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BARBARA A. SCHAAL

PCAST

Transcript of an Interview
Conducted by

David J. Caruso and Kenneth M. Evans

via Zoom

on

26 May and 30 June 2022

(With Subsequent Corrections and Additions)

Courtesy of Washington University in St. Louis

Barbara A. Schaal

ACKNOWLEDGMENT

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BARBARA A. SCHAAL

1947	Born in Berlin, Germany, on 17 September

Education

1969	BS, University of Illinois Chicago, Biology
1971	MPhil, Yale University, Population Biology
1974	PhD, Yale University, Population Biology

Professional Experience

	University of Georgia
1973-1974	Research Fellow
	University of Houston
1974-1976	Assistant Professor of Biology
	Ohio State University
1976-1980	Assistant Professor of Botany
1976-1980	Assistant Professor of Genetics
	Missouri Botanical Garden
1980-present	Research Associate
	Washington University in St. Louis
1980-1986	Associate Professor of Biology
1986-present	Professor of Biology and Genetics
1993-1997	Chair, Department of Biology
2008-present	Mary Dell Chilton Distinguished Professor
2013-2020	Dean of Arts and Sciences
	Society for the Study of Evolution
1988-1991	Executive Vice President
1994	President
	Molecular Biology and Evolution
1993-1999	Associate Editor

	Botanical Society of America
1995-1996	President
	National Academy of Sciences
2005-2012	Vice President
	President's Council of Advisors on Science and Technology
2009-2017	Member
	United States State Department
2012-2014	Science Envoy
	American Association for the Advancement of Science
2016	President
	Supporters of Agricultural Research Foundation
2019-2022	Member, Board of Directors
2022	Chair, Board of Directors

Honors

1980	Sigma-Xi Research Award, The Ohio State University
1993	Elected Fellow, American Association for the Advancement of Science
1998	Distinguished Faculty Award, Washington University
1999	Botanical Society of America Merit Award
1999	Elected Member, St. Louis Academy of Science
1999	Elected Fellow, National Academy of Sciences
2004	Wilbur Cross Medal, Yale University
2006	Elected Member, American Academy of Arts and Sciences
2009	Honorary Doctor of Biological Sciences, University of Illinois Chicago
2011	Honorary Doctor of Sciences, National Cheng Kung University
2013	Distinguished Scientist Award, American Institute of Biological Sciences
2019	Public Service Award, National Science Board
2023	Elected Fellow, American Philosophical Society

ABSTRACT

Barbara A. Schaal was born in 1947 in Berlin, Germany. In 1950 the family immigrated to the United States where they met her aunt and uncle (her father's brother) in Chicago, Illinois. As Schaal grew up, she started to learn English by playing with kids in the neighborhood. Once she reached school age, she attended Audubon Elementary School. In second grade, she had a teacher who allowed the students to grow bean seedlings and take them home, which initiated Schaal's lifelong interest in plants. As a child, she experienced discrimination as a German and was called names like a Nazi or a DP (for displaced person). In 1956 she became a US citizen after successfully answering a number of questions posed by a judge in Chicago. By the time she was a teenager, she had a love for science. She was a voracious reader and loved to spend time outside and play with her chemistry set. She even regularly visited a neighbor with a cactus collection and began developing her own collection. Although Schaal loved science, especially her high school biology class, she did not see a career for herself in the field because she thought that girls did not go into science and that she was not smart. She decided to attend the University of Illinois Chicago for a short period of time. Her parents hoped she would meet a pre-medical student, drop out of school, and marry him. A seminal moment for Schaal occurred during her introductory biology course where she set the curve on the first exam by many points. She realized that not only did she like biology and science but also she could do well in it, prompting her to become a biology major.

She became a lab assistant for Donald A. Levin, the professor of her plant evolution class. During her work in his lab, she contributed to different projects and had three or four publications by the time she started graduate school. Although she had originally planned to go into industry, she started considering graduate school when she was a senior, ultimately selecting Yale University to work with Don Levin who had been recruited there. As a "blue-collar kid from Chicago" and an immigrant, Schaal struggled to transition to the culture at Yale, but she came to understand and enjoy it. For her dissertation work, she looked at hybridization occurring between three plants on a particular hillside. Through analysis of the data, she was able to confirm a previously unproven theoretical concept. During her fourth year as a graduate student, she moved to the University of Texas to finish up her dissertation under Don Levin, and she met her future husband, Joe Leverich. She finished her work in 1973 and began a postdoc at the University of Georgia with Wyatt W. Anderson studying oysters. After completing her postdoc, she joined the University of Houston as an assistant professor. However, Schaal soon realized Houston was not the right place for her and began pursuing other options, ultimately accepting a position at the Ohio State University. Although she had a lot of freedom in her work, there was discomfort among department faculty members at Ohio State because she was a woman. During her time at OSU, Schaal continued the allozyme work she had begun as a graduate student.

While at OSU, Peter H. Raven invited Schaal to give a seminar at Washington University in St. Louis. After a successful seminar, the biology department at WashU invited her to apply for an open position as an ecologist, which she received. Coming in with tenure, she began putting together a large research laboratory. After a period of time, she became more interested in crop plants, which stemmed from working with a Rob Bertram, a USAID officer,

on cassava. During this time, she and her husband also started a family—a daughter and a son. She joked that her children are "academically spaced"—the first after tenure and the second after full professor. As her children grew up, Schaal and her husband introduced them to the scientific life, even bringing them to the lab on occasion. Shortly after becoming a fellow of the National Academy of Sciences, Schaal co-chaired a National Research Council committee with Harold Varmus, and several years later, Varmus called her about serving on PCAST, which she accepted. She discusses her reflections of the first meeting that President Obama attended, the reports PCAST worked on, specifically the agriculture report that she co-chaired and the aging US population report, "socializing" the reports, and John P. Holdren's rapport with the president. Schaal gives recommendations for the co-chair positions on PCAST and notes the importance of having a wide range of expertise on PCAST. She also discusses her work outside of PCAST, including serving as dean at WashU.

In 2012 Schaal participated as a science envoy to Colombia and Uruguay, and in 2016 she became president of AAAS and worked with the director, Rush Dew Holt, to make AAAS a "force for science." Although she had planned to visit colleagues in Asia after stepping down as dean, she was unable to travel due to COVID and instead spent her sabbatical designing two new courses: one on science policy and another on plants, people, and the environment. Schaal concludes by mentioning the shift she has seen in recent years toward science policy, as student have increased concern about the environment and climate change, as well as a desire to do something different than the traditional academic life.

INTERVIEWERS

David J. Caruso earned a BA in the history of science, medicine, and technology from Johns Hopkins University in 2001 and a PhD in science and technology studies from Cornell University in 2008. Caruso is the director of the Center for Oral History at the Science History Institute, president of Oral History in the Mid-Atlantic Region, and editor for the Oral History Review. In addition to overseeing all oral history research at the Science History Institute, he also holds an annual training institute that focuses on conducting interviews with scientists and engineers, he consults on various oral history projects, like at the San Diego Technology Archives, and is adjunct faculty at the University of Pennsylvania, teaching courses on the history of military medicine and technology and on oral history. His current research interests are the discipline formation of biomedical science in 20th-century America and the organizational structures that have contributed to such formation.

Kenneth M. Evans is a scholar in science and technology policy at Rice University's Baker Institute for Public Policy. He received his BS in physics from the University of Virginia and his MS and PhD in applied physics from Rice University. His research focuses on the history and organization of the U.S. federal science advisory and policymaking system, with an emphasis on the role of the White House Office of Science and Technology Policy.

ABOUT THIS TRANSCRIPT

This interview was conducted as part of the project, "The President's Scientists" (NSF SMA SBE #1854055). The goal of the project is to improve and expand existing knowledge of the role of the President's Council of Advisors on Science and Technology (PCAST), and its impact on U.S. federal policy. This project examines the working nature and policy impact of the council by compiling and analyzing presidential archives and university collections of former presidential science advisors, including developing a digital archive of this material (https://whitehousescientists.rice.edu/); and conducting oral history interviews of former PCAST members to determine their perspectives on PCAST, as well as their personal histories before and after their tenure on the council.

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INTERVIEWERS: **David J. Caruso**
Kenneth M. Evans

LOCATION: **via Zoom**

DATE: **26 May 2022**

CARUSO: [. . .] So I'm David [J.] Caruso. I'm here with Kenny [Kenneth M.] Evans. We're conducting an interview with Dr. Barbara [A.] Schaal as part of our President's Council of Advisors on Science and Technology project. Today is May 26, 2022, and we're conducting this interview via Zoom. So I know, Dr. Schaal, you were born in 1947 in Berlin, Germany. My first question for you is, were you in East or West Germany when you were born?

SCHAAL: So I was born in West Germany, probably very close to the border between East [and West] Germany. And, of course, when I was born and even the early part of it, there wasn't such a large barrier between East and West Berlin. That came a little bit later. And I've had relatives that were in East Berlin and in East Germany.

CARUSO: Okay. And can you tell me a little bit about what your parents were doing in Germany? Were they born and raised there? Did they migrate there?

SCHAAL: Yeah. So my family has a long history being German. My father [Gerhard Schaal] was born in Berlin actually in the same house that my mother [Aneeliese (Behnke) Schaal] was born in and [also] the one that I was born in. My grandfather was an architect, and he was able to develop a way of building these apartment [buildings] on very sandy soil. And so that actually . . . for my mother, that actually provided finances for the family. Her father died very early when she was quite young. And that family was supported by the rent from these apartment buildings. And one of the renters was ultimately my father and his family.

CARUSO: And what did your father do?

SCHAAL: Well, he was for a long time a soldier in the German army, because he was drafted, as everybody was of that age, because he was a young man and had tremendous resentment of that because he felt like he lost a big chunk of his life. And after the war [World War II], then Berlin was really decimated. And so he just worked on odd jobs as . . . whatever he could get a hold of. And I think they were probably . . . . I think we'd call it a gig economy now. So that

was what he did. He worked a lot with motorcycles and cars and fixing them. And that turned out to be something that he ended up doing throughout his life, was working with cars and rebuilding brakes and stuff like that. So he was basically a mechanic, and that's what he did.

CARUSO: And was your mother also working at the time?

SCHAAL: No, she's a very traditional German housewife. And she was a young girl during the war. And I think the war has completely shaped my parents and everybody who was in that because their lives were disrupted. People were killed. The apartment house was bombed. You know, all those sorts of things. So she was during the war as a young girl sent to orchards to help pick fruit during the war. [She went to school, and that was what she did in the summer—pick peaches.] And then after the war, they all worked their way back to Berlin and then very quickly they were married and had me.

CARUSO: So they knew each other prior to or knew that they . . . ?

SCHAAL: I think they did. But there's about a twelve-year age difference. And so I think . . . . I mean, there's these stories of my mother spitting on my father's head because she was a nasty little girl or something like that. I don't know if that's true. One of the things that's really interesting about these stories from families—and I'm sure you've heard this—is they get embellished throughout the years. And so it's very hard to know what really happened. But they do become, sort of, these legends in the family.

CARUSO: So you were born in '47. I know that you became a US citizen in '56. Were you in . . . were you raised predominantly in Germany up to that point, or did your family leave?

SCHAAL: No, we immigrated in 1950. And it's really . . . to me, this is really interesting because my dad's family had relatives in Chicago, [Illinois]—both his father and . . . no, actually, not his father. His father was still in Germany. His brother was in Chicago. So they—the young family—they were sponsored by my uncle to come to the United States. They went across—we went across—the Atlantic Ocean on a converted troop carrier. And one deck was for the men and the other deck was for the women and children. And I think it was pretty rough crossing because it was wintertime in **<T: 05 min>** the Atlantic. And they came along with me and two suitcases and so arrived in the United States basically almost penniless because they needed to buy things on the ship in order to make things a little more comfortable. And so then after landing in New York and going through immigration, they then got on a train and took, I think, an overnight train ride to Chicago and were then met by my uncle and his wife.

CARUSO: Given your age, I'm assuming you don't actually have memories from your time in Germany or even the transatlantic . . .

SCHAAL: You know, memories are funny things. And I sure . . . based on what psychologists tell us. I have these memories, some very . . . like vignettes, and I don't know if they're true or not or if it's something that was introduced as a memory. One of my friends is Elizabeth [F.] Loftus, and she deals with false memories. So I'm a little bit careful with those sorts of things. I do remember being on the ship and on the train ride and then very clear memories once we arrived in Chicago.

CARUSO: Okay. Did your parents speak English before migrating? No. Okay. So only German or any other languages that they spoke?

SCHAAL: No, just German. Well, you know, actually, I don't know if they spoke any other languages because it was so common in Europe. Good question.

CARUSO: And the family that . . . your father's family that was in Chicago, what part of Chicago were they in—the city itself or one of the suburbs?

SCHAAL: It was one of the suburbs: Skokie, Illinois. And my uncle . . . my dad's side of the family before the war was involved in the "hospitality" business. My grandfather worked at the Adlon Hotel, which is this really famous hotel in Berlin, close to the *Brandenburger Tor*, or the Brandenburg Gate. And so he worked there, and he apparently for a while was a cheese buyer and would go to France and buy cheese for the hotel. You know, again, this is what I've been told. I'm not sure we can verify that. And so my uncle was also, kind of, in the hotel business, but he was the chief bartender at the Ritz Carlton in downtown Chicago, which was a really, really fashionable place to be at that time. So that was what he did. And he looked just like Humphrey Bogart. It was apparently quite a scene.

CARUSO: So you pretty much grew up in Skokie?

SCHAAL: No, we stayed with them for a little while until they found an apartment. And it was a basement apartment in Chicago.

CARUSO: Okay. So you . . . so roughly what year was that, would you say?

SCHAAL: That was probably 1950, I'm sure, because that was my uncle had a small house and they wanted to get out as soon as possible, I mean, just because it's crowded living conditions and you don't want to . . . what is it like "fish and guests smell after three days" or something like that?

CARUSO: All right. So you were in Chicago itself. You were roughly three years old at this point in time. Do you have any early recollections of what life was like in Chicago at that time and obviously beyond just your three years of age? But what were some of your earliest memories of being in the United States, maybe exploring the city, things like that?

SCHAAL: I remember quite a bit from . . . there was a couple of different residences that we had. Ultimately, we ended up in the same apartment building as my grandfather. But I remember very strongly playing with children and really enjoying that. Apparently, I was learning English by starting to play with the kids, although I was apparently insistent sometimes on calling things German names and trying to get the other kids to call them the German names, which was not a good thing because we just, you know . . . Germany had lost the war and being German wasn't a great thing to be at that time. But I do remember that. I remember going to school and liking school, and I remember playing in the playground—I really loved that—playing tetherball. And then when we moved to where my grandparents were, it was . . . we developed . . . . I had friends there—I remember that—really good friends, and we'd run around, and there were some commercial buildings and so we'd go through their trash and collect all of this really cool stuff. One was <**T: 10 min**> a card manufacturing place, so we had shiny things to play with. And [we] played a lot of street games and roller skating and street baseball and things like that.

CARUSO: Did you actually call it stickball, or did you call it street baseball? I'm from New York City, [New York], so we used to call it stickball.

SCHAAL: We called it baseball. Lots and lots of stuff like that. And then when we moved to . . . my parents had the American dream. They bought a house in 1956 and were really, really thrilled with that. That was a huge thing for our family. And it's a little suburb called Bellwood and blue collar. Everybody worked. There were lots of kids, and it was, sort of, like this American upraising—dream—once we got there. They . . . lots of games, lots of . . . you know, in those days, kids played outside. And so on Saturday morning, everybody would just run out of the house and then we just did all of these games. So lots of bicycle riding and roller skating and playing baseball and catch and stuff like that. It was a really very, very active childhood—a lot of physical things.

I remember one thing that probably is seminal for me when I was in inner city Chicago, and I went to Audubon [Elementary] School, we had a teacher that allowed us to grow something. And so I was able to . . . it was just like one thing. It was a tray of soil, and we put

bean seedlings into this. And I remember being just amazed that you took the seed and you put it in the soil and there were these plants. And so I got to take those plants home. And I think that was the beginning of being really interested in plants was this teacher in inner city Chicago giving me a tray of bean seedlings.

CARUSO: And so this is while you're still relatively young, like maybe first, second, third grade?

SCHAAL: Probably second grade.

CARUSO: Second grade. So your parents didn't speak English when they came to the country. Were they taking classes to learn the language?

SCHAAL: Nope.

CARUSO: No. So it was just something they were picking up on their own? Okay.

SCHAAL: So this is very different, you know, now when somebody comes in from a different country, there are classes. I'm not sure there even were any at that time. It was much more just getting thrown in the middle of something and adapting. And my parents were so grateful to be in the United States because Berlin was in terrible shape. It was completely bombed out in many areas and no opportunity for employment. There were stories of . . . when I was a kid, I had ear infections and so my dad rode a bicycle around trying to find some medicine for my ear infections. These stories that are hard to imagine. I mean, I can't imagine that because I don't remember those times like that. So anyway, the American dream. It was . . . they were very, very happy. And my mother spoke English fairly well. My dad was okay with it, but still had some trouble with it. I mean, he never . . . he was older, and so it was a little harder for him, I think.

CARUSO: And that's . . . my line of questioning was actually coming to that. I was curious to know whether or not you as a young child picked up English faster than your parents. And if so, then did you have to serve as a translator for them?

SCHAAL: I picked it up really fast, apparently. I probably on occasion did as a translator. But my mother picked it up pretty quickly, although both my parents always spoke with accents.

CARUSO: Okay. Do you remember from a young age, given that you were in the United States not too long after the end of the war, was . . . did you ever feel resentment from anyone that you met in Chicago for being German, from coming from Germany? Was there any sort of lingering, like I said, resentment or hostility because of the war?

SCHAAL: Yeah, there was that. At that time, being German was not a good thing. And so I always felt somewhat like . . . . I felt that I wasn't part of the . . . that I was different, that I wasn't part of what the American kids were. I was always different. There were some occasions where people called me names like a Nazi or a DP, and I didn't know what a DP was—displaced person. So there was some of that, and that lingered, I would say, throughout grade school and a little bit into high school. You know, it's one of these things that it's good for you if it doesn't kill you. And I think for me, it was really important ultimately to know that I was different because then wanting to go into science at that time, that was not what most girls **<T: 15 min>** did. But I was different and so it was, sort of, comfortable to do that in a way. And so I think the tray of bean seedlings and being German at a time when it wasn't the best thing to be was probably helpful ultimately although, you know, there were times when it was not fun. It's not fun to be the other when you're growing up.

CARUSO: And so life in Bellwood, you said, was relatively normal in terms of your doing normal kid things, playing outside, baseball, whatever else was going on. Now I know that you became a citizen in '56. Was that something that you . . . were you enrolled in classes to become a citizen? Was it just that your parents were becoming citizens and you became a citizen as their child?

SCHAAL: Yeah, it was . . . so my parents became citizens and then I automatically became a citizen. My parents coming from Germany—and there was no paperwork to show that I was a citizen—my parents coming from Germany and Nazi Germany where papers were really, really important—really important—made me go through and get naturalization papers myself. And it's a different kind of form, which I didn't realize until I had to go through a security clearance. And so at that point, it was through a court in Chicago. And actually, I still remember this. The judge asked me a whole bunch of questions, but I'd been in school—I didn't know there was going to be questions—but I'd been in school, so it was easy enough to answer. But that was in '56. And it turns out that I'm really, really grateful that my parents were paranoid because there's been a couple of cases—we've seen them in St. Louis, [Missouri]—where people were in analogous situations to me, where they were an immigrant very, very young. They speak English without an accent. They've really never lived, except in a very small . . . as a small child in another country. And they don't have that paper, and they get . . . INS [Immigration and Naturalization Service] comes and they get deported. And then it was also very useful because I had documents when I had to go through all of the paperwork to get a security clearance. So that was very, very useful. And I was really grateful ultimately to my parents for making me do that.

CARUSO: Do you recall at the time if you felt that there was significance to going through that process? Were you . . . did you have some sort of party afterwards—now I'm an American citizen—or was it just, kind of, you grew up here, so it wasn't . . . ?

SCHAAL: Yeah, yeah. I was . . . . Nineteen fifty-six. So yeah, I was nine years old, and I think I didn't realize the magnitude what that really meant. But yeah, my parents tried to be citizens as soon as they could.

CARUSO: I know that not soon after was also Sputnik, right? That was 1957, nineteen fifty . . . . I'm blanking on the specific date. But it was not long after your citizenship that Russia had launched Sputnik in space. People were afraid of what that meant—hearing that beeping noise, satellites flying overhead. This was also the period of time where you could, kind of, date this to the beginning of the Cold War. I'm wondering if at that age you had an understanding of the significance of what Sputnik was. Did your family respond to it? Did people in your community respond to that?

SCHAAL: Yeah, I think it was a really big deal, particularly in school. I remember that—talking about it in school. And I think my parents were much more sanguine about it. My parents basically were, "We made it. We came to the United States, and now we're just going to live here and go on with our lives." I think they were, in general, very nonpolitical. They just wanted to be American. That was just the driving factor. My brother, who was born a couple of years after they immigrated here, and he had a little [difficulty] . . . he was like a normal kid where when there's two languages in a household—both English and German—he ended up taking a long time to learn to speak. And at that time, nobody really cherished the idea that having two languages was a great thing. My parents wanted him to hurry up, speak English, and don't speak German. So he spoke only English. And actually that . . . my first language is German. [I] spoke German I think really till I probably started first grade with some English in there, obviously, but lots and lots of German. And it's **<T: 20 min>** interesting to me the language issue because sometimes I still—I don't speak with an accent—but every once in a while I have some difficulty in particularly pronouncing names that have *v's* and *w's*. That seems to trip me up.

And I learned just like two years ago that that's a well-known phenomenon—L1, L2 interference—where even though you don't speak that language routinely, it's still stuck in your brain. And I think that also has influence. For me, writing was very difficult—it's learnable—I've learned, obviously. But that was the challenge. And so there was, kind of, these language consequences that drifted on even when I started speaking English all the time. But I wasn't particularly great at school. When I was in Chicago, the inner city, I barely passed first grade, and I barely passed second grade. I was all conditional passes. And of course now we know I was speaking two languages, and English wasn't my first language, so of course I wasn't going to do well. But that was . . . . I always thought I was stupid because I just had so much trouble with the language, you know, not . . . . I don't think I was really bad. But it wasn't the same as

somebody who didn't have that . . . an alternate first language. And in those days nobody made any accommodations for that.

CARUSO: Can you tell me . . . so you mentioned this one teacher who had you grow some beans and you became interested in plants at that point in time. Do you recall generally what science education was like for you in, let's just say, in elementary through middle school? Because I know the United States was heavily invested in scientific education. There was still definitely . . . or at the time there was certainly a bias towards male students over female students. I'm wondering if you have any recollections of what science education was like for you in those early years.

