CHEMICAL HERITAGE FOUNDATION

ANDREW BARNES

Transcript of a Research Interview
Conducted by

Mark Jones

San Diego, California

on

8 July 2013

(With Subsequent Corrections and Additions)

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> Andrew Barnes, interview by Mark Jones San Diego, California, 8 July 2013 (Philadelphia: Chemical Heritage Foundation, Research Interview Transcript # 0014).

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INTERVIEWEE

Andrew Barnes was born in the northern suburbs of Chicago, Illinois. His father was a chemical engineer at Abbott Laboratories, which inspired him to pursue a chemical engineering degree from Purdue University. While studying, he became interested in the pharmaceutical industry. After receiving his Bachelor of Science degree in 1975, he worked as an engineer for four years at GD Searle in Illinois. Realizing he did not want to pursue a career as a chemical engineer, Barnes returned to school, attending Stanford University for his master's in business administration. Being in California, Barnes began taking an interest in the biotechnology companies springing up across the state. After graduating, he interviewed with some biotech companies, such as Applied Biosystems and Amgen, but decided to stay at Stanford to work in the Technology Licensing Office on a one-year term. There, he worked on the Cohen-Boyer patent, considered to be one of the first biotech patents. After the end of his one-year term at Stanford, Barnes worked briefly at the Zymos Corporation. Barnes was then hired at Mycogen, which was developing a fungal alternative to chemical pesticides. In the late nineties, Mycogen was acquired by Dow Chemical and Barnes was offered a new position if he relocated to Indiana, though he left the company, not wanting to move. He was then contacted about a new company named Myelos, a biotech company which produced a peptide with neurotrophic properties. Barnes worked at Myelos until 1998 or 1999, after which he retired.

INTERVIEWER

Mark Jones holds a PhD in history, philosophy, and social studies of science from the University of California, San Diego. He is the former director of research at the Life Sciences Foundation and executive editor of LSF Magazine. He has served in numerous academic posts, and is completing the definitive account of the origins of the biotechnology industry, entitled Translating Life, for Harvard University Press.

ABOUT THIS TRANSCRIPT

Staff of the Life Sciences Foundation conducted this interview, which became a part of our collections upon the merger of the Chemical Heritage Foundation and the Life Sciences Foundation into the Science History Institute in 2018. The Center for Oral History at the Science History Institute edited and formatted this transcript to match our style guide, but as noted, Science History Institute staff members did not conduct the interview.

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INTERVIEWEE: **Andrew Barnes**

INTERVIEWER: **Mark Jones**

LOCATION: **San Diego, California**

DATE: **8 July 2013**

BARNES: You met with Jerry Caulder?[1]

JONES: He's a great guy with a great story. But a lot of great stories. And you've got a good one. You were there at the very beginning of commercial biotech.

BARNES: I was. It was kind of interesting. I hadn't really thought much about it until you contacted me there. Well I had thought about it, but I never—

JONES: I went down to Pacific Row and talked to Niels Riemers.[2]

BARNES: I saw you talked with him in one of the articles that you sent me

JONES: He's a great guy.

BARNES: A lot of fun. I only just really worked with him for a maybe not even a year.

JONES: He spoke very highly of you.

[1] Jerry Caulder, interview by Mark Jones on 20 and 27 March 2012 and 9 May 2015 at Finistere Ventures, San Diego, California (Philadelphia, PA: Chemical Heritage Foundation, Oral History Transcript #0986, in process).
[2] Neil Reimers, interview by Mark Jones on 30 April 2012 and 22 February 2013 at Carmel California (Philadelphia: Chemical Heritage Foundation, Oral History Transcript #1031, in process).

BARNES: Did he? Good. He really made that technology licensing office at Stanford [University]. He's been very successful over the years. Not just the [Stanley N.] Cohen-[Herbert] Boyer patent, but a lot of other[3]—

JONES: Sure. No, we talked about a lot of the different stuff that he was involved in. Some digital audio technology was one of the bigger than the Cohen-Boyer.

BARNES: Right, that was I think before I got there. That had been licensed, I think, and was generating some money.

JONES: It's interesting stuff. Well, what we'd like to do is record a professional biography of you and that fits into the broader history that we're compiling. Maybe we could start with some background. Where are you from originally?

BARNES: I'm from the Chicago, [Illinois,] area, northern suburbs of Chicago, and I went to undergraduate at Purdue [University, and graduated with a chemical engineering degree from there in 1975.

JONES: Let me ask you about your family background, then, and how you got interested in chemical engineer—

BARNES: My father was a chemical engineer, and he worked for most of his career at Abbott Labs [Laboratories], so he—

JONES: So that's—Northbrook, [Illinois]? Is that the—

BARNES: No, it was North Chicago, is where their headquarters were, and they kind of—he was involved in really the building of Abbott Park, which is now their headquarters. I don't think that's quite North Chicago. It's kind of between North Chicago and Libertyville, is where I lived, Libertyville. He became head of engineering, vice president of engineering, at Abbott, and really was responsible for the infrastructure for a lot of their expansions and expanding. So that's how I got probably exposed to chemical engineering, was—

[3] Herbert W. Boyer, interview by Arnold Thackray, Sally Smith Hughes, and Mark Jones on 28 March 2000 and 24 April and 21 May 2013 at Midland, Michigan and San Francisco, California (Philadelphia: Chemical Heritage Foundation, #0193, in process). And Stanley N. Cohen, interview by Mark Jones on 30 April 2014 via telephone (Philadelphia: Chemical Heritage Foundation, Research Interview Transcript #0106, in process).

JONES: Did it make an impression on you, what your dad was doing?

BARNES: Not so much. I knew what engineering was and was good at math and science in high school, so I decided to go into chemical engineering. I was getting ready to graduate and looking for a job. I was interested in the pharmaceutical industry, probably because of his background, but also it seemed like an interesting industry to me. I had interned, if that's the right term at a summer job for G.D. Searle, [LLC] my junior and senior year, and that's where I ended up ultimately going to work out of college, was for G.D. Searle.

JONES: What was the substance of, Purdue's a top school in engineering. What was the substance of the program there?

BARNES: Well, they didn't have any life science focus back then. I would say a generic chemical engineering degree is what I received. I did audit a couple of courses in the pharmacy school. They had a very good pharmacy school, probably I could have graduated a semester early, but I used to race sailboats at the time, and I was on the sailing team for Purdue, which you don't think of them as being—

JONES: Right, you're just in a cornfield.

BARNES: Well, that's right. There's a small lake I sailed for their university and competed against schools in the Midwest. But anyway, so I wanted to do that for the final semester, and so I ended up auditing I remember at least one—

JONES: Do you sail down here, by the way?

BARNES: I do.

