

## The Taproot Podcast

Season 6, episode 4

Guest: Jason Williams

Hosted by Liz Haswell and Ivan Baxter

Transcribed by Jo Stormer

[Upbeat theme music]

00:23 Liz Hello everyone, and welcome to the Taproot Podcast. I'm Liz Haswell.

00:28 Ivan And I'm Ivan Baxter. Today's conversation continues our theme of asking what lessons we have learned over the last three years. It focuses on improving diversity, equity, and inclusion in STEM education, and planning conferences.

00:42 Liz In both of these cases, the best way forward isn't always clear. There's so much to learn and think about. The pandemic did teach us awesome lessons, but have we really learned them? That's what we talk about next.

[Theme music]

Our guest today is Jason Williams, assistant Director of Inclusion and Research Readiness at the DNA Learning Center at Cold Spring Harbor Laboratory. Jason is also lead for CyVerse education, outreach and training. He received his bachelor's in biology from SUNY Stony Brook in 2004, and then worked as a technician in several labs at Cold Spring Harbor, eventually transitioning to several roles in the DNA Learning Center in 2009.

01:52 Jason Today's paper was just published in science and is entitled "Achieving STEM diversity: Fix the classrooms (Outdated teaching methods amount to discrimination)". Jason, can you give us a short summary of this paper and how you came to write it with your co-authors?

02:05 Ivan Yes. So this just came out I had the privilege of working with several distinguished co-authors including the lead author Joe Handelsman, (who's

currently the director of the Wisconsin Institute for Discovery, and also former office of Science and Technology Policy member in the Obama administration), and then also colleagues I've worked with quite a while including Sally Elgin from Wash U. She's emerita now but continues to be a really, really important voice for getting students involved in hands-on science education.

I think this paper was the product of reflection after the pandemic and ongoing equity issues as people try to understand how we spent more than a decade - I think - of really talking about improving "the STEM pipeline", (which many people shy away from cuz there's some problems with that idea), really looking at the idea that we need to not ask students to fix what they haven't broken but really think about fixing our system. That's kind of the genesis of this paper to have this policy form and really put a point on it that if we wanna make real change, we're gonna have to change overall systems.

03:29 Jason Thank you for that summary. So, one of the arguments you make early on in this paper is that active learning actually benefits historically-excluded communities, right? And over the past, like five years, I've flipped my course here at Wash U to be active learning, but I am not sure exactly how active learning would specifically benefit that population. Can you tell me more about active learning would specifically benefit that population?

03:59 Ivan Active learning doesn't specifically benefit (the term that we use here is) *historically-excluded*; there's many different terms. Other people would say *underrepresented minorities*. It actually benefits everybody, and the important thing is that it benefits everyone, including sometimes groups that often get left out. When we say that something works; we may not actually have the evidence that it works for everybody. Work that was done previously in one of the citations was the Texas Freshman Research Initiative, which is probably one of the most important studies that when we apply these active learning (or what we really talk about *course-based research*) experiences, it really benefits students and they don't see differences in the benefits between students who are from groups that have been minoritized from first, and family. So really it's something that benefits

everyone. And also, well, the other issue of course is it's hard to do this [laughs] and so we need to support teachers in doing it. But when it's done, it really benefits everyone.

05:08 Liz Okay, so just elevates the experience of all students.

Jason Yes.

Liz Are there learning strategies that we can employ that *are* specific to historically-excluded students?.

05:26 Jason Absolutely. When you're talking about trying to reach students that have been historically excluded from STEM, it's not that there's anything special that they need; it's stuff that you would want yourself and that would benefit you. It's just that the system is not necessarily set up for these students and therefore it doesn't benefit them. For example, just straight off the bat for quite a while now we've known that students from these communities (let's say African American, Hispanic, all of these communities), they aspire and they're interested in STEM at the same rate as every other student - at least before the college experience. They're arriving in college just as interested in being a math major, a science major, what have you. But in order to connect with these students (just like I would say every student would want), you need to be able to contextualize the course, the materials in problems that they can relate to and problems that they can grasp from their own background.

06:32 That could be using examples or talking about issues that they see in your own community (not issues that don't necessarily occur top of mind), but it also could be cultural sensitivity. If you're working with indigenous students, for example, there may be certain backgrounds and certain beliefs and certain ways of even asking questions or *not* asking questions that are just specific to that culture. Really making sure that educators have resources so that they can become more familiar with the students that they engage with, and understand how to reach them more appropriately - that's an example of trying to make sure that what you're doing is specific to those students and it reaches them.

