</p> <p>23 or not there was exposure in sort of a yes-or-no</p> <p>24 measurable level and one looked at urine, I think that</p>
<p style="text-align: right;">Page 195</p> <p>1 exposure estimated for applicators was .021-milligram</p> <p>2 per kilogram per day.</p> <p>3 Q. If Monsanto had reason to know that</p> <p>4 glyphosate absorbed dermally was primarily excreted</p> <p>5 through the feces, would it be inappropriate to</p> <p>6 measure glyphosate excreted through urine as a method</p> <p>7 of -- of measuring exposure?</p> <p>8 A. Based upon the information that you've</p> <p>9 given me, I would say -- I would say no. But then</p> <p>10 we'd have to talk in context as to -- as to just -- as</p> <p>11 to just -- just what was done.</p> <p>12 Q. So hypothetically speaking, if you as a</p> <p>13 genotoxicologist knew that a potential toxic compound</p> <p>14 was primarily excreted through the feces, would it be</p> <p>15 an appropriate measure of exposure to look only at</p> <p>16 urine?</p> <p>17 A. First of all, maybe I should have said</p> <p>18 this earlier, I -- I view myself more than a</p> <p>19 genotoxic -- toxicologist, as it -- as I did --</p> <p>20 Q. Fair.</p> <p>21 A. -- act on my expertise earlier.</p> <p>22 If, in fact, the individual who did the</p> <p>23 exposure evaluation based on urine was cognizant of</p> <p>24 the fact that most of it is excreted in feces, and it</p>	<p style="text-align: right;">Page 197</p> <p>1 would be -- would be okay.</p> <p>2 BY MR. WOOL:</p> <p>3 Q. But if you wanted to quantify the total</p> <p>4 amount of exposure to a chemical in -- in milligrams</p> <p>5 per kilogram a day, would looking only at urine in the</p> <p>6 hypothetical that I gave you be proper?</p> <p>7 MS. PIGMAN: Objection; beyond the scope of his</p> <p>8 report and outside of his area of expertise, as he</p> <p>9 stated.</p> <p>10 BY THE WITNESS:</p> <p>11 A. Yeah, I think there, there are other</p> <p>12 factors that would have to be accounted for, and I</p> <p>13 cannot tell you in depth. I can't go in depth beyond</p> <p>14 the generality that I just stated.</p> <p>15 BY MR. WOOL:</p> <p>16 Q. Okay. And -- and this is one of the last</p> <p>17 points on this topic, but on, say, the bottom -- or</p> <p>18 the middle paragraph of Page 20 of your report, you</p> <p>19 state that --</p> <p>20 MS. PIGMAN: Hold on. Can you give us a second.</p> <p>21 BY THE WITNESS:</p> <p>22 A. Excuse me. I'm getting there.</p> <p>23 Almost there.</p> <p>24 I'm there.</p>

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<p>1 BY MR. WOOL:</p> <p>2 Q. Okay. The bottom sentence of the middle</p> <p>3 paragraph states:</p> <p>4 "The much higher rate of absorption</p> <p>5 following IP administration might result in toxicity</p> <p>6 that would not be observed following dosing under more</p> <p>7 physiologically" -- "physiological routes of</p> <p>8 administration."</p> <p>9 Did I read that correctly?</p> <p>10 A. You did.</p> <p>11 Q. So what -- what I'm asking about is you --</p> <p>12 the -- the first part of this sentence where you say,</p> <p>13 "the much higher rate of absorption."</p> <p>14 I guess first, what -- what you're</p> <p>15 referring to, the absorption of the chemical into</p> <p>16 the -- into the bloodstream, is that what that's</p> <p>17 referring to?</p> <p>18 A. Yes, there -- as -- as I indicated this</p> <p>19 morning, there is a very, very rich blood supply in</p> <p>20 the peritoneal cavity and administering compounds by</p> <p>21 the intraperitoneal route results in a very quick, and</p> <p>22 in addition to very quick, probably a very high</p> <p>23 percent of the material being absorbed really quickly.</p> <p>24 So you get really high peak blood levels.</p>	<p>1 start with Bolognese, which is on Page 15.</p> <p>2 A. Okay. I'm sorry. Are we on Page 12 or</p> <p>3 14?</p> <p>4 Q. I'm sorry. Page 15 of Exhibit 1.</p> <p>5 A. I'm there.</p> <p>6 Q. All right. So this is a biomonitoring</p> <p>7 study in five Columbian regions, correct?</p> <p>8 A. Yes.</p> <p>9 (WHEREUPON, a certain document was</p> <p>10 marked Deposition Exhibit No. 25-8,</p> <p>11 for identification, as of</p> <p>12 09/22/2017.)</p> <p>13 BY MR. WOOL:</p> <p>14 Q. Okay. And I will mark as Exhibit 8 a copy</p> <p>15 of Bolognese's study and it has a MONGLY number at the</p> <p>16 bottom which is MONGLY04882823. I'm handing you</p> <p>17 Exhibit 8.</p> <p>18 MS. PIGMAN: Thank you.</p> <p>19 BY MR. WOOL:</p> <p>20 Q. Okay. And if you turn to the Method</p> <p>21 section, which is on page -- or actually, let's just</p> <p>22 look at the -- the author's description.</p> <p>23 A. Excuse me. Do you mean the summary?</p> <p>24 Q. Yes, the summary.</p>
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<p>1 Q. Okay. So -- so that's what I wanted to --</p> <p>2 to get at.</p> <p>3 So you are -- you are saying that this</p> <p>4 results in higher peak concentrations in the blood?</p> <p>5 A. Yes.</p> <p>6 Q. And do you have a citation for that or is</p> <p>7 that just well known within the field?</p> <p>8 A. I can't give you a citation off the top of</p> <p>9 my head, but in the field I think it is -- it is well</p> <p>10 known that the IP route of administration gives you a</p> <p>11 very, very quick absorption, quicker than you would</p> <p>12 get by a oral administration or -- or dermal</p> <p>13 application.</p> <p>14 Q. And -- and it is your opinion that that</p> <p>15 results in higher peak concentrations in the blood,</p> <p>16 correct?</p> <p>17 A. From the IP administration, then one would</p> <p>18 get higher peak concentrations in the blood and,</p> <p>19 therefore, those higher peak concentrations might</p> <p>20 cause adverse effects that were not seen -- that would</p> <p>21 not be seen where the blood level is lower.</p> <p>22 Q. Okay. Let's talk about some of the -- the</p> <p>23 human tests, which are -- which you discuss starting</p> <p>24 on Page 12 of your report. Although let's actually</p>	<p>1 So, in essence, the study was carried out</p> <p>2 over five regions in Columbia. Some where aerial</p> <p>3 spraying occurred, some where it -- it did not, fair?</p> <p>4 A. Some where there was aerial spraying of a</p> <p>5 glyphosate-based formulation and some where there was</p> <p>6 no aerial spraying of a glyphosate-based formulation,</p> <p>7 yes.</p> <p>8 Q. Okay. And it says sort of in the -- in</p> <p>9 the middle of that:</p> <p>10 "Lymphocytes were cultured and a</p> <p>11 cytokinesis-block micronucleus cytome assay was</p> <p>12 applied to evaluate chromosomal damage in</p> <p>13 cytotoxicity."</p> <p>14 Do you see that sentence?</p> <p>15 A. I do.</p> <p>16 Q. Okay. Now, is that a valid method of</p> <p>17 measuring genotoxicity?</p> <p>18 A. In gen --</p> <p>19 Q. In general?</p> <p>20 A. In -- in general the answer is yes.</p> <p>21 Q. Okay.</p> <p>22 And in your report, I just want to make</p> <p>23 sure I am clear, you were not disagreeing that</p> <p>24 genotoxicity was noted within the exposed populations,</p>

