INTERVIEWEE: Rebecca Buckley
INTERVIEWER: Jessica Roseberry
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BUCKLEY INTERVIEW NO. 1

JESSICA ROSEBERRY: This is Jessica Roseberry. I'm here with Dr. Rebecca Buckley. She's the J. Buren Sidbury Professor of Pediatrics and Professor of Immunology. It's February 19, 2007, and we're here in her office in the Jones Building. I want to thank you very much, Dr. Buckley, for agreeing to be interviewed today. It's a real pleasure.

REBECCA BUCKLEY: You're quite welcome.

ROSEBERRY: If you don't mind, I thought I might ask—I understand that you got your bachelor's at Duke, and I thought I might ask a little bit about that and what that experience was like.

BUCKLEY: Well, it was a wonderful experience. I enjoyed all of my time here at Duke as an undergraduate, and that's where my loyalty will always be. When I came to Duke, I think there were three hundred or so women in the class and seven hundred men. The women's college was ranked I think number two or number three in the nation, and the men's college was not ranked at all, because they didn't require college entrance exams for the men then. That was because they were trying to attract men to come to Duke, whereas within the state, most of the men were going to the University of North Carolina. But a lot has changed since then. And of course, it's now very difficult for both men and women to get accepted into Duke undergraduate school.

ROSEBERRY: Now, were your courses on West Campus?

BUCKLEY: Both West and East.

ROSEBERRY: West and East.

BUCKLEY: Yes, we rode the bus back and forth frequently during the day to go from West to East. And I was pre-med at the time. I didn't come here as a pre-med, but in my freshman year I soon became very interested in that. My dad was a physician, and I had a very inspiring zoology professor who stimulated my interest in science again. And then I became a pre-med student.

ROSEBERRY: Were there other women who were pre-med?

BUCKLEY: Yes, but there were probably no more than six to twelve women who were pre-med at the time. Medicine was not something that women usually chose as a career then. Usually the choices were between being a schoolteacher, a nurse, or a secretary. However, I didn't want to do any of those things.

ROSEBERRY: Were you met with any resistance?

BUCKLEY: Yes, especially when I applied to medical school. When I applied to medical school, the questions I was asked in the interviews people would 'go to jail for' now. Such as, "Why do you want to take a man's place in the class? When are you going to get married? And, When are you going to drop out of school?" Those were very common questions at the time.

ROSEBERRY: So what made you choose to continue in the face of those things?

BUCKLEY: Well, it didn't bother me. I just answered them and told them that I was going to go ahead. When I was accepted into medical school, I was one of three women in the class. The other two women were very good students. But we three were the 'butt' of every joke in the class for the entire four years. And again, we didn't let that bother us. We just ignored them and went on.

ROSEBERRY: And that was at UNC School of Medicine, is that correct?

BUCKLEY: Yes, I applied to a variety of different medical schools, but my parents had two other children in college at the time. And to go to Duke, it would have been very expensive, whereas if I went to UNC, the tuition was six hundred dollars a year. My father had gone to UNC to medical school, so I was advised that that would be a good place to go.

ROSEBERRY: Now, was there any coursework that was maybe geared towards men in any of the anatomy classes, or anything that kind of felt uncomfortable?

BUCKLEY: Well, of course, there were lots of jokes when we had the anatomy classes. I had a cadaver that was very 'well-endowed', and this was a constant source of jokes for all the men in the class.

ROSEBERRY: I see.

BUCKLEY: But, by and large, we were friends with all the men in the class. We just ignored their jokes and went on our merry way. But some of the things that they said and some of the things that I was asked in my interviews could never be said or asked anymore.

ROSEBERRY: So you then returned to Duke.

BUCKLEY: Yes, in my senior year at Duke, I met my husband-to-be, a Duke medical student.who graduated then became an intern at Duke. We became engaged in 1955 during the spring of my freshman year of medical school. We were married that summer, and he went into the Navy. We had our first child the following June, so it was challenging. I took the state board exams on the same date that my son was due to be delivered. My mother was standing outside the door ready to take me to the delivery room if it had happened. And all of my classmates were very nervous, afraid they were going to have to deliver me. But my son waited, and I got through the boards. It was a challenge getting through medical school with a child, but

fortunately, with a lot of help from other people, I was able to do it. In particular, my mother was wonderful to help me out when I got in a bind.

ROSEBERRY: What was attractive to you about pediatrics?

BUCKLEY: When I was growing up, my father was a general practitioner. The telephone was right outside my bedroom door when I was growing up, so I remembered hearing house calls all during the night. He would answer the phone and go out on a house call. When I went to medical school, I had the idea that I was going to be practicing general medicine, as my father had done. But when I rotated through pediatrics, I found it to be a very enjoyable experience. I soon realized that primary care pediatrics would be very much like primary care general medicine. So I chose pediatrics.

ROSEBERRY: Was pediatrics a field that was maybe more open to having women?

BUCKLEY: Well, yes. Like ob-gyn, it's natural that women feel at home in those two specialties. Later on I decided to sub-specialize.

ROSEBERRY: Well, I thought I might take a minute to ask about Dr. Susan Dees.

