

# Bart Elmore\_ Will Genetically ... Help Us Feed a Hungry Planet\_

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## SPEAKERS

Bart Elmore, David Staley

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**B** Bart Elmore 00:00  
From the heart of the Ohio State University on the Oval, this is Voices of Excellence from the College of Arts and Sciences, with your host, David Staley. Voices focuses on the innovative work being done by faculty and staff in the College of Arts and Sciences at The Ohio State University. From departments as wide ranging as art, astronomy, chemistry and biochemistry, physics, emergent materials, mathematics and languages, among many others, the college always has something great happening. Join us to find out what's new now.

**D** David Staley 00:31  
Joining me today in the ASC Tech Studio is Bart Elmore, Professor of History at The Ohio State University College of the Arts and Sciences. He is the author of "Citizen Coke: The Making of Coca-Cola Capitalism", "Seed Money: Monsanto's Past and Our Food Future", and most recently, "Country Capitalism: How Corporations From the American South Remade Our Economy and the Planet". Dr. Elmore, welcome to Voices.

**B** Bart Elmore 00:58  
Thanks for having me. It's great to be with a good friend, and one of my favorite people in the department.

**D** David Staley 01:02  
And the feeling is mutual. So, February 18th, you'll be speaking at the Science Sunday series, and you will be asking the question, will genetically engineered food help us feed a hungry planet? And your answer is, what?

**B****Bart Elmore 01:16**

Well, what do you think a good academic would do? They would panic, and they would say maybe, and they'd say all sorts of things. I think the big thing that I'll stress at this talk is that history matters, if we're gonna answer this question, and I think it's not a matter of is a technology good or bad, which is what people want us to do nowadays, you know, we live in this kind of Twitter, clickbait, "What's your stance? You got to be one way or the other". And it turns out that history shows us that it's more about how did we deploy these technologies, not so much is the technology evil or good? And so, I think we're going to walk through, I think, some of the pitfalls of the deployment of the first and second and maybe third gen, genetically engineered crops - what are some of the things we can learn from that, and, without giving away the lead, we'll save some of the meat for the talk itself.

**D****David Staley 02:07**

Well, what can we learn? Can you give us a sense of that, what does history tell us?

**B****Bart Elmore 02:11**

Yeah, you know, I think... just to back up, one of the cool things about this book was getting to have access to Monsanto's corporate records. And Monsanto was a company that started in St. Louis, Missouri in 1901, was a chemical firm selling products to Coca-Cola. Caffeine and saccharine I knew something about because I'd written an earlier project on that. And that's what had drawn me to the company, and, you know, I flew to St. Louis to detail the history of the caffeine, Coca-Cola connection, how Coke got their caffeine, and then got a lot more, I got another book out of it. Because Monsanto ultimately had donated most of the records to Wash U, Washington University, and you had to get access from the company to get access to those records. And they gave it to me, I remember thinking as a business historian, well heck yeah, let's go back and tell the story. And so, that's how I came to write this history of what one could argue is, was the biggest player in genetically engineered crops, Monsanto. They, they really helped to launch the first commercially large scale commodity crop, so, thinking "Roundup Ready" corn, "Roundup Ready" cotton and soybeans and so forth, so that they could tolerate heavy spraying of this herbicide "Roundup" that Monsanto had created in the 1970s. The idea is that you genetically engineer it so that it can tolerate this herbicide, so you can spray the herbicide on your crops, your crops survive, but it kills all the weeds. And I spent a lot of time here in Ohio talking to farmers, so it was like magic, you know, it changed, changed farming forever. And we're now 25 years past that date of the introduction of those crops. As a historian it felt like, okay, this is a good time for us to use our tools to look back at those 25 years and say, what can we learn? And to your point, I think the big takeaway that I saw was that the... you'll like this, as a futurist, because the future was in the subtitle, but this future of agriculture is really our past, is what I started saying.

**D****David Staley 04:13**

What do you mean by that?

