

Deidre Hunter

Interviewed by Wes Lockwood & Lauren Amundson

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WES LOCKWOOD (WL): Today is Tuesday, May 17, 2022. My name is Wes Lockwood, Emeritus Astronomer at Lowell Observatory. I'm here with Lauren Amundson, our Archivist and Librarian, to interview Dr. Deidre Hunter, who has been at Lowell Observatory now for several decades, and has had, in my view, a fabulous career here at Lowell Observatory, very productive. Our goal today is not to talk so much about the science, because that's all in *The Astrophysical Journal* and other places; but to find out who is this person, Deidre Hunter, where did she come from, why did she end up here, and what's it been like working at Lowell Observatory on the various things that she has done.

So my first question really goes back to childhood. Where did you grow up, where did you go to school, how did you get interested in astronomy, and who influenced you as a youth in the direction that you've followed so successfully ever since?

DEIDRE HUNTER (DH): Okay, if I'd known you were going to ask that, I'd have brought my cheat sheet with me that tells me the list of schools that I went to. I was born September 10, 1953, in Fort Sill, Oklahoma. My father was in the army, and we moved all over the place. So I think we left Fort Sill when I was six weeks old. So from kindergarten through twelfth grade I went to twelve different schools. And there were two years in which I went to three different schools in the same year. So we moved all over the place, including Germany when I was two, and the Panama Canal Zone when I

was in middle school, and so forth. And now I've already forgotten the next question!

Oh! why did I become an astronomer?

WL: [00:02:25] Well, let me ask you, where did you finish high school?

DH: Killeen, Texas.

WL: And were you ever out of the country when you were old enough to appreciate that you weren't in the USA, that you were in some exotic place?

DH: Yes. When we were in the Canal Zone, we moved there the end of sixth grade, and then I went to seventh and part of eighth grade there. So I was definitely old enough to appreciate the jungle behind our house, the banana tree in our yard, and the fact that we were in some place other than the United States. I had to learn Spanish.

WL: Alright! That's cool. Do you still have Spanish?

DH: I never learned it well enough. I stuck with it until I ran out of classes to take in school, but you have to really practice it to learn it, and so I didn't really learn it at the level where I could speak it confidently. Our daughter we adopted from Guatemala, and I was determined that she was going to be fluent in Spanish, because that's what they speak in Guatemala. And that didn't work out so well either. I kept at her with tutors since she was old enough to start learning, and taking Spanish in school, but again, you really have to use it to become fluent in it.

WL: How about astronomy? Where did that enter your life?

DH: That was the Apollo Program. I was a kid during that very exciting time when there was the race to the moon. My friend and I, in the summer between sixth grade and seventh grade, we decided we were going to be the first women astronauts. It was clear to us that there weren't any women astronauts at that point—at least none that were actively

engaged in the program, that we could see. I really wanted to do that. My dad was a pilot in the army, and he knew that if you wore glasses you couldn't be a pilot, and he knew that all of the astronauts were pilots. So since I wear glasses it became clear that I couldn't actually be an astronaut. So I decided that if I couldn't go into space, I would study what was in space, I would become an astronomer. So I set that as my goal and I never put it down.

WL: [00:05:28] Were you ever a backyard astronomer, looking at constellations, or at the sky with a telescope or binoculars?

DH: Well, oddly enough, no. When I was in high school I built a telescope, a six-inch telescope. There was this book by Thompson. You know that book? I don't remember his first name, but it was on how to build a telescope, how to grind your own mirror....

WL: Oh, yes! Yes.

DH: And build a telescope out of plywood and plumbing parts. And so I did that. I finished it in my senior year, and then I never really used it. It was held together by rubber bands—at least the secondary was—and so it really wasn't a great telescope, and it was very clumsy with the heavy plumbing pipes that held it on.

WL: Well, I would say welcome to the boys' club of astronomy, because half the people who have been in here have had that experience, one way or the other.

LAUREN AMUNDSON (LA): That's right.

WL: Did you grind your own mirror?

DH: I did. I ground my own mirror. But the thing is I never became proficient with finding constellations, like other amateur astronomers, before they became professionals. That's been sort of a sore point all my life.

WL: [00:06:58] Well, I would say you are in the elite if you ground your mirror, because most of us cheated and bought one. The plumbing and the plywood is very familiar, but some of us did cheat and buy our own mirrors. So what about college, where did you go to school?

DH: Well, since I wanted to do astronomy, and I knew that the University of Arizona in Tucson had a good astronomy department, I went there—but I majored in physics, was in the physics department. I thought that astronomy was a field within physics, so I wanted to get a good foundation in physics first. So I went there and majored in physics and minored in math and dabbled in astronomy.

WL: Did you have any astronomy classes at the U of A?

DH: I took a few.

WL: Who did you have a class with?

DH: I should have looked that up! (laughter)

WL: Well, let me name Ray White, just for starters.

DH: No, I did not have Ray White.

WL: Never had Ray White. Okay.

DH: No, uh-uh.

WL: Well, that exhausts my inventory.

DH: Yeah, I don't remember. There was a person there who was the undergraduate advisor. He's now dead, but he was very unhelpful. He felt strongly that women should not be scientists, and he wasn't really willing to talk to me when I was looking at graduate schools.

WL: Was the Steward Telescope still in Tucson when you were in school? Or had it been moved already to Kitt Peak?

DH: [00:08:45] I don't know when I was an undergraduate, but I used it when I was a graduate student later, and I used it on Kitt Peak—the 90-inch.

WL: But your graduate work was at Illinois, is that right?

DH: Right. But we got access. I don't know how we did it, actually. (laughs)

WL: How did you decide on graduate school and where to go?