BUCKLEY: When I came here to Duke to interview for a position as an intern in pediatrics, I was interviewed by Dr. Susan Dees, who was a very busy lady, and her office looked like mine (*referring to paperwork on desk*). She was very charming and nice, and I enjoyed meeting her. And then in my very first rotation when I was an intern, I was assigned to Allergy and Immunology. There were two young doctors in training who took it upon themselves to tease me so much that it made life a little difficult. When I got through with that month I said, "Well, I don't know what I'm going to do with the rest of my life, but I know one thing I'm not going to do, and that's allergy and immunology." And so the lesson from that is 'don't ever say never'. Later during my internship, I became a mother again—I had a daughter. Dr. Dees was sitting

next to me at one night at a medical center dinner and she asked, “Have you ever thought about a career in allergy and immunology?” She pointed out that one of the advantages of this would be that, if you are a woman with a family, you can be a consultant and you wouldn’t have to be on call all the time. However, I really didn’t think much about a career in allergy and immunology until a little bit later, when I went through another allergy rotation and really enjoyed it. Dr. Dees was a very important reason that I went into the field, because she pointed out the interesting aspects and the excitement of the field. And she was a great role model. So that’s how I got into that subspecialty. My husband had originally thought about going into private practice in Florida. On the day after I graduated from medical school, we drove to Miami where we both sat for the Florida boards. We were going to practice in Florida. We both passed the boards, but we’ve never used the licenses. They are still on the wall. He was also a resident here at Duke and was inspired by various people to stay in academic medicine. One day he told me that he’d decided to do that. I knew then that I would either have to enter private practice here in Durham, or pursue additional training. I was fortunate in that the Immunology Department was just being established here at that time. Duke had attracted [D.] Bernard Amos from Roswell Park Memorial Institute in Buffalo, New York, to come here and set up a Division of Immunogenetics. He, of course, was internationally known and was among the initial discoverers of the major human tissue antigens that control acceptance or rejection of organ and tissue transplants. So I was very fortunate to be able to work in his group with Dr. Richard Metzgar, who came down from Roswell Park with Dr. Amos. I was able to take a fellowship in Immunology with him after I finished my fellowship with Dr. Dees. Immunology was a new specialty at the time. Prior to that time most immunology had been done by microbiologists who used antibody tests to measure titers of antibodies against infectious agents. Immunology was

not really a formal specialty like it is now. The other thing that I was impressed with, when I was a fellow in training with Dr. Dees, was how many parents brought their children in saying, "Well, my child 'always has infections'. Can you tell me why my child is always infected?" There were very few tests that could be done back then to evaluate the immune system. While I was a fellow in immunology some of those tests were evolving, and I was able to establish those tests here at Duke. That started my lifelong career in the field.

ROSEBERRY: I wonder if I could ask a little bit more about what you feel Dr. Dees' contributions to Duke were.

BUCKLEY: She made many contributions to Duke. I summarized those in a 'History of Medicine' lecture about her that I gave to the Duke Medical Alumni Association in 2000. I sent Dr. Ed Halperin a copy of my PowerPoint presentation that details all of Dr. Dees many, many contributions to Duke and to the field. The picture of her that he placed in the hall of history of the Medical School in the Green Zone was taken from that PowerPoint presentation.

ROSEBERRY: You were talking about some of the exciting things that you found in the field of allergy and immunology

BUCKLEY: One exciting thing was that you could do tests to find out why people kept having infections, and you could distinguish people who were immune deficient from those who were not. Because of my training in allergy, when somebody said, "My child's always infected," I was able to sort out whether they were really having infections, or whether their symptoms that appeared to be infectious in nature were just due to allergies. In other words, many times people with allergies have chronic runny noses, and the parents think they have an infection all the time—when, in fact, it's really just allergy. There are ways now to tell the difference between whether it's just an allergy problem or whether there's a genetic defect in the immune system. It

was the ongoing development of these various types of tests that was very interesting and very exciting. That led me into what I've been doing for the last quarter century, which is taking care of 'bubble' babies, which we used to think was just one condition. But we know now that it's many diseases, i.e.it is a syndrome. And we've been able to save the lives of so many of these babies. I used to watch them die when I was a resident and fellow. And now we have a way to save them.

ROSEBERRY: Can you talk about some of the diseases that make up that syndrome?

BUCKLEY: Yes. 'Bubble boy disease', or severe combined immunodeficiency [SCID], has many different genetic causes. The first discovered cause was adenosine deaminase deficiency in 1972. We knew that, if the gene encoding adenosine deaminase was mutated, the infant would have 'bubble boy disease' or SCID. However, until 1993, the abnormal genes for all the other SCID infants who did not have adenosine deaminase deficiency were unknown.. Since 1993, eleven more genes have been discovered that, when mutated, cause SCID. There are now at least twelve genes that, when mutated, result in no T- or B-cell development, leaving the infant highly susceptible to all types of infection. If they are not given a successful bone marrow transplant in the first year or life, they die before their first or second birthday. It has been wonderful taking care of these infants over the past 25 years because of the new treatment options that arose from animal research in the late 1970's. It had been shown in experiments in mice and rats that, if one could remove all T-cells from the donor spleen cell or bone marrow cell suspensions, one could then transplant the bone marrow or spleen cell suspensions from unmatched mice or rats into lethally irradiated unrelated mice and rats without causing a fatal reaction called graft-versus-host disease (GVHD). Prior to that work, the main obstacle had been that if a SCID infant didn't have a brother or sister who was a perfect match, a bone marrow

transplant could not be done because of lethal GVHD. The work in mice and rats opened the door to using mothers or fathers as donors, which was not possible before that because mothers and father are usually always only half matched to their offspring. So we were able to use a technique that allowed us to remove the T cells from a mother's or father's bone marrow and the remaining cells could be transplanted into the baby to enable him or her to develop an immune system. This meant that all SCID babies would have a donor. Over the past almost twenty-five years—in May it will be twenty-five years—we've been able to transplant 157 SCID babies, and of those 157, 123 of them are alive, some almost twenty-five years post-transplant now. Our oldest one is in Brazil, and we now know her molecular defect—she has RAG1-deficient SCID. At the time we transplanted her, we did not know her molecular defect. She graduated from college and obtained an MBA in Brazil. She's also a dancer, and she's now on a scholarship to Australia. She's doing very well. My second-oldest patient is going to medical school next fall. It's wonderful to see children grow up whom we previously had not even expected to live and to become normal people.

ROSEBERRY: It's remarkable.

BUCKLEY: Yes, it really is. And it has been a privilege for me to participate in all this.

ROSEBERRY: So what does the removal of the T-cells accomplish?

