

PROJECT: GENETIC ENGINEERING AND SOCIETY HISTORY PROJECT
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[Brad Herring] So whenever you're ready I'll push record. Okay, we're good.

[Matthew Booker]: Okay this is the GES History Project. It is the 14th of October, 2015. Alison Wynn, Brad Herring, and Matthew Booker are here with Paul Thompson. Please tell us your name, your institution, and your role.

[Paul Thompson]: So I'm Paul B. Thompson. I'm the WK Kellogg professor of agricultural food and community ethics at Michigan State University. My discipline is philosophy but I've spent my entire career focused on agricultural technology. First at Texas A&M and then at Perdue. Finally here at Michigan State and as a result I got interested in the emergence of genetic engineering in agriculture pretty early on. And have done research on the ethical issues and GMO's starting in about 1986 and I keep trying to stop doing it but you know somehow I keep getting drawn back.

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[M.B.]: So as a philosopher what is it you actually do? I mean how is your time spent?

[P.T.]: Well, I—in terms of what I write I'm interested in the normativity of dimensions of agriculture as a practice and in particular the way that technologies and technological innovations challenge traditional ways of framing what agriculture's role and purpose is. What good agriculture is. What bad agriculture is. And as a philosopher of technology I'm interested in the way that technology kind of sets a frame for ethics for normative practice that people are often not very aware of. It lies deep in the background.

In terms of the work that I do it's probably a little unusual for philosophers because for me if I can just hang around with people who are engaged in technological innovations or for them that are engaged in opposing technological innovation those are the kinds of settings that really give me something to chew on. Something to work with.

So I guess what I do might be comparable to what some social scientists who do grounded theory work would do. It's largely just trying to be present hopefully in a relatively unobtrusive way, but that's not to say that I wouldn't participate in discussions. And I've been fortunate in that largely through a series of coincidences I've actually been able to be present at a number of important places where discussions over biotech were taking place, and I've had pretty good access to people in agricultural universities that were engaged in developing some of these technologies.

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[M.B.]: So you've described an unusual series of abilities. I think you've done so very modestly. But could you tell us something about how you came to this interest in your career? Did you imagine for example that you would be a philosopher when you were a young person? Or that you would specialize in agricultural technologies?

[P.T.]: So neither. I think as a young person I really wanted to be one of the Beach Boys. And maybe the Beatles. But probably the Beach Boys. And I got into philosophy by taking some courses as an undergrad getting kind of interested in it. Getting up to the point of graduating from college. I graduated from Emory University with a Bachelor's Degree in Philosophy. Having a little debate with myself whether the next step was grad school and philosophy or law school. I figured I'd have more time to practice the guitar if I did philosophy. So that's kind of where I went.

I mean when I was—even when I started philosophy we used to get letters from the American Philosophical Association telling us that there were six Ph.D.'s for every job. So you didn't go into this field with the idea that it was really a great career track. But I wound up doing a dissertation on nuclear power risk assessment. I did my doctorate work at Stony Brook University, and I studied with one of the leading people in the philosophy of technology, and I also stood out on the beach on Shoreham on Long Island with Pete Seeger and sang protest songs against the nuclear reactor there.

And so I got very—and the other thing back from my Georgia Tech days I had friends who were doing nuclear power risk assessment. And so I wound up writing a dissertation on risk analysis. My main philosophical interest coming out of grad school was thinking about risk issues and the way that you use scientific approaches to study risk and how those approaches both captured things that were really important but also tended to make—tended to erase I guess would be a term. But just make us very unaware of other aspects of risk that are really present just in the way that people ordinarily talk about risk.

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So I was very influenced by ordinary language philosophy that in some respects we get a better understanding of risk by just listening to the way people talk than by assuming certain things about exposure and hazard which is kind of the more quantitative way of approaching it. And so I kind of was prepared to do a research career that would focus on energy technologies.

I landed a job at Texas A&M much to my surprise and got there and the Dean of Agriculture at Texas A&M—this is a really long story. But had for some years prior to my arrival been discussing the idea of a joint appointment between philosophy and the college of agriculture with the department head in philosophy. And the Dean, his name was Harry Conkle, I think was a really far seeing individual and back in the 70s he had this perception that agriculture was going to be heading into an era of really unprecedented social controversy, and controversy over the values that were really incorporated into agricultural practice and where it was going. Decline of family farms, a long list of things.

So he wanted to start getting philosophers into the mix. They apparently offered the job to a couple of senior people who turned it down and so I arrived just at the point where their expectations were properly reduced and so I got an opportunity to do that. In thinking about it I was thinking well, you know I'm interested in risk. They're are obviously some risk questions here. I was thinking primarily about pesticides.

So I thought I'll just try to shift over from some of the energy technologies I've been looking at to chemical technologies in agriculture and I'll be able to think through similar kinds of philosophical questions. I didn't have any experience in agriculture.

As it turns out I had worked for a couple of summer jobs in college on a large industrial scale—egg production facility. And I often tell a joke when I'm talking to farm audiences I say that this was my experience in agriculture. I won't say what I did but I worked with a shovel and it was good preparation for doing agricultural ethics. Rural folks think that's hilarious.

So that was kind of it—I didn't have any other connection, but I had some great mentorships during those years and had a number of people that took me aside and kept me from making the most obvious stupid mistakes and gradually started learning enough about agriculture in general. Agriculture's social context and then fairly early on in my career I started—I had made friends with a number of agricultural scientists and some of them were starting to talk about genetic engineering.

And actually some of these—I remember a plant pathologist in particular who was very prescient about his words were—they're going to repeat all the same mistakes we made with pesticides. And so I was trying to understand what he meant by that. And so I started paying attention to it very early, and I think my first publication on GMO's is 1986, and from then on I probably had at least one article every year. And then gradually was asked to direct a Center at Texas A&M which was initially called the Center for Biotechnology Policy and Ethics. And I did that for basically the rest the time I was at A&M till 1997.

So that's kind of—it wasn't foresight on my part. It wasn't—and it wasn't desire to do this. It was really just—I'm very opportunistic, and so the opportunities presented themselves, and I jumped at them.

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[M.B.]: So you mentioned that you were in some key places at some key moments. And one of those we were talking about earlier was the NABC. Do you mind telling us what that was and why that was important?

[P.T.]: So the National Agriculture Biotechnology Council was a creation of a small group of Ag University insiders. I think probably the most important individual was Ralph Hardy. And Ralph had been at DuPont, had actually I think developed the capacity to do ag biotech during his years as a VP at DuPont. And then he had retired from DuPont, and I'm not sure if he went to Cornell or if he went to Boyce Thompson Institute. But those two institutions are pretty closely related in any case.

And so Ralph and some other university types and a few industry types—I know there was an attorney involved who represented biotech companies. I don't remember what his name was. [He] had this idea that we should create a forum that would be sponsored and run by Agriculture Universities where there could be a free exchange of views on the future of biotechnology and where there would be a public record created of what some of these debates were about.