SCHAAL: It was interesting because we . . . you started . . . with hindsight now I realize that they started to pull kids out into separate classes. So I was in . . . . I believe it was—actually it was my freshman year in high school—I was in an algebra class that was experimental, and it was super fun. I mean, I just loved it, but that was a group of kids. There was lots of males and a few females, so I was one of the girls in that class. In junior high, we had science, just a general science class. And I remember really loving that, and I also remember doing really well. I remember the teacher being surprised. Same thing with middle school. We had some kind of testing, you know, and I didn't know anything about testing and didn't pay any attention to it. But one of the teachers came up to me and said that I did really well in science in one of these standardized tests, but it never really sunk in that—I remember loving science—but it never sunk in that this was something that I was actually good at. It just didn't sink in.

CARUSO: You mentioned that your family was . . . your parents were very interested . . . they weren't political, but they were interested in the American dream, seeing . . . having opportunity, growth, development. When you were young, were you receiving any encouragement from your parents about what it is they wanted you to do later in life? Were they . . . at this point in time I know there are still a number of universities in the United States that did not allow women to enter their undergraduate programs, right? So it wasn't necessarily assumed at this time that women would actually go on to achieve a college degree or things like that. I'm wondering if you were receiving any guidance or push from your parents about what it is they wanted to see you doing in terms of fulfilling that American dream?

SCHAAL: I think there was a strong expectation that I would finish high school, find somebody, marry, and then have a family. I think that was the expectation of my family.

CARUSO: Okay. A couple of other questions, if you don't mind my asking about your home life during this period of time. Were there things that your family did discuss if they weren't interested in politics? Were they talking about . . . was religion an important component of your upbringing, or was your father—I don't know—talking about . . . you mentioned that he worked

on cars and things like that. Was he talking about mechanical principles or how engines were working or anything like that? What was the general discussion like around the house when you weren't in school?

SCHAAL: That's **<T: 25 min>** a very interesting question, and it does bring back a memory. So we were religious—Protestant—and so that we went to church. I went to Sunday school, I sang in the choir, you know, all of those sorts of things—confirmed and everything else. In terms of home life, my dad was very interested in mechanical things, and we would have these . . . the stories that he would tell us because he wasn't . . . you know, he spent all of his time fixing cars and was in the war and stuff. So there's a lot of things that he missed. But the stories that he would tell us was the story of mining coal and the story of the internal combustion engine. Those were the stories that he told. So that was interesting . . . with hindsight it's interesting because that, of course, brings a very different kind of information and knowledge and topics to a family. So yeah.

CARUSO: Did your father ever speak about his war experiences as time has gone on?

SCHAAL: In war?

CARUSO: Yeah.

SCHAAL: No, he did not. I think it was deeply traumatizing. And he was shot in the war, so we all knew that he had a scar from a bullet going through his leg. But no, absolutely not.

CARUSO: And did your mom talk about the difficulties of life on the home front during the war?

SCHAAL: Yes, she did. She did talk about that.

CARUSO: What would she say to you?

SCHAAL: Well, she would just talk about mainly when . . . after the war, when the Russians came, which is, kind of, apropos now talking there's . . . you know, she said one of the things that happened is the Russians came to the apartment building and they were looting. And my grandmother and her two daughters—my mom and my aunt—they were young, like eighteen, twenty-four or something like that, and hiding them so that the Russian soldiers wouldn't see

that there were young women there. And my mom talks about there was this one room, kind of a kitchen room, and it had a trap door to go down to another room. And so my grandmother put a rug over the trap door and a big chest on top of that. And my mother remembers hearing the Russian soldiers going through the chest and pulling stuff out. So, yeah, and she talked about being . . . having to pick peaches when she was sent out into the countryside to help with the fields.

CARUSO: Now the 1960s was also . . . . I mean, it was a very turbulent time for the US generally: the civil rights movement, [John F.] Kennedy's assassination, Cuban Missile Crisis. There is a lot of stuff that was going on. Did your parents ever express opinions about those aspects of American life, or were they really just, "We're not discussing politics"?

SCHAAL: No, they were concerned about the Cold War. They were very concerned about war coming to the United States because war came to Germany. And so that was a real issue. And they would talk about plans, what would happen if war came, what we would do, where we would meet—those kinds of things. So she was . . . they were concerned about that. And I think particularly with the Cuban Missile Crisis. And then as they became more comfortable, I remember with the Kennedy-Nixon election, that was something that they talked about.

CARUSO: And do you recall who they were for?

SCHAAL: [Richard M.] Nixon.

CARUSO: Nixon. Okay. Did you have any other . . . any sorts of hobbies as a kid? Were you playing instruments? Did you have a fascination with Victorian literature—I'm just pulling at things—chemistry set or other things that you did other than playing with friends and stuff like that?

SCHAAL: I read voraciously. I'd read in the summertime maybe five to ten books a week—just really read a lot. I had a chemistry set, and I survived. I mean, I can't believe we had chemistry sets with all those explosions and stuff. And that was super fun. I was . . . . I went to day camp, and it was out in the countryside at a forest preserve. And I remember really loving being outside like that. And that's something that has persisted. I was a competitive swimmer in high school—not very good. It was just a local park. But that was important. There was something else that . . . it'll come.

CARUSO: Okay. If it comes . . . if you remember later, we can always come back to that.

SCHAAL: Oh, yes. Here's what it is. How could I forget this? There was a woman that lived down the street, an elderly . . . . I thought she was really old; **<T: 30 min>** she was probably about fifty. And she collected cactus. And so I would always go meet with her, and I'd visit with her. And then I started to have a big cactus collection of my own, and that was super fun as well.

CARUSO: So really this very big interest in plants that was persisting?

SCHAAL: Yeah.

CARUSO: Okay. You entered high school in 1961. Is that . . . ?

SCHAAL: [Yes.]

CARUSO: Okay. What was your high school experience like for you? What were the . . . what classes were you taking? Were you developing interests in other areas? Were you . . . I don't know. Did you read [Edward] Gibbon's *Decline and Fall of the Roman Empire* and fall in love with Roman history?[1] What were your classes like? What were you taking? What were your interests in high school?

SCHAAL: So I . . . my interests in high school were science. I took a biology class, and it was like I was in heaven. I absolutely adored it. And the instructor [Mr. Sprietma] was very [enthusiastic]. I think he was just amazed that somebody actually liked biology. But he would . . . he let me, for example, not do what the class was, but to do other stuff. So that was really interesting. I got a microscope of my own at that point and was doing these hay infusions and looking at all kinds of protozoans and stuff from just . . . . I'd go out and collect the slimy water and look at what was in it.

I liked chemistry a lot. I thought it was easy, but it was interesting. I adored physics. Physics was really super fun. And what else did I like? I liked social sciences a lot. And I had a fantastic literature class when I was a senior. It was, I think, college prep literature, and it was the best teachers in high school. And we read just all of the classics, and we did a lot of writing, and the bar was really high on the writing. That was a very, very important and really good class. So lots of Shakespeare and American literature—just all kinds of stuff. And it was again, part of this of pulling some kids aside that were potentially going to college, although I certainly hadn't made that decision at all. But that was . . . . I think they just put me in that class. I don't know how that was done.

[1] Edward Gibbon, *Decline and Fall of the Roman Empire* (New York: Peter Fenelon Collier & Son, 1900).

CARUSO: And when you weren't in school, what were you doing?

SCHAAL: A lot of horseback riding. I was . . . . I have always loved horses, and my parents gave me riding lessons. They were really cheap at that time. So I did that and had friends through that.

CARUSO: And so there were places in Bellwood that you were able to . . . ?

SCHAAL: No, we had to drive out, but it was like maybe a twenty-minute drive. So once a week I'd take a riding lesson.

CARUSO: All right. Now, as you're progressing through high school, are you starting . . . . I mean, you made reference to this just a moment ago, but are you starting to think at all about what's going to be next? You mentioned your parents were probably assuming that you were just going to get married and start a family or something like that. But were you thinking differently, and if so, how?

SCHAAL: I think . . . . I certainly didn't think there was a career for me in science. When I was in high school, I thought—because I liked being outdoors so much—I thought being a park ranger would be really good. I mean, just a career in science was not something that seemed possible. And going on, I think it was, sort of, like when I was a senior, you, kind of, had to do something afterwards. And so I think because so many of my friends were going to college, I applied to a couple of places. And I think all of us were really pretty naïve because we were all . . . the neighborhood that the high school drew from was very uniform in terms of socioeconomic things. And so kids were going to the University of Illinois. There was some kids that actually went to a university and lived in dorms and stuff like that. That was not what many of . . . what we did. I went to the University of Illinois Chicago and wasn't sure that I would like it. It was just, "I have to do something. Let me try this." And so obviously I liked it because I haven't left the university. So yeah, it was . . . but it was just to try it out. And my parents' goal was maybe I would go there for two—I mean, I still remember this—go there for two years, find somebody who was going to be a doctor, and get married and then have those kids.

CARUSO: Okay. Now you mentioned that your mother was a traditional housewife. Your father was working on cars. Was . . . were there financial considerations for you to go to college? I don't know what tuition was like at University of Illinois Chicago at that period of time. I don't know expensive . . .

SCHAAL: Ninety-nine dollars for a quarter, and there were three quarters. <**T: 35 min**> So about three hundred dollars. I still remember ninety-nine. [crosstalk] So there is no way that I could have gone away to school. We did not have the money for that. And in fact, I provided all the money for tuition and books because I worked part-time.

CARUSO: What were you doing? What were you . . . ? What was . . . ?

SCHAAL: Well, first, I worked at a Burger King making Whoppers, which I am very, very good at. And after working there, I mean, I think it took me like a decade before I'd have a Whopper. But it was an interesting experience because, one, you get to work with a bunch of people and you see just personalities, how they're different, how some people are great workers, and other people are just sliding by. And so it was really interesting and also it made it really clear that I did not want a career in the fast food industry. So it was a stimulus to really continue taking those classes at UIC.

CARUSO: And you were commuting there?

SCHAAL: Yes. Yeah. At first taking the bus and the L, the subway. And then ultimately, as a graduation present, my parents bought me a used car.

CARUSO: Oh, nice.

SCHAAL: Economically, I think the family was in better shape at that point. And then I worked as a lab tech, just an undergraduate assistant in a lab, and that was really transformative as well. I had taken a course at UIC on plant evolution and absolutely loved it. And I was taking all of these courses in biology and really, really enjoyed them. I mean, for me, one of the most seminal things was, again, I wasn't sure—I should have known better—but I didn't think I was particularly bright, and I wasn't sure that I was going to be able to do well in college. And for me, a really seminal event was at this introductory biology course. We had the first exam, and I mean, I killed it. I set the curve by many, many points, and that was the first time I realized that biology was a good thing and that I could do well in it. And so that led to being a bio major and taking a lot of classes and really, really enjoying it.

CARUSO: So when you entered the university, do you recall what classes you signed up for, how many credits you were taking that first quarter?

SCHAAL: Full load. I think I was taking biology, math, chemistry, and probably I think an anthropology course.

CARUSO: Okay. So science and social science classes were . . .

SCHAAL: And then I had to do literature. I was also taking a language—German.

CARUSO: So when you were taking German . . . . I guess I didn't fully follow up on this. You mentioned that your parents really wanted, especially your brother, just to speak English. Does that mean that your family wouldn't speak German around the house?

SCHAAL: Correct.

CARUSO: Okay. So when you were taking German in college, had you lost a bit of your ability to speak the language?

SCHAAL: I don't think so. I think the problem with my German was it basically stopped at six years old. And so I spoke like a six-year-old child. And when you're taking German in . . . . I mean, the German grammar is something else. And so when you take it in college, you're doing a lot of grammar, and it's much less speaking. I think that has changed obviously although our son was a German major at WashU [Washington University in St. Louis], and he also learned grammar, but there was a lot more of speaking and cultural sorts of things. But in those days it was you were in German class and you were going to start reading German literature.

CARUSO: Okay. In those first classes that you were taking—specifically the science classes—do you remember the gender makeup of those classes? Was it fifty-fifty? Was there . . . were there . . . ?

SCHAAL: It was . . . . I think it was more like maybe sixty-forty, seventy-thirty. Something like that. Something like that.

CARUSO: So more male students?

SCHAAL: More male students, yeah, because those were all pre-med classes. Most of the pre-meds were bio majors.

CARUSO: Okay. And the faculty in those departments, were they predominantly male? Was it a mixture of male and female?

SCHAAL: This is interesting. UIC was unusual at that time. My anthropology teacher was an African American, which is very unusual, and there were a number of women faculty members. Predominantly men, but there were probably at least seven or eight women faculty members, which is just extraordinarily unusual. I mean, my first job at . . . my job at the Ohio State University, I was the first woman tenure-track faculty in that department. There was a College of Biological Science with—I remember the numbers because I love numbers—110 faculty **<T: 40 min>** members, and there were actually three women that were tenure-track faculty. And one of them got into it just because of her husband. So they had actually hired two women, and I was one of them. And the other one was in cell and molecular biology. So UIC was very unusual. Very unusual. And I'm sure—I wasn't cognizant—but I'm sure that really influenced me because here I could see women that were professors.

CARUSO: Right. Right. So what were the other classes that you wound up taking that first year?

SCHAAL: You know, I can't remember them exactly. I also took literature classes, which I found that I was not particularly good at. And I do . . . and I remember reading some of these and looking at the symbolism in everything and being, sort of, confounded by this, because if you want to convey that this person is psychotic, why can't you just say that? I mean, I just didn't think that way. On the other hand, I took one literature class, and I had a really good instructor, a woman. And we were having . . . we had to analyze essays. And so I did an analysis [from Pierre Teilhard de Chardin's *The Phenomenon of Man*] and compared it to [strict evolutionary] science.[2] And anyway, so I just did that, and I got a lot of really positive feedback on that so that was [encouraged].

CARUSO: So as you're taking these courses, I know it's your first year. Clearly, you like doing the science classes. You initially were saying, "Well, maybe I'll do courses for a couple of years," or your parents were thinking you'd meet someone who was going to be a doctor after a couple of years. While you're getting this college education, are you starting to now think differently about what the future might hold for you, what your next step might be in terms of growth, development, career?

[2] Pierre Teilhard de Chardin, *The Phenomenon of Man*, trans. Bernard Wall (New York: Harper & Row, Publishers, Incorporated, 1959).

SCHAAL: Yeah, I thought that for a long time that after getting a degree that I would work for one of the companies in Chicago like Abbott Labs or something like that in a laboratory being a laboratory assistant because that was . . . . I had so many lab courses, so I was really trained in doing laboratory things. Particularly after a while I gave up the Burger King job and then I worked as a lab assistant. So I was doing a lot of stuff, actually—basic research—and ended up getting publications when I was an undergraduate, which again, I didn't realize was unusual.

CARUSO: Whose lab were you in as a . . . ?

SCHAAL: This guy's named Don [Donald A.] Levin. He's still a faculty member at the University of Texas, and I ended up being his graduate student, which is another story.

CARUSO: So what drew you to Dr. Levin's lab? Was he advertising for a lab tech and you just saw the job?

SCHAAL: Well, he taught this course that I really loved on plant evolution. And it turns out that's what my expertise is, is in plant evolution. So it was this undergraduate class, and it was this beautiful textbook. It was written by Verne Grant called [*The Origin of Adaptations*].[3] Anyway, so that really focused what my interests were as an undergrad. So I ended up working in his lab and doing a lot of research and really contributing to a number of different projects. So by the time I was in grad school, I had, I think, three or four publications, which is, again, unusual.

CARUSO: In Levin's lab, was the UIC . . . did it have graduate students there?

SCHAAL: Yeah, they did. It was just starting the graduate program. I was in . . . [crosstalk] The UIC, the new campus opened up in 1965, and that was when I was a freshman. So I was in the first class that spent all four years there.

CARUSO: And so did Levin have graduate students in his lab?

SCHAAL: He had one or two master's students.

[3] Verne Grant, *The Origin of Adaptations* (New York: Columbia University Press, 1967).

CARUSO: Were there other undergraduates in his lab?

SCHAAL: There were. At this point, there was a big laboratory. And there was also an ecologist, Elmer Hadley. And he had students. And so there was a whole bunch of us. And then there were other professors. So there was a whole bunch of us, a cadre of us that were working in laboratories, and we ended up being friends. And we'd go to concerts together and stuff like that, go out to eat together.

CARUSO: How did you . . . how much time were you spending in these labs when you were working specifically, not when you were taking laboratory classes?

SCHAAL: A lot of time—probably hours a day, maybe sometimes on weekends. So it was a significant time. And **<T: 45 min>** the whole group of students did that. And that's really common. You . . . laboratories tend to be not only a place where people work, but socially . . . a social group as well. And I see it here at WashU when I had a very large laboratory with graduate students and postdocs and visitors and stuff. They . . . it's like a magnet for people. So they're spending time there even if they're not doing something in the lab. They might be reading the newspaper or just being there.

CARUSO: When you started working as a lab technician—I'm just recalling from about my laboratory experiences as an undergraduate and then doing research for a professor—I had learned some techniques—right?—in the laboratory classes that I took, but in order to do the type of research that was required for a professor, independently, there was a lot that I just didn't know. What . . . did you have a similar experience when you started doing this independent laboratory work? And if so, how did you learn the techniques that you needed to in order to undertake the research?

SCHAAL: I had absolutely the same experience that what you learned in a chemistry lab, in a biology lab had nothing to do with what was going on in a research lab. So I learned—Don Levin didn't know how to do a lot of these techniques—so I learned from somebody else in maybe a lab in cell and molecular biology or something because we started to do some analysis of proteins. And so I just learned in another lab and then set up the lab, basically—his lab—in order to do that. And that happened with a number of things where you just—and that's how everybody learns—you go into another lab and you see the techniques and then you bring it into the new lab. And I don't remember that as being particularly difficult.

CARUSO: And when you were in Dr. Levin's lab, were you learning things beyond just the technical aspects of doing science and doing research? Were you being exposed to what

scientific culture was like or grant writing? You mentioned that you had some research published as an undergraduate. Were you involved in learning how to write scientifically, or was Dr. Levin teaching you how to write scientifically?

SCHAAL: No, there was no teaching. I didn't do much writing, and I'm not . . . and I wasn't particularly good at it. I was involved in data analysis and data collection. We did field work. He was working on a lot of native prairie plants, and so that . . . . I was involved in collecting and doing analysis of the proteins and then also data analysis.

CARUSO: Okay. And did you work in this lab the entire time . . . once you started working there, were you in it until the end of your undergraduate education?

SCHAAL: Yeah.

CARUSO: So several years working in that lab. As your college career progressed, when did you start thinking differently about what your ultimate goal would be once you received your degree in biology? You've mentioned that you had considered working at a company in Chicago. I know that you went on to get a master's and a PhD. When did you start to think about something other than just working in a lab in Chicago?

SCHAAL: I think that was when I was a senior, and I took some plant physiology classes, and it was, again, a woman professor, and she said I should go to graduate school. And Don Levin said I should go to graduate school. And so then obviously I liked being a student, so that seemed like a good thing to do. And I had to do something, you know. So that's . . . then I applied both to University of Illinois Chicago, and then Don Levin had then been recruited to go to Yale [University] as a professor. And so I also applied to Yale.

CARUSO: Okay. Are there other aspects of your college career that you think we should discuss or that you'd like to note? It could be—I don't know—maybe you became interested in theater, and so you started doing Shakespeare plays during the summer or . . . . I like throwing out these random things that just come to my mind. Were there other aspects of your college time that you think we should . . . would be important for us to discuss?

SCHAAL: A lot of horseback riding. I still did that quite a bit and pretty seriously, but never **<T: 50 min>** had a horse or anything. What else did I do then? It was mainly biology. And then again, there was this whole group of friends, people that I worked with, that we did a lot of stuff with. We went to Northwestern and heard Simon and Garfunkel, you know, that kind of stuff. Yeah.

CARUSO: Okay. So you mentioned you applied to University of Illinois. You also applied to Yale University. I know that you went to Yale. Were you accepted at University of Illinois graduate school?

SCHAAL: Yeah. The woman who taught my plant phys [physiology] course wanted me to work with her, and she was apparently a little disappointed that I . . . but understood that Yale was an attractor.

CARUSO: How did your parents feel about this continued education and your decision to pursue an advanced degree in science?

SCHAAL: I think my father was extremely proud. He just was so excited that I went to Yale. I think my mother was more suspect because she felt that for her what women did was to have a very traditional role. So I think she was somewhat uncomfortable with it.

CARUSO: Okay. And so what made the . . . so the decision to go to Yale was because of Yale's name compared to University of Illinois?

SCHAAL: Yeah. And Don Levin was going to be there, and I was going to work with him. And it turned out to be a really good decision.

CARUSO: Up to this point in time, had you traveled much outside of the Chicago area?

SCHAAL: Went to Germany a couple of times because . . . to visit relatives.

CARUSO: On your own or with family?

SCHAAL: Once with family, once on my own. We had started to take vacations. Again, we didn't have much money. So my parents bought a tent and ultimately a little trailer that turned into a tent and did a couple of years of really nice vacations going out to the West and going to the Smoky Mountains and actually to the Ozarks and once around up north around Lake Michigan. So there was that. That was the travel that we did.

CARUSO: So I wanted to know what it was like for you going from Chicago to New Haven, Connecticut. Was that transition a difficult one for you? Was it relatively easy? What was it . . . ?

SCHAAL: No, it was hard because I was a blue-collar kid from Chicago, an immigrant. And then at Yale, I mean, there were . . . . I still remember one party that I was at. And this, sort of, is indicative of the whole thing. And we were talking about literature or something like that. I was listening about literature—I wasn't talking about it—and one kid who was actually the son of the ambassador to Russia at the time—at least that's what somebody said—said, "Well, I don't understand these literature survey courses, how you can have them in college. That's what you get in prep school." Well, and I just finished my literature survey course, and I, kind of, liked it and I didn't know what a prep school was. So there was just this huge cultural gap. And a lot of the graduate students that were at Yale had come from Vassar [College] and places like that. So they were all Ivy League, most of them. And here I was this blue-collar kid from Chicago. And just culturally, it was difficult. They all drank different brands of whiskey and stuff like that that I'd never even heard of. So it was interesting, and that subsided after a while.

CARUSO: How many people were in your entering class for graduate school?

SCHAAL: Wow, I don't know because it depends on how you describe what a class is. So we were a group of ecology and evolution. There might have been ten to twelve—something like that, fifteen. [crosstalk] It wasn't that many. It wasn't that many.

CARUSO: And gender makeup?

SCHAAL: Oh, probably sixty-forty. Men.