BUCKLEY: T-cells are the main cause of GVHD. For example, if you were lethally irradiated and you were given a transplant of my bone marrow, the T-cells in my bone marrow would recognize you as 'foreign'. Because you were lethally irradiated, you would have no way to reject my T cells and the reaction would be fatal.. The same thing is true for SCID babies. Since they have no T-cells themselves, they can't reject. If someone else's T-cells are given to them, and the donor of the cells is not a perfect match to the baby, those T-cells recognize the baby as

'foreign' and cause fatal GVHD. By removing the T-cells, the remaining stem cells can then 'go to school' in the baby's thymus, learn how to be T cells and learn not to kill the baby. The newly generated T cells are tolerant of the baby, they enter the blood of the baby as normal T cells and they are protective. So that is the basis of why this technique is used.

ROSEBERRY: Can you talk about the process of coming to that realization?

BUCKLEY: Well, it certainly wasn't all my achievement. The researchers in Germany who performed the experiments with rats and those in Israel who worked with mice first showed that it was possible to use this approach to avoid GVHD. One of the T cell-depletion methods was applied successfully to bone marrow transplantation in non-matched monkeys at Memorial Sloan-Kettering Cancer Center, New York in 1980. Shortly after that, they gave T cell-depleted unmatched marrow successfully to a leukemic child and, in 1981, to the first SCID baby.

ROSEBERRY: And was that here?

BUCKLEY: No, that was at the Sloan-Kettering. But we have been using this approach here for the past 25 years. My research has focused on the development of immunity in these infants after they were transplanted. One can't study T-cell development and B-cell development ethically in normal humans becaused the fetus is *in utero* when this is happening, These unique SCID chimeras have become useful models for looking at the normal development of the T-cell and B-cell systems. Because they don't have any T cells prior to transplantation, we don't have to give them chemotherapy or irradiation to prevent them from rejecting the graft. Because we take out the T cells from the donor marrow before it is given to the baby, we also do not have to give the infants drugs to prevent GVHD. So all we do is put the stem cells in their blood stream and then watch their T and B cells systems develop. From them we've learned an enormous amount about T-cell development, B-cell development, tolerance induction, major

histocompatibility locus antigen restriction and many other immunologic phenomena. We've also learned that half-matched stem cells work just fine. So it's really been a very exciting quarter century.

And now the thing that I'm actively lobbying for is newborn screening for this syndrome. This is because we have learned that the major cause of death in those who did not survive was from viral infections they had contracted prior to diagnosis and for which there is no effective antibiotic. When we summarized our findings in the New England Journal of Medicine in 1999 in our initial large report of our experience with these infants, we found that the mean age at diagnosis was six and a half months. At that age they were usually sick and many would be admitted to the Intensive Care Unit where they, more often than not, would end up on a ventilator. We subsequently had families that had second children who were affected. When we found out they were expecting and possibly carrying an affected child, we had them come here to deliver. And then we were able to transplant the second affected patient in the family at eight or nine days of life. At this point we have been able to transplant forty-five SCID babies in the first three and a half months of life and we have a 96 percent survival rate. For the 112 infants transplanted after three and one-half months of life, only 71% survive. So it is important to do these transplants before the babies become infected. The main problem is that there is no newborn screening for SCID. So unless there's a family history—which was the reason that we could identify our young non-infected patients—babies who have SCID do not look any different from normal babies. Usually the only way they become diagnosed with SCID is when they become ill and then they frequently have to go into the Intensive Care Unit on a ventilator. When we find that they are already infected with a virus for which there's no antibiotic, we know the odds of survival are much diminished. Nearly all of the thirty-four babies we have lost over

the years have died of viral infections for which there's no effective antibiotic, such as CMV [cytomegalovirus], adenovirus or EBV [Epstein-Barr virus]. So I'm urging newborn screeners to introduce screening for SCID at birth. This would be very easy to do because it could be done on the cord blood, and it is possible to make the diagnosis of SCID very shortly after birth. However, there's resistance to doing this because newborn screening has been done a certain way since it was first started twenty-five or more years ago. It is also not possible to screen for defects of the immune system using the most popular method of screening, i.e. tandom mass spectroscopy. The way newborn screening has been done up until now is by sticking the baby's heel after the first 24 hours of life, and collecting five drops of blood on a piece of filter paper. The filter paper is then mailed to the state lab, and then sometime later the doctor is notified whether the infant has sickle cell disease, hypothyroidism, PKU [phenylketonuria], M-CAD, or one of approximately thirty more extremely rare metabolic diseases. There is no effective treatment for many of the latter diseases. Newborn screeners are reluctant to change that because they've been doing it that way for a long time. There is a way to screen for SCID right now, by doing a blood count on the cord blood. However, HMOs [Health Maintenance Organizations], don't want to pay for that. So it's going to be a long fight. But it is really important for SCID babies to get diagnosed early so they can be transplanted before they become infected. It's also important to diagnose these infants early because they should not be given live virus vaccines or non-irradiated blood transfusions, which can be fatal for SCID babies. Most of the time immunization protocols are developed for babies with the presumption that they all have normal immune systems. One live vaccine that's just been recently released, Rotateq, is a rotavirus vaccine that contains five different live rotaviruses. It is given orally. It is unknown yet what would happen if this vaccine is given to a SCID baby. So I'm lobbying for newborn screening

for SCID because those so identified could be transplanted right after birth, and you could also keep them away from live virus vaccines or people who might be infected.

ROSEBERRY: You may have mentioned this—but how common is SCID?