DH: Oh, that was so.... Nowadays when I have REU students who are going off to graduate school, I try to give them advice, and I tell them, "Don't do what I did." It all worked out, but it was quite by accident, because what I did was, at the time I wanted to do cosmology, and I picked three schools. One of them said, "Come. But bring your own money." So I didn't go there. The other one was the University of Texas, and then the University of Illinois. So I picked Illinois because they offered a cosmology class in their catalog. Now it turned out they didn't really offer that class, and furthermore, there was nobody there doing cosmology. It was just stupid. It was just the stupidest thing I could have done. And I went there in the physics department again. So I was in the physics department, and the people who were doing astrophysics in the physics department, after a year or so I realized that what they were doing was boring. And so I was sort of casting about—this was like three years into graduate school. I really should have been working on my dissertation. And I heard, somebody told me—I don't know who—somebody told me that the astronomy department had just hired a new faculty person. His name was Jay Gallagher and he worked on galaxies. So I gave him a week to get settled, and I walked over to his office and said, "Hi. I'd like to do some research with you." And he said,

“Okay.” And he gave me a semester project, and to this day I still don’t understand what he was asking me to do. I can’t tell you what it was he asked me to do, because I didn’t understand it. I thought, “This is like a tautology. I don’t understand what it is I’m supposed to explore here.” In spite of that, at the end of that semester I said, “I’d like to do my dissertation with you,” and he said, “Okay.” (laughter) I think in today’s world, if all that played out, I would have been kicked out a long time ago. He agreed, and then there was the usual, What would I do my dissertation on? And by that point I’d lost interest in theory, which I wanted to do theoretical cosmology. At that point I was kind of envious of my friends, my colleagues in the physics department who had gone off to work in labs and could actually see things, do things with their hands. So I was interested in doing observations, and Jay suggested that I look at Irregular II galaxies, and I said, “What’s that?” And then he said, “Well, find out.” So I started looking into Irregular II galaxies, and at some point I got colors of irregular galaxies and the average colors of spirals, and I plotted a UBV color-color diagram, with the deVaucouleurs spiral sequence on it, and the irregulars were all over the place. And I asked Jay, “Why is that?” And he said, “Well, I don’t know. That’s a good question. That’s a good start to your dissertation.” So for my dissertation I studied dwarf irregular galaxies—at least what people called Irregular II’s at that time, irregular galaxies. And it just sort of evolved. Different pieces of it fell together. As I pursued one thing, it led to something else, etc., etc.

WL: [00:13:46] Would it be fair to say that you basically created your dissertation entirely on your own, without much guidance?

DH: No, I think Jay gave me a lot of guidance.

WL: [00:13:56] Jay?

DH: Jay Gallagher.

WL: Jay Gallagher. Oh, of course. Was he at Illinois then?

DH: Yes. So he was my dissertation advisor. And so he gave me a lot of advice and suggested instrumentation to use to observe and so forth and so on. So no, I didn't invent it all on my own.

WL: Did you observe as a graduate student?

DH: Yes.

WL: Where?

DH: Well, I started out at Prairie Observatory in the cornfields. It was an hour's drive from Champaign-Urbana out into this wildlife preserve that was in the middle of the cornfields. I did a few little projects out there with a 1-meter telescope. After I left, they moved it to California, Mount.... A peak there whose name I can't think of right now. But they moved it to a better site. I borrowed some filters from Sandy Faber and I spent a year out there observing with her filters. They were narrow-band filters, and eventually, at the end of that year, a large aperture spectrograph came online, called the IRS on Kitt Peak. It was on the 36-inch on Kitt Peak. And it made my photometry irrelevant. I got time on that instrument and I could get a large chunk of the galaxy and I could just get spectra, instead of doing this narrow band, hit and miss.

WL: So this filtered imaging you did, was that with a CCD?

DH: No, it wasn't imaging, it was photometry.

WL: Photometry. With a CCD.

DH: No, I don't think so.

WL: [00:16:11] Photomultiplier?

DH: I think so. (laughs) I told you, there are things I've forgotten. (laughs)

WL: I'm trying to place you in the timeline of instrumentation.

DH: Well, let's just say that if I had to reboot the telescope, I used tickertape.

WL: What?

DH: I used punched tape if I had to....

WL: Okay, that sounds like the seventies to me.

LA: Yeah, that's about right.

DH: Yeah, it was [unclear 00:16:43].

WL: We know about punched tape around here. So you finished up your degree then with Jay as your advisor?

DH: Yeah.

WL: And then what happened?

DH: Well, then I applied for postdoc positions, and I got one at Kitt Peak. So I went to Kitt Peak for two years as a Kitt Peak [unclear 00:17:09].

WL: Did you work with someone in particular at Kitt Peak, or were you entirely on your own?

DH: I was entirely on my own. There was somebody I was interested in collaborating with there, whose name I can't remember now. (laughs) Gee, this is embarrassing. But before we could get started, he left for the Netherlands. So I just worked on my own there. I collaborated with Jay on some papers during that time.

WL: Was the culture at Kitt Peak congenial, in your view?

DH: Well.... Hm.... Our little postdoc group was very congenial. There was another person there who was working on blue compact dwarf galaxies, but he didn't really want to talk

to me. (laughs) I think he was shy. Maybe he was afraid. (laughter) I won't mention his name, even if I remember it!

WL: [00:18:20] Shyness is not necessarily bad.

DH: No. So I mostly worked on my own or with people outside of there, but it was a great place to be a postdoc for a while.

WL: Well, maybe this is a good time to take a little side trip. This was in the early eighties, I guess?

DH: Yes. I got my degree in '82, and so I was at Kitt Peak from '82 to '84.

WL: Well, the question of women in astronomy really started to heat up, I think, about that time. Were you involved in that? Or maybe more specifically, did you feel at a disadvantage as a woman in astronomy?

DH: Well, I definitely encountered people who felt that women should not be scientists. One of my undergraduate teachers told me that. So there were clearly times when I didn't feel welcome as a woman. There were times when I didn't feel welcome, but I didn't know whether it was me or something else. In graduate school there was an astrophysicist in the physics department who told me that I wasn't good enough—I wasn't good enough to be an astronomer. It's quite possible he honestly believed that. I eventually switched from the physics department to the astronomy department. I went through—I forget now, the qualifying exam was different. And then I went through the exam where you talk about your dissertation, and the committee said, "This is astronomy. Why are you in physics?!" (laughter) So they passed me, but I then moved over to astronomy.

WL: So is your doctorate in physics or astronomy?

DH: It's in astronomy. My master's degree is in physics. And then there was a letter—as long as we're talking about negative things—there was a letter from the American Astronomical Society. The way I remember it, I was in graduate school, and I got this letter saying, “Don't go into astronomy. There aren't any jobs.” (laughs)

WL: [00:21:03] Well, that was almost true.

DH: Well, I guess it was, but at each of these points along the way when there was some.... Oh, also, when I was in the astronomy department in graduate school, I was told by a very nice person who had my best interests at heart.... I was up for—because Jay didn't have money to pay me from a grant—so I was the next person in line to be the Prairie Observatory assistant. I would go out and mostly observe for myself, but sometimes help other people. And he didn't want to give it to me. He said, “It's dangerous, going out there all by yourself.” (laughs) But Jay fought back on my behalf, and I was given the position, and several years later that person sent me a [unclear 00:22:04], “You were the best person we've ever had in that position.” I did have to call the police once while I was out there. (laughs)

WL: Times have kind of changed. The things we did as graduate students, going out to some place in the wintertime, in the snow, and there's no phone, and there's nobody else out there. And if you lose track and smack your face on the side of the spectrograph and knock yourself out—which I did! It's just not done anymore. I've noticed Lowell has become very touchy that way, about having other people around—for good reason. But anyway, back....

