

## TRANSCRIPT

**SCRC Series:** North Carolina State University Oral Histories – MC 00449

**Field Notes:** Kenneth Barker

**Interviewee:** KENNETH BARKER

**Interviewer:** Virginia Ferris

**Interview Date:** March 3, 2015

**Location:** Raleigh, North Carolina

**Length:** Approximately 84 minutes

This interview was conducted at the D.H. Hill Library of North Carolina State University in Raleigh, North Carolina. Kenneth Barker was born and raised in Wilkes County, NC, on a tobacco farm. He earned a B.S. in Agronomy in 1956 and an M.S. in Plant Pathology in 1959 at North Carolina State University. After receiving a Ph.D. in Plant Pathology at the University of Wisconsin in 1961, he continued in that department as an assistant professor until 1966. He then rejoined NCSU as an associate professor of Plant Pathology, becoming professor in 1971 and emeritus professor upon retirement in 1998. Dr. Barker served as departmental graduate studies coordinator for more than a decade, contributing to the development of one of the top nematology and plant pathology programs in the United States.

In the interview, Dr. Barker discusses: discovering the field of plant pathology in high school through a tobacco disease clinic led by North Carolina extension agent Dr. Howard Garriss; NC State Plant Pathology Professors Arthur Kelman and J.N. Sasser; conducting research under J.N. Sasser for Dr. Barker's master's thesis on an alfalfa stem nematode; studying under Dr. John Charles Walker at the University of Wisconsin; returning to NC State to teach; applying for grant funding to support research; NC State Plant Pathology department heads Don Ellis and Robert Aycock; buying the first computer for the department; changing research trends in Plant Pathology, from crop-oriented descriptive approaches to genomics, molecular biology, and genetic engineering; his memories of growing up on a tobacco farm and helping his father work the fields and prepare the tobacco for market; collegial relationships between Plant Pathology departments at NC State and the University of Wisconsin; historic contributions to the profession by faculty members in the Plant Pathology department; memories of being an undergraduate student in Arthur Kelman's classes; arriving at NC State as the first member of his family to attend college; participating in mandatory ROTC service as an undergraduate; unrest on campus at the University of Wisconsin and NC State during the Vietnam War; growing numbers of women students and faculty in the 1960s; Dr. Hedwig Hirschmann, female faculty member in Plant Pathology; the Plant Disease and Insect Clinic; and the department's relationship with extension and the agriculture industry in North Carolina.

START OF INTERVIEW

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Virginia Ferris: It's the morning of March 3, 2015. I'm Virginia Ferris here with Dr. Kenneth Barker. We are in D. H. Hill Library in Raleigh, North Carolina. So, Dr. Barker, thank you for joining us this morning. We like to start off by finding out a little bit about your life before you came to NC State, so could you tell me when and where were you born and a little bit about your childhood?

Kenneth Barker: Yes. I was born eighty-three years ago in Wilkes County in a very good neighborhood called Benham; tremendous parents and a huge family, six brothers, six sisters, on a small tobacco farm; great neighbors; very different from some neighborhoods today. There was no such thing as crime. The keys to all of our doors had been long lost when I came along. Then I went to the local high school, Ronda High School, played basketball, and there's where I first encountered a plant pathologist. Dr. Howard Garriss, the extension pathologist from 1939 through some of the '70s, had a clinic workshop and invited growers to bring in specimens to characterize and identify disease problems. So we took some tobacco plants and looked to see if we had root-knot nematodes on some of the roots, and at that time tobacco in the early '50s – and in fact this evil crop, tobacco, was largely responsible for the development of the large and very outstanding plant pathology department in the '40s and '50s.

So as I was finishing high school, since I liked math I'd planned to go to Appalachian and become a math teacher, but we had an Ag teacher who was a NC graduate and he said, "Ken, you need to think about NC State. You don't want to be a math teacher." [Laughs] So I enrolled initially in Ag Education and switched to Agronomy so I could take more courses needed for graduate school, and in that process I learned about a course in plant pathology taught by Arthur Kelman. Everybody gave his

course and his teaching as the best they'd ever had, and in fact many students that enrolled in that course over the years became plant pathologists or some field of research.

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He could make looking at a fungus come alive with his enthusiasm, in the lab particularly.

So then after finishing undergraduate in agronomy I enrolled in plant pathology for a master's degree, initially under Dr. Lewis Allison, who was a USDA plant pathologist stationed in the department, and he left to move to one of the western states and then I switched to Dr. J. N. Sasser, who was an outstanding and world-renowned nematologist in plant pathology. I did the master's on a nematode that was located out where the University Club is now, *Ditylenchus dipsaci*, and, of interest, that particular nematode has the ability to withstand desiccation and a clergyman who first discovered it in 1743 said, "Hey, this material can bring life spontaneously." So since you'd put them in water and they'd come to life they were used to support the theory of spontaneous generation. It caused a lot of confusion in the very limited scientific community in those days.

But in any case, I did an interesting master's thesis on that nematode, the alfalfa stem nematode, and got into the area of differential interactions of different populations of that nematode on the Wando pea versus alfalfa. You could switch them back and forth and they would cause what was called a hypersensitive reaction. That's a type of resistance, and the resistant-. I won't get into the details but in any case that was the beginnings, you might say, of moving away from descriptive plant pathology to analytical, because the physiologists that came into plant pathology at that time and later

showed that there were specific chemicals induced in the plants that are resistant called phytoalexins that were related to that so-called hypersensitivity; in other words, overly susceptible reaction. The overly susceptible reaction resulted in resistance; in other words, the tissues affected would die and bring about resistance.