JONES: Are you a sailor?

BARNES: I used to. I've switched over to golf, but I used to race out of Mission Bay. I remember taking a course in pharmaceutical unit operations, which is like tableting, capsuling, you know, those kinds of things, just to kind of get some exposure to the industry.

JONES: And your dad approved of all this? Did you discuss it with him?

BARNES: I'm sure we did, but he wasn't really a helicopter dad at that time. He was more leading by example, I would say, than doing a lot of coaching. But I ended up getting job offers from G.D. Searle, from Eli Lilly [and Company], and from [The] Upjohn [Company]. **<T: 05 min>** The only one left standing is Lilly today.

JONES: Well, it's interesting. Lilly's right down the road. And where was Searle at?

BARNES: Searle was in Skokie, Illinois. That's where I ended up going to work. That was probably more to do with my sailing interest. I was racing sailboats at that time. Sailing at Lake Michigan was a lot better than sailing at a small lake near Indianapolis or Kalamazoo, Michigan. There was just a small lake there.

JONES: So Upjohn was the other one?

BARNES: Upjohn was the other one. Yeah. I worked for four years at Searle as an engineer, and the first two years was a project-engineering role. The second two years were more process engineering, kind of analyzing different processes, and getting involved in the economics.

JONES: What was the first part? It was—

BARNES: Project engineering was the first two years. Well that's if there's a project need to install a new reactor; somebody had to manage that project. Which means working with the design firm that might be designing it; working with purchasing to get all the piece of equipment necessary that need to be ordered, and working on the trays to do the installation, and sort of keeping the whole schedule, and managing the project, if you will.

JONES: Just some good operational experience.

BARNES: Right, it was kind of broad exposure. I remember the first thing that dawned on me, though; we've got to have a pump. Well, I brought out the books. I was going to spec out a pump. Well, the senior engineer said, "No, no. Just call up a manufacturer, bring them in, and tell them what you need, and they'll do all that for you." I realized you don't have to do everything yourself there. You can rely on experts. During that sort of tenure, I did get some

fermentation exposure, because Searle had bought an old fermentation plant over in Harbor Beach, Michigan.

JONES: What were the years here?

BARNES: It was from ’75 to ’79. I was there for four years.

JONES: And Searle—Searle during those years got mixed up with Genex [Corporation] right? Or did you have any contact with—

BARNES: No, that was probably after that. There was no real discussion of biotech at that time. I didn’t even know the word until I got to Stanford. They did some fermentation work at this plant, helping look at heat exchangers and that kind of thing. I knew what fermentation was, had some exposure there. I decided that I really didn’t want to be an engineer the rest of my life. I wanted to be involved in the business side, where decisions were being made, but I just felt as an engineer I would provide a lot of information to some businesspeople, and they would have to make the decisions, and we’re just providing input. I decided to get an MBA [Master of Business Administration], and applied to Harvard [University] and Stanford, and was rejected at Harvard and accepted at Stanford, which is good, because that was Stanford was my first choice anyway. I went out to there in ’79, fall of ’79. And—

JONES: So, Stanford was your first choice. Why? California or—

BARNES: No, not necessarily. At that time, Harvard was teaching all their courses through case study, and like University of Chicago would be my third choice. I didn’t end up—it was kind of my default. They were doing no case study. Stanford was doing a mix, some courses case study, and some courses like statistics or accounting or just conventional lecture and textbook. I decided, well, why not do a blend of those two, instead of just—because I’d done pretty well learning the traditional way, through the engineering program. Didn’t know if case study was necessarily—I wanted to jump in there full bore. That was sort of my thinking.

JONES: And how did that turn out?

BARNES: Well, it was—it worked out really well for me. The case study was fine. It was good to get exposure to that. But I don’t think it’s the right way to teach, or the most efficient way to teach a statistics course or an accounting course, those kinds of things. It’s useful for marketing, for example, or maybe some more general courses.

I didn't go into Stanford thinking I was going to focus on biotechnology or anything like that, because I wasn't even really aware of it. But when I was there, you started reading about it in the local papers, that Genentech [Incorporated] had got started, and Cetus [Corporation]. Those were the two local—

JONES: People were talking about it?

BARNES: In the newspapers they were talking about. At the university, there was a little exposure to it as well. I ended up taking a—I forget what it was called, either small business or entrepreneurial class from [Franklin] Pitch Johnson [Jr.], who was a guest **<T: 10 min>** teacher there. He brought people in, and—

JONES: So, what are the years here? Because he—

BARNES: Seventy-nine through I graduated in '81, so—

JONES: He had gotten started with Hybritech [Incorporated], and was involved in Amgen [Incorporated]—

BARNES: That's kind of what happened. The project for the course was to develop a business plan. The whole course was based on that. I had hooked up with a couple of other classmates, and we came up with a business plan for a company in the diagnostic field. I forget exactly what our premise was. I got some interaction with Pitch on that. Then I talked with him about what I wanted to do, was get involved in a small biotech company. Stanford has a lot of opportunities, too. I remember having a lunch or a dinner with Tom Perkins of Kleiner Perkins [Caufield and Byers], who was Genentech, and all that. I got to talk with him a little bit about it, too. I had decided I kind of wanted to get into biotech, and I ended up auditing the biochemistry course and like a biology course in the undergraduate part there, just so I could speak the language a little better, because we didn't really have any of that at Purdue.

We didn't even have biochemistry. We just had chemistry, organic chemistry, which was the chemistry school taught. So that provided some background. Then it is interesting, because Pitch Johnson I believe—I had an interview with George Rathmann, and my father knew George Rathmann as well, because he came out of Abbott.[4] Whether that helped me or not, but anyway, Pitch Johnson—it was kind of an interesting story, because Amgen was originally

[4] George B. Rathmann, interview by Arnold Thackray, Leo Slater, and David Brock on 16 and 17 September at Philadelphia, Pennsylvania (Philadelphia: Chemical Heritage Foundation, Oral History Transcript #0187).

going to locate in Thousand Oaks, [California] the area where they thought about it, and they were kind of a strange startup at the time. It was heresy, almost, because they raised twenty million bucks in venture capital before they even had a company. George Rathmann had a scientist out of UCLA [University of California, Los Angeles], I think. I forget his name, but—

JONES: Winston Salser.[5]

BARNES: That's right.

JONES: I talked to him. He's also interesting—

BARNES: Did you? He was a character. He was a little controversial at the time. And so, I went down there. They had rented some temporary space, and went down, interviewed there. He said, "You know, our pacing item here is we've got to hire some scientists. We're having a little trouble hiring them to come to Thousand Oaks." He said, "We may have to make a change here."

JONES: He may have to move the company?