DH: So I certainly encountered things. I wouldn't say I was involved in any major way in terms of the discussions that were going on about women in astronomy then, or even later

very much. I just figured I was going to go as far as I could, and they were going to have to kick me out, I wasn't going voluntarily. (laughs)

WL: [00:23:32] This topic was never hot at Lowell Observatory, because it never seemed to be an issue. And you're "Exhibit A" in that regard, I think, as the first and maybe the best. But anyway, back to your career path. From Kitt Peak you went to work with Vera Rubin, is that right?

DH: Right. I got another two-year postdoc position at the Department of Terrestrial Magnetism, of the Carnegie Institution. Vera Rubin and Kent Ford were there at that time. Francois Schweizer was there. And it was a very small group, but it was a very powerful group; and a very active and enthusiastic and a welcoming group. It was great.

WL: Kent was kind of the enabler for my dissertation work on image tubes, so the DTM connection I can really appreciate. It was a small, kind of obscure place, but the things that were done there were really important. Was Merle Tuve still around when you were there?

DH: No, I don't think so.

WL: And did you work on projects that were of specific interest to Vera, or did she pretty much turn you loose to follow your own path?

DH: Well, I did both. I did my own projects, and then we collaborated on some projects.

WL: Did you ever go observing with her?

DH: Yes.

WL: Out here?

DH: No, not here. We went to Las Campanas. I remember, in terms of the previous topic, it was very special because.... I don't even remember what telescope we were on. I guess

the 2-meter telescope there. Anyway, there is a picture of Vera and myself, and all of the other astronomers who were on the mountain that night. We took this picture in the control room of the telescope that we were using. All of the astronomers were women that night.

WL: [00:25:49] Alright!

LA: Wow.

WL: Well, I think Vera posthumously gets the last laugh, because as I understand it, she was this close to a Nobel Prize, and has a major facility named after her now.

DH: Yeah.

WL: She made only one professional mistake, and that was to sign my dissertation (laughter) as the outside referee on my graduate work. She didn't know what I was doing. No one in the department knew what I was doing! I was doing near-infrared spectroscopy of titanium oxide, and nobody knew anything about molecules, so I got a pass! That's not what we're here to talk about. So how long were you in Washington?

DH: Two years.

WL: And then what?

DH: Well, in the fall of '85.... My position would be up in the fall of '86, so in the fall of '85 I sent out my first application for a faculty position. I was done with being a postdoc. So I was looking for a faculty position. So I sent out an application, and then I got a call from Dave Monet. I had come up here to give a talk. Dave and I were friends from Kitt Peak days. And he invited me to come up and just give a colloquium here. And he was at the U.S. Naval Observatory. And he said, "Bill Baum at Lowell is advertising a job." And I said, "Oh?" He said, "Yeah, it's a postdoc position." I said, "No, I'm done with

being a postdoc, thank you anyway.” And then the time went on and Bill Baum called. He said, “I have a job I’m trying to hire someone for.” So Bill Baum was here as an astronomer, and he was a member of the WFPC team, the Wide Field Planetary Camera team. The first camera that was to fly on Space Telescope. They’re now up to WFPC-3, but this was WFPC-0 [zero]. He was on that team. He had taken responsibility for calibrating the filters that were to fly, and providing information I know that you understand, but for just general public the standard filters on the ground, UBVI, and the filters that were flying with WFPC were kind of like those filters, but they weren’t exactly those filters. It was F555-W and 814-W, so forth and so on. So they needed to be calibrated, so we would know what they meant astrophysically when we took pictures with them. And so he had taken on that responsibility, and Hugh Harris who was here at Lowell at that time, had started the process of calibrating the filters, which meant observing, taking images with the ground-based versions of what was going to fly, and calibrating them with UBVI standards. But he had just accepted a job over at the U.S. Naval Observatory, so he was leaving, and Bill Baum needed to replace him. So that was the story behind the job ad. And I told him, “You know, I’m not interested in a postdoc position.” And this is where I have to put in a disclaimer. I can only tell you what I know. I don’t know what happened, really. Wes would know, but I wouldn’t know. What I was told is that Bill Baum presented this to the staff, and they unanimously agreed that I should be offered a permanent staff position. So he came back and said....

(laughs) Don’t contradict. (laughter) Anyway, he came back, he offered me a tenure track staff position, and then I said, “Oh!” Now I was interested. Of course I was at DTM with Vera and Kent, and they had nothing but positive things to say about Lowell.

It was a great place, they had such fond memories of coming here and observing. And so with all that positive reinforcement, I said yes. Poor Bill, he said, "Can you come now?" (laughter) This was like October. I said, "No. I can come next August." Because I wanted to finish out my time at DTM. I was having a great time, I didn't want to go yet. And so he hired somebody else, whose name, of course, I can't remember. But he hired somebody else to take on the work in the interim, and then I took over when I came in August of 1986.

WL: Was that Jon Holtzman that filled in?

DH: No.

WL: That was later?

DH: That was later.

WL: Okay. I don't remember anybody being here before you.

DH: I'm sorry, I've gotten to the age where I don't remember names. (laughs)

WL: Well, I don't remember any discussions in the staff about appointments, because basically I guess Art Hoag was still the director, and I'm sure that he and Bill put their heads together for the benefit of the observatory, and they obviously made the right decision. So I think if there was a rubber stamp from the staff, it's probably faded away by now. Anyway, it was a good idea. So when you got here, you basically had an assignment.

DH: I did.

WL: Were you able to do your own work in addition?

DH: I did, yes.

WL: Or did Bill keep your feet nailed to the floor?

DH: [00:32:48] No, I managed to do both.

WL: So you were observing to calibrate these filters then?

DH: Yeah.

WL: Out at the mesa?

DH: Yeah. I don't remember all the observing rooms, but I remember Hugh Harris and I observing together out at the 42-inch, and we spent the whole night observing, and we walked outside, and the sky was covered with clouds! And so we had to throw that night out. (laughter)

WL: There is a balcony out there, you can look.

DH: Who knows when they came in?! Anyway, they did get calibrated in the end.

WL: So how long was it before you got free from this particular project and could just go your own way with your own research?

DH: So Space Telescope was launched—I had to look it up—if I remember correctly, in 1990.

WL: Sounds about right, yeah.

DH: Of course I came in August of '86, and it was January of '86 when the *Challenger* exploded, right?