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So at that time, as I finished the master's – and I might back up a bit on that master's degree. Plant pathology had superb faculty members with real interest in graduate students and, of interest, we had exceptionally outstanding graduate students in the department at that time. One of Dr. Kelman's students that is still alive in my mind yet he unfortunately died of leukemia as he was graduating with his PhD. He stayed here and I went to Wisconsin. His name was Ellie Maine. But I can remember taking the methods course, and I was happy with a ninety-three or ninety-five or something like that on the first exam. He had a ninety-eight and went up and argued with the professor and he won one more point. He had miscalculated. So he was that sort of a perfectionist.

VF: What was his name?

KB: Ellsworth Maine.

VF: Okay.

KB: Sadly, his name appeared only a few times in the literature because at that time that monstrous leukemia, there was no treatment whereas if it had been today they could have saved him.

So, as I finished the master's, the department here did not like the idea of inbreeding, having a person get three degrees at one university, even though some did. So I looked around at California, the University of Wisconsin; considered going to LSU,

Davis, California, and Wisconsin. So I was admitted to Wisconsin to work with probably the number one plant pathologist at that time, Dr. J. C. Walker [John Charles] and switched from nematodes to a fungal problem, *Pellicularia filamentosa*, and did a physiological problem on that fungus, and again I was really fortunate to be in a department with superb faculty members and exceptionally able graduate students. In fact some of those students were hired to stay there, as was I. In fact as I was starting to look for a job my advisor said, "You don't want that job. You don't want that job." I didn't know quite what was going on but one Saturday morning – it surprised me – I had a call from the department head. He said, "Ken, get up here. We want to offer you a job."

[Laughs] I didn't even apply for the job.

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So I stayed there on the faculty as assistant professor for almost five years and it was a great experience; moved from an old building to a brand new building, Russell Labs, and my partner – who was a student at the same time I was there – and I were so eager we moved everything by hand before the movers came to move into the new lab and offices. But I might mention, just to show you a little bit of the humor that goes on amongst a group of graduate students, just before we graduated and before we moved to the new building we were in a building called T-18. It was an old military building, like they used to have here on campus. I would put my lunch in the drawer in my desk, so one day I opened that drawer, took out a brown bag, and there was a live chicken in it. Paul Williams, later my office mate and great friend, had switched, so all of the students of course got a real charge out of that.

But anyway, I stayed on the faculty there for between four and five years, worked with a number of students, and had to have grant money. If you wanted to buy a pencil you had to have external money to pay for it because the department, like the ones here today, provided you a desk and a salary and you would get the money to support your program. But in 1965, the fall of '65, I gave a paper at the University of Illinois. Plant pathologists and nematologists were meeting there and, I might mention, in switching and taking the job at the University of Wisconsin, since I'd done a master's here on nematodes they had me to take responsibilities for a nematology position where Gerald Thorne, their nematologist, had retired at about age eighty or something like that. Anyway, giving that paper at the University of Illinois, I think Howard Garriss again and some of the people here at that time asked if I was interested in moving, something about that, so shortly after I was contacted to apply for a job in plant pathology at NC State. They agreed I could stay there and teach a course in nematology

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the next spring of '66 and then leave.

So, I taught part of a course that was on nematodes, and in March we moved back to North Carolina, the opposite of what we'd encountered when we left North Carolina in January of 1958. It was sixty-five degrees here; we get up there a week later and it was thirty-two below, and in fact in West Virginia crossing a bridge we could see they were putting sand over the bridge where there was ice, and a truck in front of us stopped and we were pulling a trailer, put the brakes on, the car just eased right on into the back of that trailer and punched two big holes in the hood. But then coming back to North Carolina we started out pulling a trailer with an old car, and on the first hill it said, "I

can't get up this hill." [Laughs] So we turned around, went back, and traded it for a new car and hadn't even thought about it before.

So we ended up in North Carolina in March of 1966 and, I might mention, at that time pressure was beginning to be applied to plant pathologists for external support here. You had to have grant support at the University of Wisconsin or you couldn't have a program, but in any case the department head here, Dr. Don Ellis at that time, said, "Ken, there's some opportunities to apply for some grants. You need to see if you can have some grant money before you come." Fortunately one of the two that I applied for was funded. So, we came here and had to work in one of the greenhouses for a lab for the first year or two until facilities were built for the program that I was to head up and develop, a pilot nematode advisory program for the state. But it was very different from today. That position brought money for a graduate student and, let's see, two or three technicians, and then the grant that I had supported a couple technicians, so we had almost an army right to start with as we started the program. I was fortunate to have a number of able graduate students at Wisconsin and here, particularly here since I was here thirty-some years versus four or five at Wisconsin, and worked totally with somewhere between forty-five [00:15:04]

and fifty graduate students and post-docs over thirty-seven years.

So that was one of the great things of being in plant pathology at the time I came. The relatively young discipline was sort of on a long phase of growth and all sorts of opportunities for placing graduates. We increased the number of graduates here from around twenty-five up to a max of fifty-five or sixty, which was one of the top departments in the country, and, of interest, for twelve years working under the

department head that succeeded Dr. Ellis, Dr. Robert Aycock, I was the graduate coordinator for twelve years and in fact I went to Dr. Ellis and Dr. Aycock about getting a computer. There were all of these letters that my secretary, Margaret Googe, had to retype ninety-eight percent of them for prospective students. You'd change their names and locations and interests; otherwise it was the same letter.

