

Barrett Oral History Project

Interview with Dr. Leland Hartwell

6 December 2018, Office of Vice Dean Nicola Foote

Primary Interviewer: Matthew Jernstedt

Notetaker: Julie Kaplan

Transcribed by: Nathan DeJonge

JERNSTEDT: Good morning, this is Matthew Jernstedt and Julie Kaplan interviewing Dr. Leland Hartwell on December 6, 2018 at 11:28 am in Vice Dean Nicola Foote's office. This interview is part of the Barrett Oral History Project. Our goal is to preserve a record of Barrett's history in honor of our 30th anniversary. Dr. Hartwell, thank you so much for taking the time to sit down with us and share your experience. So, we'll begin with a bit of personal history. Can you tell us what specific personal, academic, or professional experiences shaped your decision to pursue a career in biological sciences?

HARTWELL: Okay, well, it was actually a fairly dramatic moment. So, I was an undergraduate at Caltech, and I was a physics major, and I took an elective course in biology. And this was about five years after the structure of DNA had been discovered. And this class was, I don't know how he did this the whole semester, but the instructor would stand down there in front of the class, wave his arms, and jump around about how excited he was about DNA and what we were going to learn from it. And I got excited too and just decided that this biology was really going to change dramatically and I wanted to be part of it.

JERNSTEDT: And would you say that professor at Caltech was one of your most influential mentors during your years as an undergraduate student?

HARTWELL: Not most influential but was my advisor and did help along the way.

JERNSTEDT: So, when you look back, either at Caltech or any of the schools you attended when you were in our position, who stands out as being one of your most influential mentors, would you say?

HARTWELL: Well, several. Caltech was a special place in that there were very few undergraduates compared to faculty, so you could do research with any faculty member you wanted to any time. And so, I did research every semester, every quarter I was there. And so there was a lot of influence, but probably the most important one was a fellow named Bob Edgar, who was in the Max Delbruck Phage Group. And I did a research project with Bob, and he was using genetics to elucidate the assembly pathway for a virus, and I thought that was really spectacular and I sort of followed his example through the rest of my career.

JERNSTEDT: Wonderful. And then when you were in school, were there any programs that remind you specifically of Barrett today that might have shaped your decision to come here to Barrett?

HARTWELL: I'd say Caltech was a lot like Barrett. It's a small university. It's smaller than Barrett. But highly selected group of students that were encouraged to think for themselves, to be original, were respected as contributors, so you sort of entered an environment where you were assumed to be a contributor. I remember once when in Max Delbruck's group, he would have a weekly meeting in which people would talk about the research and it was a small room because he wanted it small. And so, he would stand at the door and say who could come in and who couldn't. And I've seen him turn faculty away and allow students like me in. So that was the environment.

JERNSTEDT: And is that how you would define your philosophy today as an instructor here, Barrett?

HARTWELL: Absolutely, as I think the students are much more interesting than faculty.

JERNSTEDT: So, I wonder, Dr. Hartwell, can you tell us more about your decision to come here to Arizona State University, and then subsequent to that, to Barrett? After you shared the Nobel Prize in 2001, I mean, presumably you could have gone anywhere, you know, a scientist of your stature. So why specifically here at ASU?

HARTWELL: Well, there's the fun anecdote and there's the sort of logical motivation. So, let's start with the logical motivation is when I was coming to the end of my time as president of the Fred Hutchinson Cancer Research Center, I had already given up my research laboratory then and was thinking about what I wanted to do next. And I decided that what was the most important thing was education, and that the world was changing dramatically in many ways, and that creating a sustainable planet was the first order of business. And so, I began creating a sustainability science course for teachers while I was still at the Fred Hutch, and I brought it here too, and we continued working on it for years here at Arizona State University. The fun anecdote is that a good friend of mine, Orin Edson, invited my wife and I to go on a trip to the Galapagos with he and his wife and a few other couples. And one of the couples was Michael Crow and Sybil. And so, we got to know them and Michael invited me here and so the two things sort of came together.

JERNSTEDT: Wonderful. And then we're going to pivot into what you're doing at Barrett today. So, looking back over the years you've been here at Barrett, can you pinpoint one moment that you're proudest of, or maybe one experience with a student that you're proudest of?

HARTWELL: Well, I think the thing I remember the most in terms of feeling happy about what I'm doing is when students send me a card at the end of the semester saying what a great time they had.