WL: Uh-huh.

DH: And so of course Space Telescope was then delayed in its launch by, I don't know when it was supposed to go up, but anyway, it was delayed. So I finished the calibration of the filters. And then I was involved, I remember they did vacuum testing. You know, they stuck it in the vacuum chamber in California, and the team was involved in participating in that to make sure that it survived and performed okay under pressure. And then when the telescope was actually launched, we set up operations—I think it was in Bowie State,

which is in Maryland, not too far from where all the action was going on in terms of operating HST. And our job was to take images and see how things were going, and take pictures. I forget what-all we were supposed to do, but look at the first images. I wasn't there. Roger Lynds was one of the team members. There were a whole bunch of team members. And I wasn't there when the first image actually came out on a screen, but of course it was an image of a star, and it looked like a basketball, and everybody apparently went, "Oh. No." And Roger Lynds, according to the accounts I heard, said, "Um, that's a, that's a...." What is the term? Astigmatism? The mirror has been misfigured. "This is a problem with the mirror!" I can't think of the word right now. Aberration!

WL: Aberration. Yeah, okay, there you go.

DH: Then after lots of extensive checking, that came out to be....

WL: That must have been the most sickening day in the history of space science.

DH: Yeah, it was.... There were people.... You mentioned Jon Holtzman. He was Sandy Faber's graduate student. He had been intending to do his dissertation with HST, some of the guaranteed time the team was guaranteed. And of course his dissertation was several years postponed. And then this! So he ended up having to do his dissertation on something else. But the team tried to figure out ways to correct for the problem in software, after the fact. And HST built corrective optics that they sent up and stuck in the telescope. That was the first thing the astronauts did. And then we were good to go. And then all of the WFPC's and other instruments that came after that had corrective optics embedded in their [unclear 00:38:13].

WL: I didn't realize Roger was involved with the Space Telescope.

DH: [00:38:14] Yeah. We wrote a paper together.

WL: I was his first-ever summer student. He didn't know what to do with me, and I didn't know what to do with him. I spent most of my time in the basement with Bob Barnes. But I did learn to drink coffee. (laughter)

DH: Roger was unique. Roger was [unclear] unique.

WL: Roger is unique. Elizabeth Estrada always said that she thought that Roger was a genius. Maybe that's true. Anyway....

DH: I don't know, [unclear].

WL: How long did this WFPC validation process go on where you were involved sort of actively as a part of the project?

DH: I don't remember exactly, but it was probably on the order of a month. I don't remember it going on and on for very long.

WL: So you weren't sort of a paid employee of Space Telescope for a long, long time?

DH: No, I was not. We quickly transitioned to doing science. So the answer to your original question of how long was I involved, I don't remember exactly, because there was then a series of science papers. The first thing I did was look at R-136, which was the cluster in the 30-Doradus star in the Large Magellanic Cloud. And the center of R-136—and I'll just use the term super star cluster, because that's what we figured out it was. It was a super star cluster, and in the center there was this object called R-136A, which from the ground looked like a single star that was so luminous that it had to be a star that was a thousand times the mass of the sun. So of course with WFPC, with HST, we found it was a cluster of very massive luminous stars. Still remarkable, but the theorists were tied in knots trying to figure out how you'd make a thousand-solar-mass star, and how it would evolve. And it really was just a bunch of 150-solar-mass stars, which is still quite

respectable. And I joined the team late enough that I wasn't part of defining what the objects were that the team was going to spend its guaranteed time on. So I just filled in to analyze data that people had already decided to get. R-136 was an obvious target with HST, because of its interest in R-136A. The person who was going to lead that project was Belle Campbell. She was an astronomer at University of New Mexico in Albuquerque, and she got seriously ill just before the data started to come in, and stepped out of the team. So I took over looking at that object, R-136, leading the team's effort on that. So we did a series of papers, and the only one that is really of note with the team was we.... I did photometry of all of the stars in R-136, which we could now see were individual stars, which from the ground were blended. But now we could see them, and I put them on a color magnitude diagram and plotted isochrones. And there was this beautiful main sequence, and there were a whole bunch of stars on the pre-main sequence still, so I decided to measure the stellar initial mass function. People—not me—but other people like Phil Massey who's here at Lowell now—had measured.... Well, Salpeter started in 1955. He measured the stellar initial mass function. So the number of stars is a function, and the mass of the star, and found a power law. And so then the Salpeter Stellar Initial Mass Function became a thing. And everybody then measured this function and the slope of this function, and measured the power index that they got compared to Salpeter's. And so everywhere people look. You know, [unclear 00:43:36] associations, and all sorts of places, it was always the Salpeter Function. So here we had this very massive star cluster that was a very dense environment in which stars were formed. And so I wanted to see was this the normal initial mass function? Because people had been starting to say, "Well, in this galaxy, too far away to see individual stars. In this galaxy,

it can't be a normal stellar mass function. It has to be top heavy or whatever." So here I have the data to look at an extreme star-forming event, and so I measured... I had to cut it off. I couldn't deal with the pre-main-sequence stars; so I could only deal with the stars that were on the main sequence. And I think I went from something like three solar masses up to, I don't know, ten. I'd have to look at the paper to see what the exact numbers were. But the minimal range of masses. And it was Salpeter. And it was so exciting, because here was this extreme environment, and it was a totally normal stellar initial mass function. When I give talks to kids, I tell them that one of the exciting things about being an astronomer is that when you figure something out, for a moment, until you tell your colleagues, you know something nobody else on the whole earth knows. And that's the moment I always think about, when I tell that story.

WL: [00:45:34] I think that's a feeling that all of us have had at least once in our lives.

DH: Yeah. Well, I haven't had it very many times, but that was the first time.

WL: It really sets a fire, though, doesn't it?

DH: Oh yeah!

WL: And you've been doing it ever since, more or less.

DH: Most of my career I haven't discovered things—it's just been another scatter plot, or another "well, this doesn't work" kind of thing. But that was a clean discovery in my book. Anyway, it was exciting. But there's more to that story, because my friend and then husband, Phil Massey, was interested in the massive stars. You can't tell the mass of a massive star unless you get spectroscopy and can classify it, because the colors are.... Basically all the massive stars have the same color. So he wanted to collaborate on the massive stars. I mean, I had the image that showed where they were, and he

wanted to get spectra of all of them. And the question was how do you get spectra of all of these stars without it taking so much time that they would never give us that time with Space Telescope? So he and I went on a trip. We were taking the ferry at the Inland Passage from Washington up to Haines, Alaska. My parents lived in, let's see, they were in Anchorage by then. So we were taking the ferry up, and then took buses around to where my parents lived. So he brought the HST manuals on the ferry with him, to read and figure out how to do the spectroscopy—and he did!