So, I convinced them to buy the first computer. It was really a word processor, a CPT. It cost fifteen thousand dollars and they wanted five hundred dollars a month to maintain it, because it was so likely to go out. So that computer had a fraction of the memory that your cell phone would have today. But in any case it was a godsend for Margaret because she could-. Well in fact I could whip out twenty or thirty letters in an afternoon whereas you do them all from scratch it would be three or four days' work. But it was interesting that the departmental secretary, Joyce Johnson, was the fastest typist I'd ever seen, but even in later years she would have absolutely nothing to do with a computer. She said, "I can type better."

Mentioning computers, it was interesting working and serving on different student advisory committees from different departments. I happened to be on Jacque Ranier's advisory thesis with Dr. Rabb from entomology and they were very forward-

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looking so he did the first thesis on a computer, but the computer he used was an old big monster in the textile building. You didn't have these PCs or any computers in the lab at that time. That was before we got the one in plant pathology.

But plant pathology is an area where we were fortunate to have very able people early, as I mentioned F. L. Stevens, 1901 to 1912 here, and his wife, did outstanding

research and characterized some of the diseases on tobacco, including what's called Granville Wilt, caused by a bacteria. That set the stage for the later development of the department, first as faculty in the biological sciences division headed by D. B. Anderson, and all the work at that time was descriptive. They would analyze the causes of the disease and the nature and the host responses, anatomical and sometimes physiological, mostly though just morphological anatomical. The physiology came in the '50s and '60s and then the virologists started developing molecular biology. Really the first was, again, a tobacco disease. Tobacco mosaic virus was characterized in the '30s. In fact when we first moved to Wisconsin even the medical people were using tobacco and TMV to learn more about viruses: their nature, their characterization. So in the '60s that virus was completely characterized from the standpoint of its morphology and mode of infection of plants, so that was opening a major door for subsequent developments in the medical area as well as plant pathology.

So, this area has changed very dramatically. At the time, like I mentioned, when I was here as a student it was largely descriptive research: causality of disease and how you control them. Then, as we moved to Wisconsin and then came back here, the area of [00:21:04] molecular biology really opened up and this department moved from faculty and students being assigned a specific crop to work on—. Tobacco, as I mentioned, was the number one because that was the money crop in the state; corn; soybean; all the vegetables; wheat. We would have plant pathologists working just on one or two crops and this was a great thing at that time because we had what was called commodity groups, like the tobacco support groups, soybean growers, cotton growers. They would provide the money for

research on those problems, including nematodes or fungi or bacteria. But as they moved from the descriptive just control area and integrated pest management to the molecular area the crop assignments were a hindrance, so most of the people in plant pathology today will not have crop assignments. They do sort of, like Gary Payne had an assignment initially on corn but he developed a molecular biology program on the microbial or molecular genetics of the *Aspergillus* fungus that causes aflatoxin in corn, and Dr. Margo Daub [Margaret Daub], who was in plant pathology – I guess she still has an appointment there – before she became department head in botany, worked on *Cercospora* and leaf disease of tobacco, but her work was again on the molecular area and in fact she opened the door to the interaction of some of these toxins that are produced by the fungus and cause disease on tobacco and how the, you might say, antioxidants, like certain of the vitamins, would prevent that, and this area that she did interfaces with the medical area. So plant pathology today is a different discipline from what it was when I started almost sixty years ago.

VF: You have a very interesting way you were introduced to plant pathology. Growing up on a tobacco farm in North Carolina, I think that's no coincidence that you became interested in something like this when the plant pathology department at NC

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State really grew largely out of the state's needs and how tobacco was such a central crop for the state at the time. Could you talk a little bit about your family's background with tobacco and interaction with extension agents?

KB: Yes. I was born right in the middle of the Depression and at that time my dad was growing tobacco, but he gave it up because at that time he was selling tobacco for

like three or four cents a pound. Fortunately in later years the federal government developed what was called their price support program so that they would have a federal grader go and grade each basket or pile of tobacco and that grade would set a base price. So that opened up an opportunity for tobacco to really develop in the state, and with these sandy soils you have in North Carolina the quality of tobacco that's grown in this state is unmatched in most of the world.

So tobacco at that time, when I got old enough to work in it, actually during the war because I had three brothers that were in the military and at age ten or twelve I had to work with my dad and some of my sisters in growing tobacco, priming it, turning the land, setting the tobacco by hand with a hand setter, pulling the worms off or else—. One pesticide that was used, that finally became illegal, was a mix of cornmeal and arsenic of lead, and they'd punch holes in the lid of a quart jar or else use a lady's hose, an old one if you could get it during the war, and you would hit the top of each plant to control the budworm and all of the insects on the tobacco, so I'm sure that contributed to some people having cancer using tobacco, as well as growing the stuff.

But it was an exciting adventure. My dad really liked to work hard, up at 6:00, singing as he would go. During the war you would use mules to pull the sleds through the

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fields and you'd get what's called the first priming, which was the most difficult. You'd almost stand on your head to pull those leaves right off the ground. I can remember working in almost a hundred degrees and you'd get to the end of a long row and just lie down and rest for a second. But one exciting aspect of tobacco production – two or three – one would be I would get up in the top—. You'd have about eight or ten [what were

called] tier poles, and you'd have to have somebody go to the top to put these tobacco sticks at the top of the barn and another person hand them up, so I liked to get up to the top at that time. You know I could barely reach across the four-foot spans.