07:22 Liz That's interesting.

07:23 Ivan It's really struck by the "weed out" mentality point that you guys made of this idea that still a lot of these introductory courses are thought of as weeding out or getting rid of students who "can't cut it". It ties back to this mentality we have of "we have to create places for competition cuz that's how we get the best people." I guess what I'm wondering is how high up do we have to start fighting that? I mean, is this something that individual instructors can make a difference on?

08:06 Jason One of the figures in the paper: here are things that could happen at the instructional level, at the sort of academic leadership level and at sort of the national level that could support all those. Because there could be interventions that can work across all of those levels to help move the needle.

At the instructor level, it could be our individual instructor mindset - that if you don't make it, you just can't cut it. The instructor needs to change their mindset (not necessarily change the curriculum), but then obviously you'll need institutional support to say that in this institution, we do support every student succeeding in every class. That doesn't mean that every student will make it into med school or even should be in med school, but maybe that means that you help students identify what their strengths are and give them mechanisms for getting stronger where they are weak or weren't as well-prepared. You have to think about it that the students that are coming to you, they're already just about at the adult stage and they've already been through a lot in their lives that have put them into boxes unfairly. And so you have to decide, are you just gonna keep them where they're at or are you gonna have lots of ways for them to go where they would like to be?

09:34 Liz Yeah, we discussed something sort of similar to this with respect to graduate programs over the years, which is this idea: are we training or not here? Is the idea to take students with a range of backgrounds and lift them all up, or is it to take those who already have the advantage and give them more? If we're always selecting students that already have the skills needed to be successful, then what is the point of undergraduate or graduate education [laughing], right?

10:11 Jason One of the problems is that you'll always have brilliant scientists out there that are just gonna be succeeding, writing interesting papers, doing creative work. There's lots of ways where you could look at a system and say that we produce great science here, but you're certainly not going to see the students that *could have* produced great science and come up with ideas that no one else has really delved into, but they just didn't have that support. You won't see what you've lost.

10:43 Liz I loved having all these sort of incoherent thoughts I have about teaching put into this really clear and concise thing. But one thing that I did wanna ask you about was just how your personal history influenced anything that went into this paper or even your current job, because you do kind of have an unusual trajectory where you went right into working in this teaching environment without a PhD, without a postdoc. I wonder, did you have early experiences doing research as an undergraduate?

11:23 Jason When I went to college, I started working in the lab since I was an undergrad, since freshman year. I thought that I would go to the life sciences building and I would start at the top floor and every year just work on a different floor and just try everything. Uh, I stayed on the top floor (Ecology and Evolution) and worked there the whole time, but I was always interested in the lab work. Then in terms of PhD or no PhD, in some ways I felt like it's something that I'll probably do when I'm sixty or something I'll think about doing.

Liz I love it.

Jason I'm always a kind of backward person in that way so having a chance to work with students of many, many different backgrounds, it's really rewarding to see that.

To make a very long comment short, this paper is sort of reflective of the fact that we really owe it to every student to give them the best possible experience. We don't wanna criticize the teachers for not doing it, but we wanna criticize the system for not providing the support to do what we know works best.

12:34 Liz Yeah, exactly! Actually, I had a conversation with our provost. He had sent out this tweet that was like, "Nobody should be using lectures in science education ever again." And I was like, "Well, fine for you to say, but that's how we were all trained." So where do we have the space and time to learn how to do this differently? Instead of escalating things, he just invited me to come talk to him. We talked about teaching-learning sabbaticals and all these ways in which it would be great to give faculty the opportunity and training to make these important pedagogical changes without asking them to do it the first two weeks of January, which is also when everybody's writing their NSF grants. You know what I mean?

13:23 Jason Well, in a not related but somewhat related preprint to this, we basically suggest that for about fifty million the country could invest in a center which would support teachers in making that transition, train them in making that transition, and even give them course-based research experiences that were very relevant to their sub-discipline or their specific interests, and make it easier for them to bring research experiences especially into the freshmen-sophomore realm where that's where you kind of retain students and increase graduation rates. And again, for all students.