I don't remember—there were four universities at the beginning. I think they were probably Cornell, Texas A&M, Iowa State and maybe UC Davis. Maybe. Maybe one of the—maybe the whole UC—University of California system I'm not sure. And gradually the membership expanded. I think it still continues today. Although it has less of a grandiose function today.

And so probably starting in about 1985—something along then they started having annual meetings. Maybe it was later. Maybe it was '86 or '87. I'd have to actually do the archival research to figure that out. And these meetings would be places; they would pick a theme, and they would invite people from NGO's, people from organizations that were critical. People from industry, people from different universities to come and talk over those themes.

And I think I've—my first meeting might have been the—it was certainly not the very first meeting. It might have been the second or the third. And I was very involved with actually organizing what I think was the fourth meeting which was held in College Station at Texas A&M and the theme of that meeting was animal biotechnology. It really focused on transformation of animals.

I remember being at one of those meetings and again I don't remember the year where—why we were at the meeting and we're sort of talking about how biotech should be regulated and doing this in a fairly open ended way that the—there was an announcement I think from Dan Quayle's office who was director of the Competitiveness Council that they had decided how it was going to be regulated and that it was—they were basically announcing in fairly succinct terms the coordinated framework. They announced that there wouldn't be—they decided that there wasn't any need for any new legislation. There wasn't any need for any new regulatory agencies.

And I also remember that I was in a room full of people who probably thought that they should have been involved in that decision who were just as surprised to hear that announcement as I was. So it was an interesting place and I think particularly for the first decade of its existence those meetings and the transcripts of those meetings the public—the papers and so on that were presented are actually a really important archive for some of the early years of biotech.

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[M.B.]: So you've described an interest in agricultural technologies which in your telling brought you into agricultural biotech rather naturally as an extension of previous interests. What do you think was most significant about that technology? Was it in fact simply another agricultural technology among many? Or do you think it is distinctive? And here you could take an historical approach if you wish. Have you changed your mind for example?

[P.T.]: I have changed my mind, and I changed it in two ways. And I'm not—it took a while. I mean I couldn't—I didn't have an epiphany. There's no single moment where I changed my mind but—so I came into this after having studied nuclear power. And you know succinctly I think that although there are wonderful, thoughtful engineers in nuclear power, institutionally there is not really much capability or interest or willingness to talk about ethical issues. And I think that there's actually a lot of denial that there could be such things. Overconfidence in the technology.

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So I was kind of prepared to go into ag biotech expecting to see the same thing. And I did see the same thing to some extent. I think many people who have come into it, that's what they take from ag biotech, but I saw actually a group of people whose motivation for their work was really deeply ethical. That in distinction to engineers of any kind really. I would say that agricultural scientists had a kind of—they had an ethical mission that really informed their work.

So they were more receptive to conversations and to discussion about the ethical dimensions of their work, and it was considerably easier to introduce ethical subjects into that conversation.

So in one—that's one sense in which my view changed and probably made me more disposed to think well of any agricultural technology as compared to some other areas of technology development. I went into genetic engineering with I think, also with a predisposition that many people who are not biologists or geneticists have which is that this was—it was going to be a path-breaking totally new kind of technology. This idea of moving genes across species boundaries was totally unprecedented in my view, and we were just not really prepared to know how to think about it.

And that the other thing I was really impressed by was that once you've moved a gene across species boundaries it could reproduce and it could move into the environment and so it would not be a technology that could be spatially controlled the way even nuclear power which we have trouble spatially controlling. Radiation once it gets out into the atmosphere. But at least in principle it is a more controllable technology and I think that it took me several years of working in biotech for me to really start to see it more like just like another agricultural technology.

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And part of that was really coming to a better appreciation of what just ordinary plant breeding is. Being told by plant breeders that hey, we've been crossing species lines since

the seventeenth century. And getting a sense of what that means. It still doesn't mean that there isn't—that there aren't significant ways in which genetic engineering and genetic technologies increase both the power and the speed of being able to introduce genetic changes but I do think that from the standpoint of asking the right kind of ethical questions you could ask all the same questions about a conventionally bred potato or strawberry that you could ask about a genetically engineered potato or strawberry. And there wouldn't be any kind of ethically forceful reason for presuming that the GMO is going to be more ethically problematic.

In many respects I mean there are some obvious differences, but the obvious differences are really on the social side. They really are a function of the way that non-biologists—ordinary people have been trained to think about genetics. The legacy of a eugenics movement that made many people leery of particularly the—combining the words genetics and technology together. The domination of the medical bioethics community which really I think for maybe even still today tends to drown out ethical conversations around agriculture and food biotechnology. And let me specifically say elite conversations by that I mean me. You know people who spend a significant part of their scholarly lives studying the technology and trying to understand it.

And even today I think for many official functions you would probably see a famous medical bioethicist called to testify about agricultural biotechnology rather than someone like me or one of my peers that have actually spent a lot of time studying it. So there are just a lot of ways in which I social milieu for thinking about genetic technologies in general; agricultural technologies in general.

I mean it's now—over the last five years I think we've really come to appreciate culturally how distant we are from food production and how little people actually know about it. The interesting thing is that I think many ways culturally and institutionally the assumption is that everybody knows about that, right? I mean we designed our K through 12 system for education on the assumption that hey, everybody grew up on the farm so we don't need to put any agriculture into this curriculum, right? And we still have a hard time putting it into that curriculum.

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So there's this implicit assumption which everybody knows is false that we don't really need to actually think in a careful or reflective way about agriculture because everybody came from a farm, didn't you? And that bias creates a lot of problems for agriculture that extend beyond GMO's, but it has really come to roost in a big way with respect to some of the GMO controversies.

So I think those wound up being the important differences. The place where I really see important differences that raise substantive ethical questions. Whereas in terms of food safety or environmental impact I mean honestly in terms of environmental impact can you think of anything worse than tearing all the native plants out of a field and then plowing it up and putting non-natives in there? I mean from an environmental standpoint agriculture itself is the problem.

So there just—the idea that these are unique for those kinds of issues I think is probably just it reflects a kind of failure to understand some pretty fundamental things about agriculture itself.

[M.B.]: I would like to ask you about that. About the role of ethics and philosophy and perhaps the humanities broadly in decision making, in thinking about genetic engineering and agriculture. And particular you've had a long career thinking about the ethics of agricultural biotechnologies. What did you imagine as those—what are the major ethical concerns perhaps when you began and have you changed your idea about what central ethical questions there are in agricultural biotech?

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[P.T.]: So my—not surprisingly given that I was interested in risk all of my early papers were about risks and also about how framing the issue in terms of risk really put us on a particular trajectory for other sorts of questions. And in particular that it put us on a trajectory where other kinds of considerations we could just call them cultural or even aesthetic were going to be—they weren't going to count, right?

And some of that—I have a new book out on food ethics, and I'm, in this book I would argue that it actually just goes back to John Stewart Mill, that we decide that the important questions for public policy are, are we going to hurt anybody else? And everything else is either up to the market, or it's up to a private ethical domain.

