George Bird, Narrator

Anneliese Abbott, Interviewer

July 12, 2021

Location: George Bird's orchard, Holt, MI

GB=George Bird
AA=Anneliese Abbott

AA: All right, this is July 12, 2021, and this is Anneliese Abbott interviewing George Bird. So George, thank you very much for taking the time to interview today. So why don't you start with talking a little bit about your background in organic agriculture and your specific connection to it.

GB: Okay. I have to go way back, okay, to talk about that. And I will begin by saying I was born the year Hitler invaded Poland. And because of that, in my youth we moved around a lot in the family. And because I was moved quite a few times when I was very young, I became most comfortable at my great-uncle's farm in southeastern Vermont. So that was my basically introduction to agriculture. And I know sometimes you remember things from your youth clearly, and many things you do not remember from your youth. But one thing I remember very, very clearly is July of 1949. And I guess my uncle George, we know that organic gardening, at that time, J. I. Rodale began in 1942. And the farm there was a pretty large, modern poultry farm. My great-uncle also had hobbies. And one of the hobbies was organic gardening. And my best guess is he started getting *Organic Gardening* about 1945.

And so one of my chores on the farm that morning, other chores after I became a little older than that, I never missed morning milking. I took the cows out to pasture by the time I was probably 12, you know, in the morning, after morning milking, brought them home in the afternoon. But that particular day one of my chores was to go with one of the tenant farmer boys down a dusty, nonpaved road to Chester Depot to pick up a new strain of earthworms that had been ordered through the *Organic Gardening* catalogue. And so for the next three years, from about my tenth to thirteenth birthday, I was director of vermiculture for that farm. And the worms made compost for potting in the greenhouse. So that was my first start.

My second start was after World War II. My dad was in the Pentagon during World War II. We moved a couple times, and when I started high school I wound up living in Grandville, Massachusetts, which is an apple-producing community in western Massachusetts in the Berkshires. And I remember getting on the school bus, because we had to be bused into a larger town, that very first day. I didn't know a single person going into ninth grade. And after a couple days one of the older boys asked me if after school I would like to pick apples. And I said, "Sure." So I picked apples that fall. And the next spring the owner, an absentee owner of an orchard, bigger than the one you're at, at the moment, basically, asked me if I would like to manage his orchard. So then by year fourteen I was an orchard manager. And I didn't know the results of that until many years later I happened to come across a letter of recommendation he had written for college, and basically it said that I had messed things up. Basically that orchard was supposed to be a tax write-off and I had turned a profit. [Laughter]

So those are my first two experiences. And I wound up going to Rutgers, and I majored in horticulture, and then for a master's I stayed there in nematology and entomology. And in nematology we were in the chemo-technology era. I mean, everything was chemicals. Basically, I'm an expert on some of the nastiest chemicals that you can have. I probably know more about methyl bromide than anybody in Michigan, in relation to that. So I got my master's in nematology, and then went on to Cornell for my PhD. And after that—but I've always had kind of an environmental conscience, I thought, even though what I've just said didn't demonstrate that. And my first job was with Agriculture Canada, after that. And then this New England yankee, after that, left to become a professor at the University of Georgia, in Athens, Georgia, where both of our children basically were born.

And again, it was still pretty much a chemically-oriented agriculture, as much of global agriculture still is today. And I remember that one of the first things that the government recognized there, state government, kind of from an environmental standpoint, was a little control of pesticides. So this is awful language, but the most environmental thing they did was they issued something, and I got myself one, called an exterminator's license, where you had to kind of pass an exam to get it that was somewhat environmental. Then a couple years later I basically left the University of Georgia in '73 to come here to Michigan State University. And I had to give up tenure—I was a tenured professor, associate professor—to come here. I was associate professor here, but I had to gain tenure again. And so the first thing I thought about was, "Gee, with two young children, that's a little risky, and so maybe I should start going to seminars." So I started going to seminars, and basically I didn't understand anything that was going on. It was all mathematical models and algorithms and all of this.

So what was happening? Well, Rachel Carson's book had come out. And that had kind of woken up some people in relation to this chemo-technology era. And Michigan State University, the Department of Electrical Engineering and Systems Science was in the process of inventing something that today is known as integrated pest management. It may seem a little weird in relation to that. So basically I started taking the engineering classes with the students at that time to learn systems science. And those courses I actually wound up teaching for many years because there was a backlash in relation to this because engineers basically at that time, the electrical ones in particular, didn't think that agriculture or integrated pest management was a suitable activity for engineers, those types of engineers. So at Michigan State there was a backlash, and the Department of Electrical Engineering and Systems Science was basically abolished. So it was all of this kind of turmoil going on.

But at the same time we were pretty successful with developing integrated pest management, not only here, but we got our biological control from Cornell University, and University of California-Berkeley. And then our fourth partner was Texas A&M, and Texas A&M was with us basically for money and politics in relation to that. So if you go back, I think I pretty much am credited with writing maybe the first definition of IPM. I didn't do that intentionally, but it was part of a grant proposal. And we were awarded that grant proposal basically back in the '70s. And then a couple years later, actually two years later, in '79, in President Carter's environmental message to Congress, basically was a good definition of integrated pest management. Although President Carter was, as you know, a Georgia peanut farmer, and a captain in the Navy, and a captain of a nuclear submarine, he also—he didn't actually write that definition, a bunch of people in a café in a nice warm spring outside afternoon, in the spring of 1978, wrote it, but we got it into his speech for that time.

And so basically at that time we began thinking that, "Gee, integrated pest management is a little bit narrow." When you go from integrated pest management, at least here at Michigan State University, there was a pretty smooth transition to what then became known as sustainable agriculture and what today I call sustainable and equitable development. So, while this thing's been going on a little bit long for a first question here, all of this you can find in greater detail in my memoir. And so here is a copy of my memoir that was published last year. And if you see that big apple tree, right out there, the one with the picnic table under it? That apple tree has more than a 45-foot wingspan. That's where we were supposed to be talking right now. And I chose that apple tree here for a picture on the cover of this.

And so, integrated pest management went on to sustainable agriculture. And just about that time Robert Rodale, who was J. I. Rodale's son, began to think that organic, and of course the organic part to Rodale came basically from Sir Albert Howard's book. He thought that maybe this was a little narrow and he should expand out into this thing that was becoming known as sustainable agriculture. Anne and I, we're kind of proud that we've had a luncheon in our own home with Bob Rodale. And unfortunately he was killed in an automobile accident in Moscow, I don't remember the exact date, but something like 1990. And that was very unfortunate. So the Rodale Institute got involved with the sustainable agriculture, basically, movement, which basically the people that were real leaders in it were like Chuck Hasselbrook, from Nebraska Center for Rural Affairs, are you familiar with them?

AA: Not super familiar.

GB: Well, anyways, and then at that time Dick Harwood from Boone, Iowa, who was the founder of the Practical Farmers of Iowa, these all became kind of a group, and then they hired Ferd Hoefner in Washington, DC for the Sustainable Agriculture Coalition. And that brought the Rodale family into a sort of sustainability movement. But eventually they decided that that was too broad and basically went back to what we'll say is semi-pure organic farming, whatever that really is or is not. And so that got me involved with the Rodale family, and they asked me to be on their board, and so I was on the board of directors of the Rodale Institute for a period of 19 years. And at that time, it was a very interesting period because it was a period of transition. We had a major activity in Japan at that time, because you need to raise money for these types of things.