Wood was used in those days to cure tobacco, so when it got to where you'd keep the temperature up to a hundred and eighty somebody would have to check during the night, or sometimes just sit with the barn to keep that temperature up there to dry the tobacco out. Then one aspect – to sort of deviate a little from plant pathology – is when it was dry you'd move it to the top of a feed barn to store it and cover it, but when it came market time it needed to be exposed to moisture. So we had a basement under a granary that it was placed in what was called casing it; it would be cased in that basement. So one of my chores, my dad would ask me, “Hey, Ken, you need to go check in that basement and see there are any snakes.” Sometimes there would be snakes, [and I'd] go under there with a flashlight and a hoe and clean out any snakes there'd be before – and think nothing of it. [Laughs]

Then you'd have to grade the tobacco on the quality, the color, and type. You'd take one leaf, a good leaf, and roll it around the ends of the stems and put those on a stick, ready to go to market. So that was the exciting adventure. One year my dad got a new pickup and I drove – before the markets opened in Winston-Salem – all the way down to Sanford in his new truck for him to sell a load of tobacco. So that was an exciting adventure, and farmers would think nothing of it, of sleeping on the tobacco or in their vehicles right in the warehouse rather than going to a motel.

VF: That's amazing.

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KB: So that was a different era. Today it's machines. We would have like, what was it, like six to eight acres of tobacco and that would keep a family busy, whereas the neighbor who grows tobacco on the land where I worked now grows a hundred acres, all of it mechanized, and mostly, where he needs help, Mexican labor, so that's where the farmers are really interested in this immigration issue. But we were up to the house, and in fact stayed in the house, where I grew up a couple of months ago – yeah, or three months ago – and a guy pulled up with a corn harvester that would get six rows at a clip, and it was so tall he had to go under a white oak tree and get a chainsaw and cut some limbs off; otherwise he couldn't get to one field. Whereas, when we were harvesting corn we did it like the tobacco, by hand one ear at a time, and he was getting six rows at a time. I asked him what did that machine cost: a hundred thousand or more? He said actually he bought it secondhand and if it was new it was over three hundred thousand.

So farming is like research, it's really changed in North Carolina, and the department of plant pathology has really changed, and I think in their last review, even though they've been downsized, they were still rated as one of the three top departments in the country. But at the peak, when I was here, we had like fifty-five or sixty students, including USDA, more than fifty faculty including about eight or nine USDA plant pathologists, plant breeders; whereas today I think they have somewhere in the neighborhood of twenty-eight or thirty faculty, and still a good number of students, I think thirty-five or forty. But they're like Wisconsin was when I started today: with all of these cuts in state support they have to get grants, and in fact the plant pathology department here I think is the leading department in CALS in getting outside support,

largely federal support, quite a bit from industry. In fact I had lunch with two of my former students about a month ago and he works for one of these big outside companies [00:33:05]

and was mentioning that his company had just contributed a hundred thousand dollars to support one graduate student. So some of it comes from industry, some comes from the federal government, and some retired faculty, former faculty, left funds to support various programs, including the first plant pathologist who focused on major tobacco diseases and on nematodes, Dr. C. J. Nusbaum. He and his wife left all of their estate to the department since they didn't have children, so they have a Nusbaum Symposium every two years and draw from some of the funds that he left.

I mentioned that there's been a fairly close relationship between this department and the department at the University of Wisconsin because when I went to Wisconsin I was just one of many NC State people who did a master's and then went to Wisconsin, like Dr. Nash Winstead, who was provost here for years, did the same thing. It was really interesting: he worked with the same advisor that I did, Dr. J. C. Walker, but when Dr. Walker retired, about—. Or rather, not when he retired. Well, when he retired was a big celebration, but when he reached one hundred, roughly fifteen years ago, there was five of his seventy-five former graduate students at NC State, including Dr. Freddie Wellman, who was his first graduate student, Dr. Nash Winstead, who had been provost and I think had retired at that time, Dr. Eddie Ashandi, and KRB, yours truly, and Charles Main, who was his last graduate student of his seventy-five graduate students he worked with. He had published something like eight hundred various publications and books. But the five of us got together, since we couldn't attend his celebration for his one hundredth year,

and did a movie with each of us giving remarks about working with him and how plant pathology had changed since we were graduate students and sent that video to him, and of course that was played as a part of his retirement and got laughs, from him

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particularly.

So that was a great experience, and we had another interesting experience, let's see, four years ago. The department at Wisconsin had its one hundredth celebration and invited, of course, former students, and one of our daughters, Elizabeth, and her two children and my wife drove to Wisconsin to that big celebration, and our granddaughter at that time was like, let's see, about fourteen. They had the reception out on the huge area behind the student union, right next to Lake Mendota, beautiful lake, and all these people were out in sailboats, and our granddaughter said, "This is the place I'm going to have to go to school." [Laughs]

Fortunately as you age you still have a lot of fond memories and can relive a lot of these experiences and, I might mention, the department of plant pathology has played – in addition to making major contributions to plant pathology, to nematology, virology, forest pathology – the department has provided leadership at the university level, really around the world. In fact one of Arthur Kelman's students, Durward Bateman, went to Cornell as I went to Wisconsin and he became department head there, came back here as research director, then became dean. Our very first plant pathology faculty head, Dr. James Jensen, who was head from '45 to '53, moved to Iowa State to become provost and then became president of Oregon State. Just two or three years ago Steve Leath, who was again a USDA faculty member, plant pathologist in the department, became one of the

directors here on campus and then moved to the Kannapolis group that developed in the old textile buildings, and then moved from there to become president of Iowa State, and, as I mentioned, Nash Winstead as provost. J. Lawrence Apple was involved in