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<p>1 is that correct? Your...</p> <p>2 A. That is correct. That is correct.</p> <p>3 Q. Okay.</p> <p>4 A. I am not disagreeing that there was some</p> <p>5 genotoxicity noted in some populations.</p> <p>6 Q. Okay. And the authors noted a significant</p> <p>7 increase in the frequency of binucleated micronuclei?</p> <p>8 A. Yes.</p> <p>9 Q. Is that correct?</p> <p>10 Okay. And you were not -- or are you</p> <p>11 disagreeing with that finding of the authors?</p> <p>12 A. I am not disagreeing with that finding.</p> <p>13 Q. Okay. And BNMN, binucleated micronuclei,</p> <p>14 is an effect of genotoxicity, is -- is that accurate?</p> <p>15 A. The presence -- the presence of</p> <p>16 micronuclei is an -- is a indicator -- can be used as</p> <p>17 a indicator of genotoxicity.</p> <p>18 Q. Okay. And so one of your criticisms, if</p> <p>19 you look at the middle of the page, you state:</p> <p>20 "However, the highest reported frequency</p> <p>21 of BNMN was in Boyaca where no aerial spraying of</p> <p>22 glyphosate was conducted."</p> <p>23 That's in the middle of the page.</p> <p>24 A. That's correct. I see that and that is</p>	<p>1 A. Well, that is important to me because</p> <p>2 in -- in evaluating the results of this study, the</p> <p>3 thing that was paramount in my mind was whether there</p> <p>4 would be a -- an appropriate positive correlation</p> <p>5 between the degree, level of spraying of the -- in</p> <p>6 this case they are -- they are saying glyphosate and</p> <p>7 the genotoxicity reported. So while the report might</p> <p>8 be correct in terms of saying, Yes, we did observe</p> <p>9 micronuclei, the question is, Can you from that say</p> <p>10 that this is due to glyphosate or a glyphosate-based</p> <p>11 formulation.</p> <p>12 Q. Is it your belief that the population of</p> <p>13 Boyaca was not exposed to glyphosate or</p> <p>14 glyphosate-based formulations?</p> <p>15 A. I am taking the -- you know, I forgot -- I</p> <p>16 just don't know whether it is a he or she. So I am</p> <p>17 taking the -- the -- the author's word for this when</p> <p>18 the -- when the author says that there was no</p> <p>19 glyphosate spraying. And, again, I'm sure that he or</p> <p>20 she means glyphosate formulation spraying in this</p> <p>21 area.</p> <p>22 Q. Okay. So --</p> <p>23 A. I have no independent knowledge of this.</p> <p>24 Q. So if you turn to Page 991 of the</p>
<p>1 correct.</p> <p>2 Q. Okay. And so is it your belief that the</p> <p>3 highest rates of BNMN occurred in Boyaca?</p> <p>4 A. It -- it is. I'm -- I'm taking what the</p> <p>5 author has said as -- as correct based upon, based</p> <p>6 upon the information presented in the manuscript.</p> <p>7 Q. And is it your belief that the highest</p> <p>8 rates of BNMN occurred in Boyaca following the</p> <p>9 exposures in the other areas?</p> <p>10 MS. PIGMAN: Objection; form.</p> <p>11 BY THE WITNESS:</p> <p>12 A. I'm not clear on that.</p> <p>13 BY MR. WOOL:</p> <p>14 Q. Meaning, I guess what I mean by that is</p> <p>15 that Boyaca had the highest frequency of BNMN compared</p> <p>16 to the exposed populations in the other regions?</p> <p>17 A. Yes, but the -- the key aspect that --</p> <p>18 that I would like to include here is that Boyaca was</p> <p>19 the -- an area where there was no aerial spraying,</p> <p>20 and -- and I know that they say glyphosate, but I'm</p> <p>21 pretty sure they mean a glyphosate-based formulation.</p> <p>22 Q. Okay. So why is it pertinent to you in</p> <p>23 your discussion of Bolognese that the highest reported</p> <p>24 frequency of BNMN was in Boyaca?</p>	<p>1 Bolognese study, I'd ask you to look at Table 2.</p> <p>2 A. I'm there.</p> <p>3 Q. So on the left-hand column it says</p> <p>4 "Region" and below that "Phase 1."</p> <p>5 Are -- are you following me?</p> <p>6 A. I am.</p> <p>7 Q. Okay. And below Phase 1 it says, "Number</p> <p>8 of subject" -- "subjects" and then "BNMN."</p> <p>9 A. Yes.</p> <p>10 Q. Correct?</p> <p>11 Okay. Okay. And I guess in the -- in the</p> <p>12 table description it defines Phase 1 as five days</p> <p>13 after spraying, correct? Oh, sorry. Phase 1 as -- as</p> <p>14 being before exposure and then Phase 2, five days</p> <p>15 after spraying, and then Phase 3, four months later?</p> <p>16 A. It looks like that. It looks to me that's</p> <p>17 what it says.</p> <p>18 Q. Okay. Now, if you go down to BNMN</p> <p>19 reported in Phase 1, under Boyaca it reports 5.64?</p> <p>20 A. That's correct.</p> <p>21 Q. Okay. And so am I correct that that is</p> <p>22 the frequency of BNMN prior to aerial spraying of</p> <p>23 glyphosate-based formulations in any of the other</p> <p>24 regions?</p>

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<p>1 A. Yeah, Phase 1 was -- was --</p> <p>2 Q. Okay.</p> <p>3 A. -- was before.</p> <p>4 Q. And -- okay. And if we go down to</p> <p>5 Phase 2, the number that I see for Boyaca is 4.96.</p> <p>6 A. I see that.</p> <p>7 Q. Okay. And that number appears to be lower</p> <p>8 to me than the number under Valle de -- del Cauca, I</p> <p>9 guess is how I pronounce that, the -- the furthest</p> <p>10 province to the right?</p> <p>11 A. It does. It's -- it's also rather</p> <p>12 interesting that there doesn't seem to be any</p> <p>13 statistical analysis here.</p> <p>14 Q. Okay. But so in -- in this section, if we</p> <p>15 are looking at Phase 2, does it appear to you as</p> <p>16 though the frequency of BNMN is higher in both Valle</p> <p>17 del Cauca and Nario than Boyaca?</p> <p>18 A. The number -- the -- the -- the numbers</p> <p>19 are higher. Whether there is a statistical</p> <p>20 difference, I don't know.</p> <p>21 Q. Okay. Now, if you turn to Page 988, which</p> <p>22 I think is back a page or two -- or actually...</p> <p>23 A. I'm sorry...</p> <p>24 Q. You know, I might just skip that question.</p>	<p>1 A. By "significant," do you mean</p> <p>2 statistically significant? Because I don't see that</p> <p>3 they did statistics.</p> <p>4 Q. Okay. Let's just ask if the levels were</p> <p>5 increased, do you have any reason to disagree with</p> <p>6 that finding?</p> <p>7 MS. PIGMAN: Objection; form.</p> <p>8 BY THE WITNESS:</p> <p>9 A. If you just look -- if you just look at</p> <p>10 the numbers, you can say that one number appeared to</p> <p>11 be higher than the other. Now, is that really</p> <p>12 different, meaning was it a different population, you</p> <p>13 can't really start talking about that without some</p> <p>14 statistical analysis.</p> <p>15 BY MR. WOOL:</p> <p>16 Q. Can you definitively rule out exposure to</p> <p>17 glyphosate-based formulations as a cause of both the</p> <p>18 BNMN and the micronucleus formation and peripheral</p> <p>19 blood lymphocytes for the exposed populations in this</p> <p>20 study?</p> <p>21 A. Well, I think that the -- I think that --</p> <p>22 I think that the authors really speak for themselves</p> <p>23 on this point where they say, "There is not sufficient</p> <p>24 information to correlate the frequency of micronuclei</p>
Page 207	Page 209
<p>1 Let me just go to the bottom of Page 994. And if you</p> <p>2 look at the -- the very last paragraph on -- on that</p> <p>3 page that carries over to the next page, the authors</p> <p>4 state in the second sentence that:</p> <p>5 "The frequencies of BNMN in Nario and</p> <p>6 Putumayo during the second and third sampling fell</p> <p>7 within the range of values observed in Boyaca, an area</p> <p>8 where people were exposed to a complex mix" --</p> <p>9 "mixture of different pesticides (including</p> <p>10 glyphosate)."</p> <p>11 Do you have any reason to believe that the</p> <p>12 people in Boyaca who were sampled by this study were</p> <p>13 not exposed to glyphosate?</p> <p>14 A. Based upon -- based upon what is said</p> <p>15 here, the an -- the answer is no, but because they</p> <p>16 were exposed to a complex mixture, I don't see how you</p> <p>17 are able to point to any one or combination of</p> <p>18 those -- to any one of those and say that the effect</p> <p>19 observed was due to this particular chemical.</p> <p>20 Q. Do you believe that the subjects in the</p> <p>21 exposed populations of the Bolognese study experienced</p> <p>22 significantly elevated levels of micronucleus</p> <p>23 formation and peripheral blood lymphocytes following</p> <p>24 exposure?</p>	<p>1 to the pesticide exposure."</p> <p>2 Q. So you would defer to the authors?</p> <p>3 A. Well, I look here and look at the paper, I</p> <p>4 think that the authors have placed a -- a proper</p> <p>5 context on their -- on their -- on their -- on their</p> <p>6 findings.</p> <p>7 Q. I'm going to hand you the -- the</p> <p>8 Paz-y-Mino study.</p> <p>9 A. So are we finished with No. 8 for the time</p> <p>10 being?</p> <p>11 Q. Yes, we are finished with -- well, hold</p> <p>12 on.</p> <p>13 I'm going to mark the Paz-y-Mino study as</p> <p>14 Exhibit 9?</p> <p>15 MS. PIGMAN: Which one?</p> <p>16 MR. WOOL: The 2007 study, which I believe is</p> <p>17 the first that you discuss in the Human Study section.</p> <p>18 (WHEREUPON, a certain document was</p> <p>19 marked Deposition Exhibit No. 25-9,</p> <p>20 for identification, as of</p> <p>21 09/22/2017.)</p> <p>22 BY THE WITNESS:</p> <p>23 A. Thank you.</p> <p>24 MS. PIGMAN: Thank you.</p>