BUCKLEY: Well, you ask the same question that all the neonatologists ask. "How common is it? Would screening be cost-effective?" Well, the problem is unless you do screening, you'll never know what the incidence is. Just to give you an example, last summer I was called by a pathologist in New York who was looking at the spleen, thymus and the lymph nodes from a baby who had died suddenly at 3 months of age, and he said that there were no T-cells in those tissues. He asked, "Could this infant have had SCID?" And I said, "Well, it certainly sounds like it." So he called the infant's pediatrician, who then told the mother who then called me. It turned out that she had been persuaded by a company to save the cord blood from this little boy. They still had his cord blood in the bank there, she was able to retrieve it and send it to me. We made the diagnosis of SCID, identified the molecular type, discussed with the mother the mode of inheritance, and genetic counseling has been given the family. However, the only reason that the baby had an autopsy was that he had died less than twenty-four hours after hospitalization, so an autopsy was mandatory. I suspect there are a lot of babies who die of meningitis, sepsis, pneumonia or fever and the death certificate lists the cause of death as infection, pneumonia or meningitis. Autopsies are rarely done because HMOs don't want to pay for them. So without an autopsy, there would be no way to know if the baby died of SCID. Thus, the short answer to your question about 'how common is SCID' is that we don't really know. Last year we were referred nine babies with SCID. Three of those were from North Carolina. There are only 120,000 births per year in North Carolina. So that tells you the incidence last year in North Carolina had to be at least 1 in 40,000. And those were the ones we knew about. We don't know how many we

didn't know about. Until there is a newborn screening program, no one will know. I have accumulated some data on costs because people keep bringing this up. Most of the babies whom we transplanted in the first three and a half months of life have stayed in an apartment in town after the transplant. They didn't have to be in the hospital. Even if you count the cost of the rental apartment, the rental car, and the clinic visits for checkups, the mean total cost was around $100,000. By contrast, among those SCID babies who had to be admitted to the Intensive Care Unit where they were on a ventilator, we have several million-dollar babies and we have at least one that's a two-million-dollar baby. The average cost of those transplanted after 3 and one half months of life was something like $500,000. So it's clearly extremely expensive if you don't diagnose SCID early. In addition to being life-saving, a transplant can be done relatively inexpensively if it is diagnosed early. So I think you can see why it is so important to get newborn screening for SCID approved.

ROSEBERRY: If you don't mind my asking, what avenues have you tried?

BUCKLEY: I have been to the state newborn screening committee. I've been to the CDC [Centers for Disease Control] twice. I have been to the FDA [Food and Drug Administration], I have been to Maternal and Child HealthI in Washington. I have parents who have contacts with the state legislatures around the country, and they're all primed to write letters to whomever in support of this cause, because they know how important it is. So we're just hoping that the right moment will appear in this lobbying campaign where it will be helpful for all of the parents of my patients to write letters.

ROSEBERRY: Well, it sounds like this particular disease has become a real passion of yours.

BUCKLEY: Well, it is because it's a pediatric emergency. If you don't recognize it early on, then the odds are that the patient's going to die. But that doesn't mean that we only see this

particular type of immune deficiency. There are more than 200 different genetic defects of the immune system now. And we see every variety of primary immunodeficiency here at Duke. Many of the other types can treated effectively with just intravenous immunoglobulin (IVIG)and antibiotics as appropriate.and that keeps them healthy unless they had sustained permanent damage to their lungs and sinuses because of late diagnosis. The reason that we're pushing so hard for screening for SCID is that they will die if you don't recognize them. But there are many other immunodeficient persons out there. In fact, I suspect that there are probably about a million people in the United States now walking around with some form of genetic defect of the immune system. But there's no screening for any of these defects, not only in the U.S., but nowhere in the world. In third-world countries, where they're worried about people dying from tuberculosis, they give a vaccine on day one of life, which is a live vaccine. Anybody who has a defect like SCID will die from the vaccine. So there are a lot of reasons to screen for it. And with the Genome Project and all the new technologies available, it should not be difficult to develop a newborn screening system for these diseases.

ROSEBERRY: Now, is your own work primarily in the lab?

BUCKLEY: Well, I have two NIH [National Institutes of Health] grants, and those support the studies that we're doing on our SCID chimeras. Chimeras are people who have living parts from another person in their body. The transplanted SCID babies have circulating immune cells that came from another human. They have their mother's T-cells, sometimes the mother's B cells but their own natural killer cells. In other words, they have some cells that are theirs, and some that are the donor's. And so we we're doing studies on these people. And this gets back to what I was saying earlier about all the different immunologic questions that can be asked about T-cell development, B-cell development, natural killer-cell development, etc. One thing we don't know

is whether the transplants are going to last them the rest of their life. We're following them longitudinally and trying to find out whether we're going to have to give them booster transplants or do something else to them to keep them alive.

ROSEBERRY: So are you—you're doing clinical work, it sounds like, as well.

BUCKLEY: Well, I see them in my clinic on Thursdays. But my lab is where we do all the studies.

ROSEBERRY: And are you doing the transplants as well?

BUCKLEY: Oh, yes. We do all the transplants. As I said, we don't give any of these babies chemotherapy, irradiation or anything like that. And our fellows get to do the transplants, which is good.

ROSEBERRY: Okay. Well, I wonder if I can go back a little bit and ask about your growing interest in lab work.

BUCKLEY: Yes. When I was in medical school, I was required to write a thesis in my third year. And after that, I said, 'Well, this is the last research I'm ever doing'. But when I had an opportunity to work in immunology research, I really began to enjoy working in the laboratory. So it was the influence of the Immunology group here that really got me involved in laboratory research.

ROSEBERRY: Was it also uncommon that a woman would be in the laboratory?

BUCKLEY: No, because women could be a PhD or a technician. But there were not many women faculty at that time. I remember that in the Department of Medicine there was one—Dr. Grace Kerby was the only woman I know of in medicine. In addition to Susan Dees, there was a doctor in Pediatrics by the name of Dr. Doris A. Howell, a pediatric hematologist-oncologist here. She used to take care of all the leukemic patients. When we were residents and interns we

helped her treat these patients, and they were all dying. But she was a very empathetic physician, and she was also a good role model.