But I felt there's going to be some people who don't like these foods and the reasons they don't like them are going to be much more similar to the reasons that lie behind kosher and halal diets than they do to any risk-based concerns. That may eventually branch out into this is in the 1980's when I'm thinking this. That may eventually branch out into things like political solidarity that you know I'll want to make sure that I get that hot sauce that's made in Texas and not New York City, right? I'm at Texas A&M. And of course pretty soon the food industry catches on to this, and that's actually an ad for hot sauce. I don't know if people will remember that.

But I think that we have actually seen that development in terms of local foods and affinities for fair trade foods and all of these various kinds of hyphenated foods that people want today. They may associate that with health but I think what's often driving it is a sense of cultural value or political solidarity and I felt like at the outset that the risk trajectory was going to make all of those concerns seem illegitimate. Both from the standpoint of public policy but perhaps even more important from the standpoint of agricultural research as something that they didn't have to pay any attention to. And that's because these ag guys who I've already said they thought of themselves as very ethical, they understood what land grant universities were.

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Coming in the philosophy department I had no idea what that meant, right? But the ag guys all knew that they had this historical commitment to serving the public good and being the university that would serve the interests of the people and not the elites. And yet I felt they were sort of unthinkingly cutting themselves off from a lot of the concerns that were really going to resonate most fully with the way that people related to their food. The way that they understood their food that they were converting food into a very technocratic overly rationalized kind of thing and it was actually going to undercut a lot of the interest that people had in their food and in fact a lot of the political support they would have for their—for agriculture research and agricultural universities that ag research would come to be seen more as the enemy rather than as the friend of the people.

So I got onto that pretty quickly, and I'm probably still on that. And I'm not sure that in one sense—I mean sometimes I feel when I do write on biotech these days that I'm beating the same dead horse that I've been beating for 25 years. I guess yeah, closer to 30 years now.

But what I did do is I got off of other issues, right? So briefly I started working on animals, and I got interested in animals because some animal producer groups got interested in being able to actually talk to a philosopher rather than have one yelling at them all the time.

And so now I do quite a bit of work on animal welfare. I got interested in sustainability and sustainable agriculture. One of my personal frustrations with my association with GMO's is that people who do know who I am and know my work assume that I couldn't possibly be interested in sustainability because I'm so interested in GMO's. But I do see a lot of what I think from the perspective of agriculture seem like a quite vulcanized and separate and distinct issues as having a certain kind of unity or at least interrelationship in part because they are all about food and because food is—winds up being an experientially unifying thing in people's experience. So although the issues that we talk about in terms of the diet and obesity problems and what caused this upturn in obesity? I'm not sure that it's—that the causes can be tied to anything that's going on in GMO's or that's going on in animal welfare. I think often times the activists really push their arguments a little too hard in that regard.

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Nonetheless the fact that it's all food provides an integrative framework that is really important for thinking about these issues. If I can get back to your question how have I changed? I really—although it's impossible to do good work in all of these different areas because you have to know so much in each area. I really hope that if there are people who do follow in my footsteps of doing ag and food ethics that they will approach this as a subject matter that has cross connections and integrative features that cut across all those things.

So it's become really important for me to not just do biotech. It would be—probably should have given you that answer right at the beginning. That's kind of the short answer to your question, right? That just doing biotech is not enough. That it's the larger context that

really calls for some kind of understanding at the level of the ethical issues and frankly even on the ag science side and especially on the corporate science side they're so focused on a fairly—it's reductive in that sense they're so focused on fairly narrow set of issues that they just can't—they're not thinking broadly enough to think about the broader implications. Environmental, yes, but especially cultural kinds of issues.

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[M.B.]: That in a sense leads to another question which as to do with the way that ethics can be brought into debates around agricultural technologies broadly. And I'm thinking here that you have called in the past for formal procedures to be put in place to address ethical questions in agriculture. And I'm going to read you a quote from a paper you wrote. You pointed out more than ten years ago that the scientific community has " failed to meet a procedural standard that calls for a full and open discussion of the ethical values and norms implicit in their thinking about genetic engineering." That's from 2004. So about those procedures do you think that such procedures have been institutionalized? And if not why not?

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[P.T.]: So I think that I mean going back to the NABC I mean I understood when I was first—when I first heard about NABC, and for a while, I was Texas A&M's designated representative. They had—you had to have some sort of at least Dean level rep, and at every school, they had a low-level rep, so I was the low-level rep from Texas A&M. And I was the only person I think around that table that wasn't a molecular biologist.

I kind of thought that's what NABC would be, right? That it would be a way in which the land grant universities would come together and would create a forum. It had financial support from every university. It had high level representation in terms of its own governance structure. There were at least Deans or Vice Presidents as the main representatives and at least in the early years it had a fair amount of visibility especially in the plant science, animal science communities where biotech was really being deployed. And I think that it did serve that function up to a point. But these days it's sort of devolved into just another conference. It is a conference where I haven't been now in four or five years but looking at the annual conferences you know there's a lot of discussion about the hot new thing in biotech. And a few discussions about the policy but these broader kinds of things I'm talking about. They're just not done any more.

Another way that I thought this would be institutionalized and I think would be that other universities would do what Harry Conkle had done. And that just as we were starting to see these medical bioethics departments show up in medical schools we'd at least start to see agricultural universities have groups—I mean groups like at least two or three people whose responsibility would be to do bioethics in the realm of food and agriculture.

And that showed some signs of starting to happen in the 80s. There was a position at Iowa State that was like that. There was a position at the university of Florida that was like that and to my knowledge that's kind of where it ended. And partly because the budget situation was really different in medical schools and ag schools. I mean medical schools

were awash in money and philosophers were cheap relative to medical researchers. Ag schools were in this situation where they were having to let go of that person whose specialty was the insects that attack a particular kind of being. And they were having to really reformulate things.

And part of that was driven by biotech. They all of a sudden had to find a place for all these molecular biologists. And so they just were not ready to embrace an institutional component that would be doing this. That clearly hasn't happened.

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And I think that there have been some other places. I worked for a number of years with Genome Canada which was a program in Canada that was intended to sponsor a lot of their work in biotech and genetics both medical and food and ag and natural resource. And I think Genome Canada actually developed a very good approach which is that all of Genome Canada's research programs were required to have what they called a GE3LS component. GE3LS is a—I think it's a French acronym for something that's kind of like what we in the US would call ELSI—Ethical, Legal, and Social Issues.

And so all of the research supported by Genome Canada had to have if not philosophers then at least economists, sociologists, anthropologists thinking about the social and ethical issues that were tied to that particular kind of genomics research. And not all of those have been successful, but most of them have been. Many of the biological scientists that run those programs report that they actually felt like that interaction in a strange way improved their biological research. We've never done that in the United States.

I mean in our age there is a bit of that with the medical, but it's a long way from the idea that every major grant has to have a bioethics component and we've never done it at all at USDA or at NSF. We have taken steps in that direction but the idea that you would actually have real interaction with people who are thinking about these issues. And frankly, the thing I'd say is that it's not—just because you've tacked an economist onto your program doesn't mean that you're going to get ethical reflection either so.

