

OREGON HEALTH & SCIENCE UNIVERSITY ORAL HISTORY PROGRAM

a project of OHSU's Historical Collections & Archives

an interview with:

Nancy Haigwood, Ph.D.

interview conducted on: April 3, 2024

by: Mary Zelinski, Ph.D.



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Narrator: Nancy Haigwood
Interviewer: Mary B. Zelinski
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Transcribed by: Teresa Bergen

[Begin interview.]

Zelinski: Hello. My name is Dr. Mary Zelinski. I'm a professor at the Oregon National Primate Research Center [ONPRC]. And for the OHSU Oral History Program today, I have the great honor of interviewing Dr. Nancy Haigwood, who's a professor at the primate center. And she has also been the past director of ONPRC. We'll have some time to talk about her scholarship, her groundbreaking research that she conducted both in academic and industry settings, her leadership, her community outreach and her mentorship, all of which has had a great impact on OHSU. It's April 3, 2024 and we are recording this oral history at the EdComm facilities in the BICC Library. Welcome, Nancy.

Haigwood: Thanks so much, Mary. I really appreciate you coming and helping me do this interview.

Zelinski: It is my pleasure. So let's start with your early life and your early career. Can you describe for us your background education?

Haigwood: Well, I have to go back to the fact that I was a military brat and was fortunate to live in Bangkok, Thailand when I was kind of middle school age. And that was so incredibly important for me. Because during the '60s, which is when this was, there were not vaccines for a number of important diseases that happened each year. And unfortunately, a lot of people died. It was my first exposure to public health writ large. And I think I got very, very interested in what infectious diseases do to individuals and to populations at that time. And of course, the tropics are so different from the United States. At least, most parts of the US. So, it was just a very exciting time.

And then following that, I moved back to the States and finished high school in the United States. And thought about going to medical school but quickly changed my mind once I got into research. And I did that as an undergraduate. And then ended up staying at my school, which is University of North Carolina at Chapel Hill. And was there then for ten years. I often tell people I was a slow student. But I actually got a couple of degrees. Both my bachelor's of science and my PhD there. And I studied microbiology as a graduate student. So that was sort of, takes you into the late '20s.

Zelinski: Fantastic. So as an undergraduate, what would you say inspired you about deciding to go into a career in research?

Haigwood: Oh, I was very, very lucky to take a course from a person, a professor, Marshall Edgell, who was ultimately my graduate mentor. And Marshall taught a course using the

scientific literature. And he was teaching us phage biology. And all of the information that was learned about early genetics of the lac operon—perhaps things you studied, too.

Zelinski: I remember. (laughter)

Haigwood: Maybe they were on your quals. At any rate, I was so astounded at what research was really like. That it wasn't just a bunch of textbooks. Because that's the way we learned back in those days. And this is in the '70s. Then I was just so interested in what scientific discovery was like. It's a puzzle. It's a very exciting thing to do. And it just seemed like the only thing I ever wanted to do.

Zelinski: That's fantastic. That's very inspirational. And what led a lot of us into this field, of course. So you got your PhD there. And then did some postdoctoral work. Can you tell us about that?

Haigwood: That's when I moved to virology. I went to Hopkins for a really interesting couple of years where I learned tissue culture, mammalian cell culture and virology, especially with DNA viruses. Somewhat ironic, since I've spent most of my career with RNA viruses. I didn't really learn them in my scientific upbringing. But I met a lot of interesting and brilliant people, including my mentor there, Dan Nathans, who unfortunately passed away a number of years ago. After he had won the Nobel Prize was when I went to the lab. I had nothing to do with that. (Zelinski laughs) But it was a very interesting time to be in microbiology. The beginning of genetic engineering really started about the time I was a graduate student. And both my mentors in graduate school also made important contributions to that field when they were at Cal Tech together. And then they started their labs. So, a very, very exciting time because we were talking about could we clone pieces of other organisms into plasmids and express these in *E. coli*, and perhaps make important medical products for people.

And it was a very hypothetical issue in those days. There were a lot of regulations that needed to be ironed out. And an interesting time. But as a field, that got solved.

And really, I'll jump ahead and say that's how I ended up in my career in industry. Because it was such an exciting time to be doing molecular biology for the biotech industry. So that's what I did for several years. Actually, 17 years.