WL: Weren't you supposed to be looking out the window? (laughter)

DH: Well, the ferry goes kind of slowly. Anyway, he figured it out.

WL: You're probably the only people who have ever done that in the Inland Passage.

DH: Probably.

WL: Carrying along an HST manual!

DH: And so we did the spectroscopy, and Phil re-reduced the data to get the best signal-to-noise ratio out of it. And he printed out the spectra and he started classifying them. As he tells the story, an O3 star, which is very rare, meaning the hottest, most massive O star.... "Oh! Another O3 star! Oh! Another O3 star! Oh! Another O3 star!" And of course his immediate thought was, "Did we get spectra of all the same, one star, over and over again? Was there something wrong with the data?" So we went through all the processes, ruling it all out, figured out that the data were good, and it's just that there were a lot of very massive stars. But, if you looked at the stellar initial mass function, it just was a fit right along with the mass function we had for the lower mass stars, and all these massive stars is exactly what you would expect if you stopped to predict, given the

stellar initial mass function, and the mass of the cluster and so forth. So that was another beautiful result.

WL: [00:49:44] That's a great story. We've been going about an hour now. Maybe we should stop and restart our machine, and take a thirty-second break if anybody needs one. (aside about taking a break) Do you want to let it run?

LA: I'm fine, if you guys are.

WL: Well, I'd like to shift gears, if I might.

DH: Okay.

WL: You have two lives....

DH: At least!

WL: Well maybe three! (laughter) The other one is the work that you or Amanda or the two of you together started long ago, to get Native Americans interested in astronomy and Lowell Observatory. Could you tell us how that started, and how it went, and what the rewards are, and what the frustrations are, and where it stands today?

DH: Sure. I was interested in doing some sort of outreach, and part of what motivated it was just a feeling that society was putting all this money into HST and astronomy, and we should share with the rest of society, what we were learning, and just share the excitement of astronomy. That was one motivation. And also, I felt—naively, I guess, because I didn't really know—I felt that scientists had something to contribute to the classroom. And then my sister got a Ph.D. in human development, and a master's degree in counseling, and did research on that kind of social stuff. She, at one point around then, she was doing some research for the Alaskan natives, and I don't remember the nature of her research, but I learned from her that among the Alaskan natives, the rate of

graduation from high school was much, much lower than it was for the white people in the community. And this was not just Alaska natives. The Navajo and Hopi have the same problem of low graduation rates from high school, and therefore low rates of going on to college, and certainly in participating in science and STEM. And I thought, “Whoa! Astronomy is the most exciting thing out there! Everybody’s excited about astronomy. Why don’t we use astronomy to get kids excited about science and about learning and about school?” At the beginning, I didn’t have a very good idea of what to do. Lowell Observatory—this was now under Bob Millis—paid for a teacher. And I forget how the contact came about, but he came for a summer here with his family. And I don’t remember his name, of course. Sorry. But he spent the summer working with me, mainly coming up with activities that we could share with teachers, related to astronomy. I had this idea at that time of sort of a lending library, where I’d have all these activities that teachers could use, and I’d have all the materials that they needed, and the lesson plans for each activity. I guess we had e-mail then. They would e-mail or write and say, “I’d like this activity,” and I’d send them the stuff, and then they’d send it back when they were done. So it never went anywhere, because I couldn’t find the funding for it. And in retrospect it was really a bad idea. It would never have worked. It would never have done anything useful. And so it was good that it died. But a few years later, then, Bob Millis brought Amanda and myself together, saying, “Both of you are interested in outreach. Why don’t you get together and do something?” So we did. That was the spring of 1996. Amanda I think was a postdoc here at the time. Somehow, I don’t remember exactly how we settled on what to do, but at that point there was the Project Astro that the ASP had invented, of connecting teachers with astronomers, and

the astronomer would go into the classroom throughout a school year and do hands-on activities. And so we adopted that as the kernel from which to start.

WL: [00:55:59] What was the first thing you did? Did you go to the reservation and meet a class, or did the teachers come here? How did you get it underway?

DH: That summer, the summer of 1996, we went on a road trip. And we had contacts. I think Bob Millis gave us the name of somebody who was doing an NSF project related to STEM, and she was located at Diné College in Shiprock. And I think Kathy Eastwood gave us the name of two teachers, one teaching at Hopi, and one who was teaching at Shiprock, who had participated in some sort of a teacher workshop put on by the AAS. I don't remember the details exactly. But we had these names, and we got in touch with them and said, "Can we come visit you and talk to you?" So we went out and talked to these teachers. They already had some astronomy background because they'd participated in a workshop, they were interested in astronomy, and we said, "Can we work with you this coming school year?" So they were our first two teachers. And we also talked with this person at Diné College and got some advice from her. And so the first year Amanda and I worked together with these two teachers. We had activities. The ASP had put out this book called *The Universe at Your Fingertips*, which is this amazing collection of hundreds and hundreds of hands-on astronomy activities. And I don't remember whether at that time we drew our first activities from that, or just exactly how we came up with them, but we came up with these activities to do with the classes. We put all the materials together. We would go to the classroom and we would do them with the teacher and the class. I think our first visit was out to work with the eighth-grade teacher in Shiprock. The teacher at Polacca, I think he was teaching fifth or sixth grade.

And I remember that first day. She had multiple classes and we worked with several of them. We didn't work with all of them, and at the end we were totally exhausted.

(laughter)

WL: [00:58:46] I can believe it! What's an example of an activity that you could do in a classroom?

DH: Lots of activities. I don't remember what we did that first time, but I'll just tell you a few of the favorites over the years. The first one is making a model comet nucleus. You can have the students do it in groups. You take two plastic gallon-size bags, and the students put in so much water, a little bit of dirt, a little bit of ammonia, a little bit of organics in the form of corn syrup or something like that. Then they pour in so much dry ice, which we chopped up. And then they have to squeeze it together into a ball, and everybody's wearing gloves so they don't get.... There are all these rules we have to have them abide by. (laughter) Then they pull out, hopefully, an intact ball that's frozen together, and it's out-gassing too. That's what's really cool as well, and that's a comet nucleus. Of course we precede this by talking to them about comets. I like to use Comet Hale-Bopp as an example of what a comet is like. And I talk about the properties of Comet Hale-Bopp in the Oort Cloud, and how the comets may have brought oceans, water, to earth. And then we do this making of the...

WL: Did you do anything at night with the classes out there?

DH: Oh yes, we did star parties. Yes, absolutely.