I think I can point to all of those experiments with this and I think that in some respects they were partially successful experiments but it has not taken hold and we still don't really do it. There's a lot more of it in Europe than there is in the United States. The Europeans I think have embraced this and here I'm not talking so much about biotech in particular but just this whole responsible innovation program which is EU wide is—I'm not necessarily—sure I would point to that as the model that ought to be followed, but it's been a tough road in the US.

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[M.B.]:

As someone who's participated in I guess I'm going to call it decision making or maybe we could use the word governance, both as a scholar but also as a participant in committees and boards like the ones you just mentioned. How do you regard the role of ethicists, philosophers, humanists in that kind of science dominated setting? You just pointed to some of the drawbacks perhaps. But when you participate in those settings do you think of yourself—who do you think of as your major audience in a sense?

[P.T.]:

So in those settings, in particular, the audience is the—first the other members of the committee and then indirectly it's usually the scientists, right? And one of the things that every chance I get I would say I don't think it's that you don't discuss ethical issues it's that you discuss them around the water cooler and that means two things. It means it's a fairly narrow conversation because you have to be at the water cooler to participate in it. And secondly that there's absolutely no documentation of it, right? So it means it's really hard to learn from it.

So there needs to be both a formalization, not an over-formalization I really don't want to recreate something like human subjects committees or something. I really push back pretty strongly on that. But there needs to be a little bit more formalization of the process of thinking about whether this is a good idea. Thinking about what kind of goals it serves and what kind of goals it should serve. And then also some level of memory of those conversations. So that you can enable learning at least at an organizational level and preferably at a cultural level.

And what we've had is in fact by not doing that in a formal way we've actually created an ethos or kind of culture that ethical issues don't matter, right. I mean I think in fact they matter a lot more and are reflected upon much more than that ethos suggests. But if you were one of the scientists who happen to be down the hall when that water cooler conversation took place you might not realize that they had had five or six of your colleagues that had a really heated discussion about whether this really serves small farmers or whatever, right?

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And the result has been it makes it difficult. People resist the idea of an ethics component in grants because they presume that that will actually make it harder for their grants to get funded. Their colleges will look at it and say ah, this ethics stuff is a bunch of nonsense, right?

So I think these things are—you know there's very much a kind of vicious cycle process in terms of these things but it could just as easily be turned around and become a virtuous cycle. If you made the commitment to once a semester we're going to devote our departmental seminar to an ethics discussion or at every meeting of every professional society we have two or three invited sessions or sessions where we dig into some of these things. It might seem fairly small but I think that the cumulative impact of doing that would actually be huge.

So I'm not really asking for epiphanies on the part of the science community. But there are ways that you can play those kinds of roles. And often times in terms of the specific role that I will play in a committee it will be to say well, you know they don't know how to do the ethics and I say well, you know something pretty simple. Like saying we're going to have a seminar series on ethics.

Or we're going to get a—we're going to work with an economist or social scientist and the thing that I would also say both as a reviewer and as an advisor is that it's really important that those things that they actually talk to one another, right? It's not enough to have somebody off publishing in science and technology and human values because molecular biologists don't read that journal, right? And it really needs to be done in such a way that there will be a real exchange of views.

Substantively sometimes substantively I have things that I say. And one of the things that I did early on with biotech is really to stress that there are—there's one way of thinking about risk which is common and regulatory frameworks that derives from what we in philosophy call utilitarianism. It's very forward-looking. You're looking at the probable outcomes of your action and that's how you think about the ethics of it. But all of you guys participate in a totally different way of thinking about risk which is the human subjects committee. And in the human subjects committee, you could be—you could have some sort of fantastic research that's going to benefit humankind but if the people don't agree to participate in it, you can't do that research, right?

So there we have this ethic of informed consent being the dominant paradigm for thinking about risk so what happens in biotech if we actually put these two paradigms in conversation with one another and we actually think that well, there may be two different ways to think about risk and it—at that point usually I don't have to say much more because I've got everybody else already talking about it.

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And I think that—I mean those are small things and sort of issue by issue there's a lot of that kind of thing. Lately I've been doing that kind of thing in the context of animal welfare discussions and I sit there and I'm quiet a lot and I don't say much but I try to pick the moment and make a point that is going to open up an ethical decision. I'm never prescriptive. It's not my nature to be deeply prescriptive. Some philosophers are very prescriptive but I see ethics as the primary role of ethics in our time at least is in terms of making sure that the decision stream doesn't get too narrow too quickly.

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[M.B.]: So that is a wonderful comment, and it reminds me of something that is obvious to me in reading the body of your work or at least looking over the body of your work. And here I don't mean just your publications, your books, your articles, but also your public talks, the courses you've taught and so forth. There it is clear that you imagine your work—your audience perhaps both as decision makers but also as a broad public. A broader public. And I'm wondering if you—what you think about that role? The role of humanist, philosophers, ethicists, in translating perhaps. Is that, in fact, one element of it? Translating what scientists are doing and what they're actually doing behind those doors to a broader audience.

[P.T.]: It is a role that I think not just philosophers but that humanists, historians, social scientists can play and should play and probably don't get enough rewards for playing when they do it well. They're—we can be just as assertive inward and reductive as the scientists but I

think that one of the things that we can do and can often do quite well is to—your word translate I think is a good word to be—people who—and help—people who wouldn't be—they might not be part of the inner circles because of the expertise that they have or don't have but it also might be just a certain kind of life experience.

I mean a lot of people that are in the inner circle of biotech don't have much biological training. They may have law degrees or business degrees or something like that, and there's as much need to translate and interpret in that regard. Roger Pielke Jr. calls this the honest broker role that you—that one role in science policy is to be—and it's not a role that—it requires judgment because there's such a morass of things to talk about that you have to exercise some judgment and that judgment should be informed by scholarly values as to what messages you're going to emphasize. You need to have some understanding of what those publics are. And how to reach them. But your role is not to advocate for a side in an issue but to really try to help people who are in a state of uncertainty or initial interest. Get some entrée into the issues and start to be able to make sense of them.

[00:48:44]

So I think that's a totally legitimate role for and one that's really important for scholars in science to play.

[00:48:51]

[M.B.]: Well I'd like to ask a couple of questions about controversies within agricultural biotechnology, genetic engineering in agriculture and one of those is an observation made by several persons that there's a kind of major power difference between those who extol the virtues of GE foods and those who oppose them. Both groups of—at times deceive the public with exaggerated claims. From an ethical perspective is the group with more power more culpable for doing this? Or is the ethical breach equal do you think?

[P.T.]: Well I think the ethical breach is—I'm not going to—I think it's probably equal honestly. I mean I think that—I mean people in the US, in particular, are not naïve about that businesses want to sell them something, right?

And I think that everybody approaches these messages that come out of economically powerful groups. A lot of the power just arises from the fact that because they expect or hope to make a lot of money on this down the road, they have a lot of money behind them, right? So they can—they get forums. They can pay to have web pages built. They can send people to public meetings. They have a—those are all the primary advantages they have. But I think people are—expect them to overstate their work, and interestingly I think people may not expect some of the critics to overstate their work.