6:00

Zelinski: That's quite a long time to dedicate to the pharmaceutical industry. And I think that, how was your experience there different than in academia?

Haigwood: There were a number of important differences. The science was exciting, has been exciting everywhere. That's not the difference. The difference was the culture is quite distinct, I think. It depends on the company and so forth. But especially in small biotech companies, everyone is depending on everyone else. And it's not just to get another paper. You're actually trying to make something. And what you do has to be right. So it's not like you can retract something if you make a mistake. So there's a lot of interdependence. Much more teamwork.

Less competition. And women were very much appreciated in all of the jobs that I had in industry. I was very, very lucky. And I really thought from the '80s on that we were finished with equal rights.

Zelinski: Well, isn't that interesting? (laughter) So I will take a little detour here then. I was fortunate to come to a recent celebration of your retirement. And a lot of your mentees, former trainees and colleagues were there. And they sang your praises, of course. What I was really struck by were two things: the success that your former trainees all ended up in. Many of them ended up working on the vaccine we now have for Covid19. But you had a lot of women who spoke, and spoke about how you were truly a role model for them as women in science. So could you talk a little bit about your mentorship philosophy? And I'd say specifically to the young women that you had working with you.

Haigwood: Well, I really enjoy young scientists. They're so, as you know, they have so many wonderful ideas. And we as mentors get to watch people grow intellectually. To me, that's the fun of mentoring. I was lucky. I just mainly, fortunately attracted women to my lab. And I've had almost all women trainees. Not exclusively. And I think that my philosophy is to let people grow into their own ideas as much as possible. We're there to guide people and to help them understand the basics and the hurdles that they will face. And also to provide them with some important hurdles that they will need to get over in order to qualify. But that can be very fun. It's not meant to be a stressful time, although it can be. I think with the right guidance, you can really enjoy your graduate work and postdoctoral work. And that was certainly my goal. I think, again, I was really lucky to have such brilliant people come to my lab. And I could not have accomplished any of what I've done without all these brilliant people that worked with me.

Zelinski: That's fantastic. And what a legacy to leave for the future and how they can carry on--

9:29

Haigwood: Thank you so much, Mary.

Zelinski: --all of the wonderful things that you taught them. So what made you decide to leave the biotech industry and take your position at the primate center at OHSU?

Haigwood: Well, I actually left the biotech and pharma a little bit earlier. Because at the point, I was actually, my last job in industry I was working for Bristol Myers Squibb in one of their research institutes in Seattle. And my opportunities were to stay with that company but move to the east coast, or potentially work in industry, maybe in California, where I had come from. And the issue really was for me that I wanted to keep working on HIV, which I had started working on in the mid-'80s and had become really excited about the possibility, even in those days, of using antibodies as therapies for HIV.

And there were really no companies working on HIV in those days. People had left because the first vaccine trial had not worked. So if I wanted to stay in HIV, I needed to go to academics. And it was really kind of simple. There was a personal reason as well, in that thanks

to industry I was able to have children while I was working and afford some help with childcare so that I could keep working. And because of that, I had two young children and I just didn't want to travel as much as, people may not realize, but typically in a company as you get a little more senior, you're basically on the road a lot. And I just didn't want to do that. I wanted a job, a position where I could really grow scientifically, contribute hopefully in the HIV field, but also be able to be at home a little bit more. It meant writing grants at the dining room table. But I still didn't have to travel for several years. And that was really helpful.

Zelinski: Fantastic for your family. Could you describe a little bit of your work as the director of the primate center? What your duties were?

11:54

Haigwood: Oh, yes, of course. I kind of skipped your question about getting to the primate center. I was really lucky that OHSU was looking for a new director right about the time that I was thinking hmm, my kids are in college. Now would be a good time to think about possibly other positions. And OHSU was very attractive to me. I had a couple of friends who were working here. I knew about OHSU, and I knew about the primate center because I'd been doing primate research for a long time, even at that point. So for me, coming to the primate center was kind of a perfect world where I could learn about the nuts and bolts of running a center while at the same time I could continue my research. And luckily, they were looking for a director who was going to continue to do research. And while that creates a lot of tension to try to do two jobs at once, it's doable because of the talented people that are also working in administration. And of course everybody's doing their own research. That's the fun part of being around other scientists.