You didn't see it because it was raining, but on the walk from your car there's a big sign that says you're now sitting in a MEAP verified organic-friendly farm. And MEAP is sort of the Michigan Department of Food and Agriculture's version of, not of organic, but of, we'll say, sustainability. So I'm not sure where I should go, actually, from here. From today, we'll quickly, it's all described in my memoir there.

I retired from my tenure-stream faculty position that I was worried about getting in 2004. And come December I will have flunked retirement 17 times. My class for next spring sold out in 15 hours from the time it opened, so I'm kind of a joke when it comes to retirement. But in December of 2011 I was at a potato growers meeting, and sitting at the back of the room with the rowdies, when somebody from the front table came up and said, "George, we want you up at the front table." So I went up to the front table, and they basically said, "We think we have a soil health problem because we can no longer decompose cornstalks. Will you help me with it?" And I said, "Yes, I'll do that, but I don't know much about it." But I did, I'd been dabbling in soil health, but not, today it's a fairly major frontier that we still don't know very much about, and

you took a course under Ann last year, so you sort of know where the state of that art, or science is.

So the first thing we did in Michigan was we wrote a white paper and published that. And we held a little workshop in the spring of 2012, and out of that they decided that we had to conduct a survey. So we conducted a survey of 96 potato fields throughout Michigan. And then the next question is, "Well, what do you do with those soil samples?" Well, in 2012 there was no place in the state of Michigan to send a soil sample to for a soil health analysis. And as you sit here this morning in 2021, there is still no place in the state of Michigan to send a soil sample to for a soil health analysis. So these 96 samples were sent to Cornell University for the Cornell University soils lab thing. And actually, when Cornell was developing that, they actually came here to Michigan State to talk to some of us about our research. But you can see that, Michigan State's pretty good at being at the cutting edge of things, but not that good at bringing it to fruition. Didn't even ask you to turn it off for that!

So now I've got 986 data points, and what to do with them. Well, Cornell uses 12 soil health indicators, and four of them are physical, four are biological, and four are chemical. Believe it or not, while that soil survey went on in 2012, I really didn't get to the endpoint of the results until this year. And now I have written a report card for the Michigan potato farmers for their 2012 soil samples. For soil chemistry, they get an A+. They know their soil chemistry, and with NPK out of a bag they know how to grow potatoes from that. Of course, that's not the type of soil fertility that is used in organic farming. For soil physics, after looking at all the data I have awarded them a D-. And for soil biology an F. So you can see that we have quite a ways to go in relation to learning about soil health and getting the growers to manage the soil health a little better.

You look out here, can you identify that plant?

AA: That's buckwheat.

GB: That is buckwheat. You got your first question correct. And I raise that buckwheat to make the topsoil kind of mellow for next year. And can you, with my second question, tell me what's growing underneath it?

AA: Looks like some kind of brassica.

GB: Yeah, it's a brassica.

AA: Turnips or radishes or something?

GB: And basically that's oilseed radish. No, excuse me, I flunked now. That's not oilseed radish, that's daikon radish. And daikon radish gives you a much bigger taproot than the oilseed radish. Oilseed radish is great as a trap crop for sugar beet cyst nematode. And that's one place where we really had success in Michigan, our sugar beet growers like oilseed radish as a trap crop for sugar beet cyst nematode. And then what I'll do after that—this is my wife's garden. We have separate gardens. Even if you get wet, we're going to go down and see my garden, because I can't let you just see my wife's garden, even though I manage her cover crops for her. And then this fall I'll either put in some type of legume or rye until next spring, and then parts of her garden you can see, which is all split up here, then they rotate around this. And while this, our

hobby orchard and gardens, are not certified organic, they're basically managed with as close to zero synthetic inputs as you can get. And if you go down, this is the 12th of July, I harvested my first new potatoes on the 4th and had my first tassel of corn on July 4th. And Quintys, which are our earliest apple, we're eating at the moment.

And so since the potato growers made me come to the front table, I've been invited to give more than 125 invited soil health presentations. And the next one is this Thursday night, and it will be to the mostly elderly wealthy women that are master gardeners up in the Grand Rapids area. So basically that takes you, not rapidly, but from 1939 to forward to Thursday night. (19:57)

AA: That is so great that you've been involved all these years. That's really cool. And you just went into some of that, about the cover crops. But is there anything you want to say more about farming methods?

GB: Oh, definitely. So I brought you a second book also, okay? And last year I also published another book, and this book is entitled, *Ecosystem-Based Agriculture*. And that book is also for you.

AA: Thank you.

GB: And I am not the senior author of that, I am the junior author. And the senior author of that is a soil scientist from India. And we were born in the same year. He thinks we have similar backgrounds; I think they're probably quite different. But I'm not going to argue with him in relation to that. And there are three chapters in that on organic agriculture. There is one that is general organic agriculture, probably a very brief overview compared with what's going to be in your PhD dissertation, or I would give you a hard time. And the second chapter is called "Global Organics," which talks a little bit about organic agriculture today in a lot of different countries throughout the world. And then the third chapter on organics in that book is on organic rice production. Of course rice is a major crop globally. And then the other thing that's kind of interesting in relation to that is that in the prologue I end it with some quotations. Really, I believe that to get to where organic agriculture would like to be, we have to teach the world how to think in the language of ecology, and where no one has even started in relation to that. But in that very last prologue you will find some quotations from another book. And that particular book is this *Developing and Extending Sustainable Agriculture*. Have you ever seen this one?

AA: No, I need to look that up.

GB: It's by Chuck Francis and myself. And as you do oral interviews with people, if I was to recommend one person, it would probably be Fred Kirschenmann. Have you ever talked with him?

AA: Not yet; I'm still trying to get in touch with him.

GB: Yeah, I'm not exactly sure what's going on there. He's on the board of directors of the Old Stone Barns in New York. And I'm not going to load you up with all of these, but here is a third

book for you, this is just a spare copy I have around, I didn't sign it for you, it was supposed to go to one of my other graduate students, but he obviously didn't get it, so you can have it.

AA: Thank you.

GB: Look at this book. Let's turn it to the prologue, because I think this is very important at the end. We're actually going to read this. Go to page 162. And halfway down, a quotation by Kirschenmann and Bird. Agriculture for the future "must meet the requirements of an exploding human population, in the face of entrenched poverty in a post-fossil fuel era." If you look at this morning's *New York Times* and what they're saying about electric cars, they're saying that gas might even be hard to find for your antique. I don't believe that. Next, "must restore the ecological health and natural resources on which agriculture depends, while the climate is changing"—and change is something that is definite—"and when global society insists that food is a human right, while increased infectious diseases"—yes—"require that we attend to the ecological ramifications of human activities and farmers must retain a sufficient share of the value of productivity to be economically viable!"

And of everything I've ever written, even though Fred probably wrote most of that, I think that's pretty astute. Then you go to the next page, and you will see that this team of Kirschenmann and Bird stole—but we modified it—and we quote from Gandhi's *Seven Social Sins*. Are you familiar with that?