CARUSO: Sixty-forty, okay.

SCHAAL: There was a number of women. Yeah.

CARUSO: So when moving into this graduate program, how is it structured overall? Were you taking classes? Were you thrown into teaching? What was the overall arc of this graduate program?

SCHAAL: It was basically you were required to take a couple of classes—two, I think. That was maybe the requirement if I'm remembering right. You were expected to do research. That was . . . it was really research-focused. There were seminars where we had . . . they were relatively small seminars where we'd bring in people from other schools and in many cases rip them apart. It was really bad for them. But **<T: 55 min>** what was interesting is there were a couple of classes that were really seminal. One, at this point there was an extraordinarily distinguished ecologist, G. Evelyn Hutchinson, and he was an icon like a god in the field, and he would teach this ecology course. And it was so incredible that you take it once, and then we'd all sit in on it again. It was just one of those amazing experiences, so I remember that distinctly.

There was a really interesting course. It was a new course, and it was the theory of population processes. And what was interesting about that is—it was all theoretical and we had problem sets and in order to do the problem sets, you had to program—now code—a computer. But this was an IBM 360, which was a really small computer, and we had these cards, and you'd submit them and the cards would be read, and then you'd come back three hours later, and you'd get one sheet of paper that would say "error," and you'd have to go through and fix it. Anyway . . . and I became friends ultimately when I became a professor with a lot of the instructors in that class. And they said they just laughed at us because they couldn't believe we actually learned to program a computer so we could get these darn problems done. So that was an important class because it was a real reach for everybody. We had to do a research project coming up with a theoretical construct and then programming a simulation of that construct. So it was something that was important because it made us reach so far beyond what we were comfortable with.

CARUSO: Now I know that you came to Yale. Don Levin was moving there as a professor. Did you . . . before arriving at Yale, had you already decided that you would continue work with Dr. Levin, or did you—

SCHAAL: Yes.

CARUSO: Okay, so there was no exploring other labs, other professors' work. What about other students in your class? Did they do rotations in different labs to, kind of, figure out who they wanted to work with?

SCHAAL: We didn't have rotations, but I think they started talking to folks, and we had these seminars. So everybody . . . you got very familiar with what the faculty members did and also what their labs were like because different labs have different cultures.

CARUSO: You mentioned getting together with graduate students at parties and things like that. What were you doing outside of your time as a graduate student when you were at Yale? Were you . . . did you find a place to go horseback riding?

SCHAAL: Yep.

CARUSO: Yes. But were there other aspects that you were exploring while you were a graduate student there?

SCHAAL: It was interesting because at first the culture of Yale was intimidating. But after a while, I really began to enjoy it because literally there would be people talking about philosophy on the street corners. And they had a series—a concert series—at Woolsey Hall, and the orchestras, for example, or the acts that would come into New York, they would also play Woolsey Hall. But we could serve as ushers. And so we would get in free and would actually make a little bit of gas money and get to see all these amazing people and amazing orchestras and stuff. And so that became really, really intense. And one of my roommates was a musician. And we would go into New York and hear Wagner's the Ring Cycle and just all kinds of stuff.[4] And so it was really . . . that was really exciting—the music scene, the classical music scene. So that took up some time, and that was really fun. I began to read a lot outside of biology. At that point, Hermann Hesse and just a whole bunch of different things. I just did a lot of reading, and that was . . . . I would go to the bookstore and just buy books, and that was really fun as well. So I still just . . . . I've always been interested in reading, so I just continued doing that.

CARUSO: And can you tell me a little bit what life was like in lab for you? How many hours were you spending there? How many other students did Dr. Levin have? Was it a similar culture to the University of Illinois where people were going to other people's labs to learn techniques? What was the culture like?

SCHAAL: The culture was a little more isolated. The lab was, kind of, small. There would be maybe five people, and you spent a huge . . . basically, if I wasn't in class or riding a horse, we would be in **<T: 60 min>** the lab. And that was where we spent most of our time. You know, not all of it doing stuff like sometimes I'd read *The Atlantic* or *Saturday Review* or something like that because they had subscriptions in the lounge that you could just take and read. And so really it was a pretty intense, really intense graduate education. And Don Levin was, sort of, a taskmaster. He expected people to be in the lab. But one of the things that was so great about Yale is that everybody came through. And so these people that were icons in the field, we . . . they would come in, they'd give one of these seminars, you could talk to them. So there was just

[4] See Betsy Schwarm, "Der Ring des Nibelungen," *Encyclopedia Britannica*, February 1, 2023, accessed June 7, 2023, https://www.britannica.com/topic/Der-Ring-des-Nibelungen.

this very, very intense intellectual environment there. And I mentioned the seminars, they could be brutal for people that came in—and we all had to give seminars—but you really learned to think on your feet. And for me, after going through . . . you know, some of them were almost like a harassment. I mean, now you'd never allow that; you'd get kicked out of the place. But it was a good experience because I've never seen anything close professionally to what we had to endure in those seminars. And so when you've seen the worst, it makes you pretty calm about what's coming.

CARUSO: When you started working in Levin's lab at Yale University, were you encouraged to develop your own project, or were you taking on an aspect of Levin's research that was going to become the focus of your thesis?

SCHAAL: It was something that he was interested in. It was actually a very interesting natural situation where you had three species of plants and they were hybridizing, and everybody was sorted out on [an] ecological gradient. And so that was the situation. And that was what Don Levin proposed that I look at. Then what I . . . . I would say where I diverged from that was the way that I collected data and then did data analysis. That turned out to be going in a direction that was really different than anybody would have expected.

CARUSO: Do you . . . can you provide a little more detail about that?

SCHAAL: Sure. So what we thought was that . . . so we used these genetic markers, allozymes. Nobody uses them anymore because we have much better . . . we use DNA. But so there was just this hillside and there's species one, species two, species three, and there's hybrids in between. So I actually didn't look at that whole situation. I looked just at one species and plotted them and did a very detailed position analysis of each individual before I did the genetic analysis. And what we found was that instead of being like a smooth genetic transition across the ecological gradient, there was this incredible variation going from one site to another. You would have these large differences genetically and then . . . and had no relationship to the ecological gradient. So it turns out that theoretically this had been predicted long ago by this guy, R. A. [Ronald Aylmer] Fisher—no, Sewall Wright, Sewall Wright—as theoretical results of when you had gene migration that was really limited. And so that was the case here—that pollinators tend to go always close. They don't fly between large distances. I'll take a sample of plant here and get some pollen here. It's like they're efficient, so they'll go to the closest plant. And that turns out to have genetic consequences to this . . . making this what looks like a uniform set of plants to being genetically very different. And so there was a theoretical concept that suggested that and then I was able to show it, and nobody had ever shown that before. So that was a very good study for the time.

CARUSO: And so that was the . . . that was your thesis work?

SCHAAL: Yes. And then, then I was able . . . then by lumping the data all together, I was able to show that in fact there was a pattern, a genetic pattern. So I looked at the relatedness based on multiple markers, and that then emerged this pattern called isolation by distance that again had been predicted. So it was a cool project—different than what we had initially started, but a good project.

CARUSO: While you were speaking about your work, you did move between talking about you in the individual sense and then talking about the collective. So there's the "I" and the "we," and so I'm wondering if there was significance between the uses of the I's versus the we's like, "We were working on this," but it's also your thesis project, so you are working on it. And I was wondering if there . . . about **<T: 65 min>** the language.

SCHAAL: That blurred. Initially, it was clearly "we," and all the previous publications, it was "we" and Don Levin was very generous to put me on them. And then initially he was on some of the papers and then some of those papers for my thesis I was sole author on, and I think he wasn't happy about that. So there was a little bit of acrimony, but not bad. But with this isolation by distance, that was a single-authored paper in *Nature*, and that's a big deal.[5] But that was work I'd . . . . I came up with that. I came up with the data analysis to do it.

CARUSO: Right. Can you tell me a little bit more about then what the writing process was like for you once you were starting to create sole author papers? You'd mentioned earlier that writing wasn't necessarily your specific forte. You got something published in *Nature*, so clearly you learn how to write scientifically. How did that come about?

SCHAAL: Well, the dissertation, that was really painful, and I had to rewrite and rewrite chapters, but I think I learned a lot. And then as all of these papers started coming out, there was just a lot of writing and rewriting. And I'd submit something—we would submit something—and then you'd have to revise it. So that's a real learning experience. But still writing was really, really tough, but you slowly get better at it. I mean, the great thing is, if I can learn to write, anybody can learn to write. It was . . . it just got better, I mean, to the point then where later on in my career we've had some comments about how well-written something would be, which I never would have imagined, because at first it was incomprehensible pretty much.

[5] Barbara Schaal, "Isolation by distance in *Liatris cylindracea*," *Nature* 252, no. 703 (1974), https://doi.org/10.1038/252703a0.

CARUSO: So it was an iterative process that you were picking up over time based on feedback that you were receiving, commentary, and things like that. So at one point I know that you were at Yale until 1974, so this was ’69 to ’74 was your graduate career?

SCHAAL: Yeah, I actually . . . . Seventy-three I, kind of, finished, but Yale only gives degrees in June or whatever it is.

CARUSO: All right. So you finished in ’73—

SCHAAL: But then I did a postdoc at the University of Georgia.

CARUSO: Okay. So when we were . . . when I was initially asking about your undergraduate experiences and then talking about graduate school, you’d mentioned, you know, you liked being a student, so you were going to go on to Yale, continue on being a student, learning. At what point during your graduate career did you start to think about what the next step was going to be, and what was that next step?

SCHAAL: It was when I was writing my dissertation and Don Levin said, “Well, what are you going to do when you’re done? You have to do something.” And so that was when I started applying for postdocs. It was a little late in the game.

CARUSO: So you just . . . had you . . . so you were encouraged to do something to take a next step. The next step for you was the postdoc. Did you have a vision for what was going to come after the postdocs?

SCHAAL: I guess vaguely that I was going to be a professor, and I had thought that a really good job for me would be to be a professor at a branch campus of a state school and do predominantly teaching but do research. Maybe not such high-powered research, but research with the local environment with the students and working on plant evolution in that way. So my goal was predominately to be a teaching professor.

CARUSO: Did you have experience teaching during your graduate career?

SCHAAL: Very little. We had to do one TA. And so I was a TA in introductory biology. And that turned out to be . . . the students were just terrific in that class. I remember this pretty distinctly, and actually one of them I still have contact with. He’s now some . . . in New York,

some big financial person, but he did an independent project that we all . . . that I assisted him with. So, yeah, that was . . . and it was a wild class, actually. It was really fun.

CARUSO: So you had that one teaching experience, but based on . . . did you enjoy it to the degree that you thought to yourself, you know, I want to be a teacher at a college level?

SCHAAL: I think so. Yeah, it was a good experience.

CARUSO: Okay. So you're wrapping up your PhD. You finished the work in '73. You're encouraged to apply to postdoctoral fellowships. Did you have any guidance about where you should be applying to postdoctoral fellowships—what universities to apply to?

SCHAAL: Yeah, but I knew who was really good in the field. And so I met with those individuals. **<T: 70 min>** So I ended up going to the University of Georgia with Wyatt [W.] Anderson. He had been a faculty member at Yale and had moved to Georgia. And so I did a very short postdoc there. I actually ended up working on oysters of all things. It's about as close as you can get to a plant, I guess, as an animal. But it was developing some techniques. But actually what was . . . what happened is Don Levin was recruited to the University of Texas my senior . . . the fourth year when I was a graduate student. So I actually moved to the University of Texas to wrap up . . . to do my data analysis and to write my dissertation. And that turned out to be really important because the University of Texas had this huge evolutionary biology group. And there was this guy, Bob [Robert K.] Sealander, who was really difficult and crusty, and he was developing some techniques—some data analysis techniques—that I was really interested in. So I ended up interacting with him a lot and for some crazy reason we really got along well together. And so that was really instrumental in doing a lot of the data analysis for my dissertation and being able to really pick out all of these . . . so if you looked at one genetic locus, it was chaos. You looked at another one, it was chaos. There was no pattern. But if you started to mash all the stuff together, you could actually pull out some conclusions and everything. And so there was some techniques and some programs that he was working on that I got to use. And that really, really helped a lot.

CARUSO: Can you tell me a little—

SCHAAL: The other thing that's important is I was . . . . I had a little office space in the herbarium and just tucked off in a corner. There was a desk next to mine. And this young guy who had just finished being in the Navy used that desk. And we now have two children [Joseph Leverich and Leah Leverich] and a bunch of grandkids.

CARUSO: All right. So Texas proved to be a good place to go. You met your future spouse. I am curious to know, though, you'd lived in Chicago, you had traveled with your family. You'd now lived in New Haven, Connecticut. You're going to Texas in the early 1970s. What was that transition like? This is still a tumultuous time for the United States—civil rights era, Jim Crow laws. Change takes time. What was it like being in Texas at that point?

SCHAAL: I was . . . before I went there, I was pretty terrified because of just the cultural things, because, of course, it was very liberal in New Haven and particularly the group that I was in, we had all kinds of protests going on at Yale. There was the National Guard and all of . . . a lot of us were involved in that . . . in those protests. So it was pretty concerning. It was in Austin, [Texas], and Austin is like this island. And so it's really liberal. I used to walk to campus, and I'd go pass this little store that was called Whole Foods. And it was . . . and lots of hippies and so very, very comfortable. Very comfortable. And then I grew to really appreciate Texas away from the cities, just out in the countryside. The culture of the people there, it was very open. There's a lot of really liberal old Czech farmers. And so it was portrayed one way, but it was very heterogeneous, and there was a lot of pockets of people that I was extremely comfortable with.

CARUSO: You mentioned that it was . . . your postdoc was with Wyatt Anderson at the University of Georgia. That started in 1973, or was that . . .

SCHAAL: Seventy-three, '74.

CARUSO: So you finished your . . . you finished your thesis but hadn't received your degree yet. So you were, I guess technically a pre-doc postdoc, right?

SCHAAL: Yeah, exactly. But once you defend most of the time . . . and then that paper is signed, most people consider you're a . . . yeah.

CARUSO: Right. What was it like going to Georgia at that period of time?

SCHAAL: Georgia was more conservative and more uniform. Again, I was at a university, and so that's a . . . that was comfortable there. It was a short postdoc. I wanted to get back to my future husband [Joe Leverich], and we had a couple of papers come out and so . . . a lot of theoretical work. So I learned <**T: 75 min**> quite a bit. It was a good postdoc.

CARUSO: You mentioned that your future husband was in Texas after military career. Was he a graduate student at Texas? Was he . . . ?

SCHAAL: He was an undergrad at the University of Texas. And then after being in the military, he came back and visited some old professors. And one of them was someone who had himself been in the military and said, "Well, yeah, you can come and hang out in my lab. The only issue is you have to come and have coffee at six-thirty every morning." But so that was how he started.

CARUSO: And what area of science?

SCHAAL: He is . . . again, a . . . he ended up working with Don Levin of all things, but he's more ecological. He's more ecological.

CARUSO: So you had some papers come out of your work as a postdoc at Georgia. Anything else from the . . . that period of time that you think we should discuss?

SCHAAL: Yeah, I had been on the job market and ended up actually getting a job at the University of . . . as a graduate student, I was on the job market, and I had gotten a job at the University of Houston, and they allowed me to delay for one year to do the postdoc. What was interesting at that time is, you know, so there was a cadre of us at Yale—graduate students—and everybody was out getting jobs. And that's where you could see there was still . . . there was discrimination because I did really well as a graduate student, and there were folks—men—that didn't do as well, and they ended up getting these nice jobs. And I got University of Houston. So it was interesting. And you can't pull that apart, and you can't say it was discrimination, but a number of people had noticed that there was a difference in the kind of places that even I was interviewing at.

CARUSO: Did you apply to places other than the University of Houston? And if so, where?

SCHAAL: Yeah, I applied, I think, to University of Tennessee. I interviewed there. University of . . . someplace in New York. I can't even remember. I looked at about five places.

CARUSO: And were they all state schools as you had envisioned?

SCHAAL: They were all state schools.

CARUSO: Okay. What was the position specifically at the University of Houston? What were they looking for?

SCHAAL: They were looking for an evolutionary biologist. I think with plants, yeah.

CARUSO: And what was the expected teaching load and research like?

SCHAAL: It was expected to be research primarily and one course a semester.

CARUSO: So you had mentioned that you had this vision of yourself becoming principally a teacher at a university. You apply for and decide to take a position that is now principally research.

SCHAAL: Well, it was still strong teaching—two courses a year that are intense with lots of students. And then there was probably a seminar, of course, as well. That's pretty intense.

CARUSO: Okay. What was it like transitioning to a position as an assistant professor?

SCHAAL: At first, [terrifying]—not terrifying—but I didn't know what to do. It's, sort of, you unpack all your books, you sit at a desk, and go, "Now what? I have to start a research program." But that was like a week. And then it became . . . because I had already been familiar with the Texas flora, it was real easy to start choosing a research project. And so I did and did a lot of work there that actually continued when I was at Ohio State.

CARUSO: Did you feel that prior to becoming a professor, you had achieved a certain level of knowledge of what it meant to be a faculty member at a university? I know that you're supposed to be applying for grants for research support, and you have to construct a syllabus. Were . . . did Levin or Anderson or anyone else provide any guidance, mentorship about how one becomes a professor, how one applies for grants, or anything like that?

SCHAAL: Not really. I knew I had to apply for grants because I was now in a cohort of other professors at University of Houston, and they were all applying for grants. So I knew I had to apply for grants and knew I had to publish papers, and I knew I had to establish a research program. Where . . . but I think I got that by osmosis. Where there was no training whatsoever

was in teaching. I mean, it was really just amazing at that time. How do you construct a syllabus? How do you run a course? How do you interact with students? I was . . . . I had students trying to date me at that point. I mean, it was . . . well, I was really young. I was twenty-four or something, but weird. **<T: 80 min>** Really weird. And so that . . . teaching you learn by . . . . I mean, I think the way I learned was by making mistakes and reading the student reviews and fixing things that when you start getting more than one or two students saying something, then you figure you really have to fix whatever they're saying. I had that at Ohio State. I taught this this ecology class, and I got a number of student evaluations that said I was disorganized. And so I figured out I'm really disorganized if they say that. And it was really easy to fix. But you just . . . that's the kind of feedback you need. Now what we do, we not only look at student evaluations, but we have faculty members that sit in on classes and all kinds of things. And as part of the faculty mentoring and . . . well, there's faculty mentoring, there's formal mentoring. You get feedback on that. But in those days, it was learned by experience. And just like with some other things, I think I made a lot of mistakes, and I learned by them.

CARUSO: So how was it starting your research in Houston? Did you find it relatively easy to get your lab up and running?

SCHAAL: I had hardly any lab at all. I had . . . . I basically . . . this was, kind of, weird. There was a faculty member who headed this University of Houston Coastal Center. And basically they wanted me to bring this technique of electrophoresis looking at allozymes into that group. And so he had ordered all of the equipment and everything, which is just really bad form. I mean, when you're starting something, the professor that does it should be really ordering the equipment. And so basically I had the feeling there that they wanted me to set up this lab and then everybody else was going to use it. So I ended up not doing that. I ended up actually doing some more ecological work where I could go out in the field and collect data. So I had a number of publications from that, actually, but it actually was not involving the protein work. And then when I was recruited to Ohio State, then I set up my own lab and did those techniques again. And then actually what was really significant there is I started to have conversations with someone about analyzing DNA.

CARUSO: Sorry. I'm just taking a couple notes for myself. So during this period of time, as you're doing this research, I know that . . . . I'm pretty sure you mentioned that it was Ohio State where you were the first female tenure-track faculty member. What was the makeup like at the University of Houston? Was it predominantly male? Was it a mixture of men and women?

SCHAAL: It was predominantly males. But again, there were some women. Not many. Maybe two or three.

CARUSO: And you just mentioned that you were recruited to Ohio. How did that come about?

SCHAAL: I realized that University of Houston was not the right place for me, that . . . . I think by that time I had really shifted my career goals to doing research, that I was really interested in pursuing that. And it was predominantly teaching even though this group was trying to become more research-oriented and was research-oriented. There were some political issues in the department. I had, sort of, a split position that I was supposed to be at this coastal center, but also in the department. And that's . . . what I know now, that's a recipe for disaster. But it was real clear that that this was not a good position and that I was going to end up getting stuck there. So I very quickly applied to other jobs.

CARUSO: Okay. Where were you applying to?

SCHAAL: Well, I applied to Ohio State because I got the job, and I can't remember exactly where else I applied to.

CARUSO: At this point in your career, were you . . . so when I was first going on the market after finishing graduate school, my partner and I had the two-body problem, right? So there were two individuals that needed to be in the same relative location in order to make things work. Were you at that level in your relationship with your—I don't know if you were married at that point—but your partner . . .

SCHAAL: We got married at University of Houston. Yeah.

CARUSO: Okay. So was that an issue for you two, as well, looking to find an institution **<T: 85 min>** that was interested in taking both of you or being in a city where there were multiple institutions where each of you could find a position?

SCHAAL: I think since my husband and I are the same age, but he was in the military for four years, so he's always been behind in terms of his career. So he was willing to go . . . he was still at . . . one of the advantages of Houston was it was a close—not a hard drive to get to Austin. So while I was there, we were going back and forth all the time. But Ohio . . . so we decided . . . . I think Joe recognized that Houston was not a good place. So I had the job at Ohio State, and he came with and then looked around for another position and ended up working at Ohio State but in the research office, helping with grants and things like that. So that was his position.

CARUSO: Okay. So how was it transitioning to Ohio State University? I mean, you're familiar with the Midwest and what life is like there, but you're also coming into a department where you are the only female tenure-track faculty member. How was that for you?

SCHAAL: Well, it was . . . . I got a lot done and I made some really good friends there on the faculty. There was a couple of faculty members, one was clearly misogynist, and so I didn't interact with those folks. I interacted with my friends. The students were good. That was nice. I think there were aspects that were strange. I got invited to the Botany Wives Club, which was weird. I guess I was in botany, and I was a wife, so it was okay, but not what they meant. So it was . . . it would have been okay to stay at Ohio State. I mean, there were some peculiarities, but it was okay. And I know lots of people that are there, and it's really changed. So it would have been a fine career place.

CARUSO: You mentioned your experience when you were going to Houston that you were brought in to set up a certain lab, but someone had already ordered all the equipment. Did you get . . . did you have a similar experience when you were setting up your lab at Ohio State? Or were you given more freedom at this point to get the equipment that you wanted to have, the lab space that you wanted? What was it like at that . . . ?