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international programs, and we had a mission in Peru that he headed up for years. At the professional levels, I mentioned Frank Stevens. In 1910 he became the second president of our professional society of plant pathology, the American Phytopathological Society, and that particular society has benefited from the department providing eight or ten presidents over the years, and the Society of Nematologists benefited. J. N. Sasser, who I mentioned, was the second president and then three or four others of us were presidents of that society, and I had the role of sort of being the chairman and then the founding president of the International Federation of Nematological Societies. The accomplishments have been recognized nationally and internationally. I think we've had like three or four members of the National Academy of Science, including George Hepting, again a USDA Forest Service researcher actually based in Asheville, then Arthur Kelman, Ellis Cowling, and, in the current faculty, I think there's like six or seven members who are distinguished Reynolds Professors and one is Phillip Morris Distinguished Professor. So plant pathology has I think excelled in graduate education, in research, and contributed tremendously in administration locally and across the country, and even around the world in international societies. Arthur Kelman was one of the key leaders in developing the International Plant Pathology Society, and of course I've mentioned him two or three times.

VF: So you were in his class as an undergrad?

KB: That's right.

VF: What was he like? What do you remember about that class that kind of turned you on to this field?

KB: He was—. As an undergraduate I had three professors who were absolutely superb. He and Sam Tisdale in Soils were the two most outstanding professors that I've ever seen. Dr. Kelman was very good in lecturing. He didn't need to read his notes. Of course he taught Plant Pathology 315 a zillion times, and when he went to Wisconsin he [00:42:02]

taught that course. But he would bring these organisms to life. For example, he would take a stem of tobacco infected with this Granville Wilt bacterium, organism, and he could put it in a beaker of water – I can see him now – and the bacteria were so numerous they would start streaming out of that tissue, and of course he would describe this in exciting terms: “Look at these pathogens! They're coming out, looking for another victim.” He would do that type of demonstration, and protoplasmic flow was another thing, with fungi. He'd put them under a microscope and certain of the fungi you could actually see the living protoplasm move in those strands of fungi.

So he brought plant pathology to life, and as a result of the faculty that came into plant pathology here and around the world there were two or three dozen former students, like Durward Bateman, as I mentioned, and myself, Nathaniel Powell, his brother, Bill Powell, G. V. Gooding, Dave Strider, Charles Averre, who still comes into the department even though he's in his eighties, so a large number at other schools, and even though they frowned on inbreeding a number stayed here.

And Sam Tisdale was—. I almost went into soils, teetering between soils, plant pathology, and economics. Economics was very different. Dr. Ed Bishop was a similar teacher, very good, and he moved on to become a dean and a president somewhere; I've forgotten which school since I didn't follow economics. But in any case, Sam Tisdale was a former paratrooper and in Williams Hall in that major auditorium he would teach those soils classes, never look at his notes, but marching up and down the aisles between all those rows of seats, describing the exciting aspects of soils even though soils, you look at it, it's dirt, but it wasn't dirt for him.

VF: So can you tell me a little bit what it was like for you as an undergraduate at NC State first arriving here? Had your family—? Were you the first of your family to go to college?

KB: I was the first of my family to go to college. My youngest brother, Rex, also came to NC State. But after being here the first night—. Well, first driving down here was [00:45:08]

very different from today. I had to drive down by Asheboro and come in on 64. It was a five- or six-hour drive because you had to go thirty-five miles an hour through all these little towns and finally get to Cary and enter into the campus. I was driving my dad's car because I sold the one that I had bought because I'd been advised: you don't want a car when you first start in school; otherwise you'll get in academic problems.

But going to the old Frank Thompson Gym to register, and later on Reynolds Coliseum, you'd load up with all of the stuff they give you, including a great big armful of ROTC clothing, and then you get into your dorm. I was fortunate to be in a room, 120 Owens Dorm, with two very able, dedicated students who fortunately had to study more

than I did, Bill Rochester and Charles Reardon. The first night I was asleep and I heard a loud thumping sound. I thought somebody was coming down the hall-. It was a train going down the railroad track but it sounded just like it was coming down that hall in Owen Dorm, so you had to get used to that noise to sleep. Then on top of that some cranky, mischievous students would come along and throw firecrackers through the transom in some-. They never did it in my room but they did in some of their friends' rooms and that would really jar you awake. But fortunately my two roommates would study to 11:00 so I figured I needed to follow their pattern and finally I learned I didn't really need to do that, but it was great mentors to follow.

Another interesting aspect was all of the PE tests they gave you. First you had to climb a rope up to the top of the old Frank Thompson Gym and then they'd test to see whether or not you could swim. If you couldn't swim the length of the pool you had to take swimming, so I ended up having to take swimming because the creek where we went swimming, the water didn't have ponds that deep or that long.

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But it was a really interesting experience as an undergraduate. One aspect, I had to take-. Well you had to take PE every quarter. We were on the quarter system when I first came and one quarter I ended up with volleyball with the basketball team in that class. Ronnie Shavlik - I'm sure you've heard of that name - you get in front of him he's going to drive that ball right on top of your head, so whichever team he was on that side would always win. Another PE course I took, ended up taking it twice because of conflicts, was soccer. I took soccer and then had a class in Kilgore Hall and didn't have time to take a

shower. First you're wet and sweaty from playing volleyball and then walk that mile and have to sit there for a class, still with your motor running a hundred miles an hour.