<p style="text-align: right;">Page 210</p> <p>1 BY MR. WOOL: 2 Q. And take a moment to glance over the study 3 if you need to. 4 A. I do. 5 Q. Okay. And you describe these -- 6 A. I -- I mean I do need a moment to -- 7 Q. Oh, yeah, yeah, yeah. Okay. Go ahead. 8 A. All right. I've looked it over. 9 Q. Okay. And this study is -- conducted a 10 Comet assay, is that correct? 11 A. That is correct. 12 Q. And what is a -- a Comet assay? You might 13 have answered that earlier. If so, I apologize. 14 A. I do not think I described that earlier. 15 Q. Okay. Very well. 16 A. So, what is a Comet assay. 17 A Comet assay is an indirect measure of -- 18 of genotoxicity. When compounds interact with DNA 19 cells have an ability to repair the damage. Repair of 20 the damage starts with making a strand break in the 21 DNA strand near the damaged site as the cell then 22 tries to cut out this damaged site and patch over it. 23 During this process, there is a break in the strand of 24 DNA as it's trying to cut out that one patch. So if</p>	<p style="text-align: right;">Page 212</p> <p>1 Q. And is a Comet assay a valid test for 2 assessing genotoxicity? 3 A. Yeah. You know, actually, I think we did 4 go over this part a little bit this -- this morning. 5 Q. Yeah, that's what I was thinking. 6 A. But the -- the answer is that a -- in my 7 opinion, that a properly-formed Comet assay is 8 certainly a -- a -- a good test to use for evaluating 9 genotoxicity. 10 Q. Okay. And if you turn to Page 457, the 11 Paz-y-Mino study. 12 A. Okay. I'll -- I'll get there. 13 I'm there. 14 Q. Okay. The first full paragraph states 15 that: "The exposed group consisted of 24 random" -- 16 A. I'm sorry. 17 Q. Are you there? 18 A. Yes. I -- I just touched her papers. I 19 said I was sorry. 20 Q. It states: 21 "The exposed group consisted of 24 22 randomly selected individuals" in "(Table 1) who lived 23 3 kilometers or less from an area on the border 24 between Ecuador and Columbia where aerial spraying</p>
<p style="text-align: right;">Page 211</p> <p>1 one then places the cell -- isolates the nuclei and 2 places the cells under alkaline pH conditions, this 3 causes the DNA strands to unwind. And if there are 4 strand breaks, one will see fragments of the DNA. And 5 if there are no strand breaks, then you'll see big 6 pieces of DNA. 7 Q. And do you believe -- oh, go ahead. 8 Sorry. 9 A. And then one puts these nuclei in an 10 electrical field, the DNA is negatively charged, and 11 that means that in the electrical field the negatively 12 charged DNA will move towards the positively charged 13 anode and what you will see is -- what you will see is 14 streaming, if you will, of the DNA. If the -- if 15 there are no strand breaks, you'll see that most of 16 the DNA will stay bunched up to where the nucleus was. 17 If there are a modest amount of strand breaks, you'll 18 see some streaming. If there is a great amount of 19 strand breaks, you'll see more streaming. And if you 20 picture this and then you use your imagination a 21 little bit, you can say, Well, you know, this looks a 22 little bit like a comet that has a head and then has a 23 faint tail. And so that's why this is called a Comet 24 assay.</p>	<p style="text-align: right;">Page 213</p> <p>1 with a glyphosate-based herbicide had occurred 2 continuously during three days between December 2000 3 and March 2001, sporadic aerial spraying continuing 4 for three weeks following continuous spraying (MREE, 5 2003, at Accon Ecolgica 2004)," is the source for 6 that. 7 So do you have any reason to disagree that 8 the exposed group was exposed to at least multiple 9 days of aerial-based glyphosate formulation spraying? 10 A. Do I have any reason to disagree with -- 11 Q. Yes, to -- to make that? 12 A. No, I do not. 13 Q. All right. Now, if you go to Page 12 of 14 your report, you indicate that you have four major 15 concerns that cast serious doubt on the validity of -- 16 of this study. 17 A. That is correct. 18 Q. Okay. Now, is it a totality of those four 19 concerns or does any one concern on its own in your 20 mind render the results of the paper invalid or 21 questionable? 22 A. I think each individual concern, each 23 individual concern that I ar- -- I articulated raises 24 a level of concern in my mind. And my level of</p>