AA: Not really.

GB: Okay, well, you will be right now. "Food and farming systems must be regenerative in nature and based on cooperating partnerships and ecological independence. Food and farming systems must be based on family enterprises cooperating to maintain vibrant communities and foster intergenerational equity." And remember, it wasn't until 1987 in the sustainable movement that basically the United Nations put out their definition of sustainability where really it was IPM going to that almost a decade earlier than United Nations got involved. And then, "food and farming systems must generate appropriate wealth through work and food and farming systems must foster commerce inoculated with morality and politics with principles."

And then, another person that is really great is Dr. Fred Magdoff, who was former chairperson of the department at the University of Vermont. And Fred came out, and Williams, with a book a couple years ago entitled *An Ecological Society.* And basically that's what I'm building on in relation to my concept of the language of ecology. And I must say, go a little further—we may never get to question—yes, we will get to question 2—is, this bothers me because the students I teach, undergraduates in a 200-level course, still tell me that the last ecology they ever had was about 40 minutes of it in seventh or eighth grade. And they don't get anything more than that. So in my class basically I have to start with reviewing chemistry, in fifty minutes I go from what is an atom to the difference between DNA and RNA. And then the next lecture basically is a review of biology. If they know the difference between meiosis and mitosis, and karyogamy, by the end of that, I'm happy. And then we basically get into ecology.

So why did I go there? Well, my daughter Andrea—we have two children, they each have two children, one of them lives in my house right over there at the moment, the other's studying to be a nurse, and my other daughter has two younger children, and that's Andrea—and when Andrea was in, I believe it was seventh grade, my wife Anne, who's also an organic

advocate, learned that they were going to be having a little section on ecology that I just told you about. But it was going to be taught by the shop teacher. Anne wasn't particularly happy about that. Well, I travel widely, but one thing I'm very proud of is that I never missed a parent-teacher meeting. But that night Anne was kind of upset, so I put a virtual leash on her, a choke collar. We went, and when we got to that particular teacher, Anne said, "You know, it might be a good idea if you took them on a field trip." And the teacher responded, "Oh my goodness, Mrs. Bird, that would not be possible. This isn't Africa; there are no lions, tigers, giraffes, or zebras." And we left.

Guess what? A couple months later, at that time, they have this MEAP test in Michigan of the kids, and those questions were published in the Sunday edition of the newspaper. And when it got under science and went to ecology, the question was about lions, tigers, giraffes, and zebras.

AA: Really?

GB: So the state of the education doesn't stop with the shop teacher; it went all the way to the top.

AA: Okay.

GB: So we have work to do in relation to that. That's question 1.

AA: All right! Well, you already got into it a little bit, but is there anything else you want to share about your philosophies and how you developed them, how they changed over time?

GB: Well, my philosophies have changed, and they're going to change. I'll start that off by saying that there was once a very great philosopher that said, "The only thing that's certain is that nothing is certain." And I can do you much better than that this morning, because I can tell you that the one thing that is very certain is that when you leave this orchard today, the world will be a different place than it was when you drove in this morning. And so change basically will be continual. If you open up this particular book to one of the very early pages—anyways, our world changes basically all the time. And so that's something that I respect much more. And I'm always trying to get the students to think about that. You know as we sit here today there about 7.8 billion people in the world. And the dominant hypothesis is that by 2050—I say there will be 10 billion, but the students are telling me numbers that are much higher than that these days—and so I ask them, "What is the alternate hypothesis?" So when did we reach the first 1 billion people? Well, I say it was about 1815. And when I was in college it was 3 billion. And now it's up to wherever it is.

So we have these dynamics of human population that have basically been changing. But now with what happened in relation to COVID-19, I never really looked at that curve very much before 1815, except for the Bubonic Plague. And one of my next microessays—and I write microessays, I'm up to about 126 of those—is going to be on pandemics. And it should be done within the next 45 days, or something like that. But when people upset me, then I go back and I write my microessay. If we will take my memoir here and go to the epilogue of that, way at the back, we'll look at—it's not an epilogue, it's Appendix B, which is about page 55—this was really my first microessay. And I don't remember writing it, and I don't remember why I wrote

it, but basically it's called, "The Evolution of Homo Sapiens," which is very strange. And I cite where I got the ideas from. But we'll come back to this in relation to another thing. But I say, species start as neospecies, and eventually all species evolve, and subsequently become extinct, and they are telospecies just before they go extinct. So that was microessay number 1.

Microessay 91 here is entitled, "Systems"—going back to my systems science, which I still teach. What happened was because of the backlash against integrated pest management, getting rid of the system science department, and that came to somebody like my responsibility. So what I did, when I first came here, there was a class entitled, "Biology for engineers" and "Systems science for biologists." So I took the systems science for biologists, and those who wanted to go on, we went into an 800-level modeling class that of course I made all my graduate students teach, and I sat in on it. And we got some publications out of that. But so after we had this backlash, I invented classes to continue teaching it through entomology. And if we look at this first little diagram here, what is a system? "A system is something with two or more interactive parts." All systems evolve. Hopefully they then get to dynamic equilibrium. And then they may undergo senescence and crash. And so that is a philosophy that I've developed over the years. But if you look at this title here, "Systems, Communities"—which is an ecological term—"Society and Values."

So you can see that my philosophy has evolved considerably from a muddy-boots farmer and a spraygun entomologist with all kinds of nasty fumigants as a nematologist. It's changed tremendously. And so over the past few years, while I mentioned that I had Japanese programs with Rodale, I now work in Central Asia in the former Soviet republics of Tajikistan, Uzbekistan, Kyrgyzstan, and Kazakhstan. I didn't even know where they were 15 years ago, I didn't know how to spell them or spit them out. And so 2014 we were at the base of a glacier here in Tajikistan. I witnessed a collapse. Matter of fact, I witnessed collapse in Dushan—in Tashkan, Uzbekistan before that. And then all of a sudden I came home. Basically I saw that collapse in Michigan, and in Detroit. Flint isn't a groundwater problem. Flint is a collapsed city. Detroit—now you're getting your third question from me. What year did Detroit reach its maximum population density?

AA: I'm going to guess, I probably do not know, sometime shortly after World War II?

GB: You're absolutely right. 1950. And very few people get that right. Even most Michigan people don't get that right. They tell me late '60s, '70s, 75. And you know what the population was in 1950?

AA: I do not.

GB: 1.84 million.

AA: Oh, wow.

GB: You know what it is today?

AA: Not even half that.

GB: 640,000. So we've had 2/3 of the population go. I took this picture here of that Soviet factory, basically it collapsed in 2014. When I came home, I took a 2014 picture here in Michigan. That's a Packard plant, and the Packard plant closed in 1955. And that's a picture I took of it in 2014. My interest in Detroit became a little greater when that daughter Andrea and her family decided they were going to move from the suburb outside Detroit into the city limits. We weren't necessarily too happy about that, but it's worked out pretty well. And the reason for that is she was going to send her children to a private school. And interestingly enough, the private school her kids go to is Detroit Waldorf School. You know anything about Waldorf schools?