BARNES: Yes. He said, "So Andy, I don't know you might have a role as our finance guy early on, or as our—" he called it marketing, but it was business development. That sounded interesting. But then he did tell me, "We're going to take a time out here, so we may have to locate the company up in the Bay Area or someplace else so we can hire scientists."
The other thing that happened at the same time, and again, this must have been Pitch Johnson's contact as well. I think I interviewed with Sam Eletr, who was the founder of Applied Biosystems.[6] That was different for me, because it wasn't really—a chemical engineering background didn't seem to have a lot to apply there.

JONES: Well, the chemistry.

BARNES: But it turned out it would have. It was an instrument company, but I was interested in it. I can't remember what happened. I didn't get the job; it wasn't moving along. I was graduating, and I said, "I need to do something here."

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[5] Winston Salser, interview by Mark Jones on 18 April 2013 via telephone (Philadelphia: Chemical Heritage Foundation, Research Interview Transcript #0045, in process).
[6] Sam Eletr, interview by Mark Jones on 2 February 2012 and 15 May 2014 at San Francisco, California, and Kensington California (Philadelphia: Chemical Heritage Foundation, Oral History Transcript #1001, restricted).

JONES: George Rathmann offered you a job?

BARNES: He told me that he thought there'd be a job there for me once they figure out where they're going to end up and what they're—because he just took a time out on the whole thing there. There was no formal offer, but it was pretty encouraging.

It was about that time, though, that I saw something at the university for the Technology Licensing Office position that Niels Reimers had. They had a tradition there of hiring a business school student on a one-year kind of a contract assignment to work on future projects, just general licensing things. But this seemed unique to me because it was the Cohen-Boyer patent which, again, I wasn't aware of—

JONES: Did you realize—

BARNES: Well, I didn't realize it until I got in and talked with him, and he explained to me what it was. It was kind of a groundbreaking patent, and they had a very unique licensing program that he envisioned doing here. It was sort of a flier, because all my other classmates were out taking real jobs with companies and all that, and here I would take a one-year assignment with the Technology Licensing Office at Stanford. But I decided it would probably be a pretty good springboard into biotech because I would get to talk to a lot of biotech companies because **<T: 15 min>** they'd be interested in the license, and I would learn about patents, and I would learn about licensing, which I didn't really know much about at the time. There's no business school courses in any of that, those areas.

Anyway, that's what I ended up doing. Now in hindsight maybe I should have held on, and if Rathmann would have come through with the job at Amgen, I would have been getting in at the ground floor there would have been pretty good assuming I stuck with it and held all the stock until things. But anyway, that didn't happen. I think I made a very good choice because it was a neat assignment there at Stanford. It was very, kind of, baptism by fire because you had to learn very quickly about patents and licensing, and I worked with Bert Rowland was the patent attorney that did the Cohen-Boyer patent, that prosecuted it. There was still a little cleanup going on, as I recall. The patents had issued, but there was some—maybe international patents or something. But we talked with him, and then the other guy that was involved was Aldo Test, who was a patent attorney, but more of a business advisor to Niels. He's the guy that they talked to about legal issues related to licensing agreements. I learned a lot about licensing from him and from Niels, and—

JONES: Was the plan formulated at that time? Because the way Niels explained it to me, it evolved over time.

BARNES: It did evolve over time. He had the concept of non-exclusive low royalty rate but requiring something up front from the companies. I believe that was pretty much what he had envisioned when I got there. Nothing was really put on paper, or very little. So that was sort of my job, was to put something on paper, a license agreement, and come up with a marketing strategy, if you will, how we're going to contact all these companies.

He deserves most of the credit, but I was involved more in the implementation of it. I worked with the lawyer to get the license drafted. We came up with the provisions of—I think it was ten thousand dollars up front, and ten-thousand-dollar annual fee.

JONES: How did you arrive at that figure?

BARNES: It was an ask and they wanted something that was not ridiculously expensive, but something that was a meaningful amount, and we were hoping to get several dozen companies signed up. The whole strategy was we get enough signed up, a critical mass, then it would be difficult for others to challenge, because we were kind of worried about people challenging it. It was a controversial patent at the time.

JONES: There were some controversies on campus. Had that all blown over by the time—

BARNES: That had pretty much blown over. There was no—I don't remember there being any resistance there.

JONES: What did the industry people say about it? Because this is what I've been told, that, you've got there's some collusion. Some people say, "Well, we should challenge this patent." A large group of people, maybe they're already licensees are saying, "No, no, this is a good deal. We're not paying very much for it."

BARNES: Right. I didn't hear any of that. But most of the companies had lots of questions about it, and some people—Genentech wanted sort of a special deal. I remember Niels and I had lunch at the eleventh hour a few days before the deadline, with Tom Kiley, who was their attorney. [7] And I think it was Bob Swanson, too.[8] They were kind of putting the heavy lean on us to try to get a deal.

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[7] Tom Kiley, interview by Mark Jones on 25 February 2013 at San Francisco California (Chemical Heritage Foundation, research interview #0070, in process).

[8] Lynwood Swanson, interview by David Brock and Richard Urlych on 4 December 2013 at FEI Company Headquarter, Hillsboro, Oregon (Philadelphia: Chemical Heritage Foundation, Oral History Transcript #0943, in process).

JONES: What kind of leverage did they have?

BARNES: Well, they didn't really have any. They were just Genentech and so we just had decided we were going to hold firm. But we had spent a lot of time trying to figure out—there were different royalty rates, depending on the type of product. If it was an end product like a pharmaceutical drug, the royalty rate was a one percent going to a half percent, I think, depending on volume. But if it was a bulk product, meaning an intermediate, it was a different royalty rate. If it was a research tool, it was a different research—so I think it was four categories, if I remember right. We had examples put together for all that. That was part of the materials that I took with me when I went off to the companies. We had done some economic analysis, too. Then we had the—I think this was Niels' idea, "Let's get the license printed up. Let's just not have it on a eight and half by eleven [inch] paper." We had it printed up and bound. It was a little booklet type thing. It looked like a take it or leave it thing. We weren't intending to negotiate with each company. We wanted to make it one size fits all type of a thing there.

I think that helped. Literally went around the world marketing this thing, because I think in addition to the US, and many of the US companies came to visit us, I traveled around to **<T: 20 min>** other US companies, but I went to Japan. That was really interesting because they were very excited over there. Biotech was a big thing. The press found out I was coming, and so I got interviewed by the press, and I was on Japanese TV a little bit. Trading companies organized a lot of the meetings. They'd bring companies in in their group, and I'd go into a room, and there'd be like twenty or thirty of these elderly Japanese guys sitting around this humongous table. I got a little presentation I went through, and would ask questions, and I did that a couple of times there.