So there's a certain sense in terms of where I think people's expectations are that it—that the companies are not really betraying their expectations when they plump the products in a way that they maybe some of the NGO's that are active are. But the other side of this is that I think people do expect the universities to be much more like honest brokers.

And there I think the problem—this is what brings me back to why I'm always saying we need to have more space for ethical deliberation because I think partly because these guys and now the guys I'm talking about are molecular biologists that work at my university and your university and every agriculture university. They're just so insular they talk to each other at the water cooler, and they just don't really—they're not really plugged into this debate. And they're not really very reflective or aware of what they're—what the critics are even saying.

If you go back and do a literature research on what people from the scientific community have said they'll constantly or even more in their public talks they'll constantly refer to the stupid mistakes that their opponents are making. But they will never actually site any of those opponents. We don't have any evidence they've actually even read that stuff. And I think in a lot of cases they're making it up. They're own—they have very good scholarly values when it comes to their science but when it comes to their ethics they just don't approach this in the same way. They don't—they've never been exposed to anybody who thinks that you have to site your sources when it comes to ethics.

And so I think there there really is a kind of ethical failure that I would say is pretty commonplace in the agricultural research establishment all the way up to Deans and Directors of research stations. They just for the most part are—they're just—they aren't given the tools, and they don't have the culture that allows them to address these issues in the way that the public expects them to.

I mean I will say that I think that it would be nice if we had some way of making the fight a little fairer than it currently is. It would be nice if there were—there was a little bit more money behind some of the critics. We might—this is actually something that I think the Europeans are trying to do. I'm not sure they're succeeding at it. But it might be nice to see something that begins to approximate a match between equally well-funded opponents.

[00:53:45]

So I do think that there's a problem there, but I'm not so sure I would really blame particularly the industry scientists because I mean they're—if anything the industry scientists are probably more modest about the claims they make for biotech than the university scientists. There's actually research that supports that. And it's partly because the industry scientists know that nobody's going to believe them to start with, right? So I think it's a complicated problem.

[00:54:14]

[Alison Wynn]: What do you think are the long-term costs?

[P.T.]: The long-term costs I mean are what we're paying right now. When I started doing this work which was in the 80s and doing it fairly seriously in the 90s I expected this to be a controversial issue that would play out by the year 2000, right? And here we are 15 years later, and it seems like it's building up steam again, right?

Congress is debating labeling laws, and the long-term costs are that many people in the public—I mean is a little bit of an overstatement, but they've come to believe that there's nobody out there they can trust. And in that kind of environment you're going to—if you don't think you can trust anybody you sort of approach it well since I can't trust any of these sleazeballs, which sleazeball do I want to line up with? And the sleazeball that's saying no seems like a lower risk than the sleazeball that's saying yes, right?

So I think that many people have lost a lot of confidence in mainstream agriculture generally and in agricultural research generally and in this technology in particular. So that's the long-term cost. I won't say that I—I mean I'd love to sit here and say I told you so, right? And there is a certain sense of which I did tell them so, right? But I can't honestly say that if they'd followed my advice they'd be in any better shape. But I think there's a certain rationale behind thinking that a little bit more balanced and nuanced. It's not even so much balanced in the sense the message needs to be different but it just needs to be more nuanced, and it needs to be more appreciative of the role that foods are playing in people's lives.

[00:56:27]

Once I gave a talk and there were a bunch of Monsanto people in the audience and I compared the biotech industry to the computer industry because I was actually doing a lot of work with some people in computers at that time. And I was saying everybody in the computer world hates Microsoft and loves Apple. This would have been before Apple got to be quite the gorilla that it is today. I'm not sure we love Apple quite so much as we did then. And but they still pay attention to Monsanto but they—there's something about the way that company presents itself that seems to be much more in tune both with the ethos of geeks—people who love technology but also people who aren't being exposed to it. And I didn't say—I promise I won't make you delete this question. But I did not say I didn't—I just left it like that, right? And there was a vice president who was there with his wife. And she just started lecturing him immediately. She loved this analogy.

And it was—I think looking at some of those industries would have suggested that there were much more subtle and frankly I would say from a philosophical perspective the technologies that Microsoft and Apple are engaged with are much more disruptive than biotech, right? Culturally and every which way, right? But they have been—they have—I mean I would actually say it's too bad we haven't been more critical of some of those technologies. But they certainly have been much more culturally attuned, and the cost of not being culturally attuned is a situation where people today are utterly confused by the food system. And really don't have much confidence in anything that looks like high technology.

[00:58:36]

[M.B.]: One of the striking things about the debate over genetically engineered crops today is that it often seems to move to shift—opponents seem to shift from concern to concern. And that is a reminder of again of early decision making about how opponents would frame their objections. And what I'm thinking of is that back in 2005, Fred Buttel wrote an article that warned opponents of genetically engineered crops that they were painting themselves

into a corner by focusing solely on the health and environmental risks or problems associated with genetic engineering crops rather than other types of concerns perhaps ethical concerns beyond those. What are your thoughts about that decision? Or do you think that's accurate?

[P.T.]: Well, I think it is accurate. And I think that in some respects they made that choice—I don't know that they made it reflectively, but it was probably a strategic choice because to the extent that they were going to have any leverage in the regulatory environment they had to make that kind of a focus, right? This is the point that goes back to John Stewart Mill as a kind of liberal in the broad sense society. So we believe that when it comes to religious beliefs and cultural attachments and whether you eat hot dogs or tofu dogs that's all up to you. Because those are individual decisions and we—, the government should stay out of that. A lot of our debates concern how far the government should stay out of that. But that becomes the framing way of thinking about a lot of issues in American society. And when you're clearly on that turf of human health you're in the governments' wheelhouse, right? A little bit weaker on the environment side. And actually, once you're talking about animals it hardly counts. There are some laws that protect animals but even most of the animal protection stuff is outside the realm of what's considered to be an appropriate area for governments.

So I think to the extent that these groups felt they had to get some kind of government action it was probably a necessary choice to focus on that. The other thing which I'm not sure that they thought about was that there is implicit logic to risk which is it's very easy to be suggestive about risk and to—once you put the thought in somebody's mind they'll start to worry about it. Maybe there really is a monster in the basement, right? And even rational adults may have that little fleeting thought that maybe I should go down and check in the basement, right?

And even things that are that everybody knows are totally false it's still that little nagging thing. So it's a very easy to raise doubts, and it's very difficult to allay them so when you choose that strategy you're in a domain of human rationality I guess we could put it where habitual thinking and the tendency to gravitate towards what Dan Kahneman calls fast thinking encourages a suspicion or worry. So it actually is a way to build a certain kind of public constituency. And it's a way that many people in the biotech community think is ethically irresponsible but I think it's just intrinsic to risk issues and we need to finally just recognize that this is the way people are and we're not going to force them into being rational risk assessors by beating them over the head.