Another interesting aspect of class was—. Well, let me back up. As we registered everybody warned you: don't get Red Wynn for English. If you do you'll flunk, and in fact some classes he would flunk like twenty out of twenty-four. He flunked so many that they fired him once or twice, but I think he finally settled down. Fortunately he was able to raise a very good student, Willard Wynn. In fact he got his PhD in plant pathology and worked at the University of Georgia.

But another English course—. English was a really interesting area for me because I took speech under Professor Padgett. His summer activity was running up and down the mountains in Colorado to stay in super shape. He would never use an elevator. If it was eight flights he'd walk up and down the steps. But we took that course in old Pullen Hall, which was a rickety building and ended up burning up after I left here. But his opportunity for an A, that he described for that class, if you can make those windows rattle you get an A in that class. On Patrick Henry I rattled the windows. He said, "You get a B. You smiled." [Laughs] So those were some of the sort of interesting characters.

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Another English course that I took was Shakespeare. Shakespeare didn't do much for me in high school but again because of conflicts I didn't have a choice, so I took it under the department head, Dr. Hartley, and that was one of the best courses I ever had. He was a superb teacher, just loved Shakespeare, as you would expect, so I learned to appreciate Shakespeare and it's interesting to hear discussions on various plays or movies based on some of his plays and whether or not he had a ghost writer and all that stuff.

VF: You mentioned when you first arrived and were registering you got that stack of ROTC clothes. You were a student when that was mandatory.

KB: For two years it was mandatory; then it was optional for the second two years. I took two years, so I ended up going in the military during my master's on what was called an ROTC six months alternate program and stayed in the Reserves eight years, which was a good deal. In fact I almost ended up going in the Korean War during my undergraduate days because they were drafting people if you were not in college, and I think my sophomore year I received an induction notice and a deferment on the same day. That's how close I missed going into the Korean War as a youngster. So, I guess that was where I felt I owed something to the military to go ahead and do that reserve program.

VF: So you went straight into a master's program and then to Wisconsin and back to NC State within about an eight-to-ten-year period.

KB: Yes.

VF: And during that time there's so much change that's happening in North Carolina and in the world. How did the climate on campus feel when you returned to teach compared to when you were a student?

KB: Well, let me mention a little at the University of Wisconsin because when I was there the Vietnam War was ongoing. They actually had an explosion or two where anti-war people set off bombs in some of the engineering buildings, particularly where they were working on nuclear energy and that type of thing. So there was a tremendous  
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resentment against the war and particularly on the campus of the University of Wisconsin, and there was some here, in fact a lot of anti-war sentiment in that prolonged war where we lost so much and gained very little, like the recent wars. So I guess I sort of empathized with the peace movements even though I think it's essential that the military be supported through ROTC programs, and in fact I think it's unfortunate that we moved to a volunteer Army rather than having a draft where all people should have some experience in the military because that's a real maturing experience to go in the military. In fact when I came here it was interesting that a number of people—. I had finished my Reserve bit at Wisconsin but a number of the students and one or two faculty members still had active Reserve assignments, so plant pathology has been a supporter. Being ultraconservative in most cases, they've been a supporter of the military in contrast to some of the other disciplines.

VF: Did you notice kind of the growing number of female students and African American students, sort of the changing demographics?

KB: This was a major change. That was a major change—. We left—. When I started as an undergrad there was a total of like fifty female students on campus out of four thousand – only four thousand instead of almost forty – and when we went to Wisconsin—. And the graduate program here, nearly all male, and the faculty all male except one, Dr. Hedwig Hirschmann. She was the fourth female to have a professorship at NC State University, and in fact, again to show how women were discriminated against, she had superb credentials from a university in Germany and through the arrangements of one of the nematologists that Joe Sasser had worked with in Washington, Dr. Gotthold Steiner, he arranged for her to come to NC State. But she had to start out not

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as an assistant professor, not as an instructor, but as a technician, and in fact she was on the faculty for twelve years and did not have a state-supported technician and at that time I had four. So I went into the department head – that was Dr. Don Ellis – and I said, “Dr. Ellis, I think to use the technical help that I have more effectively I think one of them needs to be assigned to Dr. Hedwig.” He said, “What do you mean?” But that came to be, after he was very hesitant. So it took her like twelve years to become a full professor whereas most of us would become a full professor in eight or ten, and largely again because of discrimination.

That started going by the wayside. We started having more female graduate students, a number of very able graduate students, and in fact I had Dr.—. Let’s see, Dr. Carnegie, who was head of horticulture – I don’t whether she still is or not – I had her in class when she was doing a master’s in plant pathology. A number of students excelled, whether female or male. You didn’t look at it anymore. In fact plant pathology, being more—. As this book is entitled, *From the Laboratory to the Field*, it’s gone from the field to the laboratory; so it fits very well the interest of many aspiring female graduate students today, and of the Reynolds Professors in plant pathology today one or two are female, so it’s very different. In most campuses probably half of the graduate students are female today whereas when I started, all male.

VF: You’ve seen the campus grow incredibly in size—

KB: Oh, unbelievably.

VF: – Geographically and in the student population. What do you think are some of the

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more remarkable, dramatic changes in the climate on campus and the way that the department has operated, in your experience?