AA: Was that the idea that was developed by Rudolf Steiner?

GB: Absolutely. So I have grandkids that are getting a Rudolf Steiner education. And at that particular school they had in-person classes all through the past year. Guess how they did it? They built outdoor classrooms last summer. And the kids went to school all last year outdoors. So this is the kind of discussion that my microessays generate. And if you look above this you can even see that I quote from Dr. Seuss a little bit here. That's a great parable in relation to sustainability. And then if you go on to the next page, down here at the bottom, there's something really weird. Have you ever heard of Kenneth Boulding?

AA: I don't think so.

GB: Kenneth Boulding was president of the Economic Society of America. And basically he was excommunicated from that society based on his presidential address, which was entitled, "Economics as a Moral Science." And in that particular presidential address there is a little idea that leads to this. And basically it says here that we as *Homo sapiens* may have evolved into two races, *Homo economicus* Race *clodiensis* and *Homo heroicus* Race *foolynchus*. And hopefully someday we will reemerge from that and become *Homo humanicus*, which will be compatible with ecosystem language in relation to that. So you can see that sometimes I get on a wild in where I go. But Boulding's address was in 1969. And some of your questions basically we'll cover a little later go to backlash. And he definitely succeeded a backlash. But if you're one who likes to read and you really want to read a neat publication, read Boulding, "Economics as a Moral Science," *American Economic Review*.

I'm going to go sidetrack for just a second before we go on. I have another project where we actually started last Friday on a Zoom talking about our next publication being in *Harvard Economic Review*. That's weird for that muddy-boots nematologist. But we're trying to develop soybean cyst nematode management in sort of an environmentally sound manner. But the way we've decided to do this, and we've been working on a number of years, we've gone out and hired a professional marketing company that uses all the modern social media things. So when we write up our results from that, one of our projects last year had 25+ million hits, like 6 new videos had been put out last December, we did a campaign on those over about 6 weeks or so, something like that, a thousand views of them. And that's a little different than a university professor writing books like this.

So there's an example of one of my microessays that tells you what my philosophy is. Now if you go on to the next one here, which is number 105, so we went from 96 to 105, this one's entitled, "Science, Technology and the Humanities: Towards a Successful

Anthropocene"—and I'm sure you know what an Anthropocene is alleged to be, and that will never take place, and there's a more recent publication that's come out, somebody's proposing an era called an "ecocene," which kind of helped me with this particular one. But Anne and I were at a movie on campus, a movie of organic systems comparing them with conventional agriculture. And a lot of the environmental students on campus were required to attend that. And there was an elite panel of molecular scientists that were to discuss it afterwards. And basically they put their hat in molecular biology for the future and downgraded basically the organic side of the story. But we were allowed to on postcards write questions. And Anne wrote a question, and I put three questions on my postcard—I don't even know if that's legal—and only about five questions came up during the time, and two of ours did, which I thought was very strange. But one of my questions was that they were talking about population going to 10 billion, and I said, "Well, what is the alternate hypothesis for that?" And basically these molecular scientists, based on their answers to that question, didn't understand what science is. They were nothing more than molecular technologists. And they don't understand testing alternative hypotheses, which I found astounding.

So I came home the next day and wrote this microessay, which basically says that the moment when I as a scientist developed my favorite hypothesis and test it and either reject it or—I'm very biased in relation to that, I have to admit that. And when an engineer or inventor develops their best widget, they're pretty biased in relation to that. So this particular science chapter here doesn't talk about social science. It talks about the humanities. And basically I think the people from the humanities may be the best people to judge science and to judge technology for the future. And so you can see that that is a philosophy of mine that has come up fairly quickly. So basically what I'm doing there is I'm criticizing STEM and saying that STEM's got to have the H put into it.

I have no idea where we are in this discussion at the moment. But finally question 3—oh, yeah, because we're not to the backlash yet. This was just my philosophy. Do I have a philosophy? Yeah, and I actually have a microessay on my teaching philosophy. And I didn't know I had a teaching philosophy until I had to write some document for some award that I was supposed to get. And so I have a microessay on my teaching philosophy. And my teaching philosophy, all my students are required to adopt a place. To adopt a place out there in nature and watch that place change over time. And then they have to describe those changes in that place using the language of ecology that I've taught them. And so that is one of my teaching philosophies.

Another teaching philosophy I have, which is in the prologue for that next book that's being written at the moment, and that's called "Coach Smith's Four-Corner Offense." And way, way back before your time, there was a basketball coach at North Carolina by the name of coach Dean Smith. And this was before they had the shot call. And so Dean Smith developed a four-corner defense at the end of the game. They just passed the ball around and the other team couldn't get anything. So I have a four-corner offense where basically it tells the students on day one what I expect from them for the rest of the semester, like reading assignments, learning what's in the assignments, understanding what's in them, and then being able to use them in a practical problem solving way. So that's another one of my philosophies that's developed over time. And I actually have had my four-corner educational philosophy reviewed by coach Tom Misso. And coach Tom Misso says that Bird's four-corner offense is appropriate for his basketball team.

AA: All right, great! So, my next question is about your perspectives on the connection of organic and sustainable agriculture to the broader historical and cultural context. And one thing I'm really curious about with you in particular is with *Silent Spring* and how that was perceived, being an entomologist, and how the university community kind of accepted that, or how you were able to develop IPM. I'd be really curious to hear a little more about that, too.

GB: You know, Michigan State had something to do with that because of the dead robins that were collected here at Michigan State that were sent to the laboratory at Cornell University, which then evolved into *Silent Spring*. It was difficult. Period. I was still at Rutgers when it actually happened. But life went on without much for the most part until somewhere within the next decade after that. And so *Silent Spring* at Michigan State and Cornell and UC-Berkeley, and somewhat at Texas A&M, but that was a little more political in relation to that, was the basis for integrated pest management. What was different here at Michigan State, well Cornell and Berkeley was biological control. Ray Smith—oh, wow! I remember the first time I visited Ray Smith's office at the University of California-Berkeley. He got kicked off campus because he had too many books. So he had an office downtown that had two stories worth of books and ladders to get up to see them. And at that time, while I was sort of a communicator for Michigan State University in relation to integrated pest management, the research, and I was also the extension person basically. I was the youngest person by far.

And so then we started, with that team of four put together, we would meet. So I got to know the Ray Glasses at Cornell, and the Ray Smith, basically gets credit someplace for integrated pest management. So I met with all those guys. And I was the youngest. And my job, I was very definitely making the dinner reservations at the four-star restaurant for after our meeting, and to buy the bottle of Bourbon for the happy hour before going to the restaurant. And that may not be too astute, but those were the things that basically happened. We learned a lot from that. Oh, and then another thing that there's a book from because of this, in—I've forgotten the exact date—but it was, well, you can look it up, the date that Nixon and Khrushchev got into an argument and Khrushchev took off his shoe and pounded it basically on the table. We were supposed to have a bilateral pest management meeting here based on integrated pest management and modelling. And it had to be postponed because of that episode between Khrushchev and Nixon for a couple years. And life was a little different back then. It wasn't a four-star restaurant, the banquet for the Russians and California, Berkeley, all of that, was held in my basement about a quarter of a mile from here. I had to paint the basement and all kinds of things. But like the bottle of Bourbon, we were still picking up champagne corks the next spring. And so there was all kinds of sides to things.