14:01 Liz I was so skeptical of that idea that freshmen would be capable of doing undergraduate research, but they've really made that work in such a spectacular way. Now you see undergraduates who have had three, four, five research experiences by the time they hit their senior year and they understand so much about how research works. It's really amazing.

Jason Agreed.

Liz We kind of touched on this a little bit, but I wanted to come back to this idea of how the activities that we often associate with the idea of diversifying STEM typically involve changing the behavior of the minoritized population, right? They should behave in a particular way or we need to get them up to a particular level, or extra meetings for the minoritized students, et cetera. One thing that you say in your paper is that that's not the way to go. Instead, majoritarians need to be changing our behavior; the teachers, the instructors, and also the systems need to change.

One thing I was thinking about was that in some ways the COVID pandemic forced systems to change. It forced teachers to start teaching remotely - which of course had a wide range of impacts, but one thing it did was to make courses more accessible and inclusive in some ways. I know in other ways they didn't. There are lots of other ways in which we can think that COVID changed things, but it seems like the systems that COVID changed are now sort of in the process of returning to the way things were. Something that we're struggling with here is how much do we want to return to the way things were? What can we bring with us and how do we take the students along with us? Do you have any thoughts about returning to teaching and how to do that in a way that brings lessons with us from the COVID era?

16:16 Jason I don't know. I guess the answer is "I don't know" because I don't have the general university teaching experience. I kind of understand from faculty that I work with what it's been like for them. But I think across all domains it has to be an honest look back and an honest discussion especially among people who might not voice their opinions or feel that their opinions are important, but you actually have to actively collect those opinions and then respect those opinions on what they think is needed in order for them to learn best.

16:53 Liz For our Intro Bio courses, the class has been hybrid I think for the last couple of semesters and so they're trying to collect data on how students do if they only attend by Zoom and/or if they come back in person. I think that will be interesting to look at those numbers and to also, as you say, ask ourselves if there's a big difference, who are the students in each of those populations and how might they best be served? Not just by saying, "Well, students come in-person do better. So now you have to come in-person -

17:27 Jason I think another angle of it might be also that there's always gonna be majority-minority, where 80% of people want something and the other 20% want something different. How can we make that less of a zero-sum game? That might be the optimizing factor to sort of say, "Wait a second, we don't have to make it so that there's just winners and losers," but that there could be equitable solutions for everybody. But again, for that to happen, that may mean that there's significant resourcing and that the universities and that

others will need to provide those resources or the students will need to demand them or faculty too.

18:09 Ivan I guess that's always the question. If the answer is "You need to do both", how do you do that without just putting all the burden on somebody to do more for less.

18:20 Jason Yeah, there's definitely balances that need to be struck in one way. Maybe those conversations would not have even been entertained before. It's like: try to make sure we don't lose the momentum or lose the memory of the fact that no, wait a second, we did have a solution that wasn't perfect but it was closer. So can we do better when we actually have time to sit and think and then align resources to what the real needs are.

As we "get through the pandemic", things will wanna go back to where they were. Everybody wants to default or the majority wants default, and I'm part of it, right? I consider myself an able-bodied person who didn't necessarily [need] close captioning or other features from virtual conferencing. Those weren't necessarily things that I counted on, but others do. One, I think it's incumbent upon everybody who has roles in teaching, in organizing conferences, and thinking about how we include all scientists to really do some thinking and some questioning and raising these issues among colleagues who are also involved to sort of say, "Look at what we were able to accomplish." I think everybody was tweeting and conversing about, "We've gotten so many more attendees from countries that we would've never had participate." Or everything from people who were neurodiverse or had different abilities commenting on, "Wait a second, you told us before it's not possible to hold a virtual conference and then all of a sudden it becomes possible." When the majority sees that it could, that's what their choice is.

20:09 So I think it's a matter of honesty and it's a matter of really listening to people and their opinions (or really their experiences or lived experiences) to say that we can do better. I certainly love in-person conferences and I feel I'm more effective at an in-person conference than I am at a Zoom meeting where I'm totally gonna be distracted and have other things to do. Is it possible to do both? I hope so and I think. We had a conversation in one of the



communities I'm involved with called Life Science Trainers where we had that specific discussion about what do we wanna retain.