**B****Bart Elmore 04:14**

The best part about the history is you never expect to see these things, they just kind of come out of it, you know, out to you when you start looking at the empiricist. I just kept looking at these herbicides that started coming back into use at higher volume as we move further into this period of genetically engineered crops. Things like 2,4-D, which is a wonky name for a chemical that was actually the second half or one half of Agent Orange, an herbicide that was used during the Vietnam War. That particular Agent Orange was made up of two main herbicides: 2,4,5-T and 2,4-D. Don't want to lose anybody here, but the 2,4,5-T in that particular concoction was particularly nasty stuff. That was what had dioxin in it, a compound that causes all sorts of health problems. My father is actually a Vietnam vet, and so that was a bit of a personal story for me, I went back to tell that story. I went to Vietnam, and I've seen some of the places my father must have seen in the late 60s and 70s. Today, my father does receive support from the VA for exposure, potential exposure to Agent Orange. And so, anyway, some of these stories I had personal links to. And I don't want to say 2,4-D is Agent Orange, you know, but it's been more widely used today, in part because of what happened with this revolution. Those "Roundup Ready" crops came out, and most farmers were told by Monsanto that they really just needed Roundup, they needed one herbicide and that's it, they didn't have to mix or use or target weeds or scout as much as they used to. And so, there was a lot of... a huge spike in the use of Roundup, active ingredient glyphosate. And they also told farmers that weeds would not develop resistance to Roundup. In fact, there are journal articles in which they argued, we've seen Roundup since the 1970s, it doesn't seem to create resistance issues in weeds, that is that weeds adapt to become resistant to the herbicide, we'll be good.

**D****David Staley 06:25**

I was gonna say, was that true?

**B****Bart Elmore 06:26**

No, of course it wasn't true. And, you know, the great people here, some of the top weed scientists in the country are here at Ohio State. I will be honest with you that, when I first went to my first weed science talk, I was going for another topic, I was thinking they were talking about another type of weed and then found these wonderful weed scientists, who honestly were so critical to my own research, being at Ohio State was great in that sense, you know, having all these talented folks who could explain science to you and take me out in trucks and show me what was going on in fields. And they were livid about this, because they said, look, in our own greenhouses here at Ohio State, we were seeing resistance to Roundup developing, you know, in mare's tail and other types of weeds very early on, some of the early documentation was early as the late 90s, I mean, within three years or so of the introduction of these crops. And they were trying to blow the whistle, and there's a story from a weed scientist here at Ohio State, Monsanto's reps coming into the greenhouses here at Ohio State and saying, you're not seeing resistance.

**D****David Staley 07:30**

Wow.

B

Bart Elmore 07:30

And I think it's a real sign of the integrity of some of the science that's done here at Ohio State, that this particular person told his graduate student to please step out of the room, and then he said, you know, he read this guy the Riot Act, he said, you don't come here to Ohio State and tell folks who've been doing this for 30 years we don't know what to do. And, you know, having really contentious relationships in that moment, because it was clear. But over time, farmers didn't need scientists to tell them this, they saw it in the fields. And then, the gig was up, as early as, you know, the early 2000s in many places, where farmers were having to turn back to - and here's what we were talking about earlier - those older chemicals to beat back weeds that have developed resistance to Roundup. And if you look at the composite of, say, a soybean field or cornfields today, of herbicides that are used, you've got 2,4-D, you've got dicamba. These are chemicals that are older than Roundup. 2,4-D goes back to chemistry from the 1940s, that's when it first really came on in agriculture. Dicamba goes back to the 1960s. Roundup was invented in 1970. So yeah, if there's a big picture trajectory to the book that I didn't expect to see, it's that the future of agriculture, we're going backwards in a way, right, to more and more of these different herbicides. It's also more costly, and by the way, the seeds aren't cheap either, because you're, you've got these seeds that, you know, that have been genetically engineered and they're proprietary, you know, they have patents and things, so it's a very expensive system. So, this is what I mean about the pitfalls of where we're headed. If the idea is that we're trying to eliminate our chemical exposure, reduce our herbicide use, we see real problems in the system.

D

David Staley 09:16

Let's step back - genetically engineered food. What does that mean? I mean, I understand gene, I understand engineer -what's involved in genetically engineering crops or plants?

B

Bart Elmore 09:27

Right. And you might hear two different ways of describing it, some people use the term genetically modified or GMO.

D

David Staley 09:33

GMO is what I see on my cereal box, right.

B

Bart Elmore 09:35

Sure. Genetically engineered, there's, there's different ways of expressing this specific type of crop manipulation. Because, what a lot of people like to say when they're just blanketly saying, GMOs must be fine, humans have always been altering plants.

D

David Staley 09:51

I've made that argument before, yeah.