[01:03:04]

So in some respects that's—again it's a vicious cycle process. I've talked to lots of people in the NGO community offline. I don't know whether they'll say this if you get them in front of the camera but who would say that their primary concerns are some of these social concerns is this going to put small farmers in Africa out of business? Is it going to force them into factory work when they'd rather be farmers? Is this—how do the intellectual property regimes influence power distributions? What's happening to local foods and small farmers in the US? And then they'll turn around, and most of their public action will be on these health and environmental risk issues.

So I guess the one point where I might disagree with Fred's original comment is that I'm not quite so sure they painted themselves into a corner as much as they rather strategically recognized that that's what power they had was pretty narrowly confined to that domain.

[01:04:15]

[M.B.]: Well backing up a little bit thinking of a bit more big picture from your perspective in your disciplinary and scholarly basis what do you think has been or perhaps the most significant moment in the history of genetic engineering so far?

[P.T.]: Wow, that's a—I can't—I don't think there is one, okay? I think it's a—I mean I guess if I was forced to pick it would be the moment in the UK when people started advertising that they were stocking non-GMO foods and Sainsbury's had GMO tomatoes on the shelves. I remember hearing a Sainsbury executive give a presentation in which he said that when some of their competitors started advertising this way that within a matter of a week they saw a double-digit percentage drop in sales storewide. So not just these tomatoes, right? But all Sainsbury's products took a double-digit drop within a week, so it was a very effective advertising ploy and it's basically what lead Sainsbury's to take those tomatoes off the shelf and to start also advertising that they were GM free. It might have been the single most important incident in consolidating European resistance to GMO's. And frankly, I don't think that if it hadn't been for European resistance to GMO's that we'd still be talking about this in the US today. I think it's this spill over that, oh the Europeans don't eat this so why are we eating it? It's a very important part of what kind of kept this issue alive.

[01:06:17]

But you know there are bunches of little things like that, right? There's this—you could tell the GM story as a whole series of little vignettes that start with ice nucleating bacteria back in the early 80s and then go to recombinant bovine somatotropin and one after another little incident, right? And I'm not sure that biotech's different from other ag technologies in that respect but what is different is that you have a very clear identifier that allows people to associate these problems with a single phenomenon.

[01:07:00]

[M.B.]: So there are two fascinating pieces of—at least for me of at least two fascinating pieces of the example you just gave. The first is that you pointed to an example which really has little to do with the technology per say. It's an advertising campaign and its impact on a consuming public. That is the critical driver of that example.

And the other point you made that I think is interesting for us to think about is people knew about GM tomatoes because they were told about GM tomatoes. That is the consumer can't tell from looking at a tomato whether or not how it's been bred. And so there's—in both cases the technology itself was in a sense secondary. It's the information about it and then the consumer's behavior that is interesting.

[P.T.]:

Right, well that latter point is broader than GMO's. I mean the same would be true about organic. You can't tell from looking at tomato whether it's organic or not. So I think one of the things that—one of the reasons why ethics is important in agriculture in a way that it wasn't in the 1950's or 60's is because people want to know the story behind that food, right? 200 years ago people knew the story behind that food and it came from their neighbor's garden, right? Or it came from somebody's pig farm a half mile away. And food was very rich in a narrative structure. And does it have to have that? It doesn't have to have that to be safe. It doesn't have to have that to be cheap. Arguably being cheap and having a narrative structure are not really all that compatible, right? But to the extent that having a narrative structure around food is important for identity. We're the people that eat lots of pasta. We're the people that eat falafel, right? We're the people of the maize, right? That narrative structure is absolutely crucial. So it's crucial for a lot of cultural identities. It's crucial at a more micro level for a lot of families. [A] particular recipe that came down from some great grandmother that we continue to eat even if nobody really likes it. And we eat it only once a year. That narrative structure is a really important part of food and it—in many respects it holds us together as individuals and as groups. So we've now seen the emergence of a lot of mechanisms that tell stories about food that we couldn't tell just by looking at it. And in some cases it's gotten ridiculous but I talk about hyphen free foods. Give me that hyphen free food. Forget the fair trade, the gluten free, the bird friendly. The whole long list, right? But I'm a little facetious because I do think that people want those stories and there are lots of—I mean in some respects the advertisers figured this out a long time ago. But now people want—they want stories around those foods that they can actually believe in and that they think have some sort of credence behind them and that are going to be values that they really can endorse and believe in.

[01:10:51]

So I think we're moving in that direction in a big way in the food world. It's often tied to larger global ethics. People will buy lots of products—not just food products because they think they have a lower environmental impact or they think they have a better—the climate impact is better. People are starting to see a lot of their consumption decisions as needing to support a certain set of values that governments have chosen not to regulate for whatever reason.

So that's bigger than agriculture, but it is something that's very much affecting. People are trying to figure out well, what is the story with these GM crops, right? A better—I mean I like the technology enough, I see enough potential in the technology that—and if I put myself back into that “I told you so” mode what I envisioned 30 years ago was a situation where the fact that it's GM wouldn't have been the most crucial part of the story, right? I mean from one standpoint there's a huge difference between herbicide tolerant and BT crops in terms of the story you could tell about them in terms of the way that farmers use them in their environmental impact. And but rather than much more what is this particular instance of BT—genetic engineering trying to do? What's it about? The fact that it's genetically engineered itself has become the trope that really singles out the key theme for people. And it's going to be really difficult to reverse that at this point.

[01:12:43]

[M.B.]:

That's a transition for me to begin asking you about futures. You've talked some about past. What do you think are the most important emerging issues related to genetically engineering and agriculture? And what were they when you began working in the field. If you wanted to take an overview of it.

[P.T.]:

Yeah, so I think there are some fairly—not well, some poorly appreciated issues that are really important. And so that's really what I want to focus on. I don't know if they're the most important but I think that we've actually now moved into an era where public agriculture research is virtually dead. This is an overstatement to be sure. But it takes a lot of money to get a GM crop through the regulatory system and our public institutions are not set up to do that. You have to generate even for the simplest kind of GM crop you have to generate data to demonstrate substantial equivalence that we've never done in public agricultural research. We just—we develop the variety, and then we turn it over to the Extension Service or to the association of whatever crop that is and then they run with it from there. We just don't have that piece in the public sector to generate the data and take it through the regulatory system. Some universities are trying to gear up and do that but it's incredibly expensive, and it makes public research enormously more costly than it was in the past.

[01:14:25]

And then I think layered on top of that and this is something that I see as—not even so much tied to genetic engineering just in terms of genomics that even in the private sector we've actually now started to see a model of research emerge that's much more like what has always existed in the drug industry. So what—if you're a private company you do is you do a lot of sequencing and you do a lot of research to try to understand the functionality of those genes. But you don't publish any of that. That all becomes proprietary information. And just like drug companies have tested thousands of compounds to try to figure out different levels of activity from these compounds and then they make strategic decisions about which ones they're going to develop. And all that stuff necessarily behind closed doors, not public. None of that's public. The way forward in terms of plant genetics I think is going to be—companies are going to have these huge libraries of gene function. It's not going to be accessible to the people in the public institutions. And they're going to decide which—whether they do it through genetic engineering or through breeding that'll be a strategic decision that they're going to make. But they're going to have all of that information in a private domain and it's not going to be shared and so public institutions are never going to be in the position to do the kind of crop development, breed development that the land grant university system is famous for.