I remember one group there who does training in Australia (Australian Biocommons group), they commented that many of their normal workshop attendees actually preferred the virtual experience because, in their case, everybody so spread out; it meant that they didn't have to do as much travel. I think there's lots of individual decisions that need to happen for different organizations, but there's a common playbook of what's possible now that we can't throw away because we need to include people who weren't included before - couldn't have the same experience.

21:28 Ivan As you mentioned, we're seeing at these online conferences so much more inclusion in terms of the number of people attending and being able to at least view the talks. But I think there is a strong sense that there is a lot that you get out of an in-person meeting that is more than that, and that people have really, really missed. So, I think, at a lot of meetings there seems to be a real desire to get back to a mostly in-person meeting, whereas you recently organized a conference that was (again) all online, totally intentionally and unapologetically.

Can you tell us a little bit about why you guys decided to do that and what you learned out of it?

22:21 Jason Sure. So that wasn't my idea, [joking tone] if anything went wrong with it. No, it was actually the idea of Jeffrey Rosser at UC Davis, and also some other co-organizers who he pinged. As many were disappointed about the lack of online conferences and one of the big ones that we normally attend being canceled two years in a row, obviously people love in-person and I do too - love seeing people and getting a chance to talk and all of that stuff.

But at the same time, conferences I think are tremendously important to people who are really early in their career as a chance to showcase their own work and have a forum for what they're doing that goes above and beyond just the publication (which is great) but they also wanna be able to share what they're working on at many different levels.

23:17 In an in-person conference, there's basically gatekeeping which is not referred to as gatekeeping, right? Because there's the price of the conference (which is the gate, even though you walk through it and don't even notice there was a gate cause you had funding), there is the location of the conference (which is a gate), if you're coming from the other side of the world there is the selection of talks (which is a gate). Okay, yeah, there should be some mechanism to screen talks, but oftentimes in an in-person conference, the limitations means that a lot of things just won't have a chance to get presented.

So we put together this conference with co-organizers on different continents and time zones and made it a 24-hour thing so that literally it could not only be virtual, but could also have sessions which are happening during your time zone rather than forcing people to stay up awake.

24:15 It was the effort of just a few people. It was quite low budget. We did have some sponsorships, but it just showed that with just interest and a few people volunteering their efforts, it's possible to do this. Shouldn't that be possible for every scientific society to have a real investment in virtual programming that's at the level of a conference, so not just a webinar that happens occasionally? There's so many things that we need to rethink about conferences because they are so important to people's career. How can we bring the good stuff that we've learned back into them?

24:58 Ivan I totally think that's great and I do think as a mechanism for sort of getting your science out there (seeing what other science sciences out there); I think there's a lot to be said for these virtual conferences. How much of the other parts of conferences were you able to sort of get rolling?

25:18 Jason We certainly had . . . we tried to organize sessions there where there were a couple of keynotes - so a keynote to anchor every four hour block across the twenty-four hours. Then we had networking time where people could use Gather.Town.

We were hoping to try Zoom Events; there's actually this whole cool conference platform. Unfortunately it would've excluded people from China

because they would need to have paid accounts. It's not Zoom's fault entirely; it's the government's fault there. We made conscious choices to try to be as inclusive as we could.

25:59 Ivan Did it work?

25:59 Jason What we did worked in terms of trying to give spaces for people not only to see talks but also to talk with each other, which is a really valuable thing. We'd love to do it again next year, including more options for posters and lightning talks. Then everything goes online.

I think if I look back at my notes, we had something around almost more than eighteen hundred hours of watch time between the webinars and the people watching on YouTube. It was possible for a small group to do this, so I think everyone, every society or every group that has a specialized domain could think about how they could incorporate these things to make it possible. And it doesn't have to compete with if you have your in-person too or hybrid there, there's multiple ways that everything can win, I think.

I was involved in the technology needed to bring this conference together. We needed a Zoom account with webinar functionalities (a couple hundred dollars); we needed a place to upload files (which is a hundred dollars a month); a YouTube account was free. It's really people's time and it really is other things. I don't think it's really the technology cuz we did it on a shoestring budget. That doesn't mean that those costs aren't real.

Liz I see

27:33 Ivan I think it is true that you can have a totally virtual event for relatively cheap, but there are things I think you miss. I have had a lot of trouble with Gather.Town personally, just getting around it glitching and it's just really hard to actually have a conversation. So the spontaneity of walking around and talking to people, I think there's still a long way to go in these virtual spaces.