JERNSTEDT: Wonderful. And then you spoke earlier about holding on to that capacity to be taught by students while you're teaching them. So, what would you say the most significant lesson that you've been taught by a student would be?

HARTWELL: Let me just say something about that attitude is that what I think is most important in this era is that our students come out as learners rather than knowers. Everything is going to change. And we used to train students to be knowers, right? You had mastered a certain body of knowledge and then you went out and practiced it. And that's no longer adequate. What students need to do now is to go out prepared to learn as everything changes underneath their feet. So, I guess what I have learned, and so when I teach, I teach with the attitude that I'm learning as well as them. We explore things. People ask questions that they'd like to answer and then explore them. And I often do a project of my own at the same time with them. And so, I guess it's the different approaches that students will bring to their study and the questions they're asking and their interests. And I try to give students completely free reign to choose whatever they're interested in to pursue. And sometimes they pick things that seem to me very difficult to do. But I don't discourage them because "let's see what they do with it." And I think the biggest surprise is how often students succeed to do far more than I would have expected them to do. I had two great examples this semester and one last semester where that happened. And in both cases, I think, in all three cases, they came back and said, that it was really hard and that they learned so much about themselves by doing it and succeeding.

JERNSTEDT: Right, and then two of the courses you've taught here at Barrett are 21st Century Skills and 21st Century Ideas, where you have that model of teaching that you've just spoken about. So do you think, well, first of all, can you tell us a little bit more about how that works in practice and what was maybe the genesis of that- those two courses. And then do you see more of your colleagues here at Barrett and at ASU adopting a model like that for their own courses? And do you think more of them should?

HARTWELL: Well, so the model that I use for a course is there's a sort of overarching theme that we're exploring that semester. And I encourage students to find some question within that umbrella that interests them that they want to pursue. And we often take two or three weeks for them to come up with their question. And then, it depends on what we're investigating, but I think the most, the thing I've done the most frequent is to examine the issue of how we know what we know, and what are the limits of what we know, and what can't we know because of those limits. And I often do this in the area of global health, because health is the area where we examine humans the most rigorously. and come up against the barriers to knowledge based upon the fact that everybody's different and that you can't experiment on humans and various things like that. But another topic that you mentioned is sort of how students succeed. And that, of course, is the fundamental interest, how can we help students succeed? And so, I've learned a lot from the Barrett students in considering that topic. And that has resulted in a project that I'm doing now with one of your students, one of the Barrett students, to identify students who did poorly their first semester at ASU, and then by the end of their 4th semester were doing well. So raised their grades by at least one full GPA. And the Provost's Office has identified about 1% of the freshman class do that. It's very small. I'm surprised it's only 1%. But we are interviewing, as

you hear, we're interviewing those students to see what their story is. How did- what happened to them that allowed them to succeed?

JERNSTEDT: Excellent. That's actually a great way to transition to my final question for this section. So aside from the learner mindset we were talking about earlier, what else do you think characterizes a successful Barrett student here on campus?

HARTWELL: I'll let the students answer that. Okay, in one of these sections, I asked the students to write a letter to a younger sibling who was about to enter ASU and advise them on how they could be successful at ASU. And out of ten letters, nine were almost identical to one another. And they were all about, get involved in as many things as you can as fast as you can. I was surprised at that. But it was almost as if they were all saying, ultimately, that's what I found to be the most rewarding and useful thing, and I wish I had done it sooner.

JERNSTEDT: Sure. And then another question, and we'll get into a bit more of the work you're doing here on campus. So, what do you think Barrett has done to be on the cutting edge of research, particularly on the issue of sustainability? And how have you as an instructor encouraged your students to involve themselves in those efforts? How have you facilitated that?

HARTWELL: Well, our efforts in sustainability involve the Teachers College rather than Barrett, because the goal is to prepare teachers who are going into the classroom to understand the issues around sustainability and inform their students and to be able to incorporate sustainability themes into a variety of things they have to teach anyway. And so, we have a course that several hundred teachers in preparation at ASU go through every semester.

JERNSTEDT: And then regarding the future of Barrett, we're doing these interviews now because obviously we're approaching our 30th anniversary. Where do you see Barrett, you know, perhaps 10 years or 20 years or maybe even the next 30 years? What do you think Barrett should look like when we're at that point in our history?