So I came here in 2007. And was really, I was looking forward to it both from the point of view it was a perfect fit for my science because we work on vertical transmission from mother to babies, and this was a center that had a lot of breeding. So it would be possible to do a lot of research. But also, I was interested in growing that other side of my interests, which is organizational leadership. I had learned a little bit about that through Bristol Myers Squibb, through some management training. And I always had some interest in how organizations function. Especially scientists are such interesting people. (laughs)

Zelinski: Well, you set up a very successful career there. And we're all thankful for your leadership at that time. What are some of the challenges working at the primate center that you faced?

Haigwood: So I think in those days, OHSU's research portfolio was in the process of growing, and being encouraged to grow. And I think that the great thing about the ONPRC, the primate center, is that it is a research group. With everyone who's on the faculty there focused on bringing in grants to support their research, and in primate models, for the most part. Historically, the center grew from almost a mom and pop (laughs) kind of place. And I see you're nodding. And you know very well, because your field is in reproduction, that that was the genesis of the center. And to try to understand and be able to breed animals in captivity.

Thanks to all that fantastic research that was done, really many years before I got here, that particular program was very strong.

And another very strong program was neuroscience. And then the third leg of the stool, if you will, was the infectious disease group, which we worked with closely with another research group, the Vaccine and Gene Therapy Institute. And those three groups were independent in those days. And when I came here, I was hoping that we could find ways to work more closely together, and to try to lose some of the silo effect. Because it seemed likely that science was going to be more interdisciplinary. And I'm not that visionary. I really didn't see it that way. I more saw that people would appreciate each other more if they could understand each other's research.

So we started doing more things that would try to bring the Center together and communicate more. And frankly, there's so much to learn from the folks that take care of the monkeys and who provide the leadership in veterinary medicine. And we weren't taking advantage of that, either. So I think trying to find ways to integrate all of those elements was really what I felt was my most important job.

I also wanted us to recruit more people. But I wanted us to do it in a way that would benefit everybody and not be viewed as a competition. The way we did it was through strategic planning. And I can remember well the faces of all of my colleagues when I said we were going to have a strategic plan. (laughs) It was not a look of joy. It was more like oh my goodness, why are we doing that? We know what we're doing. We don't need this. But we did. And if you can't plan together, you can't change together. And it's very difficult to achieve goals if you don't have a plan. So that's what we did, some formal strategic planning. During my tenure, which was 15 years, we had three different strategic plans. They were not that dissimilar from one another, but we really did accomplish a lot together because we did start working together. We started communicating together. We started having leadership meetings regularly across the different scientific divisions. That was new. (laughs) So, those are some of the major things that I wanted to work on.

Zelinski: I think they turned out to be a great success. And people now really respect each other and what they do and pull together as a team at the primate center. So I'm very thankful for your vision with all the strategic planning that was done.

I'd like you to talk to us a little bit about your really exciting current results regarding protecting infants from maternal transmission of HIV/AIDS. You have some really stunning new results. And I think people would really like to know about that.

18:31

Haigwood: Well, we are very excited about these results. And they stem from literally decades of work. As you know, all science is like that. And all of this is built on, really on the shoulders of other scientists as well. But taking the models that existed at the time, we got very interested in whether this idea of antibodies, which are naturally occurring molecules in the body, might be useful. We had some evidence, really back from research that I did back when I was in Bristol Myers, as an affiliate of the Washington center, that antibodies could change the course of disease. But it was a somewhat subtle effect.

And in the intervening decades, very, very powerful human monoclonal antibodies, very effective in the lab against HIV, have been isolated and characterized by other scientists. And what we wanted to do was to ask whether those antibodies if they were given passively, as we call it, to baby monkeys, could actually be given after exposure to the virus. Because that's how babies get infected with HIV. Babies get, almost all babies who become infected, are infected during the birth process. And therefore, when they arrive, they've been exposed. And something has to be done to help those unfortunate babies who are positive. And furthermore, if they were to nurse with their mothers, they could get HIV also from breast milk.