Then I took a trip through Europe, a two-week trip through there, and visiting a lot of the companies. Not just small biotech companies, but chemical companies, big pharma companies, all different types of companies.

JONES: It must have been a lot of fun.

BARNES: It was. It was very interesting. I did that—those trips on my own, and in fact, I did all the trips pretty much on my own. It was just kind of me out there thrown into it.

JONES: So, you're learning the university licensing game. Did you ever have any thoughts of, "Hey, I could do something in this area?"

BARNES: Well, I did, thought I could do that, but I kind of wanted to get involved in a small company. That is what I figured out was kind of my goal going into it.

JONES: After the entrepreneurship class?

BARNES: Right.

JONES: Did that make a big impression—

BARNES: That did, and the whole atmosphere at Stanford was very entrepreneurial. I think that's what really sets it apart. It would have been a lot different going to Harvard, I think just because Stanford, you're right in the middle of Silicon Valley, [California,] there, and it turned out to be a big biotech area as well. And there's venture capitalists all over the place. A number of my classmates went to work for venture firms.

JONES: Before going to Stanford, you didn't have a good idea of that, or did you?

BARNES: I didn't. No.

JONES: And so that was a discovery?

BARNES: Exactly.

JONES: Wow, there's a lot going on here?

BARNES: Exactly, back in the Midwest, I didn't know what venture capital was. Indeed, what happened is we ended up signing up seventy-three companies I think right out of the chute, or by the deadline.

JONES: And a lot of big corporations?

BARNES: Big corporations. Yeah. Because there weren't as many small ones as there are now. Now there's a zillion small ones. A few years later there was a lot of them. But back then, it was mostly larger companies.

JONES: Were there any notable absences, that—people came around—

BARNES: There probably were, but I'm not sure I remember who there were. There were some I think we were surprised and disappointed they didn't do it. But they could always do it later. You didn't have to do it—the only reason to do it early is you got credits for these upfront payments you made, the ten thousand dollars. I believe you got like 5x that as a credit against future royalties. There was still a little bit of reward to get in early. We also said terms may change. We might change the royalties' rates for later by the deadline—

JONES: Is that something that you must stipulate?

BARNES: We did stipulate that. I can't remember—I left before. I don't know if they changed it all or not. They may have. I sort of lost touch with it after a while. I had become a licensee of the company yet. What happened after that was—I was involved in doing some other licensing programs at Stanford, a couple of things, and I—

JONES: Were they life sciences or other—

BARNES: I remember Lubert Stryer, who was a researcher there, a biochemist, I think. He had some very interesting technology that was—

JONES: Doing combinatorial chemistry types of things, or—

BARNES: I remember it was sort of fluorescent tags or something. Some unique way of tagging things. I had gotten involved in that. That's kind of what I was working on when I ended up leaving. I didn't get to finish that, I don't think. But I did get to talk to some other professors there, and it was a university like Stanford, there's a lot of technology coming out of there. It had such an active licensing program. The faculty there was tuned in, and if they had something of interest, they would usually contact the office, I think.

JONES: So, it was the case that they were contacting you, rather than you going out and asking, "Hey, want do you have, or—"

BARNES: I think by the time I got there, that's true. I think in Niels' early days, he had to do more of the going out and trying to figure—shake the labs if you will and see what was going on. It was well-known by the time I was there that a lot of the professors would contact us if they had anything. There was the patent office at Stanford. They had a patent group that was separate from the licensing, though we worked with them. In fact, Kathy Ku, who **<T: 25 min>** took over for Niels as head of the license office, she came from the patenting side. So, if a researcher there had something he thought might be patentable, he would usually contact us at the patent department there at Stanford. They would then usually work with outside counsel to get it to work, and then the licensing group would find out about that and try to make some assessment whether they thought there was any commercial potential there. But what happened there, Aldo Test, the lawyer that was helping us with the license, he was advising some scientists up in Seattle, [Washington,] that were starting a company that at the time was called Zymos [Corporation] and became ZymoGenetics [Incorporated] later on. So he was working with Ben [Benjamin D.] Hall and Earl [W.] Davie and [Michael] Smith, the other guy, who was in Vancouver, [Canada,] but—[9]

JONES: Who was a Nobel Prize winner?

BARNES: Smith was.

JONES: Was he at that time?

BARNES: No, I don't think he was at that time. But they had started—

JONES: It wasn't [Peter] Hamill was it?

BARNES: No. I'll think of it here in a minute. He was kind of a crazy guy. He was the least of the three that was interested in doing the company. He was only just going along I think because it was kind of fashionable at the time. He didn't put that much time in—well, the company was in Seattle, and he was up in Vancouver, so… But anyway Aldo was working with these guys, and they were looking for some— He was in Palo Alto, [California].

JONES: How was that connection made?

[9] Benjamin D. Hall, interview by Mark Jones and Erika Langer on 29 August 2013 and 24 February 2014 at Bellevue, Washington (Philadelphia: Chemical Heritage Foundation, research interview #0037, in process).

BARNES: I'm not sure how he got hooked up with them. I think maybe they were looking for someone to help them with the patents and licensing, and so they worked with Aldo's firm. His firm wrote patents as well. So—

JONES: Nationally?

BARNES: The firm was Flehr, Hohbach & Test [LLP], so I don't think it was national. I think it was just well-known on the West Coast there. Aldo had recommended me, then. He said, "You ought to go up and talk to these guys. They're looking for someone to develop a business plan, and to manage the company." I thought, well, that's kind of what I'm hoping to do, so I ended up meeting with the three founders there, and—

JONES: So, they're just three academics, that's it?

BARNES: Right.

JONES: At that point?

BARNES: They had—I'm trying to remember. They had a lab outside the university. They had their company incorporated. They had a couple of postdocs that were working for the company, I believe, certainly when I moved up there, but when I got involved. But—

JONES: So, they had help from somebody, from an attorney, or from Aldo—

BARNES: Aldo. He was really their advisor. I decided I was going to do that, and I was still working at the Technology Licensing, but in my spare time, I was writing their initial business plan. And—

JONES: Why did you think, okay, this is the opportunity. There must have been others at that—

BARNES: Well, there might have been others, but this was a startup, and this was an early stage, and these guys were really high-powered scientists. Ben Hall was a world expert in yeast

and Earl Davie was an expert in blood proteins. Michael Smith was a expert in enzymes, I believe, if I—

JONES: Restriction enzymes?

BARNES: Something like that. But—

JONES: I forget.

BARNES: So anyway, it just sounded good. It sounded like a good opportunity. Seattle sounded like an interesting place. I don't know, I mean, it wasn't like I had three or four things to choose from. Because it was before I was done with my year at Stanford. That's why I was kind of writing the business plan while I was there, and then I went in to talk to Niels and told him I got this opportunity, and would he mind if I left a few months early, which I ended up doing. So—

JONES: What were the technical projects that they were proposing?