But now, as I have worked in Central Asia, and if you take your copy of my memoir here, and open it to about page 38, on the lefthand page you'll see a picture of the statue of Skrjabin. And Skrjabin is the only nematologist for which there is a statue. And that's taken in front of the Kyrgyz National Agrarian University in Bishket [?]. And when I went there to teach a little nematology, there's not a single functioning microscope in the whole university, period. You go over to the next page, at the top you'll see some of my field research out in Kyrgyzstan. But if you go to the bottom here, you'll see me pictured with three members of the Kyrgyz National Academy of Sciences. And that's a whole other story that goes back to the Soviet Union. The lady next to me there, to my right, Dr. Anara, she's my main contact there, and she has a Ph.D. from St. Petersburg University during those Soviet times and is a great scientist. And that particular picture was taken a couple minutes after I had the honor of giving a soil health lecture

to the Kyrgyz National Academy of Sciences. You notice I use the word honor. I think of it as that.

So this goes back to, we were talking about this whole Soviet deal in relation to this. Could you read the question one more time, please?

AA: I was curious about your perspectives on the connection of organic and sustainable agriculture and IPM and all that to the broader historical and cultural context.

GB: You can see, it's very, very broad, and I bump into it all over. Like when you called me on Friday, I said, "She wants me to talk about my life!" And that's basically what it's been. If you go back to that page, just seeing that we were there, go to 22, okay, and that's the Anne we've been talking about, my wife, who's an electron microscopist, a pretty good ecologist, and if you go on now to page 37, that's the apple tree you're looking at in the background. And the person I'm with there is my partner in crime, Dr. Karim Maredia. Basically these days I work for Karim Maredia in international agriculture. My next meeting with him is 8:00 a.m. Sunday morning for breakfast at his house. And if you go to the next page, a few more pages, go to 44, you'll see my sign that you walk by. Down at the bottom are the Waldorf, Rudolf Steiner kids. And then a couple grandchildren. And the grandkid that lives in the house next door and his first scientific paper. And on his second one—he wants to be a pediatrician—his second one for epidemiology this year he won first place for and is writing a great new paper for that at the moment. And this is the barn that you're sitting in at the moment, Bird's Suburban Orchard, and then the last page here basically is my son's 50th birthday party.

And fortunately—I'm really proud of Greg because he is now executive director of Michigan Vegetable Council. And Greg's bachelor's degree is in mathematics. It's a long trek from math to Michigan Vegetable Council. But he's doing a good job. And his main event every year, which now—that's a whole other organic story—he is the person that puts on the Great Lakes Exposition for fruits and vegetables and ornamentals every December. And yesterday I tried to get a hotel reservation in the meeting where my son has the executive suite, and they're sold out. And I couldn't get a reservation. I wrote him up last night and said, "Good job, you're sold out!" But what happened was—of course this is conventional ag, this Great Lakes Expo—and so we started out kind of having an hour of organic discussion in the hallway or across the street in another hotel, and then we got part of a day put to organics, and an afternoon, and now the whole last day of the Great Lakes Exposition is for organic agriculture. So there's very definitely been progress made.

And I guess the most important thing that I'll say—most is a big word, I'll leave it there—is that most of the successful conventional growers today know that they have to change. They can't continue to do what they have been doing. And we've talked about the word change several times. They know that they're going to have to do things in the future different than in the past. And that's why the potato growers asked me to get involved in soil health. Well, where are they looking? They're watching the organic farmers very, very closely. Now, of course that brings up a whole other era, a whole other question. My next meeting with Rodale will be sometime later this week, it hasn't been set up yet, but Rodale—I don't know if I should be saying this or not, but they didn't tell me not to—they're trying to get involved with Russia in relation to organic apple production. And I don't know, they want some background from me on my experiences in Central Asia. And of course the Kyrgies hate the Russians because of what the

Soviet Union basically did to them. And the whole of Central Asia is an environmental catastrophe basically. They left that totally contaminated in relation to that.

So there are many different, there are at least four different types of organic agriculture today. Of course you know that the Real Organic Program is trying to deal with that. They had great seminars last winter, and I attended all of those virtually. I would have gone to the meeting in New Hampshire—but organic has to be based on soil. And the hydroponics is not going to be a solution for food in relation to that. And why? Because of the second law of thermodynamics. First time I've mentioned that today. But every time you have a transformation—in other words, you're not going to grow tomatoes with just water. You have to have nutrients. And where are those nutrients going to come from for hydroponics? They're going to come from mines, basically speaking. And mechanical transformations that show us that the soil basically makes those transformations in the most efficient manner possible.

I don't know where you want to go. I can ramble. (59:55)

AA: Well, one thing I'm really curious in hearing your perspective is on the relationship between the agricultural universities—at least the ones that you're most familiar with—and the organic and sustainable agriculture movement and kind of how that relationship's changed over the years.

GB: Very definitely. As we went from IPM to sustainable ag—and Michigan State had some leadership, basically, in both—at that time the Department of Plant and Soil Sciences had an outstanding soil microbiology department chairperson by the name of Elder Paul. Elder Paul is now retired in Colorado. And Elder Paul went to a foundation and got some money for a couple organic or sustainable ag positions. I'd have to look that up what the language was. Sustainable agriculture positions. And for one of them I chaired the search committee, and the person we brought in was Dr. Richard Harwood. You should know that name. Richard Harwood was the person that designed the long-term ecological, the long-term systems trial at the Rodale Institute. And so we hired Dick Harwood here. And Dick made a major contribution to sustainable ag before he retired. And you'll find in one of these books here, it's not my memoir, but in this you'll find that when he came to Michigan State in an endowed chair of sustainability, he was told by the—this is in writing here—that he was never to mention the O-word. O being organic. We will tolerate sustainability, but not organic. So that is in writing, and that gives you the flavor of what we were doing.

Elizabeth Henderson, you know that name? As I told you the other day, I became, because of everything we've talked about today, for some unknown reason, the first national director of the SARE program. So basically in 1985 Congress passed the legislation of LISA—low input sustainable ag. And so we had gone from IPM in the late '70s into the early '80s, and there was a lot going on there to get LISA. We had to do a lot of lobbying in Washington and things of that type. But we were pretty naïve at that time. And so when Congress authorized LISA—low input sustainable agriculture—we didn't realize that that meant no money. Because basically we didn't understand the difference between authorization and appropriations. So basically we learned, relatively rapidly, and went and found somebody with deep pockets. And that person with deep pockets was J. I. Rodale's son, Robert Rodale. And Rob wrote what's alleged to be a six-figure check, and we hired a lobby firm. And guess what? The very next year, Congress appropriated money for LISA.

And there was an era there that's explained in the book here where there was prior to the organic standards act. In the United States, there was a major debate about what organic agriculture was and what sustainable agriculture was. They were kind of merged and all messed up in relation to that. Some pretty good debates in relation to that. And so when the money for LISA came about, it was sort of being managed in Washington, but that's not the way it was supposed to be managed. But then there were some review panels for the grants out. And for the north central region I chaired the first LISA review panel for the grants. And I mean to tell you, that was an educational experience. George Bird, this guy that I said was young to begin with, now I had all the big guns on my committee. I had Fred Kirschenmann. From the Land Institute, Wes Jackson. All these big names that had massive personalities. And my job was to keep them under control. And so we worked at that. Where, like in the Northeast, there was Fred Magdoff. And Fred kept everything well under control.