So we wanted something that could be applied in that setting. And it's an obvious time to intervene. You know when a baby's going to be born, approximately. And you certainly know when it's coming. And so, once it's born, you have a window of opportunity for doing something positive. And these days, most people think HIV can be managed by drug treatment. And it certainly can. People live long and healthy lives for decades taking these drugs. But they are not without some toxicity. And particularly for children, who haven't finished developing their brains and the rest of their systems very well. Especially their brains. We don't want these toxic drugs to have to be administered every day.

And that's really, that was the genesis of the idea. We did some experiments over the years. And much to our surprise, it turns out there is a pretty good window of—okay, it's only a couple of days, but it is a window of a couple of days. If you intervene in the first two to three days after birth and give babies a single dose of, high dose of antibodies, which is completely not toxic, without any further treatment, those babies then go on to not have any virus in them at all. So what happens is the virus gets started, but the antibodies seem to snuff out the little embers of the virus infection.

Most recently, we've gotten into, and I've started collaborating with someone who does antibody delivery by another method, which does not involve making an antibody in a test tube and giving it to a child, but rather in monkey models, it's a single injection, intramuscular injection, of a harmless viral vector that is able to allow the expression of an antibody inside that baby monkey. And what we've been able to show is that these baby monkeys can express these antibodies for, now we know for several years without toxicity at levels that we hoped would be high enough to really prevent the virus from coming back.

So in the most recent experiments we've been doing, we've intervened much later than a few days after infection. We've tried experiments where we intervene a week, and most recently three weeks later. And it turns out that the babies who get the injection of the viral vector expressing the antibodies can then be taken off of treatment, off drug treatment, and they control the virus completely.

Now, these babies are still infected. So they need to keep expressing the antibodies. And this raises a lot of questions. Are we going to try this in humans? Certainly not until a lot more safety testing is done. But it says it's possible. And as you know from your own work, a lot of times primate work really helps us get to a point where we understand the proof of principle. We understand that this could work in people. And then we have to do the clinical work to find out if it really does work in people. But I can say that antibodies are being tested these months now in trials in Africa, in babies that are born to HIV-infected mothers. And we're very hopeful that they will have the same benefits that we've seen in the monkey model. But that remains to be seen.

Zelinski: Thank you for that, and for all of your work there. You're going to have the potential to save many lives. And I'm excited that it's now reaching some clinical trials in Africa. And we wish you all the best in the results from those.

Now I know that you're affiliated with some volunteer organizations outside of OHSU. In particular, the Cascade AIDS Project. And how important is volunteering and community involvement to you? Particularly in view of all the experience you've had behind the scenes in developing better treatments for AIDS?

24:55

Haigwood: I think choosing to volunteer is a very personal choice, of course. Not everyone has the time or the ability to spend time doing that. But I've been very fortunate in my career. And I always like to give back, if possible. Some people have time to volunteer a lot. I haven't had a lot of time to do that. But I have served on the Cascade AIDS Project board for many years. I'm not on their board anymore. Yet I have a lot of fondness for the Cascade AIDS Project still to this day. Many of my friends, I met so many wonderful people through doing that.

I think volunteering in an area that you feel makes a difference enriches you so much. I can't test and treat. I can't help people in my community, because I'm not a doctor. I'm a scientist. I can't really do all those things. But I'm amazed that people do. And that's what CAP has done. They've just done a great job with the community. And so I like to do that. And you know, the Cascade AIDS Project is a very fun group of people, too, I have to say. (laughs) It's been fun.

These days I am also volunteering for what's called Achievement Rewards for Collegiate Scientists, or ARCS [Foundation] Oregon. This is an organization that raises money for graduate [students], both male and female. It's a women's organization. It raises money for both male and female graduate students in the STEM fields. So, I guess that's my other main passion, is just to try to see what we as scientists can do to educate the public better about the importance of science.

You know, the SARS COV 2 epidemic was such an eye-opener for me and for many of us, especially, and you know this well because you're so effective in talking to people and talking to the public. But it was a shock to learn that people don't trust scientists. People do not trust Anthony Fauci [of the National Institutes of Health], of all people. People do not trust medical doctors the way I thought they did. I just thought that was a given. Back in the day when I was a kid, if a doctor said get a vaccine, that's what you did. (laughs) And you listened to doctors, because they were such a respected part of the community. And now we have a lot of skeptics. And the only way we're going to get back to equanimity, the only way we're going to get back to civil discourse, I think, is through more discourse. And trying everything we can to help people understand that scientists are interested in helping people. They're not ogres. What we are doing is not making money. (laughs) It's about discovery that's going to ultimately help people.