BUCKLEY: And basically those were the women who were here then. I remember when I was asked to be on the Medical School Admissions Committee for Duke I was not even on the faculty at that time. I think I was a still a fellow. And after about two or three years, I kept seeing new faces appear on the Committee, but I wasn't going anywhere. And I think I had at least three terms before I realized that these were three-year terms. So I was a token woman on the Committee. But I saw the Duke Medical School class go from six women a year to, thirty to forty women a year. It wasn't because of what I did, but it was because of what was happening everywhere.

ROSEBERRY: So it sounds like there was a shift in attitudes toward women in medicine.

BUCKLEY: Yes. And then I was also on the Clinical Appointments, Promotions, and Tenure Committee—I think for two or three terms in a row without realizing that the term was only for three years. So again, I think I was the token woman on that Committee. But I felt that I did a good service on both of those committees.

ROSEBERRY: Were you actively promoting women's issues?

BUCKLEY: Yes. But when I first went on the Admissions Committee, the problem was that no one was applying. And so I remember—I don't know whether you know the name of Dr. Lois Pounds, but Lois Pounds and I were sent on a recruiting mission to Wellesley, Smith, and [Mount] Holyoke. She and I went to talk about Duke Medical School to all these colleges' freshmen. We were told that 50 percent of the women in each class were pre-law and the other 50 percent were premed. So we were very encouraged. I can't remember what year that was, but it was probably sometime in the late seventies. But it was really encouraging to us to know

then that there were good people who were applying. I don't think that many by the end of their college days were still premed and pre-law, but at least they started out being interested in it.

ROSEBERRY: Can you talk about being a Division Chief?

BUCKLEY: Before I became that, it wasn't until Dr. [Samuel] Katz came here in 1968 as Chairman of Pediatrics that I was appointed to the faculty. After I finished my training in Immunology, I was a Research Associate in the Department of Immunology, because the Pediatric chairman before Dr. Katz had not encouraged women to join the faculty. And so when Dr. Katz came, he invited me to join the Pediatric faculty. When people came up to me, they said, "Congratulations! Do you know what that means?" And I said, "Well, not exactly." They said, it means that you have to find your own salary. You have to find your secretary's salary. And you have to find the salary for everyone who works for you. So I've tried to do that over all the years, by writing grants, etc. I became Chief of the Division of Allergy and Immunology in 1974 and learned the lesson even more, because I found that I had to encourage all of the people in the Division to do the same thing, that they had to find their own salary, their secretary's salary, and the salary of everybody that they had working for them. And we had to find the funds for the fellowship training slots that we had.

ROSEBERRY: I've interviewed other pediatricians. And from what I've heard them say, pediatrics is maybe not as lucrative of a field as others such as Surgery, Radiology, etc.

BUCKLEY: Oh, that is absolutely true. The children don't have any money, their parents are young and often poor, and they don't have diseases that older rich people want to give money for research on. Many such donors would rather give money to cure cancer or heart disease because it might help them, than to give money to benefit diseases of children. You would think that people would be sympathetic toward children, but it doesn't seem to work that way.

ROSEBERRY: And did you, or maybe Dr. Dees, ever meet with any resistance as Division Chiefs?

BUCKLEY: I don't think so. In fact, I don't think that being a woman has stood in my way for anything I've done. I've not really ever been a big 'women's libber' either. I think if you lead by example, that's the most important thing.

ROSEBERRY: Do you feel it's been an asset in some of the things?

BUCKLEY: Well, in some ways. For example, when the NIH started putting together all of the grant review committees, they were mandated to have women on these committees. I used to get several phone calls a day inviting me to be on this, that, or the other committee. I finally got so tired of this I said, "When you find two other women to be on this committee, and if it's a subject that I know something about, I will consider accepting." I said, "But I refused to accept a position on a dental institute committee or any committee that I did not feel that I had the appropriate expertise. Thus, women got lots of invitations, because the people organizing the committees had to invite women. But that was, in a way, bad.

ROSEBERRY: You mentioned some other women who were around during the time.

BUCKLEY: I'm trying to think. Debbie Kredich was a real role model in our department for a long time, in both pediatrics and rheumatology. And then, of course, there are lots of women in the Pediatric Department now.

ROSEBERRY: The question that I am thinking of is, Are there women who have made an impact on Duke medicine? Maybe not through traditional means, even—maybe through traditional means, but maybe just made an impact in other ways—that you can think of?

BUCKLEY: I have to think about that one because there were very few women faculty members here. I think in Surgery and Medicine they never had anybody for a long, long time. Except for

Dr, Grace Kerby, she was the one exception in the Department of Medicine. In Microbiology, Hilda Willett was a Ph.D. faculty member then, and she helped edit the textbook, *Zinsser Textbook of Microbiology*. In Immunology there was a Ph.D. junior faculty member, Olya Finn, who went on to Pittsburgh to become chairman of Immunology there. She apparently was not given tenure here at Duke, even though she was a good investigator and a wonderful teacher. She was highly respected and the students all loved her. But she's somebody who I guess met the glass ceiling here, but went on to good things at Pittsburgh. I'm trying to think who else. They said there were something like fifteen people here you're going to be interviewing. Do you have your list of fifteen yet?

ROSEBERRY: I'm working on a list of fifteen. I had the opportunity to interview Dr. Dees's daughter about her.

BUCKLEY: Dr. Dees was a wonderful lady.

ROSEBERRY: What was she like? If you don't mind my asking.

BUCKLEY: Well, she was somebody who always appeared to be very interested in what you were doing. And that was true for her patients, their parents and all the people who worked with her. And it was sincere. She was a very bright lady and very pleasant. She had a good sense of humor and was a very good teacher.

ROSEBERRY: I wonder if I might ask about some of your activities in associations in the field.

BUCKLEY: Well, I've been president of several national organizations. Probably the most important one was the biggest organization for our specialty, the American Academy of Allergy Asthma and Immunology. In 1980, I was the first woman president of that organization. And I have been president of the American Pediatric Society, the Southern Society for Pediatric Research and the Southeastern Allergy Association. Participating in national organizations has

been a very important part of academic life here, and something that I always try to encourage all the young people to get involved with.