SCHAAL: I had complete freedom. I could do whatever I wanted as long as it was good. And so we went back to analyzing proteins and also did a lot of field kinds of studies. So I had four master's students at that point that all finished. And they did very nice projects, cute projects. So that was a good experience there. And I was a regular faculty member. I was treated like one, although I think there was a lot of discomfort, I think, having a woman on the faculty. You know, just these little, the micro sorts of things. So at the faculty meeting, you all sit around a table, and I'd sit down and at the end there would be two vacant chairs on either side of me. And so it's like [smells armpit], you know, "I took a shower," it's like . . . and so there were those kinds of things. When I was . . . when we were on the graduate committee and they'd admit somebody, if anybody was interested in me, somebody would invariably say, "Well, this person is going to need a really firm hand," as if I couldn't provide that firm hand. So that was that kind of stuff, and that is a little annoying.

CARUSO: I remember—I didn't conduct an interview—but years ago we conducted an interview with Mildred Cohn, a chemist who was the first, I think, first tenure-track female faculty at the University of Pennsylvania.[6] And she spoke about her experiences in industry prior to joining the faculty there. And what she noted was that there was one company she was working for where even though she was a PhD chemist, she wasn't allowed to have a professional rating in her position because the company assumed that if she received a

[6] Mildred Cohn, interview by Leon Gortler at the University of Pennsylvania, Philadelphia, Pennsylvania, 15 December 1987 and 6 January 1988 (Philadelphia: Chemical Heritage Foundation, Oral History Transcript # 0080).

professional rating, all of the men at that company would divorce their wives in order to pursue her and there would just be social chaos at the company. So she couldn't be considered a professional. She had to have a sub-professional rating. So, I mean, your story sounds, kind of, obviously it's different in certain respects, but these assumptions about women in the workplace and capabilities, or, like you said, microaggressions in the ways that you were framed or discussed **<T: 90 min>** or people just sitting next to you at . . . . So was it difficult for you to recruit students when you first became a faculty member?

SCHAAL: No.

CARUSO: No?

SCHAAL: No.

CARUSO: And how did that recruitment process work?

SCHAAL: I think that at a place like Ohio State, students, people just apply to it and then they say what their interests are and then there's a discussion. And once the graduate students come in, then I think they choose who they want to work with. And so that's the way it worked.

CARUSO: During this time at Ohio State University, you mentioned that this is where you came . . . started doing genetic analysis. Is that . . . am I remembering correctly?

SCHAAL: Just the allozyme stuff which I had done as a graduate student. What this does is it gives you supposedly non-selected random genetic markers. So one of the real challenges—I was trained in population genetics—and one of the challenges is that you want a genetic locus and you want it to have variation and you want it not to be under selection so that you can track a lot of other things. And so these allozymes were the closest thing that we had at that point, and there was some question about whether they were under selection and all kinds of questions, but it was the best that we had, and they were pretty good in many cases. So that was a technique that I was using.

CARUSO: One thing I hadn't actually asked about and I really should have. So I'm going to ask you to reflect a little bit on your graduate school as well. Were you attending conferences? Were you interacting with people outside of your department as a graduate student or as an early faculty member? And if so, what conferences were you going to?

SCHAAL: There was a big one put out by the Botanical Society of America, and that was the one that I think historically people in my field went to. So I went to those and gave papers. Oh my gosh. The first one, I was so scared.

CARUSO: What was the experience like for you?

SCHAAL: Oh, terrifying. I had it all written out, and it was really hard to even read. That was when I discovered yes, your knees actually do knock together, which is just hilarious because I just gave a [cat appears on screen] . . . oh, hi, kitty. I just gave a graduation speech at the University of Illinois Chicago in a basketball stadium with people up in the ceiling. But it didn't start out that way.

CARUSO: I know you're at Ohio State for four years. In 1980, you received the Sigma Xi Research Award. Can you tell me a little bit about what that award was?

SCHAAL: I think it was a chapter—Sigma Xi supports research, and I guess somebody nominated me, and I got it. That's all that I know.

CARUSO: Okay. It's also when . . . . Nineteen eighty is when you became a research associate at the Missouri Botanical Garden, right?

SCHAAL: That was after I came to WashU, yeah.

CARUSO: That's after you came to Washington University, okay. So can you tell me a little bit about how the transition or how moving from Ohio State to Washington University came about?

SCHAAL: The director of the Botanical Garden—at the Missouri Botanical Garden—was Peter [H.] Raven at that time, and he was an evolutionary plant biologist in addition to many, many other sorts of things and really was one of the major people in the field. So the graduate students at Ohio State invited him as their one speaker in the year. He came and he said he wanted . . . he was supposed to interact only with the grad students, but he said he wanted to come and talk to me. So he came to my office, and we had this conversation about stuff that I was doing in evolutionary biology and that sort of thing. And he then said, "We should get you to give a seminar at Washington University." And I said, "Oh, sure, I'd love to," because I was giving seminars at other places as well. And so that was . . . and then I was invited to WashU

and being completely naïve, I didn't realize it was a recruiting trip. And it was actually very important because I went and talked to a lot of members of the department, and I was in a botany department at Ohio State, and this was a biology department and **<T: 95 min>** there was a lot of interaction. And people were talking about genetic stuff and kinds of research that I didn't know anything about, and it made me realize that I was being quite insular in a botany department at that time. The graduate students didn't need to take a genetics class, for example, which is just hard to believe given that genetics underpins everything.

And so I had this great seminar interaction with people and great conversations, and I really, really had a wonderful time. And at the end they said, "You know, we have a job, a position for an ecologist and . . ." Which is a stretch for me. "And we'd like you to apply." And it turns out that they had had this position open for a long time because the department was clearly cell- and molecular-oriented. And when the ecologists would come in to interview, they would do regular ecology stuff, and nobody liked it because it wasn't cell and molecular. So I came in and gave a talk and said, "Well, and what I'm planning to do is to do . . . to switch this all over to analyzing DNA and seeing if we can get an evolutionary signal from DNA." Which it turns out, yeah, you can, and that's a really good idea. And so they basically said, "We found the ecologist that we like. She wants to work on DNA," which is, of course, ludicrous because that's not ecology. Anyway, so I ultimately because of the good intellectual scientific interactions that I had and also the Missouri Botanical Garden and Peter Raven, it was just a huge attractor to come here. And I talked to Joe, my husband, and we then came for a real visit, and he liked St. Louis and so we ended up coming here.

CARUSO: And that was in nineteen . . .

SCHAAL: Nineteen eighty.

CARUSO: Right. And you're coming in as an associate professor . . . did you come in as an associate professor?

SCHAAL: Yes. With tenure.

CARUSO: So you came in with tenure?

SCHAAL: Yeah. [laughter]

CARUSO: How had you felt about the tenure process?

SCHAAL: Well, this is why I am laughing. This is so bizarre. Lots of bizarre stuff. So the department said, "Yeah, we want her. We want her hired as associate professor with tenure." So I got the job offer. But it turns out, and I went . . . and they just took my hiring package and that went through the tenure process. So I really skipped the whole tenure thing. But it turns out that I was talking to the chair at one point on the phone, and he said, "Well, there's just a little bit of a hitch." It turns out that I was the fourth . . . the third woman that had been hired from another university with tenure. And so the history is that there were two other women hired as associate professors with tenure, and I was going to be the third, and this was this first round of hiring from this new chair. And so it has to go through the affirmative action committee. And as I was talking to the chair, I just joked and said, "What's the matter? You've been hiring too many women?" And it turns out that was what was going on. There was this one guy who said, "What's wrong with biology? They won't hire women as an assistant professor. They'll only hire them as associate professors with tenure." Anyway, that got straightened out. But what this . . . basically what this was this guy, Bob Thatch, what he was doing was looking at women that were placed at universities where they were clearly much better than either where they were at or their rank or something like that. And he ultimately ended up hiring four of us in this way, and three of us are members of the National Academy of Sciences. So it was a brilliant strategy for that period of time because every one of us was, kind of, miffed at where we were.

CARUSO: So at Ohio State, did you feel like you would . . . did you feel that the tenure process there would have been more of a . . . would have been a challenge to get through?

SCHAAL: No, I don't think so. When I got the job offer, the chair of the department, who was my friend, went to the dean and basically said, "This is what they're offering her." And he—the dean—didn't want to do anything at first because he said they'll never hire me with tenure. But then when I had a letter that said tenure and all of this other sorts of stuff, he said that they would grant me tenure. So I would have avoided that. But I don't think it would have been a problem because I had research grants and I had publications and stuff like that. **<T: 100 min>**

CARUSO: So as I've asked you a couple of times, what was it like transitioning to Washington University in this case?

SCHAAL: It was great. It was just great. We loved St. Louis right away, and I loved the university. Joe was looking for positions and ultimately ended up . . . somebody died at Saint Louis University in the biology department, and they said, "We need someone to teach a genetics class." Joe, who took genetics once as an undergrad, said, "Oh, I can teach that." And so he ended up ultimately getting tenure at SLU [Saint Louis University]. It became a regular position. So they did a search, and Joe got the job and then went through the whole tenure thing.

CARUSO: Okay. How was it setting up your laboratory and your research at Washington University?

SCHAAL: It was very easy. I thought I had a lot of money to do it. Compared to what they get now, it's nothing. But the lab was renovated and renovated for biochemical stuff, and while it was being renovated, I worked with another faculty member in her lab learning DNA techniques. So I was already learning all of this laboratory stuff while mine was being built. And then I had gotten a postdoc, and she basically had been doing some DNA stuff with animals. And so she helped with a lot of the setting up of the lab. And then as soon as it was set up, I started getting graduate students very, very quickly, and we ended up putting out some of the very first papers with plants. There were three laboratories that were doing it. Ours was one of them.

CARUSO: You mentioned that you had a postdoc who knew some of these DNA lab techniques with animals. How did you get that postdoc?

SCHAAL: She was . . . let me see what this position was. I think she was . . . . I think she might have come through . . . . I think we had a postdoc position in the department. I believe that's how she came.

CARUSO: Okay. Okay. And what was the . . . or what is the structure of the graduate student program like at Washington University? You . . . when you went to Yale, you knew that you were working with Dr. Levin. What was it like for students coming to Washington University? Did they come in . . . did they apply saying, "I want to work with this professor"? Were there laboratory rotations? How did . . . how do people become familiar with your work and your lab?

SCHAAL: It's, kind of, all of the above. WashU had at that time a very unusual system. I think it was one of the first places or maybe the first place to do it. The graduate program is not tied to departments. So we didn't have a biology graduate program. What was done was there's a lot of preclinical departments in the medical school with cell and molecular biologists. Some even had a plant biologist in them. And so the graduate program is a unification of all of these basic biology folks that do research on living systems. And so we had a program—our program is ecology and evolutionary biology. The students would apply to that program, and then they would say what they're interested in, and they wouldn't say the specific professor, but it was real clear who they might be targeted to. Sometimes it'd be one or two possible people, or sometimes it was clearly one person that they were targeted to. We also had a joint program with the Botanical Garden, and so a student would come in and say, "I want to work with mosses." That would obviously be someone that wants to work at the Botanical Garden. So I was getting . . . and then we had a plant . . . we have a plant biology program. So I was getting students mainly from ecology, evolutionary biology, also the graduate . . . people that were

doing graduate work at the Botanical Garden, a lot of them ended up in my lab and then I had students from plant biology as well.

CARUSO: And so how did you structure . . . . I'm trying to think of the way I want to formulate this question. When you were doing your graduate career, when you were in graduate school, the project that you started with was a specific component of Dr. Levin's research. I know that in some fields, graduate students are expected to come in and take a component of their professor's larger research project, and that becomes their thesis. Other programs come in, and as long as your research interests align with what the professor's working on generally, you get to come up with your own specific research project. How were you structuring things for the individuals who were coming to you as graduate students in terms of their research relative <**T: 105 min**> to your overall research program?

SCHAAL: So it's the latter: that we expect students to come up with their own research project. I mean, not . . . . I think there's some negativity towards having them just take an objective [from a professor's grant]. It's very different than a lab would be that's funded in NIH [National Institutes of Health]. At the medical school, that's much more common to say: "Here's part of my grant. This is what your project is." In my lab, people would come in, they would use all kinds of different organisms. They'd have different aspects of it in part because I was developing this real partnership with the Botanical Garden and so was getting a lot of students there and what they would come to my . . . so literally one of my first students was interested in mosses and he came to my lab because he wanted to learn DNA techniques and ended up ultimately being a graduate student there. So we've worked on . . . . I had a postdoc that worked on oak trees, and I had students that worked on pines and mosses and everything in between. We started to do work on cultivated plants as well. So lots and lots . . . and a huge diversity from things that were in some cases very ecological to things that were looking at molecular evolution of specific genes.

CARUSO: How did you see yourself as the principal investigator for that lab? Were you taking active involvement in all the research that was going on in the lab? Were you walking around and checking in on your students and showing them how to do techniques? Were you providing more advice and recommendations about directions to go? Were you applying for grants? How is it that you saw yourself as being the head of that lab? And how did you interact with the people who were in your lab?

SCHAAL: Oh, it changed over time. At first, you know, I was in the lab and shoulder to shoulder with graduate students. And then as you become more and more advanced, one of my colleagues said one of his students said, "You're never in the lab." And his comment was, "You will be out of the lab only if you're successful. If you're not successful, you'll still be working in the lab." And there's some truth to that because of the grants and the paper writing and all of the other sorts of things. So at first I was working in the lab and then ultimately it was more . . .

and I never have been hands-on and a micromanager. It's not my personality. I just have no interest in doing that.

So the group was really selected for students that had a lot of initiative. They often had their own interests, and we'd choose projects by having these discussions. I met with all the students at least once a week and then we had big lab meetings as well. I'm no longer research active, so that's why there's the past tense. And so we just discussed, "What are you interested in?" And I had enough funds that I could send them out in the field and do collections to get preliminary studies. And so there was just this dialogue back and forth, and they'd show me their data and data analysis. So [I was] always keeping up on all these projects, but not going in the lab, not looking over their shoulder and not telling them what to do on a day-by-day basis because these are all going to be probably . . . probably they'll have positions at R1 [universities], and they have to learn to have self . . . they have to take care of themselves. They have to learn how to do things themselves.

CARUSO: Did you involve the students in the grant writing processes that you were going through? Did you work with them on constructing their papers? How was your . . . what were your perspectives on . . . ?

SCHAAL: So a lot of the students would get NSF grants, dissertation grants. And so we had a lot of those grants, and that was . . . we worked together really hard on those. And then after a certain point, then we would take them to lab meetings, and everybody in the lab would go over the grants. And I think that was one of the reasons why we were so successful, because if it wasn't clear to everybody in the lab group, it's never going to be clear to reviewers. And we did the same with papers—lots and lots of work. And when people went out on the job market, we'd have lab groups, and we'd have them do their presentations and they'd get feedback and everything. So lots and lots of group work on those sorts of things.

CARUSO: And so how did you see . . . or what vision did you have for your research in those early years at Washington University? What is it that you wanted to accomplish? I know you'd mentioned that you were moving into the DNA arena, exploring that. But overall, how did you envision your research progressing at that . . . at Washington University?

SCHAAL: I **<T: 110 min>** guess I viewed it as . . . . I mean, I wanted to have a big active research lab. I mean, that was essential. I wanted to do research. There . . . . I wouldn't say that I saw a progression. I saw it as there are these really interesting questions in plant evolution and there's many different ways that you can address them. And what was going on with the DNA stuff is that some of these questions have been really, really longstanding, and you could apply these new techniques now and actually get some answers. And that was really exciting. And so I think the goal was to look at these . . . at plant evolution and find out all of these new things that you wouldn't be able to find out before. So that was, kind of, the beginning of it. And we did

that on a macro level, looking at evolutionary relationships among species and also more towards what my interests are, which is what are the evolutionary processes within plants, within plant populations? And then there was a major change when I became interested in cultivated plants, in crop plants.

CARUSO: Can you tell me a little bit about that change?

SCHAAL: Sure. I know exactly how it happened. I got a phone call from [Rob Bertram] who was working with USAID [United States Agency for International Development] in the State Department. I think it's State. [No, he was in Ag at the time.] And he said, "I'm an officer, and I'm also working on my PhD." I think at the University of Maryland. "And I'm working on this crop, cassava. And the question is, nobody knows where it originated, and it's a really important crop." And then he started telling me about it that it was something that grows in Africa, and it was actually taken—well, they didn't know it at the time—it's grown in Africa. He was interested in Africa. It provides a huge number of calories, and it's a subsistence crop. And it's not being studied. We don't know what the origin of it is. And to me, for some reason, this was just outrageous that you would have this crop that's the primary source of calories in sub-Saharan Africa, and nobody even knows where it came from. And the reason you want to know where it came from is if you're going to do crop improvement, you go to the original source of genetic material, which often is so much more genetically variable than something that's been domesticated. We know that there's a genetic bottleneck associated with that.

So I said, "Well, come on to the lab, and I don't know what cassava is, but I'm sure we can answer your question," which was probably one of the stupidest things I've ever said, because it took us a lot longer to know where cassava came from than it did to get the techniques down. So he came and just started a real interest in me because it turns out that there's now organizations like the Danforth Plant Science Center that are trying to genetically engineer cassava to provide a complete source of nutrition for sub-Saharan Africa. And it's something that's really, really important. And I saw this as an opportunity to take the stuff that we'd been doing in the lab, which is primarily just curiosity, basic science, and apply it to something that was, kind of, important. And so we then started to work on a number of different crop plants, and that's led to keeping the other stuff going with grad students but it also started out this other branch, which has been really, really interesting, and it led to some really just interesting . . . . I've been to Africa, we started working on rice, and we had this wonderful, wonderful collaboration with faculty and researchers at Chiang Mai University in Thailand. So I've spent a lot of time in Thailand. And so that's been . . . that is, kind of, the progression of the lab.

CARUSO: One other question about just general laboratory life for your students. Did you have specific expectations in terms of the number of hours that students were going to be in your lab? Was it a you're here Monday to Saturday and then occasionally on Sundays? Was it

like it's nine to five and then you go home? What was your overall expectations for students in terms of time spent in the lab?

SCHAAL: Get the work done. I don't care when you do it. I never worried about that. They had to come to lab meeting, and they had to come to my office once a week, and they had to attend class and seminar. I mean, there's some things they had to do. But when they did their work; some people came in early, some people came late. There was people on weekends. **<T: 115 min>** But who it was, I . . . they're adults.

CARUSO: So in . . . you started at Washington in 1980. Nineteen eighty-six, is that when you become a full professor?

SCHAAL: Yes.

CARUSO: That's also it seems to be a year where you start to become more broadly responsible for other aspects of science around the US. And I know that was a very vague statement, but what I'm thinking of here is it's when you're a full professor, that's when you are on the editorial board of *Functional Ecology*. Soon after, you're the executive vice president of the Society for the Study of Evolution, the Editorial Board of *Molecular Ecology*. Can you tell me a little bit about how your career started to change once you received that full professorship? Or maybe it's not tied to the full professorship, but tied to work that you produced in those years that you're now being recognized more broadly in the scientific community for?

SCHAAL: Yeah, I think it was the latter. I don't think it had anything to do with being a full professor. I think it was . . . . Yeah, I mean, journals need editors. And so, you know, it's not a big thing to be an editor because they need people. The executive vice president of the Evolution Society, that was interesting. I was in charge of finances, and this is not my strong suit at all. But it was interesting. And there was a lot of mechanical work getting the yearly conference going, getting . . . working on the finances, presenting to the membership, all these sorts of things. And so that was an interesting learning experience.

CARUSO: And what was it like . . . . I know in 1993 you became elected a fellow of the American Association for the Advancement of Science. How was that experience for you?

SCHAAL: I view that more—incorrectly—as an honorific sort of thing. And I had . . . . I can't remember when—I don't know if it's even in my CV—but I was a chair of one of the biological science sections—something like that. But I think that was in recognition of my research profile.

CARUSO: Okay. One thing that I've been curious about and I don't always know the best time to ask this question, because, I mean, you're still at this point in time, you're early into your career, but you've also gone through some important changes happening in the United States, specifically transitions among different presidents, right? And you started . . . you've gone through the Carter administration. At this point you've now pretty much it through the Reagan administration. Now we're onto [George] Bush. Pretty soon you're going to be in the Clinton years. I'm wondering if you have any broad perspectives about the way that funding had changed over time during your . . . the early part of your scientific career. Was it easier to get grants at certain points in time? Did you need to focus your grants in different ways based on the broader political climate in the United States? Or was it mostly that science was science and so you just . . . there weren't . . . this wasn't about politics in some broad sense, but it was just about science and getting that research done?

SCHAAL: Yeah, my sense is because I was doing basic research that it seemed to be independent of politics, that it was just science. It came from [the] National Science Foundation, and that seemed to be pretty steady. I was fortunate to be in an area that was identified as something that they wanted to fund. Sometimes if you're in between areas or interdisciplinary, it can be a little dicey. But I was right in the middle of what one group was funding.

CARUSO: The other question that I wanted to ask about was you did mention that you have children, grandchildren. Did . . . when you were considering starting a family . . . or let me start with this: when did you decide to start to have a family, to start having children?

SCHAAL: When . . . after . . . the joke is that my kids are academically spaced. The first was after tenure and the second after full professor. Clearly having tenure was important—that **<T: 120 min>** stability, the understanding that when you have small children I figured that my career would take a bump. But yeah, and that was the decision. And then Joe had . . . was employed here. So this was a time of stability for us.

CARUSO: And so how did both of you manage raising a family while also pursuing your scientific careers?

SCHAAL: It's . . . obviously it's really challenging. When Ohio . . . at Ohio State, there was no daycare and obviously because there was no . . . they didn't have many women faculty. There . . . when we had our first child, our daughter, there was nothing—no daycare under one year. And so we just, kind of, tag teamed. We had some people that would help us part-time. WashU had no maternity leave, and I was teaching . . . in the middle of class with the second child with our son, I was teaching introductory biology. And one day I didn't show up, and Joe, my husband, covered for me. And then the next day—next lecture—I was back. I mean, it was insanity. So

that was how we managed. And then ultimately there was a daycare center, a really good daycare center, and our daughter was in that. And then when I found out I was pregnant with our son, like the second thing we did was to sign him up for daycare, even though it was, you know, he wouldn't show up for nine months or eight months—whatever it was. So it was really dicey at first. It was really hard at first. And then with really good daycare, it was fine.

CARUSO: Did you feel like you or your husband felt . . . received any sort of—I don't know what the best word is here—flack for having a family? Were . . . you mentioned that there weren't really structures in place or there were expectations for you, but was it . . . did people think of you differently for deciding to start a family, or did they just not care that you were starting it and you just had to get your job done?

SCHAAL: One of the attractions that WashU for me had was that they had a large number of women in the faculty, and they always had, and they were extremely distinguished, and most of them had kids. So really, really unusual for 1980. So it was almost like the expectation is that I was going to have kids. So very, very different. I think at Ohio State, it would have . . . . I don't know what would have happened.