B

Bart Elmore 09:53

Sure. And to some degree, I get that. I should also say like, before I started doing this, I studied biochemistry in undergrad. That's what I thought I was gonna do. My first job - I don't even think you know this, even though we've spent so much time together - is, you know, I worked the CDC and I worked on vaccines and I worked with genetics. I thought it was fascinating, and I think, you know, I'm not anti-science, I'm not a Luddite, in fact I love this stuff. I think it's amazing, the potentials for things are pretty cool. CRISPR, it's new gene editing technology.

D

David Staley 10:24

Right.

B

Bart Elmore 10:25

I wonder what future... the future is going to look like as we think about these things. Who knows? Lots of interesting things coming out. So, I don't like blanket statements, and I don't like that one, because I think it obscures the reality that something different happened. Yes, we've always been changing and breeding different types of hybrid corn, you know, it goes back, the 20s and so forth. Yeah, we've been breeding things for a long time, changing the genetic makeup of plants, that's the whole coevolution of humans and plants. But, the 1980s were different. What happened there was new technologies that allowed us to specifically insert specific types of genes into plants in ways that gave them specific properties. And, you know, using some sophisticated technology, a lot of it was using a bacterium that was known to be able to do this, to be able to insert particular gene cassettes into plants. There were also gene guns, interestingly, that were invented. I think Cornell University is one of the places where, where we saw that technology coming out, and where you would literally shoot genetic material into plant cells and, and manipulate plants that way. This was something different, and to suggest that it isn't I think is being not fair, you know? And in this case, you know, it was very targeted manipulations. The goal was to, in this case, with Roundup Ready, insert a gene - that they were able to find, by the way, Roundup did. Where would you find, you know, the gene that gives plants resistance to Roundup? Well, it turns out, in the very polluted area around the Roundup manufacturing facilities, where there are organisms that can survive in this space, and then they were able to take these genes put it into the plant, and the rest is history. 1996, you see something very different, and then various types of manipulation. The same time, they were also introducing Bt crops. These are crops that have a gene from *Bacillus Thuringiensis*.

D

David Staley 12:31

Okay.

B

Bart Elmore 12:31

And talk about a word, you know, thick word here, but it's a gene that allows essentially, for plants to produce their own pesticide in a sense, to keep back insects. And we saw some interesting things there. Well, with both cases in the early years, you know, that some people could reduce their insecticide use as a result of that, that's a good thing. And even in the early years of Roundup Ready, you could see the overall use of herbicides declined, Roundup use was going up, but all those other herbicides they talked about started going down. And that's what I think, why history is so helpful, is because this isn't an indictment necessarily of farmers. So I spent time with, it's like, dumb farmers, why did they do this? Well, in those early years, it makes sense. It seemed like the promises were going to reduce your dependence on all these toxic herbicides that I'd have to use as many, insecticides. This is using technology to make smarter plants. It seemed really good, but as most things that seem, you know, almost too good to be true sometimes that, they are too good to be true. And so we started saying, as my good friend in the wheat science of space told me, he said, you know, you don't bet against nature. And that's what we did here in a very strong way, we thought you can just dump tons of the stuff out there, this glyphosate, and expect weeds not to adapt, I mean, nature shows us they're going to find a way. So no surprise, we saw the problems that we're seeing. And I think it's, it's creating a lot of, a lot of havoc and a sense of, you've got all these weeds that are developing resistance to not only Roundup, but we have new gen, that is, second gen, third gen, genetically engineered crops that are genetically engineered to tolerate multiple types of herbicides. And we're already seeing history repeating itself. As I said in this book that I wrote on the history of Monsanto and this whole story, it's a great business model. You know, looking at our iPhones here, it's like, well, now you need the iPhone 2.0. You know?

D

David Staley 14:38

Yes.

B

Bart Elmore 14:38

The problem is, how far can you play that out? These herbicides are particularly effective at killing weeds. And if, you know, you're burning through them, is what weed scientists would say, pretty quickly when you do it. And the model that we're talking about just spraying it through the growing season and not really in a controlled fashion. So, yeah, I think again, the longer history here is that the future is our past, and I think we have a way to think around that, because, one thing is just imagining a future in which we have less dependence on these chemicals, we know that we can grow food with far smaller volume of the stuff. The problem is we've gotten into a business model that makes it seem like this is the only way forward.