ROSEBERRY: Is there—what are some other things that you might instill in people that you're working with or teaching?

BUCKLEY: Well, I think the most important thing is to enjoy what you're doing, and to realize that medicine is not a nine-to-five job. I remember when I was a first-year medical student, we were having breakfast one morning with some of our classmates, and people started asking, "Well, why did you go into medicine?" And there were about eight or ten male members who said, "I went in it to make money". So there are lots of different motivations. Probably the most important advice is to find something that you love to do. Sometimes when people I know who are as involved in what they do as I am in what I do get together, we talk about how we can't believe people pay us to do this. Because it's what we enjoy doing.

ROSEBERRY: What's enjoyable about academic medicine? If you don't mind my asking.

BUCKLEY: Well, it's intellectually stimulating. If I had gone into private practice, for example, I would probably be seeing mostly patients who don't have life-threatening conditions, and it would probably be more of the same types of conditions every day. By contrast, in academic medicine you're going to see everything from mild things to emergencies. And learning how to cope with that and learning how to problem solve, I think, is one part that is so enjoyable. And then there is teaching and seeing young people learn. And of course, helping patients. Finally, the opportunity is constantly arising to create new knowledge through research.

ROSEBERRY: You had mentioned earlier on the balance between doing such intense work and having a family.

BUCKLEY: Oh, yes. Well, I think that's extremely important. You have to be well rounded. And I've been fortunate to have a supportive husband and a supportive mother who helped me with the children when they were young. We have four children who have all done very well. There was never a dull moment, I can tell you.

ROSEBERRY: Was there ever any overlap in your work and your husband's work?

BUCKLEY: Yes. That was another good part because, even though he was in internal medicine and I was in pediatrics, we both specialized in immunology and allergy. So we used to go to the same national meetings together. At least we could talk about things that were common between us.

ROSEBERRY: Also, if you don't mind my asking about some of the awards that you've been given. I know that you have received several.

BUCKLEY: Well, I was elected to the Institute of Medicine in 2003, which was a real honor, because there are not that many pediatricians who've been elected to the Institute of Medicine. I don't know how many women, but I don't think that many women have been elected either. And then receiving the Anlyan Award in 2006 was a real surprise and honor, because I have a lot respect for Bill Anlyan.

ROSEBERRY: And that's a lifetime achievement award, isn't it?

BUCKLEY: Yes. My trainees nominated me for that, which was also an honor. But all these honors are not really for the work of one person. They're for work that involved a lot of different people. That's another thing that makes academic medicine enjoyable.

ROSEBERRY: Does having that notice or recognition make things more difficult? Does that make your work easier? Or—does that question make sense?

BUCKLEY: I don't think it makes it any more difficult. I think it makes it a little bit easier sometimes. Because people are more likely to believe what you say if you receive an award. (*laughter*) Yes, because I know that the patients that we see in the clinic go online, and they can find out just about anything they want to find out before they come to see us. They can even Google me and find out about everything. So I think that knowing if you have published in a particular area makes what you say more respected. There's one person I should mention who was also a very important mentor to me, and that was Dr. James Sidbury, Jr. The person that I hold the Distinguished Professorship for was his father, J.B. Sidbury, Sr. But Jim Sidbury, Jr. was a person who, when I was struggling to get on the faculty here, was really very helpful to me. I remember one day he came in and brought me a cartoon he had cut out of the newspaper, and it showed a picture of a man who was hanging from a gallows. And at the bottom the caption said, "Didn't publish." (*laughs*) And that was before I'd ever published anything. So there are certain things that you learn that are important.

ROSEBERRY: That's important.

BUCKLEY: Jim Sidbury was very supportive of me before Dr. [Samual] Katz got arrived. Then Dr. Katz really helped me move along with my career.

ROSEBERRY: How so?

BUCKLEY: Well, I knew that, if I wasn't a faculty member, I wasn't going anywhere. It was going to be a glass ceiling. But when I published a number of papers and became president of a major national organization, I quickly moved up the academic ladder. And Dr. Katz facilitated that. And, of course, his wife, Cathy [Catherine] Wilfert, is another very important woman. Is she on your list?

ROSEBERRY: She is, yes. Do you mind telling me a little bit about her as well?

BUCKLEY: Well, she is a contemporary of mine, and she's a very knowledgeable lady. She was a wonderful teacher here, and a good clinician. But I think she became disenchanted with certain administrative aspects of medicine and decided to retire early. However, she really didn't retire. She became president of the Pediatric AIDS Foundation, and she's done marvelous things as a leader of that. And I'm sure that a lot of what she's done has been for nothing. She's been very generous with her time. So she's been dedicated to AIDS patients. But when she was here, she was one of the best teachers we had. And she was highly respected and well known all over.

ROSEBERRY: Did your work overlap with hers?

BUCKLEY: Well, she and I shared some space together early on, yes. And I used to teach in some of her courses and co-authored papers with her.

ROSEBERRY: Were you collaborators?

BUCKLEY: She and I did collaborate on a project where some of my patients with antibody deficiency syndromes had chronic meningitis. We identified the cause of that and published that together. Probably most of my collaborators have been with the faculty and fellows in the Division. And then I've had some collaborations outside of the university.

ROSEBERRY: How has the field of pediatrics changed?