KB: The huge change has been from let's say the focus of descriptive disease publications, focused on immediate control using chemicals or crop rotation or cultural practices, to moving to genomics, molecular biology, genetic engineering. For example now the department head, Dr. Eric Davis, has worked in collaboration with people at the University of Georgia and some nematologists in Europe and have developed transgenic resistance to certain nematodes, particular certain root-knot nematodes; whereas when I came here the big focus was on using chemicals and in developing host resistance. Tobacco again as a crop model, the number one crop, the USDA had a center for research on tobacco located at Oxford and in addition they had people like Dr. E. E. Clayton working out of Beltsville and these researchers developed multiple pathogen resistance in tobacco, first to the Granville Wilt, to the Black Shank fungus, to nematodes.

Unfortunately most of that USDA program that was so much into plant pathology and applied plant breeding has been downsized or closed and the department today has like only I think three or four USDA scientists. This was an aspect that plant pathology benefited tremendously from support from the federal government by their placing USDA researchers on campus or in research units like the one at Oxford, whereas that aspect today is much smaller. But the big aspect today is doing analytical biochemical

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genetics research instead of the descriptive aspect that I started with, and most people during my graduate days and early days on the faculty, but that was evolving in the '60s.

When I first started on the faculty, Dr. J. C. Walker and I had an NIH grant based on working on the physiology of pathogens rather than just descriptive research. So that's been the major change, to go from crop-oriented, almost crop-limited research, to looking at fundamental research at the molecular level and putting systems together that give a greater understanding how you might even do functional genomics so that you know what genes are turning a pathogen or a host on to produce a certain toxin or a certain compound that might be involved in pathogenesis or the development of the disease.

VF: It's so interesting how the department has had a very strong relationship with extension historically and contributing back to farming and agricultural closely relating to North Carolina, and that sort of was your introduction to NC State from Mr. Garriss, the extension agent. Can you talk about some of your experiences with that extension service and what's happened in the department?

KB: I might back up: The Hatch Act and a number of federal acts, some of them done by Abraham Lincoln, set up the stage for the land grant universities, and the charge for the land grant universities was to do research, to teach, and extend that information to the grower. Of interest, the land grant university for North Carolina was set up initially at Chapel Hill but through the efforts of the very early deans and the people at NC State and a number of politicians they established the North Carolina Experiment Station, which is attached now of course to NC State University. It was moved here shortly after it was  
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established at UNC. As a result the department traditionally has focused on research, on teaching, and extending that information to the grower, or information transfer, so that's been a major thrust for plant pathology at NC State and across the country for eons.

But unfortunately the extension programs have been downsized and most of the applied research for actually managing the diseases let's say has evolved to become part of the responsibility of the extension specialists. For example, Steve Koenning, one of my former students, just retired, but he had the assignment of doing applied research on nematodes and plant pathology extension for four or five crops: tobacco, soybeans, small grain, and corn. Now he's retired and that's left hanging, so with the tight money they have difficulty replacing a person when they retire.

But I worked with ten to twenty extension specialists and researchers who were doing some extension, like Dr. Carlyle Clayton, even though he's basically research, did extension work on apples and peaches. Professor Furney Todd, the longstanding tobacco extension specialist after Garriss had worked on a wide range of crops, had what he called research on wheels, and he would have hundreds of research plots, including plots to control nematodes. So we worked with him and with other people in monitoring the populations of nematodes as affected by different cultural and other management practices, so that would be—. You could almost go down the list of all the extension people, as well as some applied research people. So at one time I was working with twenty-four faculty, including the extension people because they were doing work on applied aspects of managing nematodes, whereas today that would be very limited.

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VF: So, we've talked about this in different ways, but could you describe how you see the value and the impact of the work that the plant pathology department has done for the state and for the region, and more broadly even?

KB: Well, the work that the department did in concert with the agronomists, with plant breeders, really saved a number of crops – tobacco, to a large degree the soybean crop, cotton – because these root diseases, and in some cases foliar pathogens, were devastating on those crops. Plant pathologists also work in concert with plant breeders because they had to characterize the pathogens, have an inoculum ready to evaluate their breeding lines, and bring about new cultivars that would grow in spite of these plant diseases being out there. So this has been an area in total that I'd say has resulted in not millions but billions of profit to the growers and to North Carolina over the last eighty years, and this would be true in a lot of states. California: they at one point had three departments of plant pathology because these diseases are so devastating to these crucial crops that are grown in California.

VF: It's amazing to think of your father's legacy and how you have carried on sort of contributing back to the farming and tobacco roots of North Carolina, but more broadly how that's benefited the state.

KB: That aspect is sort of in parallel to others, like Durward Bateman grew up on a farm in eastern North Carolina. I think he still goes back to the family farm, has I think maybe a home place or at least a home on, I believe it's the Chowan River. I'm not sure just where it is. But in any case that farm background, up until recent years, was a very desirable aspect to have as a plant pathology graduate student and then faculty member, but that would be a small component of today's graduate students whereas in my day it [01:12:03]

would be a very high percentage. A few people though came from academics even in those days. Like Paul Williams, who I mentioned was a fellow graduate student and then

fellow faculty member at the University of Wisconsin, came from academics. His dad was dean of a med school, I believe it was. So that type of background is more common today compared to the rural background of incoming plant pathologists fifty, sixty years ago.

VF: What do you see as the future of the department? Where do you see things going in the next generation or so?