<p style="text-align: right;">Page 214</p> <p>1 concern gets raised higher as we start looking at one, 2 two, three and four. So each individual one would 3 raise a level of concern. The combination of them is 4 additive, if you will. 5 Q. But none of the four concerns listed on 6 pages -- pages 12 and 13 taken individually would -- 7 would cause you to kind of invalidate in -- in your 8 mind the results of the study? 9 MS. PIGMAN: Objection; misstates his testimony. 10 BY THE WITNESS: 11 A. Yeah, what -- what I said was that each 12 one individually I think is, as I said, a major 13 concern. And with that major concern for any one of 14 them, I would have questioned the validity of the 15 study. When I see four of them, I really, really 16 question the validity of the study. 17 BY MR. WOOL: 18 Q. So let's talk about the first one, I 19 guess. 20 Fair to say that the subjects, the exposed 21 subjects in the Paz-y-Mino study experienced a -- a 22 number of wide ranging health effects, if you will? 23 A. I have a Ph.D. I am not a medical doctor, 24 but it seems to me, looking at these different</p>	<p style="text-align: right;">Page 216</p> <p>1 glyphosate that might have caused these symptoms and, 2 B, if one or more of those other factors were factors 3 that could have contributed to the genotoxicity 4 results reported. 5 Q. But sitting here today -- or -- or strike 6 that. 7 Okay. If you look at the top of Page 5 -- 8 458, I'm sorry, top of Page 458? 9 A. I'm there. 10 Q. Okay. The second paragraph down states: 11 "None of the indi" -- "individuals 12 analyzed in this study (neither the exposed group nor 13 the control group) smoked tobacco, drank alcohol, took 14 non-prescription drugs or had been exposed to 15 pesticide" -- "pesticides during the course of their 16 normal daily lives. All of the individuals included 17 in this study mainly worked at home, sometimes 18 cultivating and harvesting crops without the use of 19 pesticides" -- I mean "without the use of herbicides, 20 pesticides or similar substance" -- "substances in the 21 named activities and their windowed houses did not 22 contain asbestos in the ceiling or roofs." 23 I know I struggled with that, but I -- did 24 I read that correctly?</p>
<p style="text-align: right;">Page 215</p> <p>1 effects, it seems to me that these individuals were, 2 in a layman's term, hurting. 3 Q. And you state after quoting the article 4 that: 5 "These people appear to be seriously ill. 6 A thorough investigation would have been necessary in 7 order to ascertain the cause or causes of their 8 illness, including what other chemicals they were 9 exposed to, and how that might have contributed to the 10 DNA strand breaks reported. Under these 11 circumstances, it is not appropriate to simply 12 conclude that DNA damage is related directly to GBF 13 exposure." 14 A. That's what I said and that's what I 15 believe today. 16 Q. Okay. Do you have any reason to believe 17 that the subjects were exposed to something else that 18 would have caused those symptoms? 19 A. I am a Ph.D., not a medical doctor, but it 20 seems to me, again, that -- that these folks were, in 21 layman's terms, hurting. It just looks like a -- a 22 variety of problems here and I think that it would 23 have been highly appropriate to inquire as to was 24 there anything else that they were exposed to besides</p>	<p style="text-align: right;">Page 217</p> <p>1 A. You did. 2 Q. Okay. Do you have any reason to disagree 3 with that finding? 4 A. No. 5 Q. And sitting here today, do you have any 6 reason to believe that something else caused these 7 symptoms? 8 A. Again, as a layman looking at this laundry 9 list, long laundry list of symptomology, it's -- 10 appears to me that -- that these people are hurting 11 and that there should have been some evaluation as to 12 what might be the cause of all of these different 13 symptoms that they were exhibiting. 14 Q. And sitting here today, you don't believe 15 that glyphosate-based formulation exposure could have 16 caused all of these symptoms? 17 A. What I'm saying is, as a -- as a -- as a 18 layman, I'm not making a -- a diagnosis. If I do not 19 know exactly what the symptoms are and all of the 20 symptoms are of glyphosate poisoning, it would -- I 21 think that it would have been highly appropriate for 22 the authors of this study to have sought some medical 23 advice as to are any or all of these symptoms 24 associated with glyphosate poisoning. If so, how much</p>

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1 glyphosate would it take to cause this and what are
 2 other factors that may cause this plethora of malaise.
 3 Q. Now, if you look at the end of the second
 4 paragraph on Page 457 of the Bolognese study --
 5 A. Are we --
 6 Q. -- or sorry, the first --
 7 A. Which column?
 8 Q. The -- the left-most column.
 9 A. Excuse me. We are talking Paz-y-Mino,
 10 right?
 11 Q. Yes. Did I say Bolognese?
 12 A. You did.
 13 Q. I'm sorry. It's been a long day.
 14 A. That's -- that's okay. I understand.
 15 Q. So I'm looking at the last sentence of the
 16 first full paragraph.
 17 A. Oh, on the right or left column?
 18 Q. The left column.
 19 A. Okay.
 20 Q. And it said -- and it states:
 21 "Exposed group individuals manifested
 22 symptoms of toxicity after several exposures to aerial
 23 spray" -- "spraying, with half of the individuals in
 24 the group having received spraying directly over their

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1 houses and the other half living within 200 meters to
 2 3 kilometers from the sprayed areas."
 3 Did I read that correctly?
 4 A. You did.
 5 Q. Do you have any reason to disagree with
 6 that finding?
 7 A. No.
 8 Q. So it sounds to me like the authors are
 9 saying that these symptoms manifested after exposure,
 10 is that correct?
 11 MS. PIGMAN: Objection; vague and form.
 12 BY THE WITNESS:
 13 A. Well, they -- they did say "after several
 14 exposures," but this does not get to the point that I
 15 was making in terms of what else might have been going
 16 on in their environment that could have contributed to
 17 the -- these symptoms. I mean, for -- for example,
 18 we -- we -- we would not do experiments on animals
 19 that started exhibiting this laundry list of -- of --
 20 of -- of symptoms --
 21 BY MR. WOOL:
 22 Q. So --
 23 A. -- without investigation and calling in a
 24 veterinarian and saying what might be going on here.

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1 Q. So to the best of your knowledge, those
 2 symptoms are not consistent with the acute toxicity
 3 caused by glyphosate exposure?
 4 MS. PIGMAN: Objection; asked and answered.
 5 BY MR. WOOL:
 6 Q. You can answer.
 7 A. That's -- that's -- that -- that is --
 8 that is -- that is not correct. What I said is I am a
 9 Ph.D., not a medical doctor, and I do not know all of
 10 the symptoms of glyphosate poisoning and I do not know
 11 the particular concentrations, exposures necessary to
 12 cause this particular plethora of -- of ailments.
 13 Q. Okay. I'm going to mark Exhibit 25-10 for
 14 you, which is --
 15 A. So, are we finished with --
 16 Q. We -- we might come back to it.
 17 A. Okay.
 18 (WHEREUPON, a certain document was
 19 marked Deposition Exhibit No. 25-10,
 20 for identification, as of
 21 09/22/2017.)
 22 BY MR. WOOL:
 23 Q. And I believe that you reference and
 24 discuss this article in another part of your report.

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1 A. Which one are we on now?
 2 Q. This is an article by Zouaoui.
 3 A. Yes.
 4 Q. Okay. And this article, in sum, describes
 5 acute intoxications after ingesting glyphosate and
 6 this is for cases where, and I believe there were
 7 attempted suicides and -- and some accidental cases,
 8 correct?
 9 A. That is correct.
 10 Q. Okay. Now, if you look in the Abstract
 11 section, it is roughly in the middle, there is a
 12 sentence that reads:
 13 "The most common symptoms were
 14 oropharyngeal ulceration, nausea and vomiting. The
 15 main altered biological parameters were high lactate
 16 and acidocid" -- "acidosis. We also noted respiratory
 17 distress, cardiac arrhythmia, hyperkalemia, impaired
 18 renal function, hepatic toxicity and altered
 19 consciousness."
 20 Did I read that correctly?
 21 A. You did.
 22 Q. Okay. And does that sound similar to you,
 23 I know you're not a medical doctor, but to the
 24 symptoms that you describe on Page 12 of your expert