D

David Staley 15:22

The second part of the question you're asking has to do with, will genetically engineered food help us feed a hungry planet? And you and I have talked about this for a few years, and maybe it's just as what I'm remembering, that the examples you're talking about is from American

agriculture. What about, what about the impact of genetically engineered plants, GMOs, on food growing across the planet? I know next to nothing about this.

B

Bart Elmore 15:46

Well, I think I should say, I don't want to undersell myself, but I think it's, we start these book projects when you start your book projects, we often start as relative novices, you know, and I'd like to think there's a great, you know, there's a food writer, Michael Pollan, who I had pleasure meeting when I wrote my first book, he gave me lots of advice, including that there's a thing called writer's insurance.

D

David Staley 16:10

There is?

B

Bart Elmore 16:12

It's like renter's insurance, it's a very small sum relative to the penalties you can face from a corporation that might sue you. And it basically gives you legal coverage. And the case of some litigation that you might encounter,

D

David Staley 16:26

This is an actual thing, writer's insurance.

B

Bart Elmore 16:27

A real thing, a friend of mine in Alabama actually told me that they ended up getting writer's insurance for what they were running. But that was helpful, I actually didn't end up getting it, and that's in part because of the, I think the only way to acknowledge a certain privilege of having family that are attorneys. And, and I mean this for anybody who's pursuing writing books about multibillion dollar businesses, you know, really thinking hard about making sure you're getting good legal advice and support because, you know, this isn't a game really. And then this sense of this can be a real, this is live, as I experienced, my first book on Coke came out and Coke was ready to have a conversation. So, you know, I was learning all these things, and trying to think through this, but your question, I've now gotten off track with the writer's insurance. You were saying something about about,

D

David Staley 17:17

About the planet? What's what's been the impact of GMOs or genetically engineered plants and food across the planet?

B

Bart Elmore 17:24

Yeah, exactly.

D

David Staley 17:25

Is Roundup used, I don't know, in Sub-Saharan Africa?

B

Bart Elmore 17:28

Right. So, you know, as I was writing this stuff, I was thinking, I need to do this, but Michael Pollan had told me, he said, actually, you need to be, it's good when you're a novice, don't be afraid of the globe, for example, you know, that you might not notice something about a place. Because it turns out that good books take a reader on a journey that you go on yourself. They're novices when they start, and by the end of the book, they're, maybe not experts, but they're, they're better, they're more knowledgeable. So I thought that was a really helpful way of framing how we, what we do as writers. I think it freed me to be a little more like, to answer your question, finally, I don't know much about Brazil's history. Fortunately, we have a great colleague, Jen Eaglin in our department, he's a good friend of mine, who does know, let's go, you know, and in fact, spent time in Brazil to try and get to your question, okay, this is what's happening here in the US, what's happening in other parts of the world, Brazil, being one of the largest producers of soybeans, and, in areas, specifically, very big production area in the [unintelligible], which is in the middle of the country, plug to Ohio State, we have what I can only describe as embassies, university embassies in certain countries. And we have one in Sao Paulo, which is incredible. I mean,

D

David Staley 18:42

Gateways, I think.

B

Bart Elmore 18:43

Called gateway. And so I reached out to a contact there, and Sao Paulo was with the gateway, Jane, and she said to me, look, what do you need? And man did I get up to speed very fast. So to your point, I just want to, before I go into what I think the implications are, like talking about how a place like it was you can make, make this possible, because I ended up getting someone who could be, not only to drive and get me around the country to places I had never been, but who were also agricultural scientists at the same time, you know, it was an incredible ability to dial up experts, you could fulfill the variety of needs that you had, and be able to give you the on the ground support that you needed, and so I spent time with Embrapa, which is their, essentially state run organization that was involved in the tropicalization of the of the soybeans that it could grow in the Serato, because the soybean is not particularly suited for the soil or the climate of this place. And they developed this technique and this new soybean in the 70s that really exploded the potential to become this massive exporter of soybean. And I met with the scientists there to talk about this. And it was interesting, it was like watching history unfold, because Brazil approve the use sort of genetically engineered crops later than the United