CARUSO: And as your kids grew up, did you bring them to your lab?

SCHAAL: Yeah. When our . . . part of the problem with our daughter . . . . I had a crib in my office. And so periodically she'd be in the office, and she was a calm baby so that worked out really well. And then we had a son, our son, and that didn't work out well. It was really clear he could not be in the office.

CARUSO: But as they grew up, did you introduce them to the scientific life?

SCHAAL: Yeah, I mean, they knew. We would go to conferences and take the whole family. When I was vice president of the Evolution Society, our daughter at one point said, "I want to go to Hawaii." So we arranged the conference in Hawaii. [laughter] Nobody complained. Everybody loved it. So, yeah, they would come to the lab periodically and bring . . . we'd have some really fun times when we'd bring the daycare class into the lab, and that got to be . . . on our floor, we had four different laboratories, and the other three were working with animals and they . . . one in particular worked with a lot of wild [animals], things that you would find out in nature. And so the kids would see snakes and this salamander-like thing called a hellbender, which was a frightening looking animal, and it was good fun.

CARUSO: And beyond those early years with the daycare group and things like that, did your children come to the lab as they were growing up to see what you were doing? Were they learning some basics of experimentation? Did you encourage them in that way at all?

SCHAAL: No, not really. I think when our son was in high school, he went with me on one of our trips to Thailand. But he seemed to have no interest in science. Our daughter has a PhD in neurobiology, which came as great shock to us. She's really artistic, <**T: 125 min**> and we really were encouraging her to go into art, which is, of course, bananas. But she's really good at it, has a great eye. But she is a neurobiologist.

CARUSO: Okay. Let me actually just check in. Kenny, do you have any questions that you want to ask at this point?

EVANS: Not at this moment. Thank you.

CARUSO: Okay. So I've lost a little bit of . . . a little track of . . . normally I follow things chronologically. I know we got into, I guess, the early 1990s-ish. Are there aspects of your career at this point in time that I haven't asked about that I should have? Are there topics that you would want to discuss that I haven't asked about?

SCHAAL: I was department chair. That was rough, and I decided I never wanted to do administration again. That didn't work either. But . . .

CARUSO: So why was department . . . being department chair rough?

SCHAAL: I think it's a difficult position to begin with because you're the interface between the faculty and the administration and so you're, kind of, getting things from both sides. And our department had . . . went through a very divisive period at that time. And so that was part of the problem. And yeah, it was just a difficult time. There were just personality conflicts. The personality conflict ultimately left, and everything went nicely after that.

CARUSO: How did you find it managing the responsibility of being chair with also your research going on? Because I'm assuming that it has to drag you away. There's a finite number of hours in a day and adding on these administrative responsibilities, navigating between the faculty and the administration, that's going to pull you away from some of the research. How did you find managing your overall research program with the additional responsibilities of being department chair?

SCHAAL: I think longer hours. I mean, that's usually been the way that I've dealt with stuff like that. Just I work a little bit longer. And fortunately, Joe, my husband, was very accommodating to that because we still had young kids at that point. And so that wasn't so much of an issue. I think you learn to be very, very efficient. That was one of the benefits. I realized, and it happened again when I stopped being dean is being a regular faculty member after you've had that additional burden of administration, it's really pretty easy. I mean, a regular nine-hour day is nothing compared to the administration, particularly being dean. So I think you just become very efficient at it.

CARUSO: It's also in the mid-1990s that you become an adjunct professor at the Chinese Academy of Science. How did that . . . ?

SCHAAL: Yeah, well, because this was so interesting. Through the connections of the Botanical Garden and some of the tremendous friends that Peter Raven has, I was asked to come to the Chinese Academy of Science and give a course in modern plant population biology. And this was pretty early when China was really opening up. It was before you saw these amazing buildings and everything. And so I agreed to do that. And I think I went for three weeks, two weeks—something like that—first taught the course, and then my family came later to Beijing, [China]. And it was an amazing experience. And I . . . obviously I became an adjunct professor there but developed some really close friendships with the folks in Beijing that last to this day. So that was an amazing trip, an amazing experience.

CARUSO: Just taking a look over your CV. Let's see. Elected fellow of the National Academy of Science. That was in nineteen ninety . . .

SCHAAL: Ninety-nine.

CARUSO: Nine. How did that come about?

SCHAAL: Somebody nominated me. It was probably Peter Raven. And then I don't know if you even know anything about the election process. It defies all probability of anyone getting elected, but I got elected, and that was absolutely seminal. I mean, it changed the course of my career.

CARUSO: How so?

SCHAAL: What **<T: 130 min>** happened . . . well, one, I went back to the . . . to my dean and said, "I want a raise," which I got. And then very shortly after, I got a phone call from someone at the NRC [National Research Council] saying that . . . asking if I'd be interested in co-chairing an activity in the NRC that dealt with agriculture, biotechnology, health and the environment. And it was a complete cold call. I had never done anything at the NRC because I'd just been elected, and I was a little surprised by that, and particularly because of the biotechnology aspect of it. And I said that my feeling is I'm an environmentalist, I care a lot about the environment, but because of the work I've done with cassava, I'm really interested in developing nutrition and food for developing countries, and genetic engineering is an important component of that. So I had like a foot in each camp. At that time, it was very polarized. But why are you talking to me? And they said, "Well, because that's the person that we want—someone who sees both sides." So then they said, "We'd like you to talk . . . if you're interested, we'd like you to talk to your co-chair." And the co-chair was Harold Varmus, who had just stepped down from being director of NIH. And so we had a conversation, and I ended up doing that. And that was just amazing. Just amazing, because I'd never done anything for the NRC in that kind of work where you work on global issues in a very different kind of way.

And Harold . . . working with Harold Varmus was terrific because he's an amazing person. And I learned how you do things in a committee like that. And sometimes with Harold, how . . . things you don't do in a committee like that. And so that was a standing committee, and I think it was a number of years where we had a whole bunch of different topics. But the first time that we met with . . . on a topic, we had a lot of people in the room, and this was really seminal for me. There was a group that was . . . we wanted to do a balance, so we wanted to see people that were advocates for genetically modified crops and people that were concerned about it. You didn't want the [most irrational] extremes, but you wanted people that were thoughtful but coming at it from different angles. And there was a lot of emotion. I mean, it wasn't crazy or anything, but clearly it's an emotional sort of thing as well. And basically one group says, "You're going to destroy the environment and you're going to wreck our health." And the other group says, "You don't care about Africa and providing good food for Africa." You know, both of them are crazy statements, but that was, sort of, this undertone.

And there was this amazing experience. And I'm not sure I want you to put this in, but I'm going to tell you anyway. So then we had a break, and everybody went, of course, to the bathroom, and there were all these women. And we had this discussion basically saying, "Well, no, I do care about the developing world, but I'm worried about the environment." "Well, I'm worried . . . . I care about the developing world, but I'm also worried about the environment." And we had this meeting in the bathroom over washing our hands about how in fact, you could reach some commonality. And I thought that was . . . . I mean, that to me was really, really significant. It was a significant event. And I'm probably overstating the way it was, but really, really interesting. And to me, that's been really important that even though a good NRC committee has a lot of different things represented and a lot of different viewpoints, but you can sometimes come to some consensus and some understanding. And, particularly, it's important to develop a respect for everybody who's on the committee because they wouldn't be on the committee if they weren't really good at what they do. And this idea that you can sometimes

come up with something that that is appropriate for everybody's background and everybody's interest. So that committee was [very] important to me, not so much in the products, which were important, but also in how you deal with . . . to me, it was a completely new set of issues and a new way of looking at things and a new thing for my career.

CARUSO: What was the overall time commitment or the average time commitment for serving on a committee?

SCHAAL: We would have meetings, and you'd go to the meetings. It wasn't that much. I don't think even as co-chair. There wasn't a lot of work outside of the meetings. That's . . . the NRC staff is so terrific **<T: 135 min>** and so they take care of a lot, you know, getting the background material. We'd have to vet who was going to be on various . . . who was going to come to a workshop or to a committee. But it was pretty straightforward.

CARUSO: Were there additional resources that were made available to you beyond just the NRC staff in order to support the work that you were doing? Did you . . . . I mean, I can't actually . . . nothing is coming to my mind immediately. But were there other financial supports for additional research that you might have wanted to have done or reports written or anything along those lines? Or was it really just going to these . . . organizing and then going to these meetings and having these discussions?

SCHAAL: And then there was writing up reports afterwards as well. But it was really the NRC staff. I think the NRC works where they get funded by various agencies to do things. And so this had that kind of funding, and the staff is terrific. Absolutely terrific.

CARUSO: Kenny, do you have any questions about the NRC?

EVANS: Yeah. Well, I know that you were elected vice president just six years later or something like that, which seems like a pretty rapid turnaround. And I know you'd also mentioned not wanting to get back into administration after your experiences as chair. I'm wondering what changed during that time and what the election was like to the vice presidency.

SCHAAL: The kind of work that I did on this committee with Harold Varmus that's very different than administration as a chair. I think the hard part about being chair . . . . I don't mind—I like getting stuff done—but it was the personalities were at that point a little bit toxic. And so that was what gave me a really negative opinion of being chair, I think.

So getting elected vice president of the National Academy, that was a surprise. I was on the committee to choose the next president, and it was a huge committee. And they also had to choose a vice president, people to run for being a vice president. So the president is . . . basically this committee that chooses that those two officers it's a committee that chooses the president, but then it develops a slate for vice president. And so I was on this committee, and at one point somebody said, "Well, Barbara, we'd like you to leave." I was like, "Okay, I'll leave. I'm gone." "But don't go far." So again, one of the themes here is I'm really naïve about this stuff. So I thought, "Well, that's curious." And then I came back, and I just remember one person who was very, very crusty smiling at me.

And oh, that's nice. And of course, what had turned out was that they had decided that I should run for vice president if I would agree to do that. And so then I was asked at a different time, and it's a half-time position. So that requires . . . . I mean, that's a real, real difference. Yeah, the time is amazing. And so I talked to my husband, and he said, "Well, you know, I don't know. What are you going to do about WashU?" So I talked to my dean and the chancellor and said, "You know, it's going to be half-time." And I remained as a faculty member and full-time at WashU, but my salary was compensated half-time, and they both said, "This is fantastic. Absolutely do it." And I got a reduction. I didn't have to teach undergraduates. I shouldn't say have to. I was not . . . . I did not teach undergraduates, which I very quickly regretted. And so that's how that happened. It was very strange.

EVANS: And what . . . . I mean, as someone not entirely familiar with the, kind of, governing structure of the National Academies, what were your . . . what did you think about . . . were you explained what the responsibilities would be going into the job? Did you know ahead of time? And how did you see yourself functioning in that position?

SCHAAL: So there's a lot of things that are just . . . that are part of the job. You sit on the Executive Council of the NRC so that's an obligation. You sit on the Council of the NAS [National Academy of Sciences]. So those are regular kinds of meetings. So lots of meetings like that. And then there's things that just become part of the portfolio, and it depends on who's vice president. So I was involved in the Frontiers of Science, which is an amazingly wonderful program, and then **<T: 140 min>** lots of stuff that the council does.[7] So there was a lot of travel to various places. There was . . . . I worked with . . . one of the initiatives that I worked with was communication of science, which is really thorny. And I was involved in the Sackler Symposia and had to work with Jill Sackler, and that was a whole new experience with somebody . . . and let's see. What else did I do? There was just a huge amount of stuff, and it was really varied and very interesting.

Then there was sometimes there were issues that needed to be pursued. We did something on science and creationism, and I was involved in that—an amicus brief for Kansas

[7] "Kavli Frontiers of Science," National Academy of Sciences, accessed June 7, 2023, http://www.nasonline.org/programs/kavli-frontiers-of-science/about.html.

on education and evolution. Just many, many different things. Lots of meetings. And I worked with the president a lot on things. So the communicating science issue, there was a lot of work done on that, global climate change, work on that. So a lot of scientific issues and then some, kind of, administrative issues and then some of just really working, keeping the wheels running on things.

EVANS: Did you as vice president, were you able to, kind of, add to your portfolio if you saw, for instance, like the communication of science, you said a really thorny topic? Was that something that you thought the National Academy should be addressing or was that mandate . . . came from a different place?

SCHAAL: I think that came from a conversation with . . . . Oops. I think I didn't hear that last part. Uh-oh. I think he's frozen.

CARUSO: Yeah, Kenny, you might be frozen at this point. Oh, now you're moving again.

SCHAAL: You were frozen.

EVANS: Sorry. It looks like my internet is not so good. Houston is not known for its infrastructure, I suppose. But I'm sorry. I was asking about the . . . kind of, your role in choosing pieces of particular policy topics or scientific topics to become part of the National Academy. So for instance, this communicating science, was this something that you wanted the National Academies to pursue, or was it something that was already under their, kind of, umbrella?

SCHAAL: Well, I think a little bit of both. It was Ralph [J.] Cicerone, who was the president, and I talked a lot about it. And so that was, kind of, a joint thing. But it was something that I think everybody acknowledged was really critical to do.

EVANS: I see. Is my internet . . . or can you guys hear me okay?

SCHAAL: Yes, you're still there.

EVANS: Sorry. Well, I guess we're at a point. We're at two-and-a half hours. And so first, I wanted to check and see if anyone needed a bio break if you're . . .

SCHAAL: Could we have three minutes so I can get some more tea?

EVANS: Yeah, sure. I will pause for—

[END OF AUDIO, FILE 1.1]

[END OF INTERVIEW]

INTERVIEWEE: **Barbara A. Schaal**

INTERVIEWERS: **Kenneth M. Evans**
David J. Caruso

LOCATION: **via Zoom**

DATE: **30 June 2022**

EVANS: Hello. Today is June 30, 2022. I'm Kenny [Kenneth M.] Evans. I'm here with Dave [David J.] Caruso, and we're doing our second oral history session with Dr. Barbara [A.] Schaal. Thank you again for being here and joining us. I was going to just start by asking first if . . . . I know we left off when we were talking about your election as vice president of the National Academy of Sciences, and your activities there. And I'm wondering if there was anything from last session that you wanted to mention or thought about in the interim between the two interviews and wanted to talk about first before we get into the rest of the interview.

SCHAAL: Since I can't remember what I told you, I guess there's nothing. I'll assume I said everything.

EVANS: Okay, great. Well, if there are things, of course you can add them later. We can chat again. Or if things pop up as we get back into discussion, feel free to bring those things up. So I know you were vice president when you were nominated to serve on Obama's PCAST. I'm wondering first what that nomination process was like, when you got the call, and what your expectations were going into serving on PCAST?

SCHAAL: Yeah, I remember it distinctly. Harold Varmus called and said that he was on PCAST. I think he was one of the co-chairs at that point and that . . . he talked a little bit about the agenda, that it was going to be a very strong science agenda in the Obama administration. And then mentioned a couple of the things that people were thinking about and then asked if I'd be willing to join them. And that was very exciting, to say the least.

EVANS: What were the things, the issues that Dr. Varmus mentioned in the phone call?

SCHAAL: I think, if I remember correctly, one of it was the H1N1 [flu] and the concern that that was going to be a pandemic. And if so, what were the bounds of it? What could be the estimate of mortality? How infectious it was? Those sorts of things. That's the one thing that I

remember, and that was indeed the first report that PCAST did.[8] That report was actually done before we met formally for the first time.

EVANS: Oh wow. So that was on Varmus or the other co-chairs got . . . ?

SCHAAL: Yeah, John [P.] Holdren. Yeah. And then as with all PCAST reports, you—well, most PCAST reports, I think—they convene a working group and so the working group has PCAST members, but also then experts in the field. And so Harvey [V.] Fineberg, I think, was one of those folks.

EVANS: Did you . . . before joining, did you have an impression of PCAST or had worked with PCAST previous to the Obama administration?

SCHAAL: No, I never worked with them, although I know that when we were doing various activities at the NRC—the action arm of the National Academies—people would talk about what PCAST was thinking about. A lot of that in the Bush administration . . . that was not a particularly active PCAST. And one of the things that that PCAST did was to leave a letter for the next PCAST, which was Obama's PCAST about some of the things that they suggested to be done that were different from what they had done. But I don't remember any of the details of that. So I just remember hearing a bit about PCAST and what PCAST's take was on particular things.

EVANS: Gotcha. Thank you. Did you have . . . did Dr. Varmus at that point, was he giving, kind of, instructions to you about, one, what PCAST would be . . . . I mean, outside of what they were working on, what you specifically would be charged with doing or what your time commitment was, for instance?

SCHAAL: I think the time commitment was during the first term because nobody knew what would happen with the second term. But I think he did mention that if it would continue that people would continue. So it could potentially be an eight-year commitment. That was about it. I think he did mention that there would . . . we'd have to have a security clearance. And so that was something . . . and being appointed was actually depending on whether or not you got the security clearance. So that was a big issue. And then I think also—and this is just what I'm thinking, I don't know if this is for sure—but I remember getting a call from the White House basically doing some background sorts of things. And I remember because it was so amazing.

[8] President's Council of Advisors on Science and Technology, "Report to the President on U.S. Preparations for 2009-H1N1 Influenza," August 7, 2009, accessed June 7, 2023, https://digitalcollections.rice.edu/Documents/Detail/report-to-the-president-on-u.s.-preparations-for-2009-h1n1-influenza/266404.

They **<T: 05 min>** asked if I was the Barbara Schaal who in 1990-something got a speeding ticket in Richmond, Virginia. And by divine intervention, I've never gotten a speeding ticket, which is just bizarre since I drive Interstate 70 to Colorado. And then whether I was a Barbara Schaal who had had a divorce in California or something, so they were doing . . . . I think they were checking records. But this seemed to be, I think, from the White House making sure that there was nothing—my sense was—and I could be . . . maybe I am wrong—that they were doing some to see if there was anything that could pop up that would look . . . would reflect poorly on PCAST and on the Obama administration. And then you do the real security clearance with the forms and the interviews and all of those sorts of things. I had actually had a security clearance because I needed it for the vice president of the National Academies. But it was a top secret, and it wasn't SCI [Sensitive Compartmented Information], and it was a different unit. The security clearance was held, I think, through the Navy's . . . the Office of Navy. And the SCI one was through the White House and whatever that office is that ultimately does it.

EVANS: Interesting. I don't think I'd heard that the appointment was contingent on passing your clearance.

SCHAAL: That was my sense that—particularly with the comments about the speeding ticket and the divorce—that they were checking a different kind of thing. But this is just what I'm making up in my mind. That was the way that I took it.

EVANS: I'm glad everyone was a safe driver. [laughter] Well, so before your first meeting with . . . the first formal meeting with PCAST, were there briefing materials? How were you integrated into working on, say, the H1N1 report and getting PCAST work started? What was that process like?

SCHAAL: I think it really started, at least for me, because I wasn't on the H1N1—at that first meeting when we were . . . we all had to swear allegiance to the Constitution. And then after that, then I think things really started, and a lot of it had to do with . . . we certainly had comments about our deportment and making sure that we reflected well on the White House and introduced all of the members and talked about what their area of expertise was and then batted around, I think, a number of topics. This was quite a while ago, so I'm having trouble remembering the specific topics.

EVANS: Yeah, all good. Do you have any thoughts, recollections about the first meeting? Was it at the White House? Was it your first time at the White House, where was it?

SCHAAL: It wasn't at the White House. The first meeting was . . . . I'm trying to remember if the first meeting if we actually did go to the White House. I can't remember. We very early

went to the White House, which was just—for someone who's an immigrant—is just absolutely stunning. We walked in the front door, and that was just amazing. And meeting with [Barack] Obama and just the whole thing about the White House was really quite amazing. We met in the State Dining Room. I remember that. But we had a lot of . . . we talked a lot preliminary to going to the White House. And I can't remember whether it was at that meeting or at an earlier meeting, just about keeping things confidential and not making statements—that sort of thing. So I think particularly—this is my sense that it could be wrong—I'm trying to be careful here. My sense was that particularly early on, the Obama administration, the White House, was very, very cautious and very concerned about having things, kind of, go haywire and have a lot of public pushback on things, which would be understandable given the situation. But it was very clear we were to be cautious.

EVANS: What was . . . yeah.

SCHAAL: That makes sense.

EVANS: That makes sense, yeah. What was that first meeting with Obama like? What did he bring to PCAST and what was his, kind of, thoughts on PCAST and PCAST's role? And what was the general tone of that meeting?

SCHAAL: The tone of the first meeting was just . . . it was pretty amazing. And he received the . . . he had received the report on H1N1 and had been briefed on it and apparently had read part of it. One of the things that became very clear throughout the Obama administration is that he was very, very interested in science. And that seemed to be **<T: 10 min>** very . . . he was very comfortable around us. And that began with the first meeting. And basically, he looked at the report and talked about the report, and then he said, "Well, why are we—at this point—why are we still developing vaccines? Why do we grow them in eggs? Give me a report—a subsequent report—about speeding up the development and the amplifying up of vaccines," because the concern was always a pandemic. And how long does it take? So that report really dealt with what you could do to speed up the development of vaccines.[9] And that, among many other things, led ultimately to this amazing development of the COVID vaccines. So he was very interested in that pandemic issue.

EVANS: Were these first meetings open to the public? Was there an audience there or was that . . . ?

[9] President's Council of Advisors on Science and Technology, "Report to the President on Reengineering the Influenza Vaccine Production Enterprise to Meet the Challenges of Pandemic Influenza," August 2010, accessed June 7, 2023, https://digitalcollections.rice.edu/Documents/Detail/report-to-the-president-on-reengineering-the-infleunza-vaccine-production-enterprise-to-meet-the-challenges-of-pandemic-influenza/266409.

SCHAAL: No, this was in the State Dining Room. There was staff. We sat around a big table and there was staff then around the outside. After that, most of the meetings were in the Roosevelt Room.

EVANS: I see. Did the Roosevelt Room then have a public forum? Was that a different . . . ? No?

SCHAAL: No, that's actually . . . that's a SCIF [Sensitive Compartmented Information Facility] facility. So we couldn't bring in our phones or anything.

EVANS: Gotcha. Thank you. At the first couple of meetings, did you . . . I guess I'm wondering what the . . . who was setting priorities for who would work on what and if it was Obama or Holdren or [Eric S.] Lander or Varmus at that time?

SCHAAL: Yeah, it was particularly John Holdren. He was, I think, a very . . . he's a very genial person, but also very smart. And I think there was huge respect for John Holdren among all the PCAST members. And so he really was a very—I don't want to say strong because that implies that he was pushing people—he was able to convince all of us to really follow some of the things that he was interested in. Harold Varmus, of course, was very interested in the medical aspects of it. And then as we went through, Eric Lander then ultimately became co-chair when Harold had to step down because he was running NCI [National Cancer Institute] I think at that point. And then . . . but that was much later.