So one of the questions that doesn't win me very many friends at Michigan State because we have a lot of plant scientists at Michigan State is why the hell are we investing all of this money in a domain that's very unlikely to actually produce the kind of technologies that agriculture universities are famous for. I just don't think we're going to do it. I would actually argue that it's time to really disinvest in this technology. We're still—the companies still want us around to train employees for them, but that's kind of the role.

And there will be important scientific breakthroughs that get made at Michigan State increasingly those get made. We have a plant science department that's not part of the college of agriculture. I would say increasingly the discoveries that are going to get into the PNAS are going to happen in the plant science department and not in the College of Agriculture. And that the technology development that's been the forte of ag is just over. And I think the tragedy is it's probably over in the international domain as well. And the international centers are just not going to be in a position to do what the green revolution did increasingly.

And I think that's unfortunate. I'm not sure that it's curable. At least not without massive reinvestments in public sector agricultural science. I hate to be so depressing.

[01:17:44]

[M.B.]: You're entitled. What are your greatest concerns about the future of this technology other than what you've just described?

[P.T.]: I think one concern is that we have created this very divisive structure in agriculture where within agriculture universities among farmers there are these competing cultures. And if you're an organic farmer or if you're growing vegetables that you're selling to chefs at high-end restaurants or whatever you're just not interested in genetic technologies. And it's like "what have they ever done for me" attitude. You have a very good reason not to be interested in it. There's a lot of interest in that among the general public, and I'm not even necessarily talking about people who would identify themselves as activists, right?

I mean I think every time I get on an airplane I read the in-flight magazine and half of it's about where to go eat at the city I'm going to. And there's a kind of huge growth of a certain kind of food culture that's only—I mean it is represented at Michigan State, and I presume—I actually know for a fact it's represented here at North Carolina State. It's represented it at land grant universities, but those guys don't ever talk to the genetics people. They're just these two completely separate cultures. Two completely separate cultures in terms of the farmers, right? The guys that are growing 500 or 1,000 acres of corn and soybeans don't think this guy that's got ten acres of mixed vegetables is even a farmer, right? That's a market garden. That's not a farm. And it plays out in terms of the politics of the Farm Bureau in different states. Can these guys get insurance? Will the Farm Bureau actually support them?

So my fear is that we're becoming really divided in terms of the way that we—that agriculture is organized and I think at a cultural level we've gravitated into—a lot of people including a lot of activists who see agriculture as just another sector of an industrial economy. And this is something I've written about many times that even activists their expectations for agriculture are driven by this idea that it's a private part of the economy. What we need to do as activists is make sure that they're not imposing health and safety costs on people. The idea that agriculture is special, the idea that would have gone back to Jefferson or Lincoln that agriculture has an ability to unite people and that it's crucial for our culture and for our political institutions. I mean that's being calved off, right?

So to the extent that I can, I would like to try to bring that back. At least it's something to think about and, but my fear is that biotech has just become—again it's a marker. It's not like it's something that's fundamental to the technology itself. It's a marker that really propels this very divisive way of thinking about agriculture forward and I'd—I don't know whether we'll recover from that. I heard somebody talking about this is supposed to be an archive, right? So this is something that's very current right? But I heard somebody talking about how the Republicans and Congress won't fix their problem until they hit rock bottom, right? And I think maybe we'll be in a similar situation in agriculture. We won't really address this fundamental rift until things hit rock bottom.

[01:22:11]

[M.B.]: So the necessary balancing question is what are you most hopeful about? Particularly when it comes to genetic engineering in agricultural biotechnology?

[P.T.]: Well, this is going to sound sappy compared to some of the depressing stuff I've just been saying. But you know when you're over 60 and you're a university professor you're always hopeful in the new students, right? And they are really different. They're different in ways that are hard to put your finger on but a lot of the students that are interested in the molecular biology seem much more anxious to really understand why this technology is so—I mean there's always a segment of them that well the people that don't like are just stupid, right? But you know increasingly it's well you know can people really be that stupid? What is it that's driving this? So they're more interested in it and although I would say that I teach a lot of students that are—they're sort of the alternative ag types and they're not particularly interested in molecular biology. They don't really see that biotech is going to do anything for them but neither are they quite as—they're a little more open to the idea that really what's created this is a badly run social debate as opposed to something that's really intrinsic to the technology.

So in terms of my biggest fear which is that this division will continue. My biggest hope is that in the next generation of people that come long will not be quite so bifurcated in terms of their mindset, in terms of how they think about agriculture.

[M.B.]: I have a couple of closing questions, but I would really like to ask Brad and Alison if they have questions they would like to ask before I go into those?

[A.W.]: I don't. I think you've done a really good job of covering a lot of things this time.

[B.H.]: Yeah, I think I had one—I think it may have been addressed. Just kind of thinking about how people blindly accept certain technologies maybe like the phones or like you were talking about we love Apple. Maybe we shouldn't love Apple so much but why is that people are just so adamant about the food crops and GMO's? What is it about that, that they just have this level of distrust that they don't necessarily have towards a company like Apple who may be doing just as much harm to our society as anything else.

[P.T.]: Yeah, I mean I do think the fact that it's food is the main thing. And I don't actually—getting into explaining that is really hard and people who have written about this from the

perspective of anthropology and study of culture they say very suggestive things but they don't say things that make people say, "Aha, now I get it", right? Mary Douglas is an anthropologist who has done some really subtle work on the interpenetration of food beliefs and religious beliefs and the way that cultures organize themselves. And it's very—I think the lesson that I take from her work is that there is something really special about food and that to combine that with what I was just saying it's a huge mistake to start to think about food and food production as just another sector of our economy in the same way that we think about the tech sector or something like that.

[01:26:01]

So maybe it's in our genes. Maybe it's historical, cultural, but it really resonates—I mean it is something that becomes part of our bodies. There's a certain sense in which it's literally true that you are what you eat. And so there are ways in which foods are emotionally resonate in ways that cell phones aren't and so I think it makes them—it puts them into a different ballpark. People don't like to think of them as technologies, I mean in the schools—in the ag school somebody who develops a new kind of bean says I've got a great new technology, right? Seeds have been technology forever in that world, right? But for the average person that's not technology, that's a bean. So they're just in a different categorical frame of mind for thinking about these things. And from the standpoint of somebody who—my base field is philosophy of technology, there's a certain irrationality behind that. It just doesn't really make sense. It makes us probably too skeptical of foods and not skeptical enough of other foods. But it probably is a fact about human beings that we're just going to have to accept.