KB: Well, I mentioned that I came in sort of on the log phase of the development of plant pathology and then it reached an asymptote and sort of came down. But now I think for the future there's an opportunity for another log phase, let's say if the purse strings people loosen them up a bit, because there are tremendous opportunities now in a new kind of plant pathology where genes are described, their functions are described, the mechanisms of pathogenesis at the not just molecular level, at the gene level, provide all sorts of opportunities, and maybe even with pesticides. There can be new kinds of pesticides that will be directed at interfering with certain genes rather than poisoning the environment.

VF: Kind of getting into the genetic engineering field—

KB: Yes.

VF: Well, Dr. Barker, we've covered a lot of the topics that I had in mind. Is there anything else you want to say before we start to wrap things up?

KB: Well first, just to mention, if anyone's ever interested in the history of plant pathology at NC State Dr. Don Ellis developed a book covering the first two hundred years. The first hundred years was limited but it did include some very outstanding

people that set the stage for the development of the discipline in North Carolina, and of course the real star of a hundred and twenty years ago was Frank Stevens, who did a [01:15:04]

number of books, described a number of diseases, and set the stage; taught the first courses in plant pathology at NC State. So there was some very able, early activity in plant pathology described in that book, and then the one that was published for the fiftieth celebration of the plant pathology department is *From the Laboratory to the Field*, written by Clay Griffith, Paul Peterson, and Turner Sutton.

VF: Really wonderful resources and we're so grateful that you brought these. They're invaluable to have for the future, to be able to know the roots of this.

KB: So that brings you fairly up to date, and of course the department still is evolving toward more molecular research and less field-oriented research but they—. Another aspect that I didn't mention in relation to the contributions by the department is the Plant Disease Clinic. I mentioned Dr. Garriss, or Professor Garriss, having these field clinics when I was in high school, but they've had a clinic where students actually were exposed to all the pathogens and various diseases as growers would bring in specimens, or they would send them in through the county extension agent. So that's an ongoing activity, and I might mention two major pathogens that were identified through that clinic. One was the soybean cyst nematode, and Dr. Nash Winstead, a name I've already mentioned, and Dr. Joe Sasser, described that disease back in the early '50s. The presence of that pathogen, that came apparently from China or Korea – probably China – resulted in positions being opened up in nematology throughout the Southeast and Midwest because, like Dr. Virginia Ferris, whom I mentioned, has done extensive work on the

soybean cyst nematode, as have dozens of researchers following that discovery of it being in North Carolina.

Another one was the witchweed. It's a flowering pathogen that attacks corn, and  
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Dr. Akhtar Husain, another of Dr. Kelman's graduate students, a brilliant man working in the clinic, saw this flowering thing growing on the roots of corn. Nobody knew what it was: "Oh, that comes from India. That's *Striga asiatic*." So that resulted in a major USDA effort and the crop weeds people in crop science working to eradicate that pathogen from eastern North Carolina, South Carolina, and they fumigated all these fields. They couldn't grow corn or any crop that was a host for that for years, and they may have been successful in eradicating it. But for many years if we worked on soil from the witchweed area for whatever purpose that residual soil would have to be fumigated because you didn't want to spread it.

The summary though I guess, the synopsis, is I've been very fortunate, first being born to a great family, super parents, super brothers and sisters, zillions of nieces and nephews that I still see and send cards, and great neighbors growing up, and in coming as an undergrad here, superb fellow undergraduates, roommates, and also joining Farm House Fraternity, great people in that organization. Of interest, a group of us from the '50s gathered at Mr. Jad Amman's beach place a couple months ago down on Holden Beach and it was amusing to see these guys like me that had little hair or no hair whereas my mental image of seeing those guys, they're twenty-year-olds. So being associated with very able, committed undergraduates and especially graduate students, the faculty

and graduate students at NC State and at Wisconsin in plant pathology are just superb and they have a history of real commitment to resolving any issues that the

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growers might encounter.

Just on a side note in that regard, when I went to Wisconsin I was on a WARF assistantship or scholarship – that’s Wisconsin Alumni Research Foundation – but a lot of that money came from a grower problem. I don’t know whether you’re–. You’re probably not familiar with–. You’ve probably heard of Warfarin. It’s for people that might be subject to stroke. They either have to take Warfarin or Xarelto or something like that to keep the blood thin. But in any case, a grower brought in some dead wild cherry limbs to the University of Wisconsin, one of the offices, and said, “There’s something going on here. If my cows eat this stuff they die.” So they referred those to one of the chemists and they were able to extract the toxin, and it turned out to be Warfarin. It’s a toxin that thins the blood. It thinned the blood of the cows and they died; so as a result of that discovery they developed Warfarin, a rat poison, and then the medical people had the bright idea: hey, if it’ll thin the blood, maybe we can use this in the medical area. So my wife and two of my brothers take Warfarin or Xarelto – a follow-up compound – that came from solving a grower problem in Wisconsin.

VF: That’s fascinating.

KB: And I’d probably better hush.

VF: No. Well, we are here–. We just want to get whatever information you want to share, so this has been incredibly valuable.

KB: Well, as I indicated, I've been fortunate being associated with very able, caring, dedicated people at the undergraduate and the graduate level and at the faculty level at Wisconsin and here, and in fact I guess I'm an example that one of our North Carolina writers, Tom Wolfe – who wrote the book, *You Can't Go Home Again?* He's right most of the time but in my case he was not.

VF: We're very glad. You've been an incredible contributor to the  
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history of this department and so generous in sharing your experiences with us today.

KB: Well, thanks for the opportunity.

VF: Thank you so much. We really appreciate it. Thank you, Dr. Barker.  
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END OF INTERVIEW

Transcriber: Deborah Mitchum

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