<p style="text-align: right;">Page 222</p> <p>1 report?</p> <p>2 A. The symptoms that I describe on my expert</p> <p>3 report were taken verbatim from the Paz-y-Mino study</p> <p>4 and there is some relatively slight overlap between</p> <p>5 the malaise reported in Paz-y-Mino 2007 and some of</p> <p>6 the symptoms that you just read from the abstract of</p> <p>7 the Zouaoui 2013 paper.</p> <p>8 Q. Do you believe the Zouaoui 2013 paper is a</p> <p>9 methodologically-sound article?</p> <p>10 A. Yes.</p> <p>11 Q. Okay. Let's go to Page 13 of your expert</p> <p>12 report and sub-point 3.</p> <p>13 A. I'm there.</p> <p>14 Q. Okay. So can you explain what the issue</p> <p>15 is that -- that you're sort of describing with the --</p> <p>16 the rank number methodology in Zouaoui?</p> <p>17 A. In reading this --</p> <p>18 Q. I'm sorry. Not in Zouaoui. In -- in</p> <p>19 Paz-y-Mino?</p> <p>20 A. Paz-y -- this is -- it's okay.</p> <p>21 In reading -- in reading this, I, frankly,</p> <p>22 was confused by what they meant by -- by "rank</p> <p>23 number." And because I was confused by that, I looked</p> <p>24 at the reference that they gave for the way they</p>	<p style="text-align: right;">Page 224</p> <p>1 done, just a person looking, you can see that there</p> <p>2 can be some subjectivity in terms of is the tail</p> <p>3 bigger, how much bigger is this tail. There can be</p> <p>4 some subjectivity here. And one way to try to</p> <p>5 minimize variability coming in from subjectivity --</p> <p>6 and by subjectivity I don't mean anything in terms of</p> <p>7 somebody being malicious, I don't mean anything in</p> <p>8 terms of somebody trying to -- to put their finger on</p> <p>9 the scale to skew things. I'm just talking about</p> <p>10 honest subjectivity. And so one way to try to</p> <p>11 minimize this is to have a individual read the results</p> <p>12 as opposed to having one individual read this piece of</p> <p>13 the results and another that piece and another that</p> <p>14 piece of the results.</p> <p>15 And so in Anderson et al., which is the</p> <p>16 reference that Paz-y-Mino referred to in terms of</p> <p>17 their methodology, makes a point, and I think a very</p> <p>18 valid point, that one can minimize variability due to</p> <p>19 subjectivity by having a individual do the analysis.</p> <p>20 And what I point out here is that in light of citing</p> <p>21 this particular reference, I find it strange that</p> <p>22 Paz-y-Mino did not say, And according to our reference</p> <p>23 for the methodology, Author X on the paper is the one</p> <p>24 who did the scoring. The lack of that leads me to</p>
<p style="text-align: right;">Page 223</p> <p>1 approached the evaluation, which is the Anderson et</p> <p>2 al. 1994 reference, saying to myself, Ah-Ha, I am</p> <p>3 going now to find out what rank number means and how</p> <p>4 one arrives at this. And to my surprise, the Anderson</p> <p>5 et al. 1994 paper doesn't say anything about a rank</p> <p>6 number from 0 (A) to 400 (E), at which -- which</p> <p>7 surprised me.</p> <p>8 Q. And does that shortcoming lead you to</p> <p>9 question the results reported by Paz-y-Mino?</p> <p>10 A. The shortcoming leads me to wonder about</p> <p>11 the analysis. And Paragraph 3 also contains a -- a</p> <p>12 second concern. So Paragraph 3 is really a --</p> <p>13 Q. So let's --</p> <p>14 A. -- a multi-concern paragraph.</p> <p>15 Q. Right. So -- so let's talk about that</p> <p>16 second concern. What -- to -- in sum, you sort of</p> <p>17 take issue with the -- actually, why don't you just</p> <p>18 explain the -- the second concern to me in your own</p> <p>19 words.</p> <p>20 A. Okay.</p> <p>21 So I did describe the Comet assay to you,</p> <p>22 and you can see, I hope, by my description, and if not</p> <p>23 I'll be glad to try to clarify, that there can be --</p> <p>24 if one is doing this by eyeball, which is what was</p>	<p style="text-align: right;">Page 225</p> <p>1 suspect that perhaps there were multiple individuals</p> <p>2 involved in the -- in the scoring.</p> <p>3 Q. But would you agree that the suspicion is</p> <p>4 speculative?</p> <p>5 A. Absolutely, yes, it is speculative but,</p> <p>6 speculative but. If it were not for the fact that</p> <p>7 Paz-y-Mino et al. 2007 referred to Anderson et al.</p> <p>8 1994 as their reference for the way they performed</p> <p>9 this aspect of the analysis, I don't think this would</p> <p>10 have risen to such a level of concern, but since they</p> <p>11 point to Anderson, and Anderson did this with one, if</p> <p>12 you will, observer, it is strange to me that</p> <p>13 Paz-y-Mino did not point -- did not point out that</p> <p>14 they had one person. And if they did not point it</p> <p>15 out, one can suspect that there may have been several.</p> <p>16 Is this speculative, the answer is yes,</p> <p>17 but I ask you to view that within the context of the</p> <p>18 analysis I just gave you.</p> <p>19 Q. And had multiple people actually reviewed</p> <p>20 the results, would that have rendered the results</p> <p>21 unreliable, saying they didn't cite to this Anderson</p> <p>22 article, they just said, We used multiple reviewers,</p> <p>23 would -- would that have rendered the results under --</p> <p>24 unreliable?</p>

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<p>1 A. If they used multiple reviewers -- 2 multiple reviewers, I would have expected them to say 3 something about comparison, how these reviewers 4 compared, how the -- how the results reported by these 5 reviewers compared, compared with, with each other. I 6 think it could have been problematic if -- if, for 7 example, speculating, that there was one individual 8 that reviewed controls and that there was another 9 individual who reviewed some of the mid dose and 10 another some of the high dose and then another some 11 more of the high dose and another some more of the -- 12 of the mid dose.</p> <p>13 I am not at all saying that anybody did 14 anything malicious. I'm not even suggesting that 15 anybody put their finger on the scale to tilt 16 anything, just that eyeballing with this type of 17 analysis can be -- there is subjectivity that comes 18 into it, to play.</p> <p>19 Q. So using multiple reviewers per se 20 wouldn't be unreliable, it would depend on how they 21 used those reviewers --</p> <p>22 A. It would --</p> <p>23 Q. -- is that correct?</p> <p>24 A. It -- using multiple reviewers -- multiple</p>	<p>1 another compound or compounds that could have produced 2 the genotoxic effect.</p> <p>3 Q. But, again, that's somewhat speculative, 4 fair, that there is another compound that they were 5 exposed to?</p> <p>6 A. Yes, it is speculative, but it -- I think 7 it's -- it's -- it's reasonably speculative because a 8 period of a couple of weeks to a couple of months is a 9 relatively long time and provides opportunity for 10 exposure to I don't know what else.</p> <p>11 Q. Okay. So viewing the -- kind of the 12 results and conclusions of Paz-y-Mino 2007 and the 13 2000 -- is it '9 Bologne- -- yeah, Bolognese article, 14 is it plausible that the observed effects were due to 15 the genotoxic properties of glyphosate-based 16 formulations?</p> <p>17 A. It's my view that the concerns that I've 18 raised rise to the level where one cannot come to a 19 yes-or-no conclusion in terms of genotoxicity on the 20 data presented. Yes, they did measure and observe a 21 measure of genotoxicity, but I think, based upon my 22 concerns, that one cannot say that it was glyphosate 23 or a glyphosate-based formulation that produced these 24 effects.</p>
<p>Page 227</p> <p>1 reviewers or multiple observers, however we want to 2 categorize this, in and of itself, in my opinion, 3 would not be problematic, but I would have expected 4 them to talk about how the different reviewers 5 compared with each other and, again, I think it could 6 be problematic if you have one individual review a 7 piece of the results and another individual review 8 another piece, and another one another piece and then 9 you put them together.</p> <p>10 Q. Fair enough.</p> <p>11 So let's go to your second criticism of -- 12 of the Paz-y-Mino 2007 study.</p> <p>13 A. We are back on Page 12?</p> <p>14 Q. We are on Page 12 to -- to 13.</p> <p>15 A. Okay.</p> <p>16 Q. And your issue is the -- the lag time -- 17 sorry. Or why don't -- why don't you describe briefly 18 why this issue that you raise in Point No. 2 makes you 19 question the validity of the results?</p> <p>20 A. Well, I question it because if one is 21 going to do the -- take the blood samples, a -- a 22 reasonably long time after the exposure to the 23 glyphosate-based formulation, then there is the very 24 real chance that these individuals were exposed to</p>	<p>Page 229</p> <p>1 Q. Okay. Okay. So I think I'm finished 2 with -- with those two studies.</p> <p>3 And let me just ask you a -- a quick 4 question on -- do you recall when you received your 5 Notice of Deposition?</p> <p>6 A. Oh, do I recall when I received my Notice 7 of Deposition? Yeah. The -- I received the Notice of 8 Deposition while I was in -- in Europe. I travel so 9 much. Time changes, which could have been a week or 10 10 days ago or a week ago or when did I get that. So 11 I returned from Europe on last Thursday --</p> <p>12 MS. PIGMAN: If you don't -- you don't have to 13 guess or speculate.</p> <p>14 BY THE WITNESS:</p> <p>15 A. Some -- some -- sometime between five and 16 ten days ago.</p> <p>17 BY MR. WOOL:</p> <p>18 Q. Okay. Do you recall when you departed for 19 Europe?</p> <p>20 A. Oh, well --</p> <p>21 MS. PIGMAN: Objection. Irrelevant and --</p> <p>22 BY THE WITNESS:</p> <p>23 A. Yes, I do. September 6th. September 6th.</p> <p>24 BY MR. WOOL:</p>