WL: So you took a telescope with you?

DH: Yes. Amanda took charge of purchasing an 8-inch Meade telescope. After twenty-five years, it's sort of retired now. We've accumulated other telescopes that people have

given us. We bought one telescope, another type of telescope, a few years ago. But yeah, we do star parties. We've even had AMER [phonetic] at NAU would come out sometimes. Occasionally we'd invite them out to join us. They brought telescopes and they would participate. This is getting [to be] kind of a jumble, but we would also.... We learned early on.... After we decided what to do and what we were going to do, we wrote letters to the Hopi education person and the Hopi tribal government, and the Navajo person [i.e., the Navajo equivalents], and said, "This is what we'd like to do, and we'd love to talk to you about it, if you want." And I never heard back from the Navajo person, but the Hopi person basically, as soon as they got it they called and said, "I'm coming to Flagstaff. Can I stop and talk to you?" He was very enthusiastic, and one of the things he said very early on, at the very beginning, "You have to include cultural connections." The people in Shiprock who we were in contact with when we had our first star party there for the eighth-grade class, they invited two Navajo astronomers as well—people who are versed in the traditional Navajo astronomy—constellations and so forth. Nancy Maryboy and David Begay are their names. They came out, and it was cloudy and we couldn't actually do anything outside, but they gave a talk on Navajo astronomy. So we had this in our brains that we should make cultural connections, but we didn't exactly know how. After maybe the following year, I called up Nancy Maryboy and contacted them and asked them if they could come to our classroom, or come to a star party at a classroom, and we couldn't afford them, is what it came down to. They had a fee, and we just couldn't afford it, so it kind of [unclear] for a while. And then after a few years, I was working with an eighth-grade teacher at Rocky Ridge Boarding School, and next door was a fourth-grade teacher who wanted to participate in

the program, but at that point we were only working with fifth through eighth grade, and I said no. But the eighth-graders would go next door to her fourth-graders and they would present the activity to them that we had just done, to them, which was even better.

WL: [01:04:30] Yes! Very cool.

DH: But the fourth-grade teacher was Verna Tallsalt. We held a star party, and somebody—maybe it was Beth, my teacher—had invited somebody to come, an elder, to come and talk about Navajo constellations, and he didn't show up. But Verna had learned about constellations and so forth from her father and grandfather and so forth, and she stepped in. And we started collaborating, and she's been collaborating with our program ever since.

WL: Oh, that's wonderful!

DH: She became our Navajo go-to person. We did eventually work with her. She's teaching fifth grade. We eventually worked with her class, and she's been invaluable to the program, just year after year after year. We had a harder time finding a Hopi person. The Hopi are more reticent. They're not as willing to share. I did manage.... One time I got the name of somebody, and he came to a star party and talked to the students. And then another time the teacher knew about somebody in the community. We were going to do moon phases. So he came before I came, and talked to the students about the Hopi names of the moon phases. And so we just weren't able to establish a Hopi contact that would be consistent from year to year, and that was unfortunate. Alethia might be changing that now. She has set up a cultural advising board this year, with Verna Tallsalt. We're also now working, starting last year with the Apache, so she is trying to

bring in a Hopi person and an Apache person so that they can all guide us in making cultural connections and so forth.

WL: [01:06:58] When you've had these star parties, have you had the experience of seeing kind of a light go on in some of the kids, or are they more reserved?

DH: They could get excited, particularly looking at the Moon. The Moon is the most spectacular.

WL: It worked for me!

DH: That's right. And so, yeah, people would look and say, "Wow! that's neat!"

WL: Well I think this program has really put Lowell on the map in a way that's unique among observatories, as far as I know. It's a wonderful thing that you've done.

DH: Well, so, I just put one foot in front of another, and I just kept going.

LA: What's your level of involvement now? Have you kind of stepped back a little bit now that there's a whole department that's taken this over, or are you still pretty involved?

DH: Right. So I ran it for twenty-five years. I say "I," because Amanda left after the first year, and I kept running it. She kept coming back now and then, and I can't remember the details of why she'd be back for a year, and then she'd be gone. But she'd come back, she'd participate for a year, and then she'd be gone, and so forth. I was the one that really ran it for twenty-five years, and last summer was the end of twenty-five years, and it was the end of this three-year collaboration with the Kayenta Unified School District, so I thought it was a good time to step down, step away, and let the young people run it. For the last five years the program has just been invigorated with all sorts of new and exciting things, and they've all come from Alethia. And I told Alethia about five years ago that I wanted at some point.... I felt that I had found the person I would feel

comfortable turning the program over to. She's passionate about the program, she has all sorts of great ideas, and so last summer, after twenty-five years, I decided it was time for me to get out of the way and turn it over to others to run. Samantha Gorney suggested that the program become part of the public program outreach, education department. Before, it had sort of been out in the ether, because I was the one who was running it, and I'm not part of the education department, and so it was just sort of, it didn't have a home, and now it has a home. It's under the education part of that program of the department, and Todd Gonzales is in charge of that. And then Alethia is in charge of NAAOP, as it's now called.

WL: Who is this person you just mentioned?

DH: Alethia Little.

WL: Does she work for Lowell? Who is she?

DH: She has been at Lowell I don't remember how many years. She's been at Lowell for many years. She started out.... She was an undergraduate—she still is—an undergraduate at NAU, getting a degree in mechanical engineering. She started out in the public program, and then she joined what was Navajo-Hopi, now called Native American Astronomy Outreach Program, NAAOP. And so she became involved in that. Eventually she became full-time, working in the program, and she was given the title of Lowell Observatory's Multi-cultural Outreach Facilitator. I think her title has now changed, but anyway, she became in charge of.... The idea is there had been plans, and there still are, now with the new ADC [Astronomy Discovery Center] being built, they want to include Native American astronomy, so they had hoped to involve her in that. So the program really changed a lot. In the first year there were two of us working with two

teachers. For quite a few years we would only partner with two teachers, because that's all we could afford, because we raised all of the money for Navajo-Hopi. So how many partnerships we can take on and so forth depends on the funding—and also on how many people we can get to partner with teachers. And so over the years the program grew, and eventually we got to seven and eight, even nine partnerships. Then Alethia came on full-time, and Travis came on full-time, and Misha came on full-time, and other people would partner part-time and would come and go. But there was this core team that was permanent and full-time. So to answer your question, when I stepped away, I didn't want to be in the way, so I have tried to stay out of it, and don't really know what's going on, except for two things. I have this NSF grant, which I'm the P.I. on. There are some things that we promised to do under it. One of them is I promised NSF I would write a paper on it, and it's now before the Navajo IRB [Institutional Review Board], because this is not just about the program, but it's about the three-year collaboration we did with Kayenta Unified School District. So that paper is written. If they approve it, I can submit it, and I will have fulfilled my obligation that way. The evaluator is going to write another paper for an education journal. This one was for an outreach journal.