States. So you're watching the problems evolve in the United States in history, and you're kind of seeing them in real time happening in Brazil. Maybe fewer instances of resistance, but you know, patterns of the same behavior. And I was able to talk to scientists, there at [unintelligible], which is one of the big organizations, ag organization University and pierce acaba. And I said, are you concerned about this herbicide Dicamba that I mentioned earlier, that's now being used in the United States to beat back roundup resistant weeds, but that is really problematic because it volatilizes at hot temperatures. And just to be clear, that's what's different about genetically engineered herbicide tolerant crops. You can spray herbicides on them during the growing season. Well, if you got an herbicide that's volatile on hot temperatures, the growing season first, you know, things like soybeans, and corn is June, July here in the United States, you got summertime, that's hot, especially if you get into more [unintelligible]. Well, there you go, you got this stuff, that volatilizes, can drift off target. And just to be clear, Monsanto had developed new seeds that will allow crops to tolerate spraying of Roundup, and Dicamba, what they called staff traits. Kinda cool if you're thinking about it from a tech side, it's like, Oh, interesting, it's got two different properties.

**D** David Staley 21:27  
Yeah.

**B** Bart Elmore 21:28  
The problem is, when you're spraying Dicamba at these high temperatures is drifting off target. Let's say you're a soybean farmer over here, who doesn't have Dicamba tolerant Monsanto seeds, you get fit with that herbicide vaporizes and moves off target.

**D** David Staley 21:42  
Yeah.

**B** Bart Elmore 21:42  
That's what happened in the United States, 1000s of farmers, I'll talk about this, on that Sunday, in detail about what I was able to unravel about this Dicamba drift. Well, it hadn't come to Brazil yet. Think about this as a historian, actually think about you and your work on the future, It's like you're in the future in a way, right? It's coming to a lot of these places, but it hasn't come yet because of the adoption rate. And I was curious as to like, what do you think about what you're seeing there and what the future is here? And boy, I just remember the first two initial interviews I had, when you're doing these oral histories are kind of trying to flag as you're doing it, the words that really stand out. It's things like we're scared, you know? We're seeing what's happening, we're seeing the fall to realisation, and go back to the beginning of what we were just talking about, Serato, tropical, hot. If it's bad there, what's the potential for this to go wrong here. So that was a really interesting moment, and I think I felt that, I went to Vietnam as well, that was strange, to be in the place where my father had been involved in war that I think is deeply troubled. His memory would say, he comes here to Ohio State, I have him teach my Vietnam class. He's very sharp. But more importantly, he's been there. And I said,

guys, I can either teach this or you can hear from somebody that was actually in this conflict. And increasingly, as he's gotten older, he's talked a lot about nightmares and things. It's been interesting for me as a son of a Vietnam vet to be in the room and listen to him, frankly, get emotional now as he's worked through things a little bit more than when he was kind of tough guy dad in his 50s and 40s. So, you know, but revisiting that space, Agent Orange contamination, dioxin contamination is still in the soil in Vietnam. Most US taxpayers, you and I don't know, most people don't know this, but we're right now paying for cleanup, of dioxins for the first time in history. The first cleanups began in 2012. I mean, decades after the war, where we finally agreed to admit this was really bad, we should do something about it. So you have this layer of contamination on the ground that Monsanto helped create, by the way, they're not paying, set to clean up, you and I are.

D

David Staley 23:59

Taxpayers, not...

B

Bart Elmore 24:00

Right, taxpayers, not the company that actually produced that, and in the book, I show very clearly that they knew how toxic this stuff was going back to 1949 when they first started making 2,4,5-T. So I feel like there's a clear record of obligation, to be honest with you, what they should do now. But I basically got into their headquarters in Vietnam.

D

David Staley 24:21

Oh.

B

Bart Elmore 24:22

And it was weird, because I had to use a fixer on the ground to figure out where the heck it was. And it was a Vietnamese journalist amazing person, and we met for lunch. And he said, it's right there. Just gotta get in. I remember thinking, this is uncomfortable, for me as a historian, because we're not trained to do this type of stuff in grad school like to sneak it to the headquarters or see if we can, you know, and see if we can get the interview and kind of Michael more than moments, you know, in a way. And anyway, it's funny I said, well this is great, so we'll go and he said no, no, no, you'll have much better luck if you go, I'm a little bit more known. I was like, so do I gotta go alone, you know. And so I go over to the headquarters, and what's interesting, there's no signage of Monsanto there, which makes sense in the end, but I just kind of walk in and go through the cigars. They don't say anything I get to the elevator shaft, my friend is with me, because we were doing film as well. He gets in, he interestingly, has, I'm throwing him under the bus, you're unnamed here, but his tendency when we traveled together to eat food in a kind of creative way that he's in other countries. And unfortunately, it kind of hit him in this moment. And he's saying "I've got to find a bathroom", I'm like, you've got to be kidding. We're trying to go up the elevator shaft. And, you know, there's like security cameras, and we're in, I'm like, and we don't even know what floor it is, we're trying to go up the elevators, I really gotta go. So anyway, there's one moment, you