And especially for those of us who do monkey research. We're so close to the translational aspect. It's gratifying to see things moving along. And then be able to actually

work in the clinic. We get to see that. Those folks who do more basic research don't always get to see their discoveries translated. And I feel fortunate about that.

But I do think that, getting back to the volunteering, it enriches your life.

28:40

Zelinski: I would totally agree with that. I'd like to point out also that you received an award sponsored by the Northwest Association for Biomedical Research. the Buster & Nancy D. Alvord Award in recognition of your lifetime contribution to ethically conducted biomedical research. And you also chaired the US Animal Research Openness Initiative. So this is a big issue at the primate center, talking to the public about the importance of animals in biomedical research. And so can you tell us your reasons for being involved in this very important area.

Haigwood: Thanks so much for asking about that particular initiative: it's very dear to my heart. In the last several years I've been, and I am still working actively with this group, the US Animal Research Openness Initiative. We have gotten together several hundred volunteers throughout the US with the goal of learning from our colleagues in other countries who have been successful in having openness agreements with companies and universities in an effort to do this very thing of educating the public. And I think that some other countries, perhaps you could argue, are more culturally homogeneous and perhaps it's a little easier to get agreements like that. Or they have fewer institutions.

The United States is a very diverse and complicated set of institutions and companies. So I think this is an audacious goal to try to get an openness agreement. But our goal is to bring enough institutions into this idea. Have them reach an agreement. And then we'll go public with this. And we hope, as other countries have been able to do, then to continue to build a groundswell. And the ultimate goal is to, going back to the public opinion, is to eventually have people understand what science really is doing. And also help the public understand that openness is good. We want to tell people what we're doing. We're not hiding it. We want people to understand it. Because if they can understand it, they'll understand when we have breakthroughs better. So that's my hope. I think it's a really long-term goal. We'll probably get to the agreement hopefully in the next year or so. But then there's a lot more work to do. So in my retirement, I'm hoping to continue to work on that.

Zelinski: That's fantastic. Thank you. You've served as a PI, principal investigator, on many National Institute of Health research grants. And also because of your leadership served on the NIH Council of Councils. What's it like working on major national projects with national advisory councils?

Haigwood: (laughs) I'm sure you must do it yourself, Mary. I've lost track of what councils you've served on. But I do know it's interesting always to see the perspectives of people from other parts of research groups, other research groups, and to see the initiatives that are going on in the organization. In this case, it was the National Institutes of Health. And the director at the time I was doing this was Francis Collins. And there was a lot of focus on interdisciplinary research at that time, and investment in technology, investment in genetics. So I was excited to

have the opportunity to see what the NIH strategic plan looks like. How does a very large organization, research organization, accomplish their goals? So it was a learning experience, I would say.

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Zelinski: A very important one that certainly affected how you led all of us at the primate center in a very, very positive way. So with all of your experience in different aspects of research and academia and industry and your interests, how has this shaped your role as an educator at OHSU?

Haigwood: That's a great question. I'm not sure I have a good answer for that. You know, I don't do formal classroom teaching. It's all been mentoring and attempting to provide leadership within the center. Perhaps I might take that in a slightly different direction and just say that the primate centers work together as a consortium. And one of the surprising things that happened was I discovered I was part of a national team of seven leaders and all of those leaders of those institutions. And we worked together, the other primate center directors and I, with all of our colleagues and the National Institutes of Health to really make a more national plan. So most of what I did in the last few years when I was director was help to educate NIH and the National Academies of Science, Engineering and Medicine, which was in the process of doing a review of all the primate research throughout the United States. Thinking strategically, thinking systems science. I'm not educated in systems science, but I'm a huge appreciator of how systems get managed and the importance of doing that and thinking strategically. We did that and I believe that we brought primate research along.