28:07 Jason I agree. And also I don't wanna minimize the fact that there are other costs - everything from reviewer time or other things that have to go behind it. Because if you are asking the same people who put on the in-person

conference to also put on the conference for this, you've now doubled the time that they need to be paid. Yeah, it's not perfect. The question is: might that be a better solution for someone who it's just completely out of the question for them to make it into the in-person conference, how can we do both? How can there be . . . I don't wanna say counter program, but a virtual stream to a conference where people who attend that conference then look in on the sessions that are happening; people who give an in-person talk and a virtual talk can do so with basically the same level of ease, if that's possible, if they're virtual. As the conference has in-person networking things, then there's online versions. It won't be the same but it might be, for people who have no other option, significant improvement over absolutely zero. So I guess that's what we're . . . [laughs]

29:17 Ivan I guess one question I keep coming back to is how important is it that talks at conferences are presented live and not recorded at all? The reason that I go to conferences is almost never the talks. Now I'm not a trainee anymore and so maybe trainees might have a different view, but I think most people the in-person conference is not about the talks. So by saying, "Well, we have to have these in-person talks that we somehow have to record and make available," it just adds huge costs to everything.

29:59 Jason Not only do I agree, but I also think that for people like myself who're constantly getting Zoom burn from being online too many hours with all these meetings and things like that, when is the last time you've watched the Zoom recording of a meeting that you missed or webinar that you missed? I would say it's fairly rare that you've ever gone back. Sometimes I have to, but you know, most times I avoid it if I could. So I agree with you that we need to rethink the structure of conferences significantly.

Would a conference be better if it was really topical discussion sessions, where everybody had a way to participate and talk about, you know. Would just like a three-day poster session where everybody presents their poster, would that be more effective than a conference where you sit in a room and, you know?

- 31:00 Liz        Yeah, I mean I hear everything you guys are saying but the one thing I wonder about is the emphasis on networking. I worry that if we return emphasis to networking and meeting people and having people see your face, then we again privilege those who can attend in person. We emphasize these sort of . . . I don't know. I would like to deemphasize who you know, and emphasize what you're doing more. And so one thing I think about when I think about the return to in-person with all of the benefits that we've talked about, I worry a little bit about emphasis on networking, which is just so unavoidable.
- 31:56 Jason      I think it's a true statement, right, because there may be people who giving a live talk for them is virtually impossible for various reasons that they're not gonna be able to really deliver it for that ten or fifteen minutes. Whereas if you gave them their own time and they could make a video and carefully edit it and they chose to present their work in that method, that would be fine, but they actually really would vastly prefer and do better on a medium that's different.
- So maybe the question is sort of what are the different media that people would choose or would want to present themselves in or they're work in, and how can we allow for all of those to have as equal footing as possible? I also wish the whole thing about, "It's who you know versus what you do", those are probably some personal things that we all have to work on to realize that people may present to us if we're deciding on who we wanna collaborate with or who we'd like to hire or what students do we wanna work with.
- 33:03             Those are personal things for us to become more aware of other people's preferences and backgrounds and contexts, so that we minimize biases wherever we can.
- 33:19 Ivan        I totally agree with Liz that networking in general is exclusive because it's hard to do if you can't be in-person. But I think it's immensely important for just the way our society works.
- 33:38 Jason      One, I don't know that you wanna get rid of something because some people will like that and that will be the best thing for them. Even the people that you

might think were excluded by it, actually, that might be what they prefer. I think it's kind of: how do we figure out what all the options are; and then also once we figure out what those options are, how do we make sure that if someone has a particular option . . . okay, we make that option available to them, but in the end that option really won't help you. It won't be considered; it won't be factored in. Just like we do now, not everyone can give a talk in a conference format on a schedule that has eight slots for speakers. But then we say, "Well, we have posters."

34:28 It's true, but you know what, if you're a trainee and you are counting on hopefully being seen in the concept of a talk, the poster is not necessarily equivalent. There will be people who seek you out. So it's a matter of asking what all the options . . . also, other cultures in completely different ways and completely different protocols for dealing with people who are strangers to them and how they decide or do not decide to interact with people whom they don't know. That could also happen for genders, right? It's really about trying to expose what we think is the default and saying that what's default is what has been, but it's not what it has to be. What do we need to completely break apart and restructure? Cuz a more than just what's exposed by COVID. COVID is just the latest example.