BARNES: Ben Hall thought—well, back at that time, there was big concern—there was *E. coli*, was the expression system of choice, I guess. He was a yeast guy. A lot of these proteins needed to be glycosylated, the sugar groups on them. And *E. coli* couldn't do that. At that time, you couldn't really work with mammalian cells, it hadn't gotten that far. Yeast was sort of intermediate.

JONES: It could be a big advantage?

BARNES: And it could do some—it could do some glycosylation, right? So that was one advantage. The other thing that—Earl Davie was a blood protein guy, and he had a blood protein, factor VIII or something, that he was involved with. He had some—several other ones that were unique, had come out of his—**<T: 30 min>** his research, so those were the initial technologies that got—when I got in there, we did a couple of things. We raised some money, venture money, Cable [and] Howse [Ventures] up in Seattle. They put the—

JONES: They put—they were putting money in—a number of different Seattle companies—

BARNES: Right, but they put it in there. I don't remember who else was in there. They might have been the only initial money in there. But I was able to negotiate a couple of collaborations, one with Novo [Nordisk A/S] in Denmark, who wanted to produce insulin—

JONES: To do insulin, or—

BARNES: —in yeast. And so they were—

JONES: Had anybody done insulin in yeast?

BARNES: Not at that time. And so—Genentech had done it with—or was doing it with Lilly, but it was *E. coli* based. And Novo wanted to do it in yeast. So, they were impressed with Ben Hall's yeast expertise. We negotiated a research contract with them. They put a fair amount of money in. They might have bought some equity, too, at that time. So, I negotiated that.

JONES: Tell me a little bit about Ben Hall and Earl Davie. I think Earl Davie is really old now. I don't—

BARNES: Well, Ben Hall's maybe not quite as old, he's—

JONES: Well, I talked to him on the phone. I haven't been up there yet, but I need to go talk to him. He said he'd talk to me if I go up. So—

BARNES: Ben Hall?

JONES: So, what were your impressions of these guys? These were solid guys?

BARNES: They're very solid guys. Now Ben Hall, I was only there a year, and it turned out I got crossways with Ben Hall, so if you ask about me, I'd be interested in what he would say now. But he had his wife, who was a schoolteacher, elementary schoolteacher, I believe, was helping out with the company. None of these guys left their university positions they… so they were kind of advisors.

JONES: And the plan was that they would not, and you would put together the whole thing?

BARNES: Right, they would bring some scientists in, which they did. We had some postdocs that were working there. We had fulltime scientists when I was up there. But it got to the point we had the Novo deal, we had a contract with Eisai [Corporation Limited], the Japanese company. I think it was for blood protein. We were negotiating with Cooper Labs, who was interested in alpha-1 antitrypsin, which is the—

JONES: I don't even know what that is.

BARNES: It's a lung enzyme that had huge potential for treating some sort of emphysema or something like that. It was a target. But anyway, we were hiring people, and so we needed to have some—a financial person. Ben Hall's wife had been handling the checkbook in the early days. We're kind of getting beyond the needs of a checkbook.

I wanted to hire a financial person. There wasn't really a role for her anymore that I saw, it was nice of her to help out, and Ben said, "Well, maybe she should be human resource person." I didn't think we needed a human resource person at that stage. I probably could have handled it better. He could have handled it better. He got all irritated because I wouldn't keep his wife on. He said, "It's either Andy goes, or I go," and he's Ben Hall, and I'm an MBA out of Stanford. I left, was asked to leave. That was after about a year. It was a tough pill to swallow at the time, because I thought I had done—well, it was recognized that I'd done a lot of good things. So then—

JONES: Yeah, so establishing these partnerships, that's huge. That's what's keeping the thing afloat?

BARNES: Right.

JONES: So how was it at that time, negotiating with these companies?

BARNES: It was interesting, and it turned out it was something that I turned out to be pretty good at. I did a lot of that over the years at Mycogen [Seeds] and stuff. This was something that I didn't have a lot of experience in at the time, because these were the only ones I'd done, but I was, again, working with Aldo Test, was the advisor, the lawyer on that side. We negotiated those deals, were able to get a better deal than Novo was originally offering. Ben Hall said, you know, "We really appreciate what you did here, but I can't have you working here anymore." That was a tough one for me. But Earl Davie was a gentleman through the whole time, and

really a smart guy, level-headed guy. His son was working at the company, but he was sort of a facilities guy. There weren't a lot of computers back then, but in terms of ordering equipment and that kind of thing. He was fine. He stayed on at the company.

I'd say those three guys were really an advisory board of the company, and we had a number of scientists in their labs that were **<T: 35 min>** doing the work, and we hired technicians. I'm not sure—we might have had a dozen people working there when I left, probably. I had an office manager. The rest were scientists. But it was very interesting to me, and again, I learned a lot about researchers interacting with the multinational companies, and that kind of thing. It turned out Novo ended up buying the company.

They had to change their name to ZymoGenetics, because they had—Zymos was a semiconductor company at the time in the Bay Area, and they didn't like the fact that they had the same name, even though they were different industries. The name became ZymoGenetics. I had a little stock that they invested. When Novo bought the company, I made a little bit of money, as I recall. That was not that long after I left. I think it was probably two, three years after I left. Then Novo ran it as an independent research company for a while, and then they spun it back out again. I'm not sure what—I don't think it exists anymore. I think they—

JONES: I think they reabsorbed it. I think it was Novo again.

BARNES: I think they did. But I know that Novo's yeast production—Novo's enzyme—or insulin production was in that—from the yeast work that was done by Ben Hall there. They came up with a blood protein out of Earl Davie's work that I believe was commercialized, if not by Novo, by someone else. So, there was really good science there. And—

JONES: So, this is the—it's 1982-ish?

BARNES: Right, it was early—I left there—

JONES: Did you have a place to go?

BARNES: No, I didn't have a place to go. It was kind of interesting. I decided, "Alright I'd like to get involved in another small company." I said, "Maybe there's some other applications for biotechnology outside of the pharmaceutical area." Because at that time, there had already been a number of companies. Little did I know, very naively, that since then there's been dozens if not hundred more pharmaceutical-oriented biotech companies. But back then, there seemed to be a bunch. I said, "What are some other potential applications?" And I—

JONES: So, you were thinking this is getting a little crowded, maybe—

BARNES: I did [Laughter] That's turned out to be kind of ridiculous. I decided, well, I'll go back down and start talking to some venture capitalists and see if they had some companies. I remember I went to talk to Cetus, and—

JONES: Who did you talk to there?