[01:27:23]

[A.W.]: So I take it back. I will ask a question that tends to be my question. So what—we had a conversation yesterday about your work with chickens. And one of the things you said to me when we were talking about it is that it wasn't what drove you. It wasn't something that you really necessarily wanted to get into. What does drive you? What does motivate you?

[P.T.]: I'm very interested in technology and trying to understand what it is and how it functions as—how changes in technology percolate through our culture and our institutions and bring about changes not only in the way that we interact with one another in our political lives but the way that we actually conceptualize ourselves. The way that we think of ourselves. And that's a huge area. It's not an area that philosophers have historically thought about very much although I would argue that maybe they thought about it more than we realized because there are bits and pieces in all of the ancient philosophers where they write about agriculture in exactly those kinds of terms.

And I think one of the blindnesses in contemporary philosophy and it probably extends into other fields in the humanities is that we don't realize how fundamental agriculture and agricultural technology were in terms of shaping the mindset and the categories that people in ancient Greece or Rome used to understand their world.

[01:29:09]

So now we're surrounded by a bunch of other technologies and the effect of agricultural technologies are probably relatively diluted compared to televisions and cell phones and computers, and you name it. I mean we're surrounded by it, right here, right? And so that leads to a lot of problems.

One is that we still don't really think enough about the technologies that surround us and the way we interact with them in a thoughtful philosophical way that continues to really drive me. But the thing that really separates me from a lot of other philosophers of technology, I love to hang out with those guys and we immediately fall into talking about this kind of stuff. But I don't think those guys quite appreciate the sense in which agriculture is a technology that had similar effects on human history and the entire philosophical cannon going back to Plato and Aristotle.

[01:30:11]

[M.B.]: One of the advantages you have being around for a while and reading widely and talking to lots of people is that you've been in contact with many important figures in genetic engineering and I mean here very broadly across the humanities, the sciences and so on, industry. Are there specific people that you think this archive needs to—that people in the future need to know about in order to better understand this technology and all of its permutations?

[P.T.]: Yeah, so one person I mentioned earlier is Ralph Hardy. I don't know how Ralph's doing, but if you can get him, he's important. He's—I don't know how old he is. He's got to be 90, and I think he was very important early on. My boss at Texas A&M, Charlie Arnson, I think is really important. Charlie followed Ralph at DuPont and then was Dean of agriculture at Texas A&M and has moved on and had I think quite a significant career and been very influential maybe a little more quietly than some other people.

There was—as I was thinking about doing this I was thinking about there's a—I think there was a very important document called Biotechnology's Bitter Harvest. It came out in the late 80's. And I've forgotten who all the authors are on there. I'm sure some of those people are already on your list. Jane Risler. I think was an author and Hope Shand who is up at—was an author. But somebody who might not be on your list who was an author is Chuck Hassebrook, who really divorced himself from the biotech industry but was actually ran for Governor of Nebraska last time around. Sort of a—somebody who's primary concerns were with the political standing and ability of farmers to resist certain kinds of corporate power and that really drove a lot of his thinking and I think it influenced things in an important way and again probably after 1992 or 93 he just absented himself from the biotech debate completely.

Another similar event and here I don't know you'd have to actually do the research to dig this up, but I met Mardi Mellon at a workshop that somebody organized in the late 80's and it was held at Bellagio at the Rockefeller Foundations conference center that was there. And I think it would be really useful to know who was there. And if you ever get a chance to get several of us who were there around the table talking to one another that would be a really interesting little piece of videotape to have. Mardi was there; Roger Beachy was there. Roger is probably another figure who is on your list already, but I don't really

remember who else was there. I know one of my good friends in later life, Sandra Batie who is an economist who did work about then, and then kind of stopped doing things was there.

But it was a very interesting group of people who were both very active in the world of ag policy in the late 80's and people who were starting to make a name for themselves one way or another with this emerging biotech thing. And we sat around and talked about the future of ag biotech and what we thought some of the issues were going to be. And it was a fascinating meeting. And I'm sure it's one of those things that's completely out of people's memory.

[01:33:54]

One more and then I'll stop. The one more is you know the Keystone Center ran a series of public dialogues on biotechnology, and I think maybe they started in 1988—88 to 92 something like that. What they did is they had I think four or five meetings at different parts of the country where they would bring in some speakers. They were not doing just agriculture; they were doing both medical and agriculture and recruit lots of local people to come in and have facilitated dialogues about those meetings. And those documents should be part of an archive. I'm not sure what it would take to get one. I was actually somebody else was asking me about this recently, and I can find citations to them, but I don't think they're available online. One of the people who was involved with that for the Keystone center is a friend of mine. Her name is Abby Dilly, and Abby is a facilitator. Is she on your list?

[A.W.]: Yeah, well we know Abby. She's facilitated a few different things.

[P.T.]: Right, well Abby's not used to being an informant. She's like—she thinks of herself as somebody who stands behind the scenes. But Abby knows a lot. If you could get Abby to sit down and do this kind of stuff. She facilitated Keystone Center things, and she facilitated a lot of the PEW initiatives on food and ag biotech meetings, and I think probably has at one time or another probably met anybody, everybody who is anybody in this field and had some level of interaction with them.

[01:35:33]

[M.B.]: My last question. Are there any questions you expected us to ask but we did not? And is there a question we should have asked that you wished we'd asked?

[P.T.]: Yeah, boy I don't know. I hadn't given a lot of thought to what you were going to ask. I did—knowing that I was going to do this did put me in a reflective frame of mind and the other thing when I was interviewed—introduced at a talk here the other night and Jennifer Kuzma mentioned that we'd known each other 15 years, and I was thinking man, that's a long time. And I partly realized that I had already been doing this for 15 years when I met Jennifer and Fred, right? So it made me realize that there's this—that there really is this fairly large history that starts well before that history that really starts with—Jennifer--Fred, in particular, have been—actually both Jennifer and Fred have been doing work in this well before the year 2000 but I don't think that they were there in the 80's when some of this

stuff was—it was still ten years from actually emerging as a real technology and people—Deans of agriculture and people in some of the federal agencies were there so I think maybe it's important to probe that.

And you had told me I could talk about whatever I wanted, so I found excuses to talk about that with the questions you did ask me. But that—roughly 1997 is when the crops started coming out. So things looked really different when the technology is a reality than they did before it was a reality.

But I think a lot of the important politics played out. It really set things up for the way that the debate has actually played out and in terms of looking at the moments when the industry and the agricultural research establishments had really meaningful opportunities to do things differently. I think they all happened before 1997 as opposed to after it.

And so looking—probing a little more a little further back in time I don't know that I necessarily came in at the beginning. I know you have talked to some people that were really right in at the beginning and some of the research activities. But there's a certain sense in which debates over the tomato harvest in the 1970s really set this up. And there is this whole—I don't have to tell you this, you're a historian, right? History counts.

Yeah, so that's the thing that I hope doesn't get—that the archive manages to pick up some of that as well. Some of the deeper—the history that may not on the surface be directly related to biotech but really actually is pretty significant for the way the biotech issues played out.

[M.B.]: Thank you, Paul Thompson, for your time.

[P.T.]: My pleasure.