As I'll tell you in a few minutes, the South definitely wasn't under control and didn't understand what sustainability was at that time. And then the West was too large basically to be efficient in relation to sustainability. So that was my introduction to LISA. And then when LISA was converted in the 1990 Farm Bill to SARE, sustainable ag research and education, I guess it was probably because I had the ability to partially control those guys that I became national director of the program. And so just for you to see and put your fingerprints on, this is the Farm Bill for 1990. And if you open it up to this particular page here, these are all of the legislation in relation to LISA. And I consider that one of my most valuable possessions. And so basically my job was to implement SARE in accordance with those regulations. Those regulations, in relation to that, are pretty strong. They're not organic, but if we could today get all of US agriculture doing what's recommended under the SARE program, that would be good. (1:06:56)

So I went to Washington, it was my second sabbatical, my first sabbatical leave I took those family that I showed you, we went to Washington and I was EPA's first IPM coordinator. We went to Washington for cherry blossoms, came back to Michigan for the summer for these apples, and then went to California over the next winter. That was my first sabbatical to Riverside. And when I went there, Dr. Ivan Thomason, he came to my laboratory and worked with my graduate students there. And then basically in my lab, 35 Natural Science Building, the California statewide IPM program was designed in 35 Nat Sci Building here on campus. He took it back to California, he implemented it, and it's still California's IPM system today. So we're going back and forth from sustainable ag and all of that.

So basically we went to—so then I took my second sabbatical leave in Washington, DC. The family didn't go with me this time because the kids were kind of grown up, but Anne came down for one weekend a month to go to all the museums and things that she loved. And so all of a sudden, as I'll tell you in a few minutes, I was working for Congress in enemy territory. I was working for the United States Congress in a department of agriculture that saw SARE as an enemy. Did I say that on tape? I guess I did. So I will have to live with it, because I've already signed off on the document. Going from that muddy boots farmer, fumigant nematologist to being director of a national program and having four regions is a pretty big step. Now, my father also—well, I told you earlier that I had flunked, come December I will have flunked retirement 17 times. My father was also a professor, and my brother's a professor. And my father taught his last university class on Monday, personally cancelled his class on Wednesday, and died on Friday. So there's a history of teaching into old age within the family. [1:09:32; this is the point at which the recording becomes very quiet]

So I inherited these four regions: Northeast, South, North Central, and Western. And with Fred Magdoff's leadership in the Northeast, it's just a great region for sustainability and for organic agriculture. Elizabeth Henderson's from there, and so that region was my model, the way things should work. The Midwest region had all these big names, sustainable ag, kind of ego people. So it was always on the cutting edge and you could never really keep control of it, but it was always the front edge, cutting edge of sustainable agriculture. The South basically, some of the southern land grant universities said, "Oh here's some more money for us." And basically he had co-opted it into the conventional ag system. So we had to rectify that. And while in SARE each region has a coordinator, you also have a host institution. And eventually we decided that we had to move the host institution from Louisiana State University to another southern university. We moved it to the University of Georgia. And in this process they had to have SARE hearings throughout the South to figure out what was going on. And out of that came some of the southern SAWG, the Southern Sustainable Ag Work Group, which just ended last year. It became a very vibrant, successful organization. So we sort of put together.

And the other thing that was interesting, the SARE program says that it should also include the 1890 black colleges. And so that was a real challenge to basically bring up. And it was very unfortunate because the black limited resource farmers of the South are going to be part of our future agriculture. But that's still sort of underdevelopment. And a lot of the black colleges that we tried to get SARE involved in from a sustainable ag standpoint said, "Oh, we want to hire two molecular biologists." And so there was that issue there. And while SARE exists today, it's not quite the way I would have done it myself, but it's still a sound program. I don't think it's driving the ship like we were trying to do with sustainable agriculture at the time.

So that basically brings up another thing. Here's Tom Dashell's hearings on the SARE program. And so basically this is where I come to say that I was sort of working for Congress with that hearing on sustainable agriculture. So I got used to testifying before Congress. And so when I told you that I was housed at CSRS, Cooperative States Research Service, which had a director, Patrick Jordan. And so I sort of worked under him. But he was also responsible for all of the funds for the national agricultural research initiatives with all of the biotechnology and molecular biology. And they thought that any money that was going to SARE was basically hurting them. So when you go through this, a friend of mine, plant pathologist, great teacher, a great man, Dr. Arthur Kalman, you can see that there was not harmony between SARE and these going for as much money as they could get for major agricultural research. And so Dashell was trying to put all of this together and find support for sustainable agriculture. (1:13:51)

So what came out of that was very interesting. So when we had to do the public hearings for the South, we teamed up with a person I didn't know, great soil scientist who was an administrator, he was older than me, Dr. Jon Lang Schifgard, [?] and Jon Lang Schifgard was one of the Agricultural Research Service directors out at Beltsville. And so the two of us and John Abron from Rodale Institute [inaudible] got back together. And then Senator Dashell came up with the idea that the SARE program should review all of the agricultural research programs in the country in regard to their sustainability. Were they in synchrony with sustainability, or not? Wow. So Schifgard and I started on that particular task. And after a while—see the person with the net? That's Anne. She attracts insects. And she's harvesting something. [1:15:04]

And so we developed this system of seven numbers: -3 to +3. -3 would be detracting from sustainability, 0 would be kind of neutral, +3 would be a pure sustainability, probably all organic would go into that and all of the research programs in the entire country we had to review, and 0 being in the middle. Well, the first thing Jan and I with that particular model

learned was that out of seven, with 0 being neutral, now let me tell you this: When you call somebody a 0, 0 is a negative number. So we had to revise our entire system. So we revised the system and conducted our review and our report, and basically it wasn't too favorable to mainstream agricultural research. We put the report together, gave it to the secretary of agriculture. It's never been too widely published. I don't know if that report still exists any place. I hope it does. When I cleaned out one of my offices before, I probably threw away about 24 laundry bins of stuff. I hope it didn't go there.

But anyways, because of that report, it became known that it existed. And so I got invited to give a lecture on that report at AAAS meetings. And I wasn't surprised, I went and gave the talk, and I was a minority of one. And basically the report said that we need to do a lot of work with sustainability. It was a pretty hostile environment that I was in. The interesting thing is, I had data. The scientific community did not have any data. So I was kind of happy in relation to that.

So in this Dashell thing, it talks a lot in there about Dr. Arthur Kilman, kind of the fundamental side of things. But it still exists somewhat today. The land grant system today, for the most part, recognizes sustainability and organics by name and not in principle. That would be my bottom line. But we made a lot of progress. (1:18:25)

AA: Thank you, that's really helpful to hear your perspective on all that. Is there anything you want to say about organic organizations? I don't know how many you were involved in.