BARNES: It was Pete Farley. I don't know if Ron Cape was there—he was there at the time. I don't know if—but I interviewed with them, and another company. I thought, maybe there's a way to use biotechnology in wine. I remember I had that idea, but that didn't really—I did some research into that, but I couldn't figure much out there. Some venture capitalists, it might have been Pitch Johnson's partner, the younger guy—

JONES: Brook Byers was—

BARNES: Brook—no.

JONES: —there for a while.

BARNES: That was after that somebody suggested, "You ought to talk to this guy David Ramler, who was with Vanguard Venture Partners, and he's a PhD biochemist, and he's become a venture capitalist, and he's got a lot of ideas for starting things." I contacted him and went in to see him. He had an office there on Sandhill Road. He said, "You know, funny you should mention this, because I've just been thinking about using biotechnology to develop alternative chemical pesticides."

I said, "Well, that's interesting."

JONES: Where did that idea come from?

BARNES: It came out of his mind. There was concern over chemical pesticides back them, and the—you know, Carson's *Silent Spring*—[10]

JONES: Yeah, wasn't Silicon doing something—

BARNES: Silicon was doing—and Ramler was—he knew of those guys. He knew John Diekman.[11] He knew Carl Djerassi. He knew Alex Zaffaroni. He knew who those guys were. But I don't know—maybe that had something to do with it. He just had that idea. I said, "Well, that's interesting. Let me look into it a little bit." And so, I did, and it's a big industry, I found out. Chemical pesticides were under pressure. So, another scientist came into Ramler's office, not the same day, but around the same time, a guy named Dave Edwards, who was living in San Diego, [California,] UCSD [University of California, San Diego], I think. He was doing some consulting for Vanguard on a different project for Ramler, and so he got exposed to the idea, and he thought it was sort of interesting.

<T: 40 min> David Ramler didn't have a business plan, or he had a business plan on a piece of paper, and he wasn't capable of really writing a business plan. He was a real smart guy, but he didn't have the discipline to write anything down. But he had one concept, which was to go out onto plants and find out what—the bacteria, the microflora was that are on plant leaves, right, that live there? And then—

JONES: And this is his idea?

BARNES: His idea. Then genetically engineer them to produce a protein that's toxic to insects. Then you recolonize the plant with that population of microbes.

JONES: And did he know about *Bt* [*Bacillus thuringiensis*] or—

BARNES: He knew about *Bt*. Back then, there was like one strain of *Bt*, one protein. So that was his concept. We filed a patent on that. He was one of the inventors on that, but—so anyway, I decided to go ahead and do it. I was up in Seattle at the time. Dave Edwards was down here. Ramler was in Menlo Park, [California]. We decided where we're going to locate the company. Menlo Park's already the Bay Area had a lot of companies. We thought that'd be harder to recruit scientists there. Also, it wasn't really an ag area. Seattle didn't make a lot of sense. It wasn't an ag[rigcultural] area. Now—

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[10] See Rachel Carson, *Silent Spring* (Boston, MA: Houghton Mifflin, 1962).
[11] John Diekman, interview by Mark Jones on 29 August 2012 at 5AM Ventures, Menlo Park, California (Philadelphia, Chemical Heritage Foundation, Oral History Transcript 0998, in process).

JONES: Silicon Valley is not too far to ag.

BARNES: No, it's not, but that was kind of our thinking. It wasn't really ag. Down here in San Diego, it wasn't really ag, but there was a horticulture industry, and we thought maybe horticulture would be our place we would start. That's kind of some of the thinking that went into that. It's a nice area to live. We could attract scientists here. Hybritech [Incorporated] was here at the time, but there really wasn't much else.

JONES: Did you know about them? Did you—

BARNES: I knew about them. We decided to locate the company here. Vanguard put up the initial venture capital, which I think was three hundred thousand dollars. Dave [David] Edwards and I got ten percent of the company, and Vanguard got eighty percent. We started. We set up. Rented some temporary space down near UTC [north-central San Diego] there, and I ended up writing a business plan.

JONES: Were there any other companies there at that time?

BARNES: Nobody knew what biotech was, other than Hybritech. I don't think there was any other biotech companies here. I called over to Hybritech, and I remember asking them, who do you use for your auditor? Who do you use for this or that?

JONES: So, who did you talk to?

BARNES: I talked with—I remember Martha Demski, who was their chief financial officer at the time, and Ted Greene I remember talking to several times as well. I remember Martha Demski is the one that I probably—I mean, I didn't talk a lot—technically. It was trying to get stuff organized and oriented.

JONES: And did they thought it was a good idea to have other people coming in and doing—

BARNES: Well, they didn't care. We weren't in their field. Yeah, they didn't—they were just helpful. They were sort of kindred spirits there. Small company, something that they had already been through, so they were willing to help out, which I think most companies are willing to do that. We ended up hiring a scientist or two, and had a temporary lab down in—

JONES: From San Diego?

BARNES: From San Diego. Frank Gartner was the first scientist hired. He was a guy Dave Edwards knew. Dave Edwards never really did a lot of science. He was very good at explaining scientific things to investors and recruiting other scientists, but I don't remember him doing a lot of work in the lab. Frank Gartner was the first kind of bench—

JONES: Where did he come from?

BARNES: Frank Gartner?

JONES: UCSD or Salk [Institute for Biological Studies] or [The] Scripps [Research Institute] or—

BARNES: It might have been Salk, but it was here locally. He brought his technician, and we hired her as well. They set up a temporary lab. Dave Edwards had a bunch of equipment, I remember, that was left over from a grant. It was kind of a funny thing. The grant had paid for it all. The grant ran out. Basically, he owned the equipment we took that into the company. We kind of had a lab we could move in, and purchased a few things, and then based on the business plan, we raised—I kind of remember a million and a half dollars. It was probably close. From three other venture capitalists. One was Cable, Howse & Ragan out of Seattle, because they had had me—

JONES: Because you—

BARNES: They also knew David Ramler as well, so they were obviously comfortable with me, or they wouldn't have invested. I think even the—that round, or another round, Bill Bowes from US Venture Partners. It might have been in that first round. Might have been the next round. They were involved. I don't know if I can remember the other ones. Vanguard—

JONES: So **<T: 45 min>** we've got the IPO [initial public offering] prospectus, so we can check that out.

BARNES: Then we set up—we leased some space in what has become the Mira Mesa Business Park there. We were one of the first companies to lease space in there. Now it's a huge, giant area, compound, but we were down there on Oberlin Drive. My role is I was vice president of operations. Dave Edwards was VP [vice president] of science or technology. Ramler was the initial president. We had a part-time guy—

JONES: So, he's up in Menlo Park?