35:22 Ivan I think there's two parts of that. One is what do we think is good and what are the options?

35:30 Jason [Interrupting] And then also, who's the "we"? Who's the "we" when we say that we think it's good? [Laughs]

35:35 Jason Yes, well, "we" as as an inclusive community or a scientific society. Historically, the emphasis has been on one (maybe two) large in-person meetings and most societies are trying to go back to that. Let's sprinkle in a bit of a bit of hybridness somehow because a) we're locked into a contract with a large venue, and b) it's really expensive so we'll put some talks online. I'm really interested in rethinking that because I think that is just gonna lock in sort of the worst. Keep the bad, throw out the good of what we've learned. Does it make sense to have these really large meetings at all? You know, the plenary talk at ASPB is in a room so large that you cannot see the speaker.

You are watching a video presentation; you just happen to be in the same room as the video presenter. Stream it! I'll watch it whenever. That's not what's valuable to me. Why would we put in big money to be able to do that? If you drop that, can you bring the cost of the meeting down a little bit and then make it more affordable for some people? I feel like we're just not having that kind of discussion at all.

37:07 Liz

Usually when you're talking about whether it's a science scientific society or even our own little online thing, you're already starting from a position where the people who are making decisions are the people who have *time* to make those decisions, and they can take time out of other things to decide that. Automatically you're starting from a place where there's gonna be people making decisions who may not reflect your needs or your reality. How do we restructure things?

I guess the question is: will scientific societies and/or will any kind of convenings that support these these things - how much do the individual members actually exercise their voice and/or how well are they heard? That's a question, and again it comes down to those voices that are not being served may be very small. But if they're not listened to, why would they stay? Then you ask yourself later like, "Why aren't those people represented at our meeting?" It's like, well, you already told them a long time ago that they won't be listened to so they're not coming.

38:21 Ivan

Societies aren't really built to change that easily, you know? Either you have a rotating presidency so you're only doing this for a short time and some of changing sort of the direction of the freight train takes a lot of time. We have an election every year for the next leaders of our society, but they're not necessarily campaigning on a vision of "how I'm gonna change everything" because they can't. They're there for a limited time and so it's not as easy to hear everyone's voice and come to a "consensus" and change directions.

39:02 Jason

Maybe let's sort of step back. I guess the real conversation to have (cuz I agree with you on things you said) is: is any scientific society serving its purpose? What are the goals of the society? How can you come up with metrics and policies and principles that hold everybody accountable, and that

“the least of us” can say something and actually really feel that they're being heard? That's a challenge for every single human organization. They all are flawed in very similar ways, but can we do better?

39:41 Liz           Something we did for the *Arabidopsis* meeting last year that was held in Seattle was to have like 50% of the sessions be community-organized. That ended up bringing a bunch of people into the meeting who none of the organizers knew.

39:58 Jason        One thing that I don't think that's happened that'd be a great outcome of anybody that's listening to this, is to my knowledge there hasn't really been any way to convene or any convening of people who organized these conferences to get together and actually share what you just shared.

Liz                A conference on conferences?

Jason            There probably needs to be. Maybe there's a lot to learn from even smaller conferences who are more connected to their communities, and sharing some of those great ideas and innovations.

40:29 Ivan         Jason, this was great - wide ranging and super interesting. Thank you so much for giving us your time. If people have other thoughts, wanna get in contact with you, how should they do that?

40:40 Jason        Yes. Folks can find me on Twitter, @JasonWilliamsNY, or also my last name, williams@CSHL.edu. I'm happy to have conversations with folks.

40:51 Ivan         Okay, and Liz, how can people get in touch with you?

40:55 Liz           As always, people can find me on Twitter at @EHaswell

40:59 Jason        And you can find me on Twitter at @BaxterTwi and you can find the podcast on Twitter at @TaprootPodcast. And with that, thank you so much, Jason. That was awesome.

41:11 Jason        Awesome. Thanks, everyone.

[Theme music]



41:37 Ivan

The Taproot is brought to you by the American Society of Plant Biologists and the Plantae website. It is co-hosted and edited by Ivan Baxter and Liz Haswell. Transcripts are by Jo Stormer. If you like this episode, tell your friends and colleagues and be sure to subscribe on iTunes or in your podcast player of choice. Thanks for listening, and we'll bring you another story behind the science next week.

[Theme music]