BUCKLEY: Enormously. When I was an intern, I remember very vividly that we did all the lab work ourself. And we didn't go to bed until all the lab work was done and the results were on the chart. Because we knew that we would have to present the patient along with all of the laboratory results the next morning at eight o'clock to the attending who was rounding on the ward. Which meant that we had to be lab technicians, we even had to be microbiologists, because we also had to plant the cultures. And then I remember we had to do bilirubins. We were taught to do bilirubins the day we walked onto the wards. And we did those all during the

night, because many newborns would be jaundiced because of hemolytic disease of the newborn. In this conditiion there were usually blood group incompatibilities between the mother and the baby. You've heard of Rh hemolytic disease? Back then if an Rh-negative mother had an Rh-positive baby, the mother would make antibodies against the Rh-positive baby red cells, and the baby would be born extremely anemic. Because of the lysis of the red cells, the baby would become jaundiced (yellow) because the liver couldn't handle all of the lysed cells, and when that happened we would have to do bilirubins in the middle of the night. Then we also did exchange transfusions, where we would take out the baby's blood and put in normal blood, and do that all during the night. Exchange transfusions are almost never needed anymore because of advances in the understanding and prevention of that problem and because of newer ways of treating it. We also used to open eardrums from babies who had an ear infection to let the pus come out. And then we also did circumcisions in the clinic. We did cut-downs to try to get intravenous access if we couldn't find a vein. So we did a lot of things then that we don't do anymore. I don't know whether you've ever been a patient or not or seen an IV bag, but if you have you could see that the bags are sealed. However, when we mixed IV fluids when I was an intern, you took the cotton plug out at the top and poured in a portion of one type of fluid from one bottle and a portion from another. People did all right. (*laughs*) But it's really changed a lot. Also, back then, most of the diseases we recognize now were just crude diagnoses. Now we know the molecular basis of so many diseases that you can really precisely define what the disease is. And we didn't have technicians, for example, who would go around and draw the patient's blood for you in the mornings. You had to draw your own blood, start your own IV's, do your own white counts and things like that. Another thing that's really different now is that there are intensive care units within medicine in pediatrics. Back then, we took care of all the children out on the

ward, and there were many who died because we didn't have ventilators and other sophisticated equipment tokeep seriously ill people alive with. So it's really changed a lot.

ROSEBERRY: How has Duke changed?

BUCKLEY: Well, fortunately one good part about Duke that has not changed is that it's still all under one Board of Trustees. And you can walk out of the door of the medical school, and you're right down on campus. But then the growth has just been incredible. The Bell Building was here when I was an intern and resident, but the old clinic over in Duke South had just been built when I arrived here. On the left as you walked out of the sub-basement into the Duke Gardens, that was where the Pediatric Clinic was. And then the Clinical Research Unit over in Duke South was built while I was an intern and resident. And then the whole Duke North was added on in the late seventies. So the whole thing has just mushroomed in size. And with all the technology that's evolved, we're better able to take care of our patients. But I guess, probably the most unpleasant part of it has been the emphasis on money and administration. I know that we're a private institution, and we have to have a black bottom line. But it was when big business took over medicine, in the late eighties and early nineties, when administrators started telling physicians what they had to do that medicine became less enjoyable. Before that, the administrators worked for the doctors. It's been a real negative, this having so much emphasis on money and administration. Because we really enjoy taking care of patients, and we don't want to be told you can't order that because it's too expensive. And I think even now that's what really is interfering with good medicine. Just like I was talking about with the newborn screening. They don't want to pay for things like that, which is shortsighted, because if you could prevent something, it would be a whole lot cheaper than waiting until they get sick and then having to pay for it. So that's a very brief overview of what's changed.

ROSEBERRY: Would you mind telling me about Buckley's Syndrome, Dr. Buckley?

BUCKLEY: Yes. That discovery was by serendipity. There was a very famous dermatologist here, whose name was Dr. J. Lamar Callaway, who was well known all over the world. He asked me to consult on a patient one day. The patient was actually a patient of Dr. Will Sealy's, who was also a very well known faculty member in Surgery who did great things here. I don't know whether you're doing a history on male faculty or not, but Will Sealy was one of the icons of surgery here. Will Sealy had a patient on his service who had an abscess of the left upper lobe of his lung. Dr. Callaway had been consulted, because the boy had a very strange appearance to his skin. There were many lines in his skin from many surgical incisions. As it turned out, when I went in the room to see this patient, the mother pulled out a page from a medical journal that had a photograph of her son where he was shown with boils all over his head and neck. And then she told me the story, that he had been hospitalized in Atlanta, Georgia, at Grady Hospital, for two years where he had more than two hundred boils incised and drained. The surgeons would cut open the boil and then put a drain in. And all these places on his skin were from these incisions and drainages. And they were all Staph abscesses. I saw this patient when I was a fellow-in-training, and I was very interested in primary immunodeficiency. I knew about a number of new tests that we could do to try to find out what was wrong. So I started doing them, and they were all normal. And then one day when I was in the room, I put on a skin test to test his T-cell function. The test is called a candida skin test. After I had placed the test, the mother began asking me a series of questions. I was still in the room twenty minutes later, answering her questions and I looked down at his arm, where he had this huge swelling where I'd put the skin test on. And that happened to be the year that a kind of gamma globulin called IGE [immunoglobulin E] was discovered. It had been discovered by two doctors, one in the United

States and one in Sweden. So there was a new class of antibody, and we knew it was a class that carried allergic sensitivity. And so when I saw this swelling, I thought " Well, anybody who has that much swelling must have a lot of IGE." So I tested him for that and, sure enough, he had an extremely high level of IGE. And then we had another patient referred shortly after that that had the same thing. They both had boils all over and lung abscesses. In fact, the second patient had had one of his lungs removed. And so they had the same thing. They had the Hyper-IGE Syndrome. And we've seen forty of those patients here since that time. These people are carbon copies of each other. If you've ever seen one, you would recognize another one when you saw it. They have very unusual facial features.

ROSEBERRY: Is there anything that can be done for the condition?

BUCKLEY: Well, not permanently. The molecular defect underlying that condition was just discovered this year by Japanese scientists. But we've learned how to take care of patients who have it. As with all immunodeficiency diseases, if it's diagnosed early, these people can be kept very healthy.

ROSEBERRY: I wonder if you could also tell me about the Duke Immune Deficiency Foundation Center of Excellence.