BARNES: He was on the board of directors, never really got actually involved. He had a guy that he brought in, a guy named Don Eichman, who was not a biotech guy, but had been president of companies in the past. They wanted him to be president of the company early on. He wasn't located here, either, but he was kind of an advisor to me, and he was on the board. We set about, you know, trying to reduce to practice this Ramler concept of—we called it biological packaging. And we did.

JONES: And all the scientists you talked to looked at it and said, "Yeah, this could work, this is a—"

BARNES: We had different types of scientists. We had etymologists, because we were trying to kill insects. The other technology we had was using plant pathogens, pathogenic microorganisms, usually fungi, to act as bio-herbicides, to take out weeds. There was no genetic engineering involved there. We just identified these—universities identified them, and we licensed them, that could then be produced on a large scale through fermentation, formulated in a way to keep them alive, and then spray them on a crop, and try to take out a weed very selectively, without damaging the others. Bio-pesticide. That never turned out to be commercially relevant, but we spent a fair amount of effort on it. That was our other platform. We had the biological packaging and that's why it was Mycogen was the name of the company, because myco is fungi, and—but that—

JONES: So, that was the main thrust initially, or—

BARNES: Well, no. There were the two thrusts. But one of them we thought was going to be quicker, because there was no genetic engineering involved.

JONES: But more regulatory obstacles?

BARNES: The other was sexy, but regulatory obstacles, and unproved science. But we were able to pretty quickly, with Frank Gartner doing the mycogenetics. We first isolated pseudomonas fluorescenses, probably the most prevalent bacteria on leaf surfaces. It had a pigmented cell well to protect its own internal DNA, so we thought that would be good for protecting our protein that's going to be in there. We isolated some strains of that, and then Frank figured out how to genetic engineer it and we put a *Bt* protein in there, and sprayed it back on plants in a greenhouse up in Encintas, [California,] and then introduced some caterpillars, and lo and behold, the leaves were fine, and the caterpillars died, and it was very—

JONES: Was it difficult to get permission to do that, or—

BARNES: Not in an enclosed space. The next step was going to be difficult. And so—

JONES: But before we go there, I just want to ask, how did this opportunity feel to you in comparison with ZymoGenetics? The difference. They're working on stuff, potentially pharmaceuticals, with really big—

BARNES: Well, I thought the timelines—we were hoping would be shorter here. The drug thing takes forever and required lots of money. We were hoping that this would be quicker to market and require less investment. There was a lot of uncertainty there. I didn't have much familiarity with the pesticide industry, and that's what led us to getting Jerry Caulder in there.

Our plan was to get the company up to a certain level, at least proof of concept, some—technology-wise, and then you can recruit someone in from the pesticide industry, someone that had experience there. Jerry came in—the company was up and going about fifteen, eighteen months or so before Jerry got involved. I was kind of working with another recruiter to find someone, and Jerry was one of the ones we interviewed, and he stood out—

JONES: And how was the role defined?

BARNES: He was going to be chairman/CEO [chief executive officer], or CEO, anyway, not chairman, but CEO. I was going to be VP of operations, one of the operating guys. But we needed someone—if we were going to raise more money and really get a pesticide through the EPA, we needed somebody out of that industry with the experience and a little clout.

JONES: I forget the details of Jerry's story. **<T: 50 min>** He—my recollection is—he told me great stories about doing stuff in Central America and all that stuff. But he was doing business development things, right?

BARNES: Business development. He has a technical background, obviously. They called it commercial development at Monsanto. That was their term for taking product from research—it was interfacing research and the market. There was commercial development, where they would do the equivalent of clinical trials, but doing field-testing. That's what he was responsible for, I think, and doing it in different parts of the world. Roundup is the big product there, so—

JONES: So, he's perfectly qualified—

BARNES: But he really stood out as—and Monsanto [Company] at the time was getting involved in the biotech side of it, too, so he had that background. His resume was really good as far as I was concerned. We were very excited that we were able to get him out of Monsanto.

JONES: Well, what did it take to get him out? How did you entice—

BARNES: —I think he wanted to run something. He wanted to run something. He wasn't going to run Monsanto, at least for a while. And he got an equity chunk, and—I don't remember the details.

JONES: But he was ready to go?

BARNES: I remember meeting him up face to face at a conference in San Francisco. He was out there representing Monsanto. I flew up, and that was the initial interview. He's heard me tell this. It was ironic, because he was very serious during that interview, kind of dour, and that was one thing—when Ramler would ask me, "Well yeah, he's a sharp guy, impressive. He's kind of serious. I don't know how much—" But it turns out he's a real character. Anything but series. He joined us there and moved to San Diego with his wife and his son and took over running the company.

What happened the whole regulatory thing was a question as to how we were going to get a live release of a live genetically engineered microorganism. So actually, it was my idea, and the patent, we decided—we were talking one day, well, it was we want to colonize these leaf surfaces to protect the plant, and we want the bacteria to protect the proteins, so the protein didn't get denatured out there in—from UV light and all those things. Why don't we engineer the pseudomonas fluorescens grow them up mass produce them, and then kill them? We're not releasing any live genetically engineered organisms, but we've got the cell wall still protecting the protein. And—

JONES: It's a problem when the cell wall starts to break down?

BARNES: Well, that was one thing. The scientists said, well, but there's technology for that, fixing the cell wall. They fix cells all the time for staining them and I guess for assay purposes and stuff. So, there's treatments that you can fix the cell wall, meaning polymerize the polymers in a cell wall. We had to find one that would do that without damaging our *Bt* protein. So, we did. Sue [Susan G.] Cummings was her name, and she and I were the inventors on the—we called it CellCap patent, which that was the trade name we came up with, was CellCap, which was—[12]

JONES: I noticed your name is on a lot of these patents. So—

BARNES: Well, those two, anyway. Then maybe there's international ones. That's really—became the technology that we commercialized. We never commercialized the biological packaging concept that Ramler had, because of the regulatory concerns. I don't think that probably would even fly today. But with the CellCap, we had to convince the EPA [Environmental Protection Agency] that we could kill all the cells, and we were able to do that. We did it in the fermenter, after the fermentation was complete, killed all the cells. They indeed were fairly hardy little biocapsules. The insect's digestive system would break down the cell wall, and then the protein would kill them. It was a very clever and kind of sexy technology that was easy to explain to Wall Street and investors and that. That was our delivery system. Then we set about finding other proteins that would kill different types of insects. The original *Bt* protein was only good for caterpillars, certain types of caterpillars. We had a program where we would get soil samples or samples from all over the place, and then bring them to the lab and analyze them for *Bt* and different strains, and look for the—

JONES: It wasn't just random, though? I mean, you're taking soil samples from where the pests are? Is that—

BARNES: We did some of that. Some of it was random. Or strange places, you know, grain elevators, **<T: 55 min>** and you know. I wasn't in charge of where it was, but it was different—all sorts of places, different parts of the world et cetera. But we wanted different *Bt* strains. So we built up a big library in *Bt* strains. Then they have etymologists who would rear different types of insects, and then have to develop assays to feed these, to see if they could be toxic to the insects, or—and that. Found a number quite a variety. That became Mycogen's

[12] Andrew Barnes and Susan G. Cummings, Cellular encapsulation of pesticides produced by expression of heterologous genes, US Patent 4595455 filed August 30, 1985, and issued September 22, 1987,

probably crown jewel, was the *BT* collection, and then subsequently the genes responsible for the individual protein there. We filed patents on those, and that became our real asset.