EVANS: I know I've heard from others in the Obama administration that it was a pretty significant time commitment to work on PCAST and serve on PCAST. At what point did you see that PCAST becoming such a major piece of Obama's science agenda and your time, I guess, for instance?

SCHAAL: Well, I think it became real clear. There were . . . . I believe still that we had thirty-five, thirty-six reports, which is a very large number. And so we were split up and working on various reports. So I participated in a number of them, but I co-chaired one on the nation's natural capital, which was looking at basically preserving biodiversity and ecosystem services and how that affected the nation's economy.[10] That was a huge amount of work. And then on other reports we could be part of the working group—a member of it. So some of the things on

[10] President's Council of Advisors on Science and Technology, "Report to the President: Sustaining Environmental Capital: Protecting Society and the Economy," July 2011, accessed June 7, 2023, https://digitalcollections.rice.edu/Documents/Detail/report-to-the-president-sustaining-environmental-capital-protecting-society-and-the-economy/266413.

energy or education, you could participate in that as a member of the working group. That wasn't the same as being a chair or co-chair. The co-chair work really was a lot more.

The one thing that I think was made it less onerous than it seems is that the staff was absolutely terrific—just an amazing group of really brilliant, hardworking, sensible people. And so the staff really was a very, very strong component of this. They certainly took the directions from Holdren and from the PCAST members, but they were so competent. So that they really did a lot of work, a lot of background work. We did a report on agriculture and supporting agricultural research, and so they looked back and got information on the proportion of competitive grants in NIH versus USDA [United States Department of Agriculture]—just all kinds of data that they would pull up.[11] And so those reports were . . . you couldn't just say something. You had to substantiate it. So I thought that was . . . and the substantiation came from the hard work of the staff members.

EVANS: Were these staff, were they OSTP [Office of Science and Technology Policy] staff or were they specific PCAST . . . ?

SCHAAL: Well, <**T: 15 min**> OSTP gets people from other departments. So there were . . . but they were . . . a couple of them were assigned specifically to PCAST. But then— [crosstalk]

EVANS: Go ahead. Sorry.

SCHAAL: But then there would be people from other agencies as well that were assigned to OSTP and so there was some overlap.

EVANS: Yeah, I've heard the name Deborah [D.] Stine. Was she involved in . . . ?

SCHAAL: Right. She was the first, I think, major staff member, Deborah Stine, and then she was replaced by Mary Maxton. Both of them are just really, really strong.

EVANS: And just to, kind of, general question about report writing and maybe I know you're in a terrific position to compare and contrast the report writing process for PCAST versus the National Academies. Was it the same . . . was it a similar process or were you doing much of the

[11] President's Council of Advisors on Science and Technology, "Report to the President on Agriculture Preparedness and the Agriculture Research Enterprise," December 2012, accessed June 7, 2023, https://digitalcollections.rice.edu/Documents/Detail/report-to-the-president-on-agriculture-preparedness-and-the-agriculture-research-enterprise/266412.

writing or was it . . . what was that process like in terms of developing a report and writing a report?

SCHAAL: Well, I think both of . . . the similarities . . . both of them are very staff heavy. So the staff were very important to this. The PCAST reports, then there's some divergence. The first thing is the National Academy doesn't recommend really policy whereas PCAST does. And so that was where there was a lot of input from other agencies. One of the things that—oh yeah, this is all coming back—one of the things that we had to do was, as we were developing a report, is to "socialize" it. And that meant going to various agencies. So for the agriculture report, we went over and talked to USDA, and for some of the other reports, we just went around and talked to people trying to get input from other folks in the government. And there was a real sense we didn't want to do something that would surprise, shock, offend—grossly offend—another agency. So it was really important to do that kind of background work. And that's real difference than the National Academies because the National Academies, we get a project, the funds come in, and then at least at that time, it was completely independent of the sponsor. So if something came from USDA, they would have no say after the project was started. So it was completely independent. That's been tempered a little bit at the Academy because there should be some conversation. I think the concern always was that the Academy should be completely independent, and that was not the case with PCAST. It was really a reflection of the executive branch.

EVANS: When you were socializing the reports, were there ever . . . for instance, with the agriculture report, were people at USDA, kind of, receptive of what you wanted to work on, or were you getting pushback in terms of recommendations and things that you wanted to push in terms of policy?

SCHAAL: So USDA is huge, and there's so many different components to it. And my sense is that they all don't march in the same direction. And so we were very strongly emphasizing competition and saying that if you look at the NIH, what they did is they invested a huge amount of money into understanding the basic biological function, biochemical functions of cells. And that led to these incredible advances in medicine, you know, sequencing the human genome. You could say on one hand, who cares? But then you understand what has developed from that: precision medicine and all these other sorts of things. And so we really emphasized competition and getting the best and the brightest to do agricultural research in basic plant biology. And so we made that case and there were parts of the USDA where they really applauded that. And then there were other parts . . . because USDA has just one lump of funds. And if you take some from over here, there's going to be less over there. And so we were very aware that there was some concern about what we were doing.

EVANS: I know in this agricultural report there were in addition to pushing that, kind of, competitive nature of USDA, there were also budgetary recommendations for, say, expanding

NSF's basic science towards agricultural research and stuff like that. I mean, what was . . . . I guess I want to ask in terms of making those budgetary decisions, how were you . . . . I mean, what was your thought process in terms of PCAST being a vessel for advocating, at some level, for those types of budgetary decisions?

SCHAAL: Well, I think those kinds of recommendations came from us looking at the data and then **<T: 20 min>** drawing the conclusion from the data that there was an opportunity to really enhance competitive grants. There was an opportunity . . . there was a sense that the best and brightest young biologists were not going into Ag research or even so much plant biology, although there's tremendously good people in basic plant biology. But the whole ecosystem, the developmental ecosystem of basic knowledge, needed to be enhanced. So that was . . . those were the data that we had. And then there was a conversation, "Well, what do you do? How can you deal with the pipeline?" Well, one way is to have really competitive postdocs. And I think that was a recommendation [for a] joint [fellowship program] between USDA . . . or certainly NSF was involved. And then just applying, having more money. I think most biologists, if there's a pot of money, we turn towards that. And it's a very good way of getting people to do research in an area. So I think it was first understanding and documenting the problem and then coming up with ways to recommend the various components of it. We also talked about stuff like genetically modified crops and those sorts of things. There was a lot of interest in . . . using those as an opportunity to really [show] the potential of agricultural research.

EVANS: Two, kind of, related questions about the report. The first being where did this report originate? Was it something that you brought to PCAST, or was it something that Holdren or one of the other co-chairs or Obama spoke to you about? And then two, when you were writing it, did you have a target audience? And if so, what was what was that audience?

SCHAAL: Well, I came into . . . so I'm very interested in basic research and making sure that the nation has a really active, basic, fundamental research enterprise, because all of the technological developments come from that. So even in physics and chemistry and in all the fields, we need to make sure that there's resources for people to do basic research because, one, you never know what development is going to lead to something that has a huge influence on our economy and starts a whole new line of industry or whatever. And two, you can't tell whether something is going to be useful. My favorite example of this is [Albert] Einstein's theory of relativity, and we wouldn't have accurate GPS if we didn't correct for that, which is just, kind of, fabulous.

So anyway, so I was also interested in that in agriculture, and I went into PCAST hoping that we could do—and pushing to do—an agricultural one and specifically on the aspect of funding research and making sure that the whole research ecosystem from actually fundamental research, basic research through applied and development. And that was . . . . I had talked to people—this may not go in the report—but I had talked to people later, and a lot of folks on PCAST didn't think agriculture was particularly important. So it was, kind of, a long haul about

it. And I think at one point Obama—and I may be fuzzy on this—at one point, I think Obama also expressed some interest in one of our meetings. But anyway, ultimately, PCAST did decide to do an agriculture one, and Mary Maxton really pushed it as well. So that was a long haul.

EVANS: Was Holdren supportive of the effort?

SCHAAL: Yeah, yeah, absolutely.

EVANS: I know there were a number of other PCAST members as part of this working group. Did you know Dr. [Rosina] Bierbaum before entering PCAST? Were there relationships you had coming in before you joined PCAST?

SCHAAL: I knew of Rosina. I had never worked with her before, but we worked together on a number of different reports and often would sit together in PCAST meetings. Usually Rosina was on one side, and Jim [S. James] Gates [Jr.] was on the other side. It was, sort of, like three of us—three academics sitting there.

EVANS: Nice. Yeah. Well, I've heard or spoken with both of them also, so they were also very proud of their PCAST work and said that they sat together. So it sounded like these meetings were really fun is the impression I got.

SCHAAL: Yeah, I think that's right. There was a—particularly with Rosina **<T: 25 min>** and Jim—there was a lot of whispered comments and things like that. The PCAST members, some of them were—I don't want to say arrogant—but certainly very confident of themselves. And so there was a little bit of that. Actually, some other members became quite offended by some of the PCAST members. But we had . . . there were moments that were really fun. And the other thing is you got to know . . . it's always when you get to know folks that you realize people . . . some of the people are just really, really nice. And Rosina and Jim in particular were very, very pleasant to work with.

EVANS: I had a question about . . . . I know you were also co-chair of this biodiversity report and—

SCHAAL: With Rosina, yeah.

EVANS: Yeah. And I'm wondering . . . I know that at the end of the Clinton administration, there were two PCAST reports, I believe, chaired by Peter Raven, dealing with biodiversity and environmental capital.

SCHAAL: "Teaming with Life" I think was one.[12] Yeah.

EVANS: Two questions. I mean, I know that you were colleagues with Dr. Raven, and I'm wondering if, one, you were aware of the I know it was 1998, '99 or something when those activities were happening, if Dr. Raven mentioned it and then two, if those reports were of use to you in preparing your own report.

SCHAAL: Yeah. So Peter Raven and I are friends. We still socialize and everything. Just to get that on the table. So he was very interested in having PCAST revise the "Teaming with Life" one. He thought it was time for an update, and I think Rosina may have felt the same way, and I was aware of the report and aware that there was a lot of interest in doing it. And I certainly felt as well that we needed to do something in biodiversity. And it was a use. I mean, I looked at the report and everything, but we did a lot of data, again, a big data dump to really update things. And it was . . . this is where . . . this, of course, John Holdren was very interested in this. And so he was extremely useful. I mean, he came up with, I think, the whole direction of it is that trying to make the case for preserving biodiversity was to preserve the nation's natural capital. So we talked about how important biodiversity is and how important it has been in the past for just the nation and all the economic aspects of it. So that whole tone, that tack on that report was John's comments. And it's obviously other people were involved with it. Somebody would say something and then there'd be a big discussion of it. And so everybody contributes to these sorts of things. It's not like there's just one person doing it. There [was] . . . Dan [Daniel P.] Schrag, who was my co-chair actually on the agriculture one. He was actually very good on the [agriculture] report.

EVANS: How was socializing that report? Did you have, kind of, a similar experience as you did with the agriculture [report] where you saw, you know, like any good government, people marching in lots of different directions, or was it . . . ?

SCHAAL: We again socialized it and particularly Rosina. So Rosina was in OSTP and so she really . . . she was great because she knew the ins and outs of all of these various agencies. And so she really took the lead on that and we went to a number of different committees. We actually had a congressional brief on it, so we went to Congress. That was interesting.

[12] President's Committee of Advisors on Science and Technology, "Teaming with Life: Investing in Science to Understand and Use America's Living Capital," March 1998, accessed June 7, 2023, https://digitalcollections.rice.edu/Documents/Detail/teaming-with-life-investing-in-science-to-understand-and-use-americas-living-capital/266545.

EVANS: Yeah. How was that?

SCHAAL: It was really . . . on one hand it was . . . we just gave information, there were questions, and it was really clear that there was a division—that there were some people that were literally sitting like this [arms crossed] and then other people were clearly for it. But I don't think anything really came of that. I think it was just . . . it was really more informative for people that were interested. And it's, kind of, again, a heads up. That was a goal of a lot of these meetings with various folks was to make sure that we weren't one, doing something that was really just bad that could be actually counter to what an agency was doing. And then the agency was doing something very, very good. But inadvertently, you can do . . . you can say things or have a section or something that could really stymie what they wanted to do. So we wanted to be sure that nothing like that happened.

EVANS: Did you also brief Obama on these reports, or what was his involvement in either the report drafting or, kind of, end release of these reports?

SCHAAL: We did. When we had our meetings, we would brief current reports. And I remember briefing on the agricultural one and listing what the to-do aspects were. And so there was somewhere . . . enforce **<T: 30 min>** an executive order or that kind of thing. So yeah, we briefed him on what was going on, and I still remember one time it was really interesting. We had a PCAST meeting ahead of time. We were going to see the president and so there was just a general discussion about what could be some of the future things that we wanted to do. And so we gave him just a list of various topics, and I think this was a really good example of how clever he was and how well informed he was. So he went through and he said—it was great because some of the ones on top he was not interested in—and he said, "Well, we've done one report, this is very similar, so we don't need to do that." And then he went down and picked a couple of the other reports that were a little bit lower on the list. So that was impressive.

EVANS: I'm not sure if you're allowed to share, but what was he interested in?

SCHAAL: Well, this may not be that list, but I can tell you that we had one report, which was really interesting, and that was technology for an aging population.[13] And it was stuff like what you do in a house, what kind of technology can be there? One of the big things was hearing aids, and so we had a briefing with him on this technology report, and he said . . . he was then very,

[13] President's Council of Advisors on Science and Technology, "Independence, Technology, and Connection in Older Age," March 2016, accessed June 7, 2023, https://digitalcollections.rice.edu/Documents/Detail/independence-technology-and-connection-in-older-age/266488.

very interested in the hearing aid issue. And that's a real serious issue. I think everybody on PCAST really resonated with this. It was hearing aids. You have to go and have your ears tested by an . . . . I think, by an otolaryngologist, somebody who is certified at that time. And then the hearing aids are extraordinarily expensive, like thousands of dollars. And if you hold up an iPhone, the technology of the iPhone, which is a couple hundred dollars, is so much more sophisticated than the hearing aids. But there's this FDA rule that you have to see a doctor, make sure everything is okay before you get your hearing aid. And what it was doing was preventing people from getting hearing aids. And that has huge health consequences because when you start to have trouble hearing, you begin to withdraw socially. And as soon as you withdraw socially and become isolated, there's all of these physical health issues. You lose . . . you reduce your cognition, and all kinds of different things happen. And so he was really, really interested in that. And so he said, "Give me a report on hearing aids."[14] I do remember one time we were talking about some other medical things and his comment was—he was very . . . he seemed to be very interested in flesh-eating bacteria. [. . .] He also had a Beanie Baby of a flesh-eating bacteria.

EVANS: Oh. I'm not sure I know what they look like.

SCHAAL: You know what Beanie Babies are right because . . . ? It's red, and it's got a little knife and fork.

EVANS: Oh, that's silly.

SCHAAL: He showed it to us. It was quite remarkable.

EVANS: Yeah, we had them. We were part of the Beanie Baby craze, so full disclosure there, in whenever that was—'95 or something like that. That got me off track. What was I going to talk about?

SCHAAL: Beanie Babies will do that.

EVANS: Yeah. No, now I'm totally distracted. I'm . . . well, I was going to ask about . . . oh, there was . . . oh, I was going to ask a follow-up to the hearing aid question about now I think

[14] President's Council of Advisors on Science and Technology, "Aging America & Hearing Loss: Imperative of Improved Hearing Technologies," October 2015, accessed June 7, 2023, https://digitalcollections.rice.edu/Documents/Detail/aging-america-hearing-loss-imperative-of-improved-hearing-technologies/266473.

something about over-the-counter hearing aids where you didn't have to go through . . . do you know where that is in terms of the process?

SCHAAL: Yeah, basically, the FDA rule was changed. And so you can get hearing aids now and then they're advertising them on the TV and on the internet and stuff. German hearing aids. Just a couple hundred dollars. You know, it's really interesting because if you buy a good set of headphones, they basically do a hearing test, and you adjust the headphones to your own hearing. And that's what you do for hearing aids. So that was . . . . I think that was a really, really important report.

EVANS: Did you see—I have other reports I want to want to ask about—but did you see . . . . I mean, in that case, it seems like there's a, kind of, direct, very tangible outcome for this report. Were there other items or reports where you witnessed a similar thing where there was a policy recommendation, and even if it takes a long time, an outcome?

SCHAAL: Yeah, I think I paid a lot of attention to the agriculture one. And I remember somebody saying it was one of our more successful reports because there were actual things that happened. I think there was an increase in AFRI [Agriculture and Food Research Initiative] funding. And there was that postdoc thing coming out. And **<T: 35 min>** then [we] recommended that there be a foundation established similar to the research foundation for NIH and that for agriculture research, for plant research, and that actually has been established. It's called Foundation for Food and Agriculture Research, and that's been extraordinarily successful. They've gotten a lot of private funding, and they have a fellowship program. They support grants. It really is . . . it's a very successful activity. So that was a great outcome. In terms of overall funding for agriculture, not so much, but some of the littler things actually did happen.

EVANS: And that's within USDA?

SCHAAL: No, I think it's independent, but it's like the one for NIH. It just supports some of the areas that USDA is in. And so it's independent. But it really enhances . . . you know, sometimes also with NIH there's not support for a particular kind of research. And it would be really good if there were funds for something that was a little bit risky or something, you know. [cat walks across screen] There we go. The typical cat.

EVANS: Sorry, he's going off.

SCHAAL: So that's, sort of, a parallel thing, and that has gone well. The original director, Sally Rockey, just stepped down, and she was fantastic and really got the whole thing going. So that was a very, very good outcome. Sometimes you throw stuff out and hope something sticks, but what's the probability? This one really worked.

EVANS: Were you involved in . . . did you continue to do outreach and bring the report around, print it out, and send it to . . . was there an effort from PCAST to keep carrying the recommendations past the release?

SCHAAL: We did a little bit of that, but a lot of it was recommendations for agencies. So there was some . . . . I remember going back to USDA, Cathy [Catherine E.] Wotecki was assistant secretary for research, and it was very . . . well, it was very interesting because I think some of the people that we met had to . . . they were employed by a particular part of the government and so they represented that really well. But sometimes they had a personal opinion as well. And so that was always very interesting. So, Cathy . . . we couldn't do the agriculture report unless somebody asked for it in an agency. That was for that report. And so Cathy Wotecki did ask for it. And we had, I think, we'd gone to her and met with other people in the agencies a couple of times.

EVANS: Thank you. I wanted to ask about . . . . I know you were on the part of the working group about K-12 STEM education. Could you talk to me about that report?

SCHAAL: I didn't do very much on that. That was really headed by Jim Gates. And the one that I was more involved was one—and I can't remember the name—but it was Craig Mundie was leading it, and it was dealing with, sort of, educational issues for modern technology and looking at things such as providing credentials and how to keep the workforce for basically technology going.[15] And that I had a much more . . . . I was much more involved in. It was looking at things such as the role of community colleges and looking at things such as getting a whole . . . you could have a whole series of different kinds of certificates and you could stack them together. And it was a way to get people educated so that they could work in technology, but not having them go through a two-year program where they were out of the workforce. And also the other thing that we were very interested in is keeping people up-to-date on technology. And so how do you keep your workforce current? And so there was a lot of ideas about new ways of doing that. That was very interesting. It was interesting to work with Craig Mundie.

[15] President's Council of Advisors on Science and Technology, "Information Technology for Targeting Job-Skills Training and Matching Talent to Jobs," September 2014, accessed June 7, 2023, https://digitalcollections.rice.edu/Documents/Detail/information-technology-for-targeting-job-skills-training-and-matching-talent-to-jobs/266496.

EVANS: Was that—I'm trying to remember the name of it—was this . . . was it "Engaged to Excel," or was it . . . there was another one specifically on workforce.[16]

SCHAAL: This was the workforce one, I think.

EVANS: Interesting. Thank you. I want to ask . . . . I have a question . . . . So I know **<T: 40 min>** PCAST originally or in the Obama—excuse me in the Clinton administration—was the executive order was released the same day as the executive order for the National Science and Technology Council. What did you see . . . did you . . . what was the working relationship there in terms of report building or either meetings or anything else? I guess how you saw NSTC and what the working relationship there was?

SCHAAL: I don't know very much about that. We did have NSTC people come, and I think it was more . . . my sense was—and I could be wrong on this—my sense was more it was to keep us updated. There were things that we had to do, reports that we had to do that were prescribed. They were congressional sorts of things. So we had to do energy reports and updates. And I think some of the [NSTC] things were that way too. But I wasn't . . . as a biologist, I wasn't much involved in that.

EVANS: Many of the . . . . I know are nano reports mandated by congressional statute?

SCHAAL: I'm sorry. I didn't hear that well.

EVANS: Are the nano reports . . . ?

SCHAAL: Yeah. The nanotechnology one was absolutely, yeah. So we had to do those.

EVANS: Well, if you weren't necessarily part of a working group or chairing one, what was your responsibilities and role in terms of producing those PCAST reports?

[16] President's Council of Advisors on Science and Technology, "Report to President: Engage to Excel: Producing Additional College Graduates with Degrees in Science, Technology, Engineering, and Mathematics," February 2012, accessed July 11, 2023, https://digitalcollections.rice.edu/Documents/Detail/report-to-the-president-engage-to-excel-producing-additional-college-graduates-with-degrees-in-science-technology-engineering-and-mathematics/266415.

SCHAAL: The ones that I wasn't involved with? I think just . . . we had updates we had . . . when there was a report, we'd have people come and talk to us. So everybody, even though you weren't, let's say, on the working group for that, there was a series of briefs. And so we always . . . . I always felt like I was really carried along on all of those reports. And then at the very end, the recommendation was to approve. And so if that was recommended, we did. So it was intellectually, really, really engaging because there was just so much . . . we had so many amazing . . . like [Anthony S.] Fauci came, all kinds of people.

EVANS: Yeah. I was going to ask more about meetings and when you guys did have . . . . I know that PCAST did have quite a lot of guests come through and meet with PCAST and stuff like that. Did the meeting format or, kind of, meeting general tone evolve with time at all? Or did you still meet in the Roosevelt Room after the first few years, or was there a transition, say, between the two terms, in terms of PCAST and the work that they were doing?

SCHAAL: It was pretty . . . . I think there wasn't much difference between the terms. What happened was I think a lot of the security issues and, sort of, constraints that we felt seemed to be relaxed, particularly after the election. So we would be . . . sometimes we would be in the White House and waiting for Obama, and there would be very animated conversation. And we were always told to keep it down repeatedly. And one time he was late, and basically they said, "Just go around . . ." And we still had our phones. So this was not . . . . I think it was in the State Dining Room or something. "You just look around and then we'll let you know when it's time to assemble again." So it was cool because you could take pictures of the Red Room and whatever. So that was a difference.