And then we also have money for a Navajo Nation teacher workshop to present the activities that we developed over the last three years with KUSD. But because of the pandemic, we weren't able to hold it. And then with the change in how the program was organized, we couldn't do it this last year either. So I'm hoping we can do it in the fall.

And then the third thing we have to do, I promised NSF we would put our curriculum units that we developed, online, for teachers anywhere to download. Travis and Misha had started on that, and then got caught up in all the other things. Hopefully

they can finish that up. So I'm still involved in that sense. I have to see those things through so I can see the end of that NSF grant, but that's all.

LA: [01:15:23] Do you feel like this program could serve as a model for anywhere in the country, with other Native communities?

DH: Sure.

LA: Have you had any contact from people sort of looking to start similar programs, or has it pretty much been localized to Arizona still?

DH: I had contact with some teachers in Montana. I went up there to give a talk. I was invited to give a talk to a girls-in-STEM thing, by the person who was involved in that, had been at Lowell as a money-raiser for many years, and so he invited me up. And he arranged a meeting with teachers from the three Native tribes in the area. One of them I was able to get in touch with later. We held a teacher workshop, and I wanted to invite them to come, and one of them came to the teacher workshop. And so he took back.... I had sent.... At these teacher workshops we gave all of the teachers these huge bins of materials, and I shipped all of his stuff back up to Montana for him to share with his teachers. At some point we were talking about how we could work with the teachers up there in their classrooms: either sending people up now and then on planes, or doing it through electronics. But it sort of died. We weren't able to really follow it through. But Alethia is keen on holding it, so we're going to hold it at a Navajo Nation-wide teacher workshop. She wants to hold a U.S. nationwide teacher workshop for teachers who are interested anywhere. And Todd and I had talked on some long ride up to a star party, about how we could work with teachers in other states, through using electronics – Zoom - which we're all too familiar with now. (laughter) But again, there's so many things

that we wanted to do, and have wanted to do, but we can't go fast enough. We want to do them, but it requires money, and already the Development group is just going all out for us all the time, and it's wonderful, they keep the program going. We just have to take one step at a time.

WL: [01:18:48] It's an incredible story, I think, and it's one that's kind of under the radar, I think, for the scientists at the Observatory. Everyone knows this is happening, but to me it seems like a really important outreach—maybe the most important outreach that's ever been done here, because of the population that you're visiting with. So congratulations, and welcome to retirement from this activity.

I wanted to switch back into the science mode again as we move along here. I looked at some of your papers this morning. I didn't try to read them, but I saw many, many names from all over the world, it looks like. Are these people who came to you, or people that you knew about and met at meetings? People in China and all over the place. It's just a remarkable list of collaborators. How did this happen?

DH: Well, I've been very lucky to have wonderful collaborators. I feel that they've been an extremely important part in making my research worthwhile. And so how did they come about? Well, one collaborator, Bruce Elmegreen, who I've worked with now for probably decades now. He's a theorist in star formation, and my memory is that I had written a paper—and I don't even remember which paper it was—but I'd written a paper, and I sent it to him and I said, "Would you like to contribute to this paper?" If I could remember what the paper was about, I could say more about it. But anyway, "Would you like to be a contributor to this paper and be a co-author?" And he wrote back, "Sure." Then it was pages and pages of what should be done and what should be changed. I

looked at it and I thought, “I can’t deal with this right now.” And I set it aside. Then after some weeks I came back to it and I looked at it, and he had wonderful suggestions. His ideas of contributing to the paper were very valuable. And we’ve been collaborating ever since. And it tends to be along the lines of I do some observations, and then he contributes the interpretation and theory ideas. Or he will suggest, “Could you plot this and that? And look at it this way?” And it’s always been valuable, and it’s been great. And then through him, he talked with Monica Rubio, who’s an astronomer in Chile, and she is an expert on CO observations. Particularly she did pioneering observations of molecular gas in the Magellanic Clouds. So the two of them got together and then involved me and several other people in using first APEX, which was a prototype...a single-dish radio telescope, which was a prototype for ALMA. And she had access to APEX, and we used that to detect molecular CO in WLM, which was at that time the lowest metallicity galaxy in which anyone had detected CO. People had lots of upper limits, but it was the first detection. And then we used that to get time on ALMA to map the CO. And we’ve just gone from there. Then I don’t know how I met Elias Brinks. He might have been at the VLA, and I did, off and on, a lot of observing at the VLA, to get H1 atomic hydrogen maps of irregular galaxies. So Michael Rupen, who was at the VLA, is a staff member there, invited me to come to the VLA and give a talk. Up until then I had just struggled, because I could easily get optical data, images of the galaxies, so I could learn about the stars, I could learn about star formation activity, but I needed the gas, to try to connect the gas with the star formation, to try and understand how the galaxies were forming stars. I needed the gas. So I put in a proposal with the VLA, and I get little dribs and drabs here and there. And so I went and I gave this talk, trying to

show what I had done with the little dribs and drabs they had given me, but now I needed more. And Michael Rupen said afterwards, “You should put in a Large proposal,” which was a proposal category—Large. “You should put in a Large proposal.” So I gathered a team, and Elias Brinks and Fabian Walter had done a project called THINGS, which was a Large project to study the H1 distribution in nearby galaxies, mostly spirals, a few dwarves. And so we came up with the acronym LITTLE THINGS, which was a dwarf version of THINGS.

WL: [01:25:53] I was going to compliment you on this two-word acronym.

DH: It was Bruce Elmegreen that came up....

WL: Somebody spent some time on that one.

DH: Yeah. It was great. So LITTLE THINGS. So Elias and Fabian joined the team. Bruce, of course, was a team member. Then I asked a few other people that I knew about, even if I didn't know them very well—I knew about them. And that was the team. So then I had a group of built-in collaborators on this big project. And then at some point, I can't remember how I met Leslie Hunt—she's in Italy—and I met her somewhere along the line, and she does infrared and molecular observations, and so we've absorbed her into the ALMA. Now she has put in a big ALMA proposal that we are part of, and I am part of along with many other people. Things just grew.

WL: Is ALMA finished, or is it still being built?

DH: It's done. It's in full operations.

WL: Also, on your Lowell webpage description you have a long list of all these students and postdocs and predoc students, and REU students, and all these people—dozens of them. Are there any of them who have become current collaborators among that group?