BUCKLEY: Yes. The Immune Deficiency Foundation was started by parents of a boy who had no antibodies due to another type of primary immunodeficiency called Bruton agammaglobulinemia. It was started I think in 1980—about twenty-five or so years ago. This is a patient organization that has more than 15,000 members with underlying immune deficiency diseases—not AIDS, just primary or genetically-determined immunodeficiencies. I am the chairman of the Medical Advisory Committee for that organization. But the president of the Immune Deficiency Foundation, Marcia Boyle, the mother of the boy with Bruton

agammaglobulinemia, wanted to designate Duke as a Center of Excellence for the care of patients with primary immune deficiencies. And in October of 2006 we had a ceremony dedicating that Center.

ROSEBERRY: What does it mean to be a Center?

BUCKLEY: It means that we are recognized as a place of expertise for anybody who has a genetic defect in the immune system. We get lots of referrals, and we take care of these patients, regardless of whether or not they can afford to come. So we have quite a large number of such patients compared to most other places.

ROSEBERRY: And you said you are the director?

BUCKLEY: Yes.

ROSEBERRY: Can you tell me what that entails?

BUCKLEY: Well, that just means that if a call comes into Duke from somebody who wants to know about immune deficiency, the call comes to me. And then I arrange for the patient to be seen.

ROSEBERRY: Is that Center within the Department of Pediatrics?

BUCKLEY: Oh, yes. Because in Medicine, there's nobody interested in immunodeficiency, which is kind of surprising, considering that Bart Haynes was formerly the Chair of Medicine, and he's an immunologist. But he doesn't see patients. So if there are adults here with immunodeficiency, we in Pediatrics get consulted.

ROSEBERRY: That's interesting. Why is that?

BUCKLEY: I don't know why. You'd have to talk with the chairman of Medicine. We're trying to get him to hire someone interested in immunodeficiency, because we get numerous phone calls from adults wanting to be seen here.

ROSEBERRY: You think that's a general trend?

BUCKLEY: Well, I think there are a whole lot more pediatric immunologists than there are adult immunologists in the U.S., and that's probably because most of the primary immunodeficiencies present in infancy and childhood.

ROSEBERRY: Can they be caught and treated more readily?

BUCKLEY: They could be if you did screening, which is why we're pushing so hard for this, not only in the newborn period but at other times during childhood and adulthood when patients are routinely checked healthwise. There's a primary immunodeficiency disease called selective IgA deficiency that was first discovered by three immunologists working in the same laboratory at the Rockefeller in New York City. They were drawing blood from each other to be used as control samples for some experiments they were doing in the laboratory—but they found out that none of the three of them had any IgA. And so they wrote themselves up and published it. But you can imagine what the odds are of three unrelated individuals in the same laboratory having a genetically-determined condition that caused them to have no IgA. It strongly suggests that primary immunodeficiencies are probably relatively common defects. There are other statistics that indicate that maybe one out of every 333 people have IgA deficiency. But until screening is done widely in the population, these people will not be found until they become ill—and sometimes not even then.

ROSEBERRY: Now, you mentioned—you've mentioned some tests that you were beginning to develop when you first started here.

BUCKLEY: Yes.

ROSEBERRY: Can you kind of talk about that?

BUCKLEY: One of the first tests I established here was one that quantified the various types of immune globulins i.e, IgG, IgA, IgM, IgD and IgE. That's how we discovered many of our immunodeficient patients. Since then, many other tests have been developed to evaluate people's immune systems. As they came along, I established those tests in my laboratory. My laboratory was in the Department of Pediatrics and Dr. Katz was the Chairman at the time. The money that was generated by these tests stayed in the Department of Pediatrics at that time. But as time went on, the Hospital decided that it wanted to consolidate all laboratories and they had to be in the Department of Pathology. I fought to keep my lab under Pediatrics but finally gave in and said, Well, you can keep the money as long as I stay in control of the lab, so that we'll know that the tests are done right. And so they agreed to that. I'm still directing that laboratory, even though it's revenue goes to the Department of Pathology. Tbe laboratory is a regional referral lab for doctors throughout the Southeast who send blood here for these specialized tests. Because we are a referral laboratory, and we have this expertise, the doctors are more likely to refer the patient here.

ROSEBERRY: Are there any patients who stand out in your memory?

BUCKLEY: Lots of them. I can't really speak about any one in particular. There have been lots of challenging patients whose lives we have been able to save and who we have tried to help create some semblance of normalcy in their lives. Two such patients spoke at the dedication of our Center back in October. One of them was a young man I've been caring for since he was eighteen months old. He's now thirty and works full time in a complex job. He has a condition that used to be called 'fatal granulomatous disease'. He is currently quite healthy. He spoke about his condition and the care he has received at Duke at the dedication. The other was a young man with another type of primary immunodeficiency who came into our intensive care

unit in early infancy with a rare form of pneumonia called PCP. We diagnosed his condition while he was in the intensive care unit. He's been treated successfully over the years and is getting ready to go to college next year. Both patients made very nice presentations at the dedication.

ROSEBERRY: So you have kept in touch with your patients?

BUCKLEY: Yes. One of the best parts about being a pediatrician is that you have continuity of care of your patients. I could never be an 'ER doc' or an intensivist, because in that role you almost never see your patients again. By contrast, our patients are followed longitudinally. We see them at least annually. It is very good for trainees to know that they can follow these patients over the years and see the natural history of the disease.

ROSEBERRY: Well, are there any questions that I didn't ask you that I should have, or anything that I didn't cover?

BUCKLEY: I think we've pretty much covered everything. So what is your background?

ROSEBERRY: I graduated from Baylor University with an American Studies master's degree. They have an Institute for Oral History there, where I had a graduate assistantship. And so I kind of grew into the field from that. I've been here for around three and a half years.

BUCKLEY: I have been approached previously to archive things, and I'm still planning to do that, but I've got to first start throwing things away in this office. When I come across things that are worth saving, I'll save those for the Archives.

ROSEBERRY: Thank you. (*end of interview*)