The meetings themselves, you know, at first they were fairly formal. And again, everything was . . . people were very cautious. And I think it's because it was a new space. And I don't . . . my sense was . . . they were—people in the administration—were very careful not to make mistakes with the feeling that people would jump all over Obama if there was something like that. That was my sense. And that really, in my mind, really, kind of, dissipated. There were times . . . . I remember one time getting a phone call from White House. There was . . . one of our members said something that wasn't smart. And so there was just kind of an all hands on deck. If you get asked about this, this is the way we would like you to respond.

EVANS: Interesting. Was it in his capacity—or their—capacity in PCAST or was it just something that they offhand . . . there was press or something that made Obama look or the White House look bad or something?

SCHAAL: I think . . . . I don't think anything actually came of it. I think it could have been interpreted . . . it was one of our members. And I'm not sure exactly who it was. I think I know, but I won't say the name because it may not be right. That it just was . . . it wasn't quite right. And so there was this concern, and I think that came from OSTP because John was head of

OSTP as well. I mean, one of the things that we really benefited <**T: 45 min**> from is that John and Obama, I think, had a lot of really close connections, and I think they liked each other very much. And so there was just a lot of interaction from what I could tell between John Holdren and Barack Obama. And so there was a lot of back and forth. And we would get . . . we would hear comments from John Holdren at the beginning of meetings about "this was going on and the president thinks this" and "I briefed the president on this." So that I think really helped PCAST was the sense that the person who was leading us, John Holdren, in fact, had the president's ear.

EVANS: Right. I've heard . . . it brings up a question I was meaning to ask at some point. And I know for us policy folks we think about the dual-hatted nature of that position what you just described—that there's this . . . . John has these two titles, assistant to the president for science and technology, and he's also a Senate-confirmed director of OSTP. Do you . . . . I guess a couple of questions. One, do you see any kind of inherent—conflict's not the right word—but challenges in terms of what you noticed John in terms of managing those two hats and then two, I know in the Biden administration that person's also been appointed to the cabinet. Is that something that makes sense to you?

SCHAAL: So the first question. To me, it seemed as though having John Holdren head of PCAST, director of OSTP and being the president's science advisor worked really, really well because PCAST really seemed to be working out of OSTP. We went over to the offices sometimes, etc., and having that direct connection with Obama as science advisor, I think really made everything work well. I didn't see that there was any . . . that offered any kind of constraints, but John Holdren is the one that should answer that. What was the second question again?

EVANS: The second is about the cabinet appointment. Do you think that that would have helped Dr. Holdren?

SCHAAL: Yes. That was one of the things that we talked about, and I think it would have helped a lot. I think, particularly sitting in on cabinet meetings, and it would elevate science. So that was one of the recommendations that I think was made to the Trump administration, and then it was taken up by [Joseph R.] Biden. Biden was at a number of our meetings.

EVANS: What was your experience like with him?

SCHAAL: He's very friendly. It was actually pretty funny. I mean, really friendly. At one point, we had finished a meeting and the president had to leave for something else. And then Joe Biden was there, and he looked at us, and he just started talking. And so we talked to him for

quite a bit of time. Another time, he was being driven to the West Wing, and we were outside waiting to go in. And he said, "Oh, who are you guys?" And he walked over and started talking to everybody. So that was our interaction. And in PCAST meetings with the president, he would ask questions as well. The thing that's so interesting about being in a meeting with the president is he walks in, and the whole room focuses on him. And it doesn't leave that focus until he leaves. It's really quite amazing. And it must take a lot of fortitude to do that, to be that person, because everybody is looking at him all the time.

EVANS: Yeah. Yeah. It seems . . . that would not . . . seems very stressful. Yeah, fortitude is a good word.

SCHAAL: And particularly if one is not an extrovert, it must be really hard.

EVANS: Right. Right. I've got a question about . . . so in addition to Holdren's title and role, did you . . . most PCASTs have had external co-chairs. Have there . . . did you see a need for . . . so does it matter who and what the background of that person are? What was your experience with . . . . I know you were . . . [had a] very close working relationship with Varmus while he was on the council, but in terms of Lander, for instance, does it matter their background or who they are in terms of that co-chair position? Could they, for instance, be another member of the administration or do they necessarily need to be external—that kind of idea?

SCHAAL: Well, to me, it seems like a really good idea to have a member of PCAST be the **<T: 50 min>** co-chairs and just simply because what you worry about, say, if you took somebody from State or from USDA and put them in that position, they would have such a strong background and particularly because they would still be in that position in whatever—the USDA or whatever it was—that I think that potentially might actually interfere. I think the co-chairs that we had represented different areas. And someone like Bill Press was just terrific all the time. And then you want to have someone who's strong in the physical sciences, someone who's strong in technology, you want to have someone who is strong in health/biological sciences. And so having those kinds of folks as co-chairs, I think lends a fresh viewpoint, a balanced viewpoint. If you've chosen the right people, that is not necessarily found within or is more difficult to have represented from an agency. That was my feeling because we were supposed to go in there with fresh eyes and sometimes synthesize and go across different agencies. And so I just think that's easier if it's somebody from the outside. And that doesn't mean that you can't . . . that there aren't terrific people that could do that from the agencies.

I think one of the things that—I've talked to a number of people, and we all have the same feeling—that one of the benefits of being on PCAST is you develop this tremendously deep respect for people that are in the agencies. These people would come in and talk to PCAST, and they were totally dedicated. They're really, really smart, and it was very encouraging. It made you feel really good about the government to see the quality of some of

these folks. And it wasn't just one or two. I mean, there was . . . people that came and talked to us were just amazingly bright and amazingly dedicated and very, very thoughtful. So that was actually a really good part of PCAST, and you wouldn't think that ahead of time with that. I think other folks had the same thought.

EVANS: Yeah. That's always been reassuring to me. I mean, even if I disagree with administration positions, I know that there are a lot of very bright, extraordinarily dedicated people working across agencies and in civil service that are still doing the work that they do. It's always been reassuring to me, but it's hard to know that outside of if you're not involved in government just how bright and hardworking these people are.

SCHAAL: Yeah.

EVANS: Your comment about expertise got me thinking another question in terms of balance of the rest of PCAST, in terms of their backgrounds, I know people come from all over, have different backgrounds. Were there . . . . I guess I'm wondering, one, if you think that PCAST was balanced or if you think that there [is] expertise Obama's PCAST could have used in terms of a background that would have been useful to the council?

SCHAAL: My sense was that we had a wide range of expertise. We had Eric Schmidt from Google and people that did computer science and all sorts of different things. There were new members that were added on the second term so there was that flexibility to really add some balance. And the other thing that I think is really important is that the actual reports were done by a working group and that had a lot of expertise that were called in—people that were called in so I think that was a good balance. I didn't feel that there was any area that wasn't represented. I think people tried real hard to do the right thing. My sense was that members of PCAST were thrilled with the Obama administration and obviously a supporter and were extraordinarily respectful of John Holdren and the work that he did. And so I think there was a lot of . . . my sense was that there was a really good spirit there that to try to do as best we could for the country and what our . . . and do the best thing that we could do for the mission of PCAST. I'm not sure everybody felt that way. But I did.

EVANS: Are there things—just as a follow-up—are there policy issues you think PCAST is uniquely qualified to be working on, kind of, regardless of the expertise, like in future administrations and, two, were there things that you thought you really wanted PCAST to work on **<T: 55 min>** but didn't get to, for instance?

SCHAAL: I think the advantage of PCAST is it can be fast and because it's so closely related to the Executive Office that it has that advantage and it has the advantage of it can pull in

information from the agencies. So I think that's interesting and unique because it can do it very quickly because of the Executive Office. So that's, I think, good. I think that's an advantage. Also, the other thing that I thought was really important is that PCAST can recommend policy and after spending so much . . . still in the National Academy, we don't recommend "do this executive order, do this policy thing." That's easing up a little bit, but that's where I see a big difference. With thirty-five reports, there was a lot of ground covered, a whole lot of ground covered. I wondered sometimes a little bit about the physical sciences thinking about—we had the head of NASA [National Aeronautics and Space Administration] and that sort of thing—but thinking about some of them. And that would be an area where I guess I would want to check to make sure that we didn't leave anything uncovered. And maybe it's just because I'm not a physical scientist.

EVANS: Yeah, interesting. I'd wondered . . . . I mean, PCAST historically has been . . . . I mean, before the Clinton administration, it was largely physicists and engineers. So it's been an interesting shift.

SCHAAL: Yeah, well, biology is a big deal now. [laughter]

EVANS: Yeah. I'm wondering too, and I have more questions about PCAST. And I also want to . . . there are a number of . . . . I know a lot of things were happening. You were involved in quite a number of activities and positions during your time on PCAST. You've mentioned the your impression of the dedication of staff. You've also mentioned that it was a real learning experience for you. Did . . . were there other lessons or things that you took with you from PCAST that really stuck with you?

SCHAAL: I think perseverance. So the Ag report that really got . . . it took a long time before people saluted on that one. And then . . . and just being able to not get upset and just continue to justify the report and getting more and more people that felt it was a good idea. I mean, that to me was a real lesson that sometimes you just have to just be calm and push your . . . what your thoughts are in a non-confrontational way. We did have a couple of people that were . . . tended to be confrontational, and that clearly doesn't work well.

I think the other thing is just being able to work well with others, particularly when you have such a broad representation, you know, there's Eric Schmidt from Google. I mean, he's a titan, right? And we had Nobel laureates and Eric Lander, and we all know about Eric, and he's very opinionated and also extraordinarily talented. Wow. So being able to work with that group of people, that requires some skills, I think. Otherwise you can't do what you want to do. That's the bottom line. I don't care if I offend somebody, but if I can't get something done that needs to be done, that's a real issue. And offending people will stop you from doing what you want to do.

EVANS: If you were today chair of PCAST or co-chair, if you had a magic wand . . . how would you . . . are there things that you saw in PCAST that may have worked . . . the council work better or things that you would have done differently, for instance?

SCHAAL: I think . . . my guess would be, first, to have a little bit more orientation about the structure of the executive branch and that we were going to be interacting with them. And this would be for people like me who had never worked in government. I think someone like Rosina, she was so immersed in all of this and really comfortable and really knew what she was doing. But for some of the rest of us, it was a learning experience. And so that's one thing that I think would have been a little bit helpful. I think . . . . I wonder if doing fewer reports would have been better. It was pretty hectic at the end. And some of them—the pro forma ones—were pro forma. Yeah. And so you wondered . . . . I did wonder about whether we were really making a contribution when we did those nanotechnology ones, for **<T: 60 min>** example. Those were, kind of, some of the thoughts that I had.

EVANS: Yeah. Interesting. Thank you. Yeah, that's a research question we've had in terms of is PCAST the appropriate body for doing those? Well, I've got . . . . I was going to return a bit mostly to think about how you were . . . . I know you were also . . . had a full-time job and many other things that you were doing how you managed . . . . I know in 2011 you were . . . became director of the Tyson Research Center. Could you, one, talk to me about that position and then, two, how you balance the work you were doing on PCAST and the National Academies with the work you were still doing at WashU?

SCHAAL: Sure. The first thing is I was . . . when I was the vice president of the National Academy, that is actually a half-time job. And so when I was first approached about running for vice president, I talked to our chancellor and my dean and said, "You know, this is really problematic. I have a full-time job here at WashU." And they were extraordinarily—I may have said this last time—extraordinarily supportive. And so that meant that I didn't have to do undergraduate teaching. I still had a research laboratory. And research for me is super fun. And I had—I'm no longer research active—but I had fantastic graduate students. Just an amazing group of people that worked together. So the research just, kind of, continued.

PCAST, we met once every two months, I think. I think we met six times a year. And so that wasn't so bad because I was in Washington a lot. For the Tyson Research Center. I took over that [when the director was let go], and that was actually fun. I really enjoyed that. [Then] I was asked if I'd be dean [for a similar reason]. So I became dean when I was on PCAST, and that was . . . that actually led to me not running for a third term for NAS vice president because I couldn't do . . . . I mean, it was really clear I couldn't do everything. The other thing is you just work hard so that was how I dealt with that. Plus, it's really easy when stuff is interesting. I mean, to me, being on PCAST was such an incredible privilege. And as somebody . . . as a scientist, it was so interesting, and it was so interesting to see how the government worked. And that was just . . . it didn't seem like work. It seemed more like . . . . I mean, it was just an honor

to do that. But yeah, I couldn't be dean, vice president of the National Academy, and serve on PCAST. That was too much.

EVANS: What was . . . . I mean transitioning into being dean, was that something that you looked forward to when you when you came in in the morning? Was it something that you enjoyed doing? And what were your, kind of, responsibilities?

SCHAAL: This is . . . the person who had been dean, I was asked to be dean when there was that search committee for that individual, and I said I wasn't interested. And then I was on the search committee. He was let go. And so they were desperate for a dean, and I was really reluctant about it. But the fact that WashU . . . . I mean, I've been so supported by WashU. I had fantastic graduate students, a really active research lab, lots of great colleagues and administrative support, and then they let me go half-time. I mean, how many people get to do that and be on the National . . . do the National Academy stuff? So I felt pretty strongly that I owed WashU something. And so with just a huge amount of trepidation, I said I would do it for a short X period of time, and it turned out to be they wanted me to do it for five years, and then I figured I would stop. And it turned out that at first it was terrifying because it was really complicated. And even though I'd been at WashU, but I didn't know much about the humanities or anything. But then after a couple of months, I became much more comfortable.

I would say in general, I enjoyed being dean. There's about 5 percent of the stuff that is just god-awful. **<T: 65 min>** It's just terrible. People behaving in ways like . . . it defies any rationality the way some people behave. So that was difficult. But in general, I love the faculty and all their craziness. You know, you get people that are interested in artwork on ancient Greek vases and they love that. We had somebody who collected Roman coins and talked about that. Just the diversity of what people do is so interesting. And most of the faculty members, by far, almost most of the faculty members are dedicated people. They're dedicated to their area of expertise. And at WashU, our faculty is dedicated to our undergraduates as well. So there's a lot to being dean that I thought was really, really nice. But there were other things. We had budgetary issues. We needed more space; we needed more faculty. So I'm continually trying to squeeze out more resources to do stuff. And that was challenging. But again, terrific staff. And so that helped a lot. So, yeah, I was glad that I became dean. It was also a very nice way to transition away from having a research laboratory after forty-some years of providing support to students and laboratory stuff and everything. It was time to let it go.

EVANS: Did your research lab continue for a period while you were dean, or was that part of the transition?

SCHAAL: No, for a while, I think I had four grad students still, and so they finished, and then I shut it down. So it was actually a really nice way of transitioning.

EVANS: What happens to your—just curious about it—what happens to your lab space when you decide to transition from doing research?

SCHAAL: If all goes really well, you hire a distinguished professor, and then he takes that place.

EVANS: Okay, very good.

SCHAAL: And that worked really well because I was in a position to hire that person as dean.

EVANS: That's great. Well, you said you were going to . . . you were fine serving for a short time, but I'm seeing in your CV that you served until 2020. Was that through your own volition, or were you . . . at a point did you get into the zone and you were in a good place being dean and wanted to continue on?

SCHAAL: I was asked to do . . . . I said I didn't want to continue, mainly because part of it is also my age. I had always thought that I was going to retire at seventy. You know, hang on for a few years, retire at seventy. So I asked to step down and again was convinced to continue because they were, we were going to hire a new chancellor. And so that's a huge transition for the university. And they wanted to have stability in arts and sciences while that transition happened.

EVANS: Right. So did you have a good relationship with the incoming chancellor?

SCHAAL: No. I think we did not choose wisely.

EVANS: Well, I don't have to ask more about that.

SCHAAL: But the relationship that I had . . . WashU has been at least previously very fortunate in having a very cohesive administrative group. And so everybody's part of a team. We obviously get very angry when you don't get a budget and stuff like that—we have our differences. But there was this sense of culture and all of us moving the university forward, and that seems to have left. But that was part of what was so pleasant about being dean as you felt like you were actually doing something important in really moving the university forward.

EVANS: Interesting. So I've got a couple other questions about . . . the first one I've been eager to ask is about your science envoy appointment under Secretary of State [Hillary Rodham] Clinton. Could you talk about that because that was 2012?

SCHAAL: Yeah. So that was for a year. And the idea was to . . . it was based on science diplomacy. And that's something that the National Academy does really well. So, for example, we obviously have very strained relationships with Iran, and now they're really strained. But when I was vice president, we would send people over to Iran, and they would be met with scientists, and they'd be moving around the country. And they were, in some cases, treated like rock stars because it was a Nobel laureate—that sort of thing. We met with a whole group of Iranian scientists **<T: 70 min>** in France and had a couple of days of just meetings and interactions. And so that kind of diplomacy and the fact that scientists tend to collaborate with people across the globe. So the idea was to use that. And it came from Bill [E. William] Colglazier, who was in State, but was also, I think, executive director of the NRC. So he knew about all of those activities.

So the idea was to do that kind of interaction—to go and develop friends and if possible, develop some kind of collaborations. That's really hard to do with a single visit in a year. There were some collaborations did develop from other folks, but I . . . there was a little bit of research collaboration, but I don't think it was exactly a strong connection between the two countries that I visited. So I went to Colombia, and I was familiar with Colombia because one of my grad students [Jason Rauscher] actually did his fieldwork there. And one of my other grad students [Ana Caicedo], was an undergrad at the University of Bogotá. So there were . . . . I had already research connections there, and I had served—there was the Center for International Tropical Agriculture [CIAT]—I had served on a review committee there.

And also I had lots of interactions with some of the scientists at CIAT. So what we did was it was really interesting. Flew into Bogotá, [Colombia], and was met by people from the US embassy. And it's one of those cars, you know, that's hardened for explosions and stuff like that because it was such a . . . it had previously been a really dangerous place and things had just settled down in Colombia. I went to Bogotá, I went to Medellín, [Colombia], and to Cali, [Colombia], and gave a research talk, met with university presidents, and basically heard a lot about how everybody was so happy that the relationship between the FARC [Revolutionary Armed Forces of Colombia]—the guerillas—and the government had improved and that there was going to be some compromise. We went to Medellín, which was from what I understand just a terrible, terrible place. They talked about bodies being found in the river in the morning—the river that runs through Medellín. And people were just ebullient. They're going out and say, "We can now go out to dinner at night. We can walk around at night." And it's this gorgeous city. It's high elevation. It's sunny; it's beautiful. I visited in both places—and I went to Uruguay—in both places some high schools. So I met with the teachers and with various students and answered their questions. And they were really blunt questions. And with one of the instructors, I exchanged some STEM material so he was really interested in receiving that.

EVANS: Did the kids ask questions about US politics?

SCHAAL: No, they didn't. They wanted to know what my parents thought about me being a scientist and not being a traditional wife. And so I had to explain to them, "Well, I am a wife, and I have children." But there were those levels of personal questions and then there was some . . . a little bit about US policy, but they were more interested in, I think, the social dynamics. And the school in Medellín was actually in an area that had a lot of gangs, and so the school was there to try to really pull the kids out of that environment. And there . . . I think there were very bright kids, very forthcoming and really interested. So I gave a talk there. This was fun. So giving a talk is . . . what do you do? Colombia is amazing in terms of its biodiversity. It's like this international gem. And so that was what I focused on and told them they were living in a really special place and a special country. And that was, with hindsight, was a good choice.

EVANS: Interesting. Yeah, sounds really fun.

SCHAAL: It was fascinating, particularly Colombia, because we went to so many different places. And then Uruguay was very interesting as well because that's such a . . . in Uruguay, we met with the US ambassador [Julissa Reynoso Pantaleón], and she was a big advocate for Hillary Clinton. So there was a lot of conversations offline about that and then went to various research institutes. There it was very interesting because the US had announced this initiative on the brain—about the brain—and there was some resentment among some of the people that how does **<T: 75 min>** this happen? How does the US just decide to do this? We work on the brain. Why aren't we part of this? So that was an interesting conversation.

EVANS: The BRAIN Initiative.[17] When did that . . . when was that announced? It was sometime during . . .

SCHAAL: Sometime, yeah. So that's just general discussions of how you do priorities and when there's a priority, what kind of international connections should there be? Should you socialize this internationally? And the answer is you can't hit every country.

EVANS: Right. Had . . . you mentioned you had students that had ties to Colombia? Had you been there before or spent time in South America?

[17] See "The BRAIN Initiative," accessed June 8, 2023, https://braininitiative.nih.gov/.

SCHAAL: I had been there before. I don't speak Spanish, so I don't understand why I was the ambassador to Latin America. But that's another thing. Yeah, I had been there . . . actually quite a long trip when I did . . . was part of this review team for their . . . the Center for International Tropical Agriculture for their Genetic Resources unit. And one of my students who was born in the US, he was actually doing his fieldwork at the time. So we went up into the Andes Mountains to this amazing region called the páramos, and it's incredible because the plants there are adapted to this crazy environment. So you're up really high in the Andes and the sun is . . . and the UV, and it's like summer during the day. And then because you're up so high and there's no clouds, it's winter [at night]. So it's so summer every day, winter every night. And the plants have all of these amazing adaptations. So you get a member of the sunflower family, which looks like a sunflower, except it's covered in fur. And you get members of the violet family, they're little, teeny, tiny plants, and they build this hard mound. And in the middle of the mound, there's decomposition which warms them. So just an amazing environment, and he was studying some of these things.

EVANS: Cool. What are those sunflowers called?

SCHAAL: What is their name? Just [google] Andes páramos sunflowers [Espeletia]. You'll see them. They're adorable. They're so cute.

EVANS: Cool. Very cool. So it was just the one trip to each country as part of your envoy?

SCHAAL: Just one trip.

EVANS: Did you have to . . . when you returned, did you have to . . . did you present—I don't know—to the State Department or were there . . . ?

SCHAAL: There was . . . beforehand, I met with . . . . I went to the State Department a couple of times, met with the Colombian ambassador to the US, went to the embassy. Not so much with Uruguay. Oh, Uruguay. I met the president of the country [José Alberto Mujica Cordano].

EVANS: Oh wow.

SCHAAL: And so Uruguay was really interesting because he was very interested in making sure that students were well-educated. That was a huge thing for Uruguay. And there was just a lot of interest in little newspapers and things like that. So it's an intellectually engaged . . . a lot of people are engaged. So he was making sure that people had—that kids had iPads and that

there was good schooling. So we talked a lot about that when I talked to him. We talked a lot about agriculture, and he was one of these people—a man of the people. So instead of wearing a suit and everything, he was wearing Birkenstocks and had a big beard and stuff like that. He was an extremely engaging person. We had a really good conversation.