HARTWELL: I think that's a great question. I hadn't thought about it before, but something immediately jumps to mind, which is that Barrett students have a little more freedom in their curriculum. And most of the other students are pretty lockstep into the requirements of a major. And I think it's poor training for their future because students are going to need to be much more versatile than that. And I think Barrett students have that opportunity. And I guess what would be really important is if the Barrett college and the Barrett students could help transform the whole university to more of an education for the future.

JERNSTEDT: And do you see some of that happening now, or is it very much something that's in the early stages and we have to keep building on it?

HARTWELL: I don't see it happening so much. You asked about what other faculty are doing, and I think that the majority of the faculty are very focused on preparing students in their major to go out and be practitioners in their major. And the students I experience from Barrett seem to

be much more sort of open to what they're going to do and trying a variety of different things. But what the Barrett students do, almost all of them, is have some kind of activity, service activity, beyond their courses. Even if they're working, they're still doing volunteer work various places, almost every one of them. And so that effort, I think, could be really put into helping to transform the university as well as the community.

JERNSTEDT: And that's actually an excellent way to lead into my next question. You talk about how the university should be working in tandem with the community, especially the city of Tempe, which is very much trying to lead here in Arizona on sustainability issues. What does that current relationship look like in your mind? And have you worked either independently or with your students to strengthen those ties between the university and then what the city of Tempe is doing on those issues?

HARTWELL: No, I don't have any personal experience there. I have appointments in the School of Sustainability and the School of Education. And certainly a lot of the students in the School of Sustainability are involved in community planning projects. They have a big project with the City of Glendale. But I don't have anything personally to do with that. What I'm more interested in myself are the K-12 education in our community. And I have taught, myself, in three middle school science classes last year. And this next semester, what I'm doing is having about 20 Barrett students working on creating activities around human sensory perception as a way of having an authentic science experience. I can tell you more about that. But basically, a lot of them are already interested in going out into the middle school classrooms and teaching as soon as possible. And in fact, one of them who came in the other day to sign up for this class has for two years been involved with a group of about 20 other students who are going out doing after-school science club in about 5 different schools in the community. So that's the area I think we might expand a pretty interesting program.

JERNSTEDT: And then a more philosophical question. I assume you're aware of the ASU charter and what that weighs out?

HARTWELL: I couldn't repeat it.

JERNSTEDT: One of the points on the charter is that the school and all of its constituent campuses will assume fundamental responsibility for the economic, social, cultural, and overall health of the communities it serves. And this is building upon the previous question I asked. What can Barrett do over the next, 10 to 20 years in its future to better contribute to that mission of making sure that, the work students do have that fundamental, social impact that's not just circulating here in the university system?

HARTWELL: Yeah, well, I guess, you know, a number of colleges encourage their students to get involved in the community using those opportunities as learning opportunities for their own careers, so, journalism, there's the Cronkite School and news program and there's, as we said, the sustainability students who are doing plans around. There's the law students who are doing

various things. There's many groups involved in immigration and those kinds of things. So, you know, I think there is a significant community outreach and I think President Crow has influenced the nature of education in that way, more as learning through service sort of model. I think he's not yet influenced the curriculum in terms of greater interdisciplinary study. But my own interest would be in education and I think really at all levels, not just K-12, but particularly older adults who love to learn and are looking for interesting things to do with their time. This is a great retirement community. Many of those people have time and resources to go out and be useful then to others, homeless students or things. But I think President Crow's call to be a service to the community is a tremendous vision and something that we're capable of having a big impact on because we're so large. There's almost 100,000 students here.

JERNSTEDT: And then reflecting on everything you've accomplished, specifically here at Barrett, when students look back and consider all of the contributions you made, what do you want them to take away? What do you want your final legacy to be here at Barrett and Arizona State University?

HARTWELL: That it's fun to learn.

JERNSTEDT: Would you elaborate on that?

HARTWELL: Hm?

JERNSTEDT: That it's fun to learn and you help your students see that, or?

HARTWELL: I hope so. I mean, I think personally I find that if I'm too focused on the end goal or trying to accomplish something, it can be very frustrating because sometimes you're not making progress and sometimes you are. But if you're focused on what you're learning, it's always satisfying because you're always learning. And we learn it's trite to say we learn by our failures, but it is a fact. And if you look upon the things that didn't work as part of learning, then it's still all success.