GB: Neither do I. A lot. They vary in their strength. I sometimes think some of them get in each other's way. I guess I get telephone calls on Friday nights. Yours was Friday night. A week ago Friday night I got one from the National Family Farms Coalition. And the National Family Farms Coalition is currently developing a sign-on letter for Senator Gillalan's proposed family farm relief bill. That was developed because of COVID-19, the pandemic, and the need for. And Elizabeth Henderson had told them to contact me. And there are about 150 organic, sustainable ag organizations signed on, and there were none from Michigan. And so my job was to rectify that. And so I drummed up 6, of which I could only name accurately 3 before a week from Friday. Now I think that's proof there's not enough communications among them, basically speaking.

So in Michigan, we have Michigan Organic Food and Farm Alliance. And here's another book you can have—

AA: I actually already have a copy of that one.

GB: You asked me about land grant institutions in relation to the organic bit. If you go in this book, there's two things I want to share with you. Laura DeLinn, a fantastic organic farmer, and she leads the urban organic thing here in Michigan. But I wrote the chapter on the organic movement at Michigan State University. And it has all of the gory details in it. I believe it says, and it starts off with Rachel Carson, and some of my stuff in it. And in one place in here it says that up to a certain time—well, I broke this up into eras. The early years, and then talked about that today. And then the reflective years. They were sort of when the organic standards were just coming in and all of that. But it talks about how Harwood was instructed by the administration not to use the O-word, organic, I've written that in quotes there.

And then the other one here has to do with Extension. At this time of one of these meetings, most telephone callers to county extension offices requesting information about organic agriculture were told that the information is not available and that organic agriculture is a bad idea. So that's in writing. That's true. Now that has changed today somewhat. The extension educator will put you in touch with somebody that knows something about organic. And at Michigan State University we had I think the second faculty position, and I was on the search committee for that one, that had the word "organic" in its title. And we have two faculty members now with "organic" in the title. But also in this book, in my chapter, you really need to read it because there's a whole page in there on George Bird's description of John Biernbaum. And I think that's very, very important. Because this question about backlash, I'm not sure how much John will go into that with you. But John hasn't been treated fairly. I tried to investigate it formally through the administration and was told that I could not receive information because it was a personal matter. John Biernbaum is a true organic scholar. His courses, hoop houses, fifteen-acre farm. My version of John is clearly stated there, very positively. I try to be a positive person in public. This morning I feel a little bit all on the negative side standpoint. (1:24:16)

Let's go back to these six organizations. MOFFA, that you know; MIFFS, Michigan Integrated Food and Farm System—have you ever heard of that?

AA: I think so.

GB: And they've sort of decided to go kind of with the limited resource minority farmers, which is very good in relation to that. And MIFFS started from MASA, Michigan Agricultural Stewardship Association. We started that, I was at the base of all of these somewhere along the line, and then we handed MASA off to MIFFS. And then there was the Organic Growers of Michigan, and then after they stopped their certification that became basically MOFFA. And then from the sustainability standpoint, a group of us started a small farms conference up north. We started it at a church in Gaylord. And then we outgrew that church and we moved to the high school in Grayling. Every year there would be a meeting there, and they outgrew Grayling and now it's at the biggest hotel in Traverse City for the past three years. And that's all being done with volunteers. That got pulled off of something called Crosshatch, I guess, an organization, and they run it now as a for-profit organization and do all kinds of other things.

And so we have those three. And then I told you that Detroit and Flint are collapsed cities. And so there's a lot of land, basically, there. And there's urban farming in both places. And it appears to be growing, and who knows what will happen with it. But in Detroit there's two major organizations. There's going to be a third one pretty soon. One is called Keep Detroit Growing, and it's the urban part. And then there's a Black Farm Communities Sustainability organization, and then there's one in Flint called Edible Flint. And all of these are these small organizations within Michigan. (1:26:38)

And so what I believe at the moment, I believe every one of these is important. But they also need to talk with each other. And in addition to within each state, having them talking with each other, they need to have one or two national places where they talk. Because with this Gillilan budget or Gillilan bill that has been proposed, with our Debbie Stabenow being chair of the Senate ag committee, they would like for her to be a co-sponsor. And so it doesn't look very well if you send a sign-on letter to Senator Stabenow and they have no support for the state of Michigan. So that's what we're sort of working on this week. And that will happen. Debbie Stabenow has as great an environmental conscience as anybody you'll ever meet. When Debbie

was in some of her low-level political appointments, way, way, way back, she would always come and lecture in my class. And basically I would do that, I'll just have to admit, is an example of gender equity, where the female legislator can go in relation to that. And then she's been in the Senate for, I guess when she finishes this term, it might be as long as 24 years. And the delicate balancing act that she has to do to keep all segments of agriculture reasonably happy, I think she does an amazing job out of that.

So we go from MOFFA.

AA: Thanks for sharing all that. Is there anything you want to say about your perspective on the organic certification at all?

GB: Organic certification. And it's stated in writing in the ecosystem book, very, very important. Third-party certification is what makes organic agriculture organic agriculture. Without it [inaudible]. Not that the certification is perfect; I guess right now what we know at the national level, the organic standards could be improved. Did you in this process interview Kathleen Merrigan?

AA: I have not yet.

GB: You need to. She's a great person. I know Kathleen Merrigan when she was a legislative aid for Senator Lahey in the ag appropriations committee. That's where we got into that. And for the 1985 Farm Bill I wrote a chapter of it for Kathleen on integrated pest management before I got kind of into the sustainability thing. And then Kathleen went off I think to Tufts and got a PhD and now has her own sort of institute at one of the universities, either Arizona University or a state university out there. But without Kathleen, we probably would not have the organic rules that we have. She came back, and I don't think organic agriculture should be in the Agricultural Marketing Service. That's where it's run out of. I think it should be run out of some more environmentally-oriented group. Yes, you have to have the marketing because it's certification. And so we need to have standards. I think the people that go around to the farms and do the inspections have to be local people. I think it can be a business like it is, but they have to abide by whatever national standards there are or on an international basis. (1:31:18)

Back in the sustainable ag days, a bunch of extension people took a tour to Iowa. That was my first meeting with Dick Thompson, in Boone, Iowa. And then we went to the western part of Iowa, and then to Nebraska. Went on a lot of farms, learned a lot, and we went to North Dakota also, and the co-ops are very strong there. And co-ops are very compatible with sustainable agriculture. But then we got to a town in Nebraska called—well, anyways, it's right in the center of Nebraska—and went to a place where they were packaging organic food. And the next thing that they were going to be packaging that day were organic raisins from Turkey. In the middle of Nebraska. Well, that has some interesting energy things, but also what is organic and what is not? And I'm not going to go into it this morning because I don't remember the details, but in the ecosystem book under "Global Organics" it talks about that in relation to about a dozen different countries.

And I believe personally that organic farms have to be economically viable. They should be family farms. They shouldn't be just large farms minimally following organic standards for a profit. And soil is the basis of that. I don't know, if you want more detail on that you can. I just think I'm winding down. (1:33:22)

AA: No, that's great. One of the last things I want to ask you about is, a couple of times you've mentioned the backlash against organic and sustainable agriculture. So I'd like to hear more about your perspective on that.