EVANS: And this was after you returned?

SCHAAL: No, this was during the visit to Uruguay. And it was weird because we were just sitting—I was across his desk—and we were just chatting and of course there was cameras and all this other stuff going on I guess for PR, but a very comfortable person.

EVANS: Cool. Very cool. I had another, kind of, major position I wanted to ask about, and that's AAAS [American Association for the Advancement of Science] and how that came about. I mean, that's a huge deal. It's such a major organization. And I know you were president in 2016, so I'm wondering about how that position came about. Is there—I'm not sure about the process—is there an election or . . . ?

SCHAAL: Yeah, there's an election. So somebody nominated me—they have a nominating committee—and then two people are chosen to run. And so that's what happened. And I agreed to run for AAAS. The executive director at that time was . . . how can I forget his name? I knew the executive director really, really well. And so we had a close **<T: 80 min>** relationship. We served together on—Alan [I.] Leshner. How could I forget that name? Alan. So we served on some subcommittees together and everything, and I really, really like Alan a lot. So I think that was how I got engaged in that. And then we had just . . . he actually had then stepped down, and we had a new director and so there was a lot of orientation and looking at that previous ways things were done and trying to get things a little more subtle. It was Rush [Dew] Holt, and he came from Congress, actually, although he is a physicist. And so there was a lot of new stuff going on. There was a concern about . . . there were budgetary issues that were really concerning. The way that AAAS ran was basically off of advertising from *Science* magazine. And now everything is electronic, and that advertising revenue actually declined. And that was a serious issue for the organization. And I think that's all been solved. And so that was . . . it was very, very interesting.

Then AAAS does so many things. The AAAS fellows, they're all over Washington. That's just an amazing program, something that the country really, really benefits from. So that was very interesting. Being AAAS president was interesting. One of the weirder things about something like AAAS, it was a three-year [commitment]: you're on the council, you're president-elect, and then you're president, and then you leave. And so it's really, kind of, hard because we were so enmeshed in so many different things. And so you always wonder, well, what happened? And that's not unusual when you change positions or step down.

EVANS: What does—

SCHAAL: Really talented people in the organization.

EVANS: Yes, I understand it to be . . . that it does so many things, like you said. What is the, kind of, respective roles of the executive officer and the president? And how did you . . . had you met Rush before? And what was your working relationship?

SCHAAL: Well, I think basically the executive officer runs the place and the presidents . . . every year there's a new president. There's more stability with the council. But I think it really does tend to be the executive director that sets the tone for everything. And I guess the council is sort of like a board of trustees and in some cases I think there's a lot of active involvement. We were pretty active with Rush Holt, and I think my understanding was that the council was much more . . . less involved with Alan Leshner because he was . . . just had so much experience and really was a very strong force.

EVANS: Not sure how to phrase this well. So in 2016 of course, [Donald J.] Trump comes into the presidency, did that—you're free to answer, obviously, or not answer—but did that change AAAS's strategy or things that it was doing or . . . ?

SCHAAL: Yes. So basically what Holt, what Rush Holt wanted to do was to make AAAS a force for science and to be the public face of science. And so we were very much involved in the march [March for Science], some of the marches in DC, and there was a real sense that we needed to be much more active.[18] And so that was a response. And I think, of course, everybody was quite concerned because Trump—unlike Obama—Trump did not seem to be that interested in science. And the fact that it took him forever to appoint PCAST and that sort of thing was probably a reflection of that. But yeah, there was a lot of concern.

EVANS: Did you . . . . I'm not sure how to phrase it. I mean, I'm wondering . . . so I'm thinking about—and now I'm forgetting his name—but the government relations officer [Michael S. Lubell] at APS [American Physical Society], I remember being, kind of, forced to step down after he made some statement about assisting Trump and there being this idea that—I'll think of it in a sec—but there was basically this controversy about APS wanting to basically remove itself and not necessarily be a political organization or necessarily help the Trump agenda or whatever it was in terms of science. I guess I'm wondering how AAAS walked that

[18] See "March for Science: Rallies Worldwide to Protest Against Political Interference," *BBC News*, April 22, 2017, accessed June 7, 2023, https://www.bbc.com/news/world-39679629.

line in terms of not . . . still being a professional membership organization that does advocacy on behalf of its membership versus I don't know how it responds to political issues with regards to its **<T: 85 min>** constituency.

SCHAAL: Yeah, I wasn't there long enough to see much of a response to Trump. I think . . . . I know that sometimes the conversations I have because I was part of so many groups, it's hard to remember which one, where the conversation was. But I know there was a lot of concern about if you were asked to serve in the Trump White House like on PCAST or something like that, would you do it? And so I think I've had this conversation with every organization, and I think initially a lot of people felt that it would be important if you were asked to serve because it would be serving the country, you could perhaps do something to move the scientific agenda along. And if the country asks you to serve, you should serve. And I think I, sort of, felt that way initially. I think as things started to move along, it was really clear that that science wasn't particularly being listened to. And moreover, you were going to be, in some cases, vilified by your colleagues—your scientific colleagues—and you also . . . and interacting with Trump could be very negative. So I think people's feeling about how to interact with the Trump White House changed, I think, quite a bit. This is not the result of a survey or anything, so . . .

EVANS: No, no. Not at all. I have just been . . . . I've been curious just because yeah, just walking that line in terms of being the face for science, [but] also being, kind of, like not a political entity, but just you want to support—I don't know—just curious about the political nature of AAAS and what that meant under Trump was my . . .

SCHAAL: I don't know as it progressed. I know initially people said, "Yes, of course I would serve." And that changed very quickly when it became quite clear what you would . . . what would happen if you did. Best would be you'd just be ignored. But eventually it could be some other consequences as well.

EVANS: Right. Well, he eventually did stand up a PCAST and . . .

SCHAAL: Yeah. Well, but I do know from conversations that people were asked, and they turned it down eventually. And I think I probably would have done the same thing after a couple of years whereas initially I felt very strongly when the government asks you to serve, you serve.

EVANS: Right. Well, so in 2020, your tenure as dean wraps up. I guess I'm curious about what you . . . what your role is now and what you're working on at WashU and, kind of, your plans for the rest of your career. I know you said you wanted to retire at seventy, but you continue to work.

SCHAAL: I missed that one. So after . . . the year after stepping down as dean, then you have a year of sabbatical. And I had planned—this was COVID—I had planned to go to visit my research colleagues in China, in Taiwan, and in Thailand where I've done a lot of work on rice. And that obviously didn't happen. So I basically spent the time working on a new course, a course [about] science for policy in agriculture and the environment. And so I worked on that course and did a lot of . . . a couple of other sorts of little things and continue to serve. I'm still chair of the Board of Life Sciences at the [National] Academies so that's all of the portfolio on life sciences—I chair that board.

Then after that one year then I did start teaching again. So I taught the science policy course and I'm going to be teaching a course on plants, people, and the environment, which is a really, really fun course to teach. It's for non-science majors. And so when I first taught this—this was a long time ago because I hadn't taught in a long time—the class is sitting there and they don't want to be there because it's the dreaded science requirement. And then my goal is to . . . plants are so much fun, and they're so interesting. And it was an hour-and-a-half class. And so what I do is I always bring something in for them to eat that's related to whatever the lesson is. So the first day of class . . . . I mean, it's shameless, right? It's really pandering. The first **<T: 90 min>** class, I make these muffins. I get this one recipe of muffins, and then I would substitute four different flours, and each student would get four muffins. And I'd say, "Now don't eat them really fast. Break them open. Smell them. What are you eating? What part of the plant? And why are they different?" And of course, after that you have them. And so the class has been really, really fun to teach. And I'm looking forward to . . . . I'm working on that now, and that'll be next fall.

So other things: I'm serving on university and arts and sciences search committees. I'm on the executive committee of the biology department—that kind of usual stuff, which is really easy. I'm still working a lot. In addition with the Board on Life Sciences, I'm now chair of the board on this small foundation, Supporters of Agriculture Research. And that's been very interesting because we've made a transition in the president, and the new president [Karl Anderson] is someone that has some real ambition and really good connections, and so that's becoming very exciting. We have support from the Gates Foundation and from the McDonald Foundation. So that, and then a couple of committees at the NAS. And then just recently, beginning in January, I'm co-chairing a roundtable on climate change and national security. And so that is supported by the Office of the Director of National Intelligence. And basically, it's to bring members of the intelligence community like from CIA [Central Intelligence Agency], DIA [Defense Intelligence Agency], and ODNI [Office of the Director of National Intelligence], and State and a couple of other agencies and climate scientists together to evaluate some of the issues for national security. And then the focus is international. It's been a real heavy lift being co-chair. There's just a lot of work, but it's really, really interesting, and I find it very energizing.

EVANS: Who is your co-chair?

SCHAAL: Karen [C.] Seto. She's from Yale University. She's an environmental scientist, works on some urban things, and she's an Academy member and I think has had a lot of experience chairing as well. The challenge with this is you've got a huge diversity of people that are in the room. You have members of the intelligence community that are there and then scientists—everything from physical scientists, oceanography to social issues in urban environments. So there's a lot of diversity. And I've chaired committees like this before. I was chair of the Gulf Research Program.[19] And when you have all these kinds of different people in the room, that makes it a little more challenging to get . . . to move things forward because everybody has a different view. So it's been . . . we've done a lot of work to try to harmonize things like terminology and harmonize what the goals are. So that's . . . but it's been really, really interesting.

EVANS: Is the work you're doing all classified?

SCHAAL: It will be. We're still getting our clearances.

EVANS: Is there . . . is it set up like PCAST where there's a co-chair that's a member of the administration, or is it . . . are you guys chairing a government . . . ?

SCHAAL: Well, it's through the National Academies so—

EVANS: Through the National Academies. Sorry about that.

SCHAAL: Yeah, it's not out of the government. It's through the National Academies. And so that's . . . . I think that's why Karen and I are co-chairing because we're both Academy members.

EVANS: I understand.

SCHAAL: Both at . . . but most of the members on the working group are not.

EVANS: I see. Interesting. I had a question about your policy course, if that's okay.

[19] See "Gulf Research Program," National Academies, accessed June 7, 2023, https://www.nationalacademies.org/gulf/gulf-research-program.

SCHAAL: Sure.

EVANS: Yeah, okay. Do you also have to make them muffins?

SCHAAL: I did not. I gave them something better. I gave them Zoom meetings with Marcia [Kemper] McNutt and Alan Leshner, and [H.] Holden Thorp because these are all my [friends]. And so they got to hear from all of these folks. One of them was Warren [R.] Muir, and he was involved in the EPA [Environmental Protection Agency] when the ozone issue came out.[20] And so he . . . so there was a theoretical paper by [F.] Sherwood [Rowland] and [Mario J.] Molina, and it's theoretically said that we think that CFCs are destroying the ozone layer.[21] But it wasn't . . . no experiment. There wasn't much information, but it was a theoretical paper. And so Warren was involved in the EPA at this [time], and he wasn't **<T: 95 min>** even sure about the paper. And he related to how all of this happened—what the scientists were saying, how the public received this potential and how ultimately it led to the Montreal Protocol. The class got to hear this story [first hand]. And it was just really interesting. Marcia McNutt blew the class away. She's president of the National Academy of Sciences. And she told a lot of personal stories, which the class was really interested in. She's a licensed, underwater explosive person. And so that got the class really going. And her comment was she never experienced sexual harassment after people knew that she could explode things. [laughter]

EVANS: That's funny. Yeah. I got to have lunch with her once right when I was finishing my degree and I was like, "How can I get involved in policy?" And she told me to run for Congress, which I thought was interesting. Yeah, well, that's fun. So are these students, are they science, STEM undergrads?

SCHAAL: Mostly, no. Most . . . . I had a couple . . . . I had someone in math, someone in biology, and someone in chemistry. But they're mostly environmental studies majors and double majors with political science. And the students are just deeply, deeply committed to the environment. It was . . . . I had nineteen students. There was one dud. The rest were just amazing. And we had . . . there was . . . so we would have a presentation. Either I'd give a lecture or I'd have somebody come in on Zoom and then we would discuss . . . then that would end, and then we'd have a discussion for about twenty minutes. And the stuff that came out was so interesting. One of the things that they were concerned about and came back to repeatedly is they all want to work in the environment. They all want to do good. And how can you work in an area where you know that you're not going to be able to solve something, that you are going

[20] Warren R. Muir, interview by Jody A. Roberts and Kavita Hardy at The National Academy of Sciences, Washington DC, 22 January 2010 (Philadelphia: Chemical Heritage Foundation, Oral History Transcript # 0866).
[21] Mario J. Molina, interview by David J. Caruso and Jody A. Roberts at The Mario Molina Center, Mexico City, Mexico on 6 and 7 May 2013 (Philadelphia: Chemical Heritage Foundation, Oral History Transcript # 0896).

to be dealing with information that is so depressing—climate change and pollution and all these other sorts of things. And so we talked a lot about, you know, how can you maintain the mental fortitude to work in an area where you know there's going to be some bad news and it's going to be hard to see the result of your work. And so, I mean, I told them the way that I deal with stuff like that is sometimes progress moves by a large group of people, a big wheel, and you're an important cog in the wheel. I think sometimes some of them thought they could just solve climate change by themselves and that's sweet but not going to happen. You've got to work on teams.

EVANS: That is sweet and somehow it's heartening to hear that from young, people that they really are just so enamored with it that they think that they'll go through and be able to just tackle it by themselves.

SCHAAL: Well, and they were all dedicated to it. I mean, that was what was so interesting is that this class was truly, truly interested in the environment and in agriculture, mainly towards an environmental aspect of it.

EVANS: Had you . . . was this your first time teaching the class?

SCHAAL: Yeah, it was a brand-new class.

EVANS: How did you go about creating the course material and recruiting students? Was it something that you . . . or people just heard of the class and wanted to be involved?

SCHAAL: Yeah, they just signed up. So I was real happy with the enrollment. The limit was twenty, and I had nineteen students. The course developed over that year of the sabbatical because I wasn't able to go to where I wanted to go. And a lot of it was just thinking. And I started out with one idea for the class and because I didn't have so many things on my plate, I could actually think a little bit. And so I changed the nature of it. One of the . . . and part of it was I also am on the advisory board—I don't even know what it's called—for this thing. It's Missouri Science and Technology Initiative [MOST], and they have a little bit of support from AAAS to do this thing about science outreach and initiative. Anyway, what they do is they have . . . they provide scientific support for the Missouri legislature, which, of course, is very polarized. So they came in, their president came in, and we talked about how you provide information **<T: 100 min>** to a government agency or how you provide information to a legislature. And they—MOST—says, "We absolutely never say anything about policy. [confirm wording] We don't do anything political. We say, 'This is the status of science. This is what we don't know. And here are the references and here are the data.'" And then we heard from the National Academy, which has, sort of, a similar approach and then from AAAS, which is, "No,

we [do] policy." And then the editor of *Science* said, "Yeah, well, I wrote an article. 'Trump lied.'"[22] So they hear this big expanse of different things. Anyway, so one of the assignments—I don't know why I'm rattling on—one of the assignments was for them to do their own legislative brief. And I said, "And if you want, we can submit them to MOST." And so you can have a publication as an undergraduate doing this policy thing. And so that was all really fun to do, but that evolved just thinking about it and thinking about opportunities and trying to . . . because I know all these folks that it was really nice for them to participate in the class. And so that was . . . and the reviews of the class were really good.

EVANS: That's great. Yeah. Thank you for sharing that. We teach a similar policy course for STEM grads at Rice [University]. And so I'm always curious when people have these little—or not little—but state initiatives and university . . .

SCHAAL: The students could do either a local one in Missouri, they could do one in their own state, and I had a couple of international students, and so somebody did how do you shift Shanghai, [China], to electrical vehicles and just the real data on that. It was really interesting. And then at the end, they had a much larger project to do. And at the end, I would have two or three students do presentations in a class about their work, and the students absolutely loved that part of the class. And the reason that they loved it is because I think the class had really gelled together and they were interested and respectful of their other students and wanted to know what their interests were. And so that was a surprise to me how well that went. And I think a lot of students in the evaluation said that was actually their favorite part. That and Marcia McNutt. They loved Marcia.

EVANS: This is, kind of, a general question, but I'm curious if you've noticed over time at your years at WashU, did you have grad students, say, thirty years ago that were very, very interested in doing policy or getting in government? Has there been a shift in what students or what your grad students go off and do or what their interests are?

SCHAAL: Yeah, I've noticed a shift. There was a cultural shift in science I think when I first started at WashU, and I think probably it's still in a number of laboratories. You're there to do research and to either get a position at an R1 university or work in a company or do something like that. And anyone who wants to do anything different, that's not appropriate, you shouldn't be here. And that was clearly the way it was. And I think particularly at our medical school, we see some of that as well. I had a grad student maybe twenty years ago who came and said, "I want a PhD. I need a PhD to do policy, and I want to do policy." And it was maybe fifteen years ago. And anyway, her name is Genevieve Croft. And so she got her PhD, and I arranged for her to do various sorts of things like be a Mirzayan Fellow at the National Academies. And then she

[22] H. Holden Thorp, "Trump Lied about Science," *Science* 369, no. 6510 (2020): 1409-1409, https://www.science.org/doi/10.1126/science.abe7391.

was a [AAAS] fellow and actually worked in PCAST when I was on, and she worked in OSTP, so we would meet together. That was very strange, but wonderful. And then there's more and more students that are interested like that.

So I think there has been a shift. One of the things I may teach next year is, sort of, a similar science policy class to our graduate students and again similar to the course that I taught before. So I think there has been a shift, and we've seen more students that want to go into policy. It's still hard. I think it's still hard in a lot of laboratories. The PIs are not real thrilled with that. And we have this division of biology and biomedical sciences, which is across the medical school and all of the other schools for PhDs in biology and biomedical sciences. And in order for Genevieve to take the time off to go be a Mirzayan Fellow, it required an executive decision. And now that's changed. Now **<T: 105 min>** people are talking about having little internships and actually putting that in as part of the graduate experience, which I think is a great idea. For those students that are interested. I mean, I wouldn't have been interested when I was a grad student; I was just straight lab rat.

EVANS: Yeah. Same here.

SCHAAL: And then you realize there's more. A lot more.

EVANS: I mean, what do you think is pushing or driving this shift that you're seeing?

SCHAAL: My sense is there's concern about . . . . I think there's social concerns among our students that policy . . . . I think there's concern about the environment and concern about all kinds of policy issues. And that's one of the ways of dealing with it is actually going into policy. And then so I think there's a pull. I also think there's a push that . . . . I remember one of my grad students who went into policy and went into other areas said that she absolutely did not want to have a job like mine where I run around like a chicken with my head cut off all the time. I always think about that. It's not an unreasonable description sometimes.

EVANS: Yeah, yeah.

SCHAAL: It's not a life for everybody. I mean, for me having to come up with all of the support for keeping this lab going, that's a lot of pressure. And the one thing you know after you've served on any kind of grant panel is that you're not going to get funded all the time. And so it's . . . there are some negative aspects of it. On the other hand, you get to do research, which is super fun.

EVANS: Thank you. Yeah. I don't want to be on record calling my graduate advisor a chicken, but my impression too was that it was really an incredibly challenging job. You get this in cartoons or whatever, you see professors as just being these . . . they had the greatest job, like they're out doing science and stuff like that. And then the actuality of being a research professor at a university like WashU or Rice is just it's so intense all the time.

SCHAAL: Yeah. You know, and one of the things that at first I never resonated with, and that was, you know, all the regulations and the forms and everything you have to fill out. And I remember twenty years ago people saying, "Oh, it's just taking up too much of my time." And I always thought that was, kind of, silly. Not anymore. Not anymore. You have to train on so many different things, and I fill out at least four conflict of interest forms for the university, which I don't understand. So I do see that. We have the chemical regulations. You have to have a book [for] every chemical, log everything in. Growing plants, we worked with weedy rice, and the USDA wanted us to treat it like a biohazard. So just really weird stuff. And it became . . . that added to the burden.

EVANS: I know it's been a . . . the subject for a long . . . . I was going through some older White House files last week from the first Bush administration. There was a major point of something that Dr. [D. Allan] Bromley was working on was just the regulatory burden for academic research. And this is 1990 or whatever, so . . .

SCHAAL: Yeah, it's gotten really bad to the point where not only does it take a lot of time, but you really feel restricted in what you can do. And it's double-edged because I think about biology labs, and chemists, the chemists are so far ahead of us on terms of safety and all of that. Biology labs, it takes a lot to get people to really realize that they have just as many issues as a chemistry lab does. So I really applaud that. The safety things. But why four conflict of interest forms and then the training sessions? Good god. We had one—this is really out of school—we had one which was to prevent sexual harassment. [And] the cover picture was a woman sitting down looking at a computer with a man [hovering behind her].

EVANS: Well, yeah, it's a tough one. The videos are . . . . I've yet to experience a COI tutorial that was helpful <**T: 110 min**> to me, but I know that they're just checking boxes.

SCHAAL: The thing is that COI, in fact, is important, and people do have conflicts. And I always understood them with the National Academy that if you're on a study section, you better . . . if you have any conflict, you better declare it and let it be managed because you could just destroy the whole results of a study.

EVANS: Right. Right.

SCHAAL: That was a particular issue when we were doing a genetic modification of crops that we had to be really careful. We wanted people that were on both sides of the fence. But you had . . . one, we didn't want the people that were extreme. We wanted to make sure that everybody had their biases, if they had any, were known.

EVANS: Right. Right. Yeah. It's important for it all to be above ground.

SCHAAL: Yeah.

EVANS: Well, we've been going about two hours, so I've been remiss about asking Dave if I'm missing anything in terms of questions or things like that.

CARUSO: No, no, nothing at all.

EVANS: Thanks, Dave. Well, at this point, I'm, kind of, out of specific questions. So what we—

SCHAAL: I'm out of answers. [laughter]

EVANS: What we normally do is just turn it to you and ask if you have questions or if there are things that we should have asked about and didn't throughout the interview.

SCHAAL: I don't think so. I mean, this is far more thorough than I would have ever imagined.

EVANS: Okay. Okay. Well, thank you. I'm glad you feel that way.

SCHAAL: Well, I think, you know, I would like to see the transcripts or whatever just to make sure that I don't say something about someone and . . . yeah.

EVANS: Yeah. You have—as Dave can elaborate on—you have full control over that. And of course the transcript will go through . . . we'll do an initial run doing basic grammar and cleaning it up, fact-checking—stuff like that. But then it goes to you and then you have control.

CARUSO: If there are no more specific questions, why don't we turn off the recording and then we can chat about the process?

EVANS: Will do. Thank you.

[END OF AUDIO, FILE 2.1]

[END OF INTERVIEW]

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