Page 230	Page 232
<p>1 Q. September 6th, okay.</p> <p>2 And we -- we talked about the materials</p> <p>3 that you produced, but did anybody help you gather --</p> <p>4 aside from the -- the attorneys at Hollingsworth who</p> <p>5 probably viewed them -- or reviewed the materials for</p> <p>6 relevance, but did anybody help you look through your</p> <p>7 publications, materials reviewed, anything like that</p> <p>8 to search for responsive articles to the -- responsive</p> <p>9 documents to the Notice of Deposition?</p> <p>10 A. No. Nobody. It -- it was me and my</p> <p>11 computer.</p> <p>12 Q. Okay. So I've asked you a number of</p> <p>13 questions today about whether or not you might have</p> <p>14 discounted any negative studies due to methodological</p> <p>15 flaws or noncompliance with the OECD guidelines,</p> <p>16 correct?</p> <p>17 A. You -- you did say that a number of times</p> <p>18 and my response is that there is a set of criteria</p> <p>19 that I employed and that set of criteria was employed</p> <p>20 to the studies and regardless of whether it was a</p> <p>21 study where the author reported a positive effect or</p> <p>22 the author reported a negative effect.</p> <p>23 Q. Okay. Sitting here today, can you point</p> <p>24 to a negative article cited in your expert report that</p>	<p>1 A. It starts with Reference 12.</p> <p>2 Q. And -- oh, no. I want you to look at</p> <p>3 Reference No. 18.</p> <p>4 And can you tell me if you relied upon</p> <p>5 that study?</p> <p>6 A. If it is in this list, it is one of the</p> <p>7 papers that I reviewed, looking in terms of the large,</p> <p>8 large number of papers that I reviewed. If you want</p> <p>9 to ask me something specific about this, I'll really</p> <p>10 have to see the paper.</p> <p>11 Q. It -- I just want to ask, it appears to be</p> <p>12 an Ames test, is that correct?</p> <p>13 A. It -- it does -- it -- it -- it is -- it</p> <p>14 is not an Ames test. It is not an Ames test. They</p> <p>15 are looking here for some type of genetic</p> <p>16 recombination and then this -- this is not within the</p> <p>17 scope of the Ames test as I described to you -- to you</p> <p>18 earlier.</p> <p>19 Q. Okay. Let's see. Do you recall at all</p> <p>20 whether you relied upon that article in -- in forming</p> <p>21 any of your opinions?</p> <p>22 MS. PIGMAN: Objection; asked and answered.</p> <p>23 BY THE WITNESS:</p> <p>24 A. If it is on the materials list, it is an</p>
Page 231	Page 233
<p>1 you disregarded due to methodological flaws?</p> <p>2 A. I cannot. I cannot.</p> <p>3 Q. Okay. And can I assume that for any</p> <p>4 opinion that we didn't specifically discuss today that</p> <p>5 your accurate and complete opinion or opinions are</p> <p>6 contained within your expert report?</p> <p>7 MS. PIGMAN: Objection; asked and answered.</p> <p>8 BY THE WITNESS:</p> <p>9 A. I --</p> <p>10 MS. PIGMAN: You can answer.</p> <p>11 BY THE WITNESS:</p> <p>12 A. I -- I stand by my report. The opinions</p> <p>13 that are expressed in the report were my final</p> <p>14 opinions on 31 July 2017 and I stand by them today.</p> <p>15 BY MR. WOOL:</p> <p>16 Q. Okay. Do you have, I believe it's</p> <p>17 Exhibit 2, your -- your supplemental reliance list</p> <p>18 handy?</p> <p>19 A. I do have it handy. I do have it handy.</p> <p>20 I think it is -- it's not there. I do have it. It is</p> <p>21 in my hand.</p> <p>22 Q. Okay. I'll ask you to turn to Page 2.</p> <p>23 A. I'm there.</p> <p>24 Q. Okay.</p>	<p>1 article that I -- that I did look at and my opinion is</p> <p>2 based on an evaluation of this large body of -- of</p> <p>3 information.</p> <p>4 BY MR. WOOL:</p> <p>5 Q. Okay. Why don't you take a look at No. 11</p> <p>6 on your reliance list, and I don't know if you'll be</p> <p>7 able to tell me, but just looking at the -- the name</p> <p>8 of the study what type of study that is?</p> <p>9 A. I'm sorry. In terms of all of these</p> <p>10 articles, I -- I -- I -- I would have to see the -- I</p> <p>11 would have to see the reference before opining.</p> <p>12 Q. Okay. Fair enough.</p> <p>13 MR. WOOL: I think that's it.</p> <p>14 MS. PIGMAN: Okay. Well, let's go off the</p> <p>15 record, take a quick break.</p> <p>16 THE VIDEOGRAPHER: Going off the record at</p> <p>17 4:15 p.m.</p> <p>18 (WHEREUPON, a recess was had</p> <p>19 from 4:15 to 4:33 p.m.)</p> <p>20 THE VIDEOGRAPHER: This the beginning of Disk</p> <p>21 No. 5. We are back on the record at 4:33 p.m.</p> <p>22 EXAMINATION</p> <p>23 BY MS. PIGMAN:</p> <p>24 Q. And, Dr. Goodman, I know we've been here a</p>