can imagine if there was an actual film, being dup, doo doo, doo doo, just standing there with like, the security, and he's in the bathroom, you know, doing what he has to do. And we find, and we find we finally get to the right floor, you know, knock on the door and go in there, and it was the headquarters Monsanto, finally see the branding there. And it turns out that Monsanto was just reentering selling genetically engineered corn, talking about the layer in such history, you know, the future in the past, the agent orange producer, is now feeding, and all this messaging, of kind of feeding Vietnam. And in fact, it was part of containing very soil in which, okay, and that's where this kind of lines are bought near and was like ringing in my head, you know, the past, never fast. Passes didn't even pass. And I thought, I need to wrestle with what this is, but but it also, as a historian being in those spaces, it tells you a story. You know, it makes sense that there was no branding on the outside, they're trying to do this in a way that doesn't necessarily raise too much attention would be my guess, give that there's a museum. And this is what doing history on the ground, shows you that's literally blocks away, that has Monsanto featured in block letters underneath the age at arms, you know, story of what happened, history and past kind of in the same space. So I guess I'm saying is, we're seeing this a very aggressive move to try and expand this technology to different places, Brazil, Vietnam, and somebody's behind. And what this book is trying to say is, hey, other countries pay attention to what happened here, because we're seeing it. And in some countries like Vietnam, there's an even deeper layer here, because some of the chemicals, you're going to need to beat back those roundup resistant weeds are the very chemicals that were dropped here during a war and my father was here decades ago. And I'm sure you've seen this in your own work. I think as a historian, just this kind of layers of connections, history is not a straight line, it seems like it's some kind of puzzle

D

David Staley 27:50

Well that's the other question I would ask you, as we've been talking here, you you evoke history, you say on many occasions, I'm an historian. But as we're talking, we're talking as much about the future, we're talking as much about the present. In fact, I don't know sneaking in or working your way into those headquarters, you sent almost like a journalist to you. What does it mean to be an historian? Because your work in many ways, probably confines,

B

Bart Elmore 28:18

Because I think one of the things like I, you know, I deeply respect your work, in part because you put an emphasis on this. You also don't particularly care about what the label is. And I think that's something that I've learned from, you know, honestly, mentors, like yourself and others who have helped me recognize Ed Ayers, who was my advisor who said, Do it your way, you know, do like don't. In fact, I was left graduate school, I remember electricity, or I just McCain, is the way this is the structure. And like, he said, You don't have to do it that way. Just hang in there. I remember him saying, just get through this whole abd thing. To get through the sense, they're the cops and all that and, and then do it your way. There's a lot. And he also said that with respect to our profession, and I don't want to be clearly, I like being an historian is awesome. And I think there's tremendous skill sets that you learn as a historian that you don't get anywhere else. But I also don't care about the label journalists, which people would throw as eat my way and I kind of subtle way to kind of undermine Oh, that's really nice, creative nonfiction. That's what I'd get sometimes. creative nonfiction. Interesting. So it's nonfiction. I think it's factual. It's creative. Okay. I guess I'll take both see it out. But I think especially now,

and especially having come back from this climate summit and cetera, we're not going to fix these problems. If we're worried about stuff like that staying in your lane or disciplinary boundaries, so I can stop take the good things that all these other disciplines, including genetics, including weed scientists can offer. Don't be afraid of it. Take Michael Pollan's advice in the sense of be anonymous. It's okay to not know say meetings, and I grew up dyslexic. And I say, like, I've gotten over it. I do write books. I guess something's changed. But I went to a special school called the speech school to try and deal with major problems. You know, be vulnerable. Like it's okay that you don't know everything and that you feel like an imposter. Turns out that using these tools that you've been given from different disciplines, you can tell really interesting stories. And I think that's what we do.

B

Bart Elmore 28:32

Coming from you, that means a lot. I mean...

D

David Staley 30:15

Okay.

D

David Staley 30:28

Can't wait to hear you on Science Sundays. Bart Elmore, thank you.

B

Bart Elmore 30:32

Thank you for having me. It's great.

D

David Staley 30:34

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