DH: Former students? Well, Megan Johnson. She was a graduate student under the LITTLE THINGS project, and she is now at the U.S. Naval Observatory in Washington, D.C. I'm not actively collaborating with her right now, but we are both on another project that somebody else is leading, that I'm involved with. Then Hongxin Zhang was also my graduate student under the LITTLE THINGS project. Again, we aren't actively working together right now, but he's standing in the wings. So I did this project with LDT [Lowell Discovery Telescope] of ultra-deep imaging of ten of the LITTLE THINGS galaxies, four passbands, and he's promised to do stellar population synthesis, fitting to the multi-band surface photometry, once I finally have that done. (laughs)

WL: I forgot to ask you: Do you use the LDT?

DH: Yes!

WL: That's good! (laughter) What else did I want to ask you, that can be put into print?

LA: I remember one night years ago I got to go out there with you. Do you remember that?

DH: Yeah!

LA: Sam Thompson and I went out for a half night of observing. It was really fun to get to see the process.

DH: I was on a campaign for a while. Whenever I would go out, I would try to take people with me who weren't professional astronomers, because I wanted them.... The LDT was the greatest thing since sliced bread! I mean, we had our own four-meter telescope, and I wanted everybody to participate in the excitement of it, so I would take people out with me.

WL: Looking back twenty-five years, it seems like a miracle that we have that telescope.

DH: [01:30:08] Yeah, it is.

WL: And it seems like another miracle that we're building this thing over here.

DH: Yeah, really.

WL: Well, looking ahead, you're at late career now, how do you see the next few years for yourself, and for Lowell Observatory? What are you going to do when you're finished with astronomy? Or do you ever plan to be finished with astronomy?

DH: Well, I'm not done yet. I have projects that I'm working on. I got all this wonderful LDT data that was like pulling teeth to get so much data to put together. I did ultra-deep imaging of these ten galaxies in four passbands, and I'm working away on trying to prepare the data for analysis. And so I have lots of things I want to do with those data. Then I'm part of these extremely large—it's a category, actually—Extremely Large—a VLA project led by Adam Leroy at OSU. Right now I'm helping with the quality assessment as the data come in, and we do flagging of interference and bad baselines and [unclear 01:31:43]. There is stuff I'd like to do with that project when it gets to the point where we have imaging done and it's ready. And then, again, I'm on a proposal to ALMA to get a whole bunch of CO data, which I'm hoping will get the time, and I'd like to be involved with that. And I have two graduate students who are working with me now. One is Haylee Archer from ASU; and the other is Lauren Laufman, who was my REU student a few summers ago, and she's at the University of Minnesota. And so they're three years out from finishing. They've got a lot of work to do yet, so I need to see them through. At some point I will stop, but right now I'm not. So that's my future.

The future of the Observatory, there was a point some years ago—it must have been before the pandemic, because I was giving some people a tour of the Observatory for some reason. Maybe they were REU students. I would do that at the beginning of the

summer. When my REU student arrived, I showed them around. And I told them about LDT and I pointed off into the trees where the ADC was going to be, and I realized that Lowell has changed an enormous amount in the thirty, almost thirty-six years that I've been here. And right now is really an exciting time. LDT is fantastic. It's wonderful, and it's exciting what we can do with it. And what's going on scientifically. And the ADC I think is going to be absolutely fabulous. So I see a wonderful future for Lowell with all these exciting things going on. There was a period of time when the finances looked really dire (chuckles) with the loan we had to take out for LDT. I don't know what the finances are with ADC, I'm not part of that.

WL: It seems to me that Lowell has gotten through this rough patch in splendid shape. Of course part of it is the stock market. You have a retirement portfolio and so do I, and we know what it looks like. And I'm sure the Observatory's portfolio has benefitted in the same way. We've been really, really lucky that we haven't had a great depression or some kind of civic upheaval in this country—although there may be one coming. But I am just awed by what the Observatory is doing right now, compared to 1973 when the total staff was fifteen people, and the place was falling down. And look at it now, it's just unbelievable.

DH: Right.

WL: I don't know how much longer Jeff is going to stick around, but it seems to me he's done a good job.

DH: [01:35:18] I think he's done a fantastic job.

WL: I can't grasp it, and I don't know anybody here anymore hardly, except the people in this room! But that's okay. There's a time to go away, and I did. Just thinking over the next five years, when this place opens up, it's probably going to be incredibly successful.

DH: Yeah, I think so too.

WL: I can't see how it wouldn't be.

DH: Yeah.

WL: The little people down at the bottom of the hill have to put up with the traffic.

DH: Yeah.

WL: That's their problem, I guess. But anyway, I think we're getting to the end here—or maybe we're past the end. I don't know where we'll cut off the transcript, but are there any deep thoughts in your mind that you'd like to go on record for, or not on record for—either way? You'll see the transcript, and you can say, “Well, I know I said that, but I don't want anybody to read it.” (laughter)

DH: The only thing I would say is that I came to Lowell Observatory with the intention of being here for the rest of my life, and so far so good! (laughter)

WL: I don't think they're going to fire you!

DH: It's been a good place for me.

WL: Yeah. Well, I have to agree. It certainly was for me. It almost seems like a miracle.

LA: I think that says a lot about the institution, that people feel they can come here and comfortably stay for their career.

DH: Yeah.

LA: That's really fantastic, and you don't see that a whole lot anymore.

WL: [01:37:28] Well, you had kind of the same experience I did—you never really actually applied for a job, it just sort of happened.

DH: I literally did not apply for this job here. I never applied!

WL: I didn't either! Art Hoag called up John Hall and said, "I've got a guy who needs a job." And John Hall said, "I've got a job that needs a guy." I had nothing to do with it. Harlan Smith was in the middle of this. It was kind of a three-way between Harlan Smith and John Hall and Art. And I went to Harlan's office and he said, "Well, John and I were talking about what to do with you." And I thought.... (laughter) "What to do with me?!" Anyway, I'm very grateful for those guys, and as far as I'm concerned, the Old Boy Network, there's nothing wrong with it.

DH: Well, I guess that's how I got my job. I don't know why Bill Baum wanted me, but he recruited me.

WL: It's great to be in a situation where you're the only applicant!

LA: Well Deidre thank you so much. We really appreciate this.

WL: Yeah, this has been a lot of fun. We love doing this.

LA: Yeah, we do.

WL: We have to twist Phil's arm and Dave's arm. That pretty much takes care of the senior citizens around here, if you'll pardon the expression.

DH: It's hard to think of myself that way.

WL: Well, it comes one day at a time.

[END OF INTERVIEW]