<p style="text-align: right;">Page 234</p> <p>1 while today, so forgive me. I'm going to jump around 2 quite a bit and just touch on a few things that you 3 and Mr. Wool discussed earlier. If I lose you in my 4 jumping around, please let me know, and like Mr. Wool, 5 I'll be happy to repeat or rephrase the questions so 6 that they make sense.</p> <p>7 Earlier today, toward the beginning of the 8 day, I think, you were asked if you considered or 9 reviewed the items on your Materials Considered List 10 and your supplemental Materials Considered List.</p> <p>11 Do you recall that series of questions?</p> <p>12 A. I do.</p> <p>13 Q. In addition to those -- the materials on 14 that list, is there anything else that you relied on 15 in reaching your opinions in this case?</p> <p>16 A. Well, in addition to a thorough review of 17 the materials on the list, this is really done with a 18 background of -- of decades in terms of toxicology, in 19 terms of toxicology research, teaching, in areas 20 related directly to the matter at hand.</p> <p>21 Q. And so is it fair to say that you brought, 22 in working on this matter and reaching your opinions, 23 you also relied on the training and experience you've 24 accumulated over the years?</p>	<p style="text-align: right;">Page 236</p> <p>1 named, did you also consider, for example, root of 2 exposure?</p> <p>3 A. Yes.</p> <p>4 MR. WOOL: Objection; leading.</p> <p>5 BY MS. PIGMAN:</p> <p>6 Q. And did you also consider whether the 7 study had a sufficient amount of test material or 8 subjects?</p> <p>9 A. Yes, I did look at -- at this in terms of 10 did it appear to be a -- a reasonable number of -- 11 reasonable number of subjects.</p> <p>12 Q. And how, if at all, did the methodology 13 you applied to the studies compare to the OECD 14 guidelines?</p> <p>15 A. The methodology I applied in -- in my 16 opinion is -- is consistent -- consistent with the 17 OECD guidelines, although it -- it is not necessarily 18 exactly following, but it is certainly consistent with 19 the guidelines and consistent with the -- with the -- 20 with the spirit of the guidelines. We have to 21 remember that a lot of, a lot of, a lot of the studies 22 that I looked at are studies in the -- that were in 23 the peer-reviewed literature, studies that come from 24 academic laboratories where they are or should be</p>
<p style="text-align: right;">Page 235</p> <p>1 MR. WOOL: Objection to form. 2 BY THE WITNESS:</p> <p>3 A. That -- that is -- that -- that is 4 correct. It is a body of -- of knowledge built up 5 over decades.</p> <p>6 BY MS. PIGMAN:</p> <p>7 Q. Okay. We're going to jump topics. 8 You were asked a series of questions 9 throughout the day, I think, about whether you 10 compared what were reported by the authors as negative 11 studies to OECD guidelines.</p> <p>12 Do you remember those questions?</p> <p>13 A. I do.</p> <p>14 Q. And just so we're clear, what was your 15 review methodology for the positive and negative 16 studies that you looked at?</p> <p>17 A. Well, what I tried to take into 18 consideration were questions of -- questions of -- of 19 dose-response, questions of toxicity, questions of 20 appropriateness of dosing, particularly whether 21 excessive doses were used, dose time responses, and 22 basically the template, if you will, was used for all 23 of the studies evaluated.</p> <p>24 Q. In addition to the things that you just</p>	<p style="text-align: right;">Page 237</p> <p>1 following good basic experimental techniques and 2 approaches, but, frankly, my -- my academic colleagues 3 vary greatly in terms of their knowledge of OECD 4 guidelines. And so I think what we're looking at, 5 basically, is for good, solid, reliable 6 experimentation and when this -- when this is done, 7 even if the author doesn't re -- doesn't know it, they 8 are still doing it consistent with basically the 9 spirit of the OECD guidelines.</p> <p>10 Q. Did you do a weight of evidence analysis?</p> <p>11 A. I did not. It sounds to me like by weight 12 of evidence what you are asking is did I say this 13 number of studies were positive and that number were 14 negative and -- and sort of weigh them. What I did is 15 my own independent, constructively critical, in-depth 16 analysis and reached a conclusion based upon an 17 evaluation of a very large body of data.</p> <p>18 Q. Another quick jump in topic. 19 You were asked a lot of questions about 20 whether you discounted any studies reporting negative 21 results due to inconsistencies with that methodology 22 you just described.</p> <p>23 Do you recall those questions?</p> <p>24 A. I do.</p>

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1 Q. And, for example, do you recall being
 2 asked whether you discounted negative reports, again,
 3 by the authors using the IP route of administration?
 4 A. I recall I was asked that, yes.
 5 Q. And what did you -- and I -- if I recall
 6 correctly, and please correct me if this is wrong, but
 7 your testimony was that you did not, is that right?
 8 A. That's right. The IP route of
 9 administration is, as I said, it's non-physiological,
 10 it is very extreme. One gets rather very high blood
 11 levels that you would not see by normal routes of
 12 administration. And so I think that one can look at
 13 this and say, Well, you know, if I don't see an
 14 effect, and in this case a genotoxic effect, under
 15 some extraordinary, in quotation marks, harsh testing
 16 conditions, then I'm not going to see an effect under
 17 mild conditions.
 18 Q. And is mild another word for appropriate?
 19 A. Mild is another word for appropriate.
 20 Q. Do you -- another jump.
 21 Do you recall earlier that Mr. Wool asked
 22 you about whether you reviewed genotoxicity studies
 23 related to surfactants?
 24 A. I do.

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1 Q. And I believe you testified that you
 2 reviewed various EPA reports describing genotoxicity
 3 studies on surfactants, is that right?
 4 A. I did.
 5 Q. Did you also consider any, what I will
 6 call primary or original data authors generated about
 7 the genotoxicity of surfactants?
 8 A. I did, and I -- I did review a number of
 9 those studies, a number of -- they are and there is
 10 a -- a handful, eight, ten, fifteen that are in the
 11 supplemental material. As I said earlier, these --
 12 these proceedings are -- this -- this venue is --
 13 is -- is very new to me and in coping with this venue,
 14 I -- there was some things I did forget to mention.
 15 Q. And is it true that for the assessing the
 16 genotoxicity of surfactants, you reviewed the
 17 underlying study reports where those were available to
 18 you?
 19 A. Yes, which, again, is somewhere between
 20 eight or ten or fifteen of the references provided in
 21 the supplemental Materials Considered List.
 22 Q. We are going to jump topics again. I
 23 again apologize for that, but do you recall being
 24 asked questions about whether the route of

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1 administration used in a study goes to the assessment
 2 of genotoxicity or to the relevance of that study's
 3 findings to humans?
 4 A. Mr. Wool did ask me a question like that,
 5 yes.
 6 Q. And just so we're clear on the record,
 7 which of those things does it go to?
 8 A. In my opinion, it goes to both.
 9 Q. And could you explain that for us?
 10 A. Well, it goes to both in terms of the
 11 appropriateness of the study and whether it is a -- a
 12 problematic confounding factor and if it is a
 13 problematic confounding factor, it goes to the
 14 approp- -- appropriateness of using that study as a
 15 basis for, if you will, translation of the results to
 16 humans. So it goes to both.
 17 Q. Okay. I have one last question which
 18 requires one last jump in topics.
 19 Do you recall being asked questions about
 20 whether oxidative stress is a sign of carcinogenicity?
 21 A. I was asked a question along those lines.
 22 I don't remember now if that is the exact wording, but
 23 that certainly is the meaning that I took away from
 24 the question.

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1 Q. And -- and what is your answer to that?
 2 A. My answer, my answer to that is that the
 3 available data in terms of glyphosate,
 4 glyphosate-based formulations and oxidative stress
 5 in -- in my opinion cannot be used as a basis to claim
 6 that glyphosate or glyphosate-based formulations cause
 7 cancer. And that this is taking into account also the
 8 fact that in many, if not all of these studies, but at
 9 least in many of them there were very, very high
 10 concentrations used and using that information that I
 11 gave you in terms of even using the EPA's high dose
 12 estimate for glyphosate -- for glyphosate exposure of
 13 the 0.78 micrograms per mL, we can see that in the
 14 experimental conditions they were many tens to many
 15 hundreds of times higher than that.
 16 MS. PIGMAN: All right. Doctor, given with
 17 that, subject to potentially questions if Mr. Wool has
 18 any more, I am finished.
 19 MR. WOOL: I'll be quick.
 20 EXAMINATION
 21 BY MR. WOOL:
 22 Q. Can you take a look at Reference 185 on
 23 your supplemental reliance list, please.
 24 MS. PIGMAN: That's Exhibit 2?