We staved off some pretty significant threats that came our way from the animal rights organizations [that were aimed] directly at NIH. There was an attempt to shut down primate research time and time again. And some of the efforts were, I would say, a little too close for comfort. So I think that, together with these other leaders, we all learned how to be better advocates for primates. And I think we're in better shape because of that. We'll have to see. It's a 50-year program. It's got aging infrastructure. There are still many, many problems to solve. But we also have many, many thousands of animals that are beautiful animals and have taught us so much. Not only about reproduction and infectious disease, but genetics and neuroscience. And these days, even metabolism. So it's an exciting time for primate research. And a better time for primate research than it was when I first started.

Zelinski: I would totally agree with that. So many wonderful, positive changes have occurred. Both in educating the public and in the facilities we have for working with these animals in the best ways possible. Now that you've partially retired, what are your hopes for the future of the primate center and OHSU?

36:26

Haigwood: Well, I hope it will become, of course, even better. And I do believe in the scientists who are here, and the leadership we have today is very strong. And I say that both for the

primate center as well as for OHSU. This is a fantastic organization that has grown tremendously. It's goal back in 2007 to grow the research portfolio has succeeded. Not just at the primate center, but also in the entire university. And there's much more focus on research than there was when I first got here. It was important then and it's even more important now. I think we as an institution, as an academic medical center, this is an exciting place to be because we've started to do more translational research right here in Oregon. We have the statewide reach. Things that certainly are far beyond what I was ever involved in. But they're good for the state and they'll be good for public health if we can just keep going. So, I feel very optimistic about the future. And I'm honored to have been part of it.

Zelinski: Thank you. And lastly, would you like to share any memories of colleagues that you've worked closely with at OHSU and at the primate center? Anyone who particularly has made an impact on you?

Haigwood: Well, first I have to say certainly you, Dr. Mary Zelinski, have been amazing. Because you have done amazing translational research to help people understand how they might preserve their fertility. And that is phenomenal. And bravo to you. Always inspired by you, Mary.

I have been so lucky to work with Charlie Roberts, who's been, when I was director was associate director for research for many years. Certainly the whole time I was there. Charlie's a brilliant scientist who has the ability to see connections between fields that no one else can see. He has the kind of energy and persuasive ability to bring people together. It was a great partnership because I'm more the strategic person. He was the people guy. It was great. It was a great partnership. And I still am good friends with Charlie today and I certainly hope it will stay that way.

I'm so excited to have worked with, oh my gosh, so many of my veterinary colleagues. All of the division chiefs I worked with were very fun to work with. Kathy Grant is a brilliant neuroscientist. She's made so many contributions to addiction research. Bravo to her. And again, there's a lot of push to do research only in murine models. And she was able to keep the focus on primates, where it belongs. Voluntary addiction research, which is unfortunately what people do. So many.

Jon Hennebold was a wonderful division chief I worked with, and Dick Stouffer before him in reproductive and developmental sciences. I've certainly enjoyed working with Don Conrad, who's leading our genetics group. I just can't thank my scientific colleagues. I have been so lucky to work with many infectious disease people. Specifically work closely with Jonah Sacha, who's done a lot of fantastic transplantation work. But a lot of other work.

And then most recently I worked with Dan Strelbow, who was my partner in, and a lot of other partners working on the SARS COV 2 epidemic. So that along with Drew Martin, who's an amazing leader for the animal resources group, head of all the vets. So many wonderful people there. I have a particular fondness for Anne Lewis because when she was in training, I happened to work with her, back when I was at Bristol Myers. So we have a long-time connection there. And Anne is head of pathology, has just done wonderful work. I mean, too many.

I've enjoyed all my colleagues so, so much. I hope I've thought of all the ones that are important to me. There are many administrators who have just been incredibly helpful. And I've really appreciated my boss, Peter Barr-Gillespie. And before him, Dan Dorsa. Interesting folks I was fortunate to work with Jay Nelson, who recently passed away, as head of the VGTI. So, so many memories. It's hard to remember all the folks. But it's been really a good time.

Zelinski: Thank you so much for spending time with us today and talking about your very rich and impactful career and life. You've had a great influence on many people you've touched throughout the years. And we wish you all the best success in the future. Thank you, Nancy.

Haigwood: Thank you, Mary.

42:00

[End interview.]