GB: It exists. It still exists. It's been severe. It's less severe today. It's less severe today because the challenges conventional ag has in staying afloat, both here and in all other countries of the world. So they're looking for change wherever they can find the answers. This probably brings me back to another story that I should have told earlier, but it does relate to that. And it was during my time as sustainable ag coordinator in Washington. And at that time CSREES in Washington, Extension was separate, was in a different unit from the research and the teaching. So there was another sustainable ag coordinator there. And his name was Dickson Hubbard. Dickson Hubbard was from Oklahoma. Now, my dad, as you'll find out, was born in Indian Territory that basically became Oklahoma. And his mom was born in a one-room log cabin on the Kansas prairies, so I have some relations to Oklahoma even though I've never lived there. But Dickson was one of these guys that wandered around Washington, DC his whole career in a cowboy hat and cowboy boots, in Washington, DC. And Dickson understood sustainability, and Dickson and George Bird got along just fine. And we were good partners, and he knew Washington. So we were a team and worked together and fought against some of this backlash.

So, one day—this is a true story, I've never told it on tape before. And this was during Bush One administration. Telephone call from the secretary's office: "George, as you probably know, you're going to be getting a new deputy secretary for science and education, and when he goes to the Senate for his hearings, we know he's going to get some questions on sustainability. So would you write a briefing document on sustainability?" So I rattled off a briefing document on sustainability and sent it to this secretary's office. And the secretary's office thanks me for that. There's an ethical issue in relation to what I'm telling you here. And the next thing that happens is that Senator Lahey's office calls me: "George, I hear you're getting a new deputy secretary for science and education, undersecretary for science and education. And we want to give him some tough questions on sustainability. Will you write some questions we can ask?" So I write some questions.

My third telephone call is back from the secretary's office. Secretary's office says, "George, we really appreciate it, that briefing document, and yes, we were right, the Senate's going to be asking the candidate some questions on sustainability. And they sent these questions over to us. Could you provide some answers to these questions?" Well, now I have a moral and ethical decision to make. And I decided that, I was in the Marines, and I should follow instructions. So I wrote answers to my questions. The story's going to get good. Sent them over to the secretary's office. A couple days later, secretary's office calls again: "George, those answers were too specific. They said something. We would like for you to write a separate set of answers that don't say anything."

Okay. So that's a little part of that story. And remember that was during sort of the last six months of the Bush administration. The gentleman arrives. A Midwest farmer by the name of Dwayne Aker. Fantastic farmer, understood sustainability, probably votes Republican, I don't know, great guy. And he didn't have any problems with Congress in relation to his appointment. But Dickson Hubbard had ways of getting in offices kind of going around things. So Dickson and I had a meeting with our new two levels beneath my boss. My boss reported to this undersecretary. And so we went around, had a meeting with him, said, "Explain sustainability," and found out that he knew everything that he basically needed to know. And so that was a great

introduction to the new political appointee, which went very, very well. About that time, in the Bush administration most people were clearing out their offices, and he was just coming in. So the next thing, my boss calls a meeting of our whole department, basically, to introduce us to the new undersecretary. And the next thing that happens to me, I was sitting in the room, and Pat Jordan says, "George, come on up to the front blackboard here and explain to the new undersecretary what sustainability is all about." And the undersecretary stands up and says, "George, you don't need to do that, I'll go up and do it." And that was just great. That was a real positive moment. And so that political appointee was one of the best I've ever seen in relation to sustainability. (1:40:20)

And that was also the year of Rio, the first international congress on sustainability, which was very, very controversial. And I didn't get invited to go to that. Only political appointees basically were assigned. And I had to write something about it, but it was pretty mild in relation to that. So the next year it was Clinton, first year. And so the next year was my final year there. And I had to write responses to whatever was done the first year at Rio, was done under the Bush administration, now under the Clinton administration and their philosophy. And I was like on two different planets. It was absolutely totally different. And so you can see that during this entire time there was growth, people were talking about sustainability, but this morning, organic's where the action should be. (1:41:28)

AA: All right. Thank you.

GB: Those are some stories you probably hadn't heard before.

AA: No, that was really interesting.

GB: I'd be interested in seeing how they go now. Or whether I get lynched. No, I'm not worried about that.

AA: So what do you think are some of the most important aspects of this history to preserve and to teach to younger generations?

GB: Younger generations. Mid-generation folks, and old-generation folks. I would not discriminate among those three. The language of ecology. And once you teach the language of ecology, you need to teach how to think in that language of ecology. And that's why in my class everybody's required to adopt a place. To adopt a place in nature, follow change, and be able to describe that place and that change using the language of ecology. And I'm naïve enough to believe that when that is accomplished, the world will be a pretty damn good place. And the humanities have to be involved. So I have an opinion, don't I?

AA: Yeah! Great. Is there anything else you want to say before we end the recording?

GB: Well, I want to go for a walk, show you my garden. You can look at Anne's on your way out. Oh, there was one question you failed to ask me! There was supposed to be a book that impacted you more than any other book. That was a question, right? *The Turning Point*, by Fredsof Kapner. Ever heard of that author?

AA: I don't think so.

GB: Kapner is a physicist. His first book was entitled *The Doubt of Physics*. And basically that's where this physicist got backlash from the whole physics community. Like Kenneth Boulding did for his book *Economics as a Moral Science*. This is his second book, *The Turning Point*. And the next book after that, I think was a book, I can't think of the name of his third one, it's one I probably should have brought, which basically explains science and sustainability in everyday language. And it is very excellent in relation to that. Another little book—have you ever heard of Tom Wessels? A New England forest ecologist that wrote a very popular book called *The Myth of Progress: Towards a Sustainable Future*. And so there are some of these books where pretty renowned scientists have crossed over the line to sociology. And I think in book 2 here—no, I think it might have been in one of my microessays—I went to the humanities because I don't understand social science or what it is, and I'm not ready to say social science fits with sustainability and organics. But being an oboe player does. Does that make sense, what I just said, or not?

AA: Yeah, I think it does.

GB: I think the social sciences are—yeah, I've got one more thing I've got to say. I try in my class to keep it to the facts until the last lecture. And in the last lecture I indicate that we need a new economics. We need a new metric system—I meant to say a new metric system, not a new economics. And I think that's kind of at the heart of the whole thing. Our current economic system has its origins in 1776 with *The Wealth of Nations,* Adam Smith. And remember, that was less than half of a century before we reached the 1 billion people mark. I think things went fairly well; I think anything would have worked because of natural resources from then until about 1960. But I think in 1960, once we got to 3 billion people on this planet, things started kind of falling apart.

What should that metric be? I think that metric should be the kilocalorie. Base everything on energy. I'll let somebody else figure out how to do that. So that's where I am in my thought process. Once you get to that kilocalorie, then you're to Einstein, and you're on to the first law of thermodynamics and the second law of thermodynamics. And Albert Einstein said, if there is one law out there that he believes will never be repealed, then it's the second law of thermodynamics. And then every time you have an energy transformation, I can't feel that heat [of a candle two feet away] here. It's no longer high-quality energy. And that's what food systems are all about. Because that's why we eat, to get matter and energy.

To my garden!

AA: All right! Thank you so much.