<p style="text-align: right;">Page 242</p> <p>1 MR. WOOL: In Exhibit 2, correct.</p> <p>2 MS. PIGMAN: Okay. And I'm sorry. 180?</p> <p>3 MR. WOOL: 5.</p> <p>4 BY MR. WOOL:</p> <p>5 Q. And my question is, if you will recall</p> <p>6 earlier I asked you some questions about the Ames</p> <p>7 tests that were not reported in Appendix 1 or</p> <p>8 Appendix 6. And I just wanted to ask you if -- if you</p> <p>9 recognize that test as one of the Ames tests that you</p> <p>10 report as negative in your report that -- that you</p> <p>11 relied on that is not in Appendix 1 or 6?</p> <p>12 A. You know, I -- I just can't answer that</p> <p>13 question at this time.</p> <p>14 Q. Fair enough.</p> <p>15 A. Because -- excuse me. I almost made it</p> <p>16 without coughing. Because of all of the materials</p> <p>17 that I reviewed, I -- I just can't respond at this</p> <p>18 time.</p> <p>19 Q. Okay. And if you'll turn to Page 24 of</p> <p>20 your report, which is Exhibit 1.</p> <p>21 A. I'll be -- I'll be there in a moment.</p> <p>22 I'm there.</p> <p>23 Q. Okay. Your opinion about glyphosate --</p> <p>24 about the genotoxic potential of glyphosate-based</p>	<p style="text-align: right;">Page 244</p> <p>1 literature.</p> <p>2 BY MR. WOOL:</p> <p>3 Q. And so it would be your conclusion that if</p> <p>4 glyphosate-based formulations were injected into a</p> <p>5 human via the IP route of exposure in large doses like</p> <p>6 you've seen in some of the studies, you would not</p> <p>7 expect to see genotoxic effects?</p> <p>8 A. A --</p> <p>9 Q. Related to geno --</p> <p>10 A. A, I would hope nobody ever did that.</p> <p>11 Q. For sure.</p> <p>12 A. B, I think that in the -- if that horrific</p> <p>13 scenario were true, I think that if one overloaded a</p> <p>14 person with -- with glyphosate, that there is a chance</p> <p>15 that one could produce cytotoxicity and have</p> <p>16 genotoxicity secondary or tertiary to that, but we're</p> <p>17 really talking about a extreme, extreme hypothetical.</p> <p>18 Q. Right. But -- but in that extreme</p> <p>19 hypothetical, it is your opinion that you would not</p> <p>20 expect to see genotoxic effects related to the -- or</p> <p>21 caused by the glyphosate-based formulation, the</p> <p>22 effects would be secondary to cytotoxicity, correct?</p> <p>23 A. To the extent that there were any</p> <p>24 genotoxic effects observed in this hypothetical</p>
<p style="text-align: right;">Page 243</p> <p>1 formulations is that glyphosate-based formulations are</p> <p>2 not genotoxic, correct?</p> <p>3 A. That they are not genotoxic, should not be</p> <p>4 considered genotoxic, and I consider those</p> <p>5 phraseologies as having the same meaning.</p> <p>6 Q. And that conclusion is not limited to</p> <p>7 geno -- I -- I mean, sorry, that conclusion is not</p> <p>8 limited to glyphosate-based formulations being</p> <p>9 non-genotoxic in humans in physiologically-relevant</p> <p>10 routes of exposure, is it?</p> <p>11 A. Maybe could you rephrase that, please.</p> <p>12 Q. Is -- is this conclusion limited to</p> <p>13 genotoxic -- sorry, sorry. Strike that. I keep --</p> <p>14 okay.</p> <p>15 Is this conclusion limited to genotoxic --</p> <p>16 glyphosate-based formulations through</p> <p>17 physiologically-relevant routes of exposure in humans?</p> <p>18 MS. PIGMAN: Objection; form.</p> <p>19 BY THE WITNESS:</p> <p>20 A. It is -- it is -- it is not limited. It</p> <p>21 is a deliberately broad statement that in my opinion</p> <p>22 glyphosate-based formulations should not be considered</p> <p>23 genotoxic. Glyphosate-based formulations are not</p> <p>24 genotoxic based on an evaluation of this large body of</p>	<p style="text-align: right;">Page 245</p> <p>1 scenario, it's my opinion that it would be due to</p> <p>2 secondary or tertiary effects and would not fall into</p> <p>3 the definition of a genotoxic compound that I gave</p> <p>4 you, and that is where the compound itself or a</p> <p>5 metabolite binds to, damages genetic material.</p> <p>6 Q. I'm -- I'm going to ask this one question</p> <p>7 again just because I worded it so horribly and -- and</p> <p>8 you objected, just so I get a clear answer.</p> <p>9 And so is it your conclusion that</p> <p>10 glyphosate-based formulations are not genotoxic to</p> <p>11 humans regardless of the -- the route of exposure, and</p> <p>12 setting aside genotoxicity that's secondary to</p> <p>13 cytotoxicity?</p> <p>14 MS. PIGMAN: Objection; form.</p> <p>15 BY THE WITNESS:</p> <p>16 A. I -- my -- my -- my conclusion is really</p> <p>17 what is stated in the report. I conclude that</p> <p>18 glyphosate-based formulations are not genotoxic.</p> <p>19 BY MR. WOOL:</p> <p>20 Q. Okay.</p> <p>21 A. I conclude that glyphosate-based</p> <p>22 formulations should not be viewed as genotoxic. And I</p> <p>23 view these two statements as -- as having the same</p> <p>24 meaning.</p>

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1 MR. WOOL: I don't have anything else.
 2 MS. PIGMAN: Nothing further.
 3 THE VIDEOGRAPHER: This concludes the
 4 deposition. We are going off the record at 4:51 p.m.
 5 (Time Noted: 4:51 p.m.)
 6 FURTHER DEPONENT SAITH NOT.
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1 INSTRUCTIONS TO WITNESS
 2
 3 Please read your deposition
 4 over carefully and make any necessary
 5 corrections. You should state the reason
 6 in the appropriate space on the errata
 7 sheet for any corrections that are made.
 8 After doing so, please sign
 9 the errata sheet and date it.
 10 You are signing same subject
 11 to the changes you have noted on the
 12 errata sheet, which will be attached to
 13 your deposition.
 14 It is imperative that you
 15 return the original errata sheet to the
 16 deposing attorney within thirty (30) days
 17 of receipt of the deposition transcript
 18 by you. If you fail to do so, the
 19 deposition transcript may be deemed to be
 20 accurate and may be used in court.
 21
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1 REPORTER'S CERTIFICATE
 2 I, JULIANA F. ZAJICEK, C.S.R. No. 84-2604,
 3 a Certified Shorthand Reporter, do hereby certify:
 4 That previous to the commencement of the
 5 examination of the witness herein, the witness was
 6 duly sworn to testify the whole truth concerning the
 7 matters herein;
 8 That the foregoing deposition transcript
 9 was reported stenographically by me, was thereafter
 10 reduced to typewriting under my personal direction and
 11 constitutes a true record of the testimony given and
 12 the proceedings had;
 13 That the said deposition was taken before
 14 me at the time and place specified;
 15 That I am not a relative or employee or
 16 attorney or counsel, nor a relative or employee of
 17 such attorney or counsel for any of the parties
 18 hereto, nor interested directly or indirectly in the
 19 outcome of this action.
 20 IN WITNESS WHEREOF, I do hereunto set my
 21 hand on this 24th day of September, 2017.
 22
 23
 24 JULIANA F. ZAJICEK, Certified Reporter

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Jay Irwin Goodman, Ph.D.

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ACKNOWLEDGMENT OF DEPONENT

I, _____, do
hereby certify that I have read the
foregoing pages, and that the same is
a correct transcription of the answers
given by me to the questions therein
propounded, except for the corrections or
changes in form or substance, if any,
noted in the attached Errata Sheet.

JAY IRWIN GOODMAN, PH.D. DATE

Subscribed and sworn
to before me this
____ day of _____, 20____.
My commission expires: _____

Notary Public