JERNSTEDT: You know, that's actually a fascinating point you made, and I want to maybe jump back and ask about that. So, you said you learned by your failures. So, if you look back at your teaching career or your prestigious career in research in biological sciences, what would you say was your most profound moment of failure and how did that teach you to maybe change your approach or become a better learner in the process?

HARTWELL: Well, I'd say about every ten years I do something different. And my experience with every one of those things is that for the first several years, I have this experience I call lost in the woods, where I'm wandering around trying to figure out how to learn or do whatever it is I'm trying to accomplish. And that it takes several years of frustration and search before I find a path and that's why we call our center Pathfinder Center because I think that is the goal is to be in search of and eventually find the path you're looking for right and so for me that's, you know,

typically, you know, five years of exploring and searching and then hopefully five years of useful productivity.

KAPLAN: What advice would you give to people who haven't found their path yet?

HARTWELL: Two things is be patient even when the rest of the world isn't. When the rest of the world is asking you to be productive and you're not ready yet, be patient with yourself. And secondly, trust yourself because you can't be creative by trying to do what other people think you should be doing. It has to come organically from yourself. And it's a painful process and requires a lot of patience. And so those are the two things, be patient.

JERNSTEDT: Julie, do you have any additional questions you'd like to ask?

KAPLAN: Sure, I have a few. So, Dr. Hartwell, you talked to us about why you came to Barrett and how you ended up here. But what has kept you here?

HARTWELL: Well, I'm still searching. So, I'm about ten years now into this education thing. We had an initial success because it was really quite amusing in hindsight is I came here with the intention of teaching future teachers about sustainability. And from what I know now, that was pie in the sky. I mean, that would not have worked if I hadn't arrived at a particular moment in time when the Mary Lou Fulton Teachers College had received a critical review because they didn't have enough content in their program. It was all pedagogy. And so, they were organizing a lot of faculty to create courses, content courses, for their students. And I came at just the right moment, and we were the only ones who created a content course. And so, it became required for all of their students. But the real big umbrella question that I'm trying to understand is how should we train students for the future? And I feel like I'm beginning to get my arms around that and am pretty enthusiastic and engaged now about having maybe a more productive few years. doing that.

KAPLAN: So bouncing that question back to you, how do you think that we should be training students for the future?

HARTWELL: Well, I think it's to be learners. It's that simple, but there's a lot involved there.

KAPLAN: You were talking earlier about how you give your students a lot of freedom regarding what they want to study and research. Do you think that all teachers should give their students that much freedom?

HARTWELL: I don't know. That's a subtle question because there certainly are skills that students need. You need to know how to write, how to express yourself, how to find information you need, and if you're an engineer, you need a lot of math and physics. So, there's this question of how much emphasis on skills training, which might be more directed, and how much emphasis on sort of exploring your interests. And the best of all is to try to combine those two, where you learn the skills as you need them. Rather than taking a course in calculus, would it make sense to have an education where you learn calculus when you needed it? I don't know. I

mean, I think those are big questions for the future of education. But certainly, a good proportion of a student's experience should be exploring their own interests, where they have a lot more motivation to learn and go beyond what they're capable of than they do when they're just working for a grade.

KAPLAN: I have one more question. So, if there is a prospective ASU and Barrett student listening to this, why should they choose to come here?

HARTWELL: Well, I think Barrett creates a great environment for students to develop. There's a very interesting time in human development these years between high school and graduating from university is 4 years. And if you don't, if you're not in a university environment, then you're out working somewhere. You come out with just a different mindset. To spend those four years in an environment where learning is the preeminent activity and thinking about the future and how to improve the world and things are the things people talk about just formulates you as an adult, I think, in a completely different way. So that's why go to university, but I think you want to go to a university where the environment encourages you to be everything you can be. And I think Barrett does a pretty good job of that.

KAPLAN: Thank you.

JERNSTEDT: Well, Dr. Hartwell, I think that's an excellent sentiment to conclude on here. So, on behalf of myself, Dean Foote, and Julie, I'd like to thank you for your participation today and for sharing your brilliant insights on all of these issues. If you have any more thoughts to share later, please feel free to reach out, and if you have any questions about this interview or the 30th Anniversary Oral History Project, please contact Vice Dean Nicola Foote. And thank you once again, sir. We appreciate it.

HARTWELL: Thank you.