We did end up commercializing several products to spray on CellCap products, one for caterpillars, one for certain beetles, the potato beetle being one of them. There were several others. But it became clear that we were limited there because you had to keep applying it. While the CellCap protected the protein better than just a regular *Bt* strain, it would wash off with rain. You'd have similar problems that regular spray-on pesticides would have. Fortunately, science was evolving so that you could genetically engineer the plants, so they could produce more proteins. And also serendipitously, one of our investors in a round after Jerry was there, an investment was there had a venture group that was feeling it oats, because they were early investors in Genentech, so they had made a lot of money on that investment. They had kind of a pretty free rein to make other biotech investments. They made a bunch of those, one of which was a company called Agrigenetics [Incorporate].

JONES: Yeah, I'd like to hear about that in detail, because I talked to some of those people. David Padwa and—[13]

BARNES: Was he—

JONES: I think he was—

BARNES: I think he was in a different one, but—

JONES: No, he was Agrigenetics.

BARNES: Biogenetics it was an amorphous thing, because—

JONES: They had all these seed companies.

BARNES: They had seed companies, and they also had researchers, and that spun out of the old RD limited partnership thing, where they raised a bunch of money from like movie stars and people, and so they could get a tax break.

[13] David Padwa, interview by Mark Jones on 21 September 2012 at Santa Fe, New Mexico (Philadelphia: Chemical Heritage Foundation, Oral History Transcript #1061, in process).

JONES: Right.

BARNES: And so, they bought up all these little seed companies and other—and other things. They were going to do nitrogen fixing bacteria and all sorts of things. And Lubrizol [Corporation] was invested in that. That kind of went bad, for whatever reason, and Lubrizol ended up inheriting whatever was left there, I think. There was lawsuits and all sorts of stuff that we weren't involved in, but we heard about, because Lubrizol had invested in us. They had got on our board. Lubrizol was looking to kind of extricate itself from that whole thing, and, you know, they were a specialty lubricants company, and so biotech didn't necessarily fit there. And they probably had a new CEO along that time, and he had decided that it was time to get out of that venture group, or maybe focus that venture group on things that were more central to their core business. So it made sense to—

JONES: What did they have that you wanted?

BARNES: They had the ability to genetically engineer plants, and they had some seed companies. They didn't have a lot of seed companies at the time, but they had patents for expressing *Bt* in plants, and they had know-all how to do it. They had patents on some of the tools, some of the vectors. Was it agrobacterium that they had some patents on. They had intellectual property, which was—to get into the plant genetic engineering game, you needed to have some intellectual property to horse trade, if nothing else.

JONES: Another thing I wanted to ask you about was there was some patent trouble with—you had a *Bt* patent and—was it Novo?

BARNES: Well, we had several troubles. The one with—what was it? Oh, when we had discovered—one of our researchers had discovered a strain of *Bt* that produced a protein toxic to the Colorado potato beetle. The whole thing—you know, I don't think we really know the full true story to it. But she had visited the lab of a researcher in Germany who made the discovery also, before—

JONES: Independently?

BARNES: She was from Germany, so she was back there, and went independently, yes. She came back, and after she came back, she had discovered a strain herself that we thought was different than that strain, and **<T: 60 min>** so we went about sequencing the gene and patenting that and everything. We got a patent issued ourselves. Then we commercialized that product.

Well, we were collaborating with Novo at the time. We needed fermentation capability. I had prior contacts with Novo from the Zymogenetics days. They had an enzyme business. They had the insulin business, but they also were the leading producer of insulin enzymes. They knew how to produce stuff.

JONES: Were they making recombinant enzyme by that time, or—

BARNES: I don't remember. Recombinant insulin at the time, but I don't know if they were doing the enzymes at the time. We had an agreement, and they were—I was traveling over there periodically, because my responsibility was to—the operations side of it. We were going to have them produce this *Bt* strain, because to commercialize it, first, we were going to just do the natural strain, and then we would follow on with the CellCap version. They were working on it.

And then they—I think they discovered it, and they thought the strain was the same as the German strain.

JONES: Who did?

BARNES: Novo did, working with our strain. Then they had decided that maybe they'll get into the bio-pesticide business, because they excess fermentation capacity. They went to that German researcher. That's how it was. And then they said, "Well, jeez, you know, we think this is the same strain. It looks the same to us." It's funny. So we got [. . .] they ended up teaming up with the researcher, and they—I don't know if they brought a lawsuit, or—anyway, they challenged our patent.

JONES: So, this is a little kind of dirty business on Novo's part? They want to—

BARNES: Well, you know—

JONES: —from you, but—

BARNES: That was a conflict, but the fact they were getting into bio-pesticides was kind of irritating to us. But they would say that we misappropriated the strain, and they believed that our scientist had come in contact with—in the lab and had taken it out of there, intentionally or unintentionally, you know. This *Bt* floating as spores, they float around—

JONES: But you had sequenced, they'd sequenced. So, what happens when you put them together?

BARNES: I don't know if they ever sequenced. That researcher wasn't into that type of thing. So, if they did, they did it after we did, because we wouldn't have got our patent. There was a lawsuit, and we went back and forth for a while, and we ended up settling with them. I don't know—we had to pay them some money or something. Cross-license each other, something like that. I think they commercialized it as well, maybe. It wasn't a big product for us, anyway. Or maybe we dropped—we went forward with the CellCap version of it. Maybe they did the natural version. But it soured that relationship. It was disappointing.

But that was the first of a number of patent issues, because we pretty quickly got in Monsanto's crosshairs, because they were trying to commercialize, develop transgenic crops as well, and *Bt* restriction. So, we had our *BT* collection of a number of genes, and then we had the Agrigenetics technology, and their intellectual property. And so—

JONES: And Jerry Caulder's tied into those networks, right?

BARNES: So, he knew all those guys over there. It was a little—it was helpful, but I think they looked at—maybe we can stick it to Jerry here. Jerry was getting a lot of publicity, because he was active—it was a strategy of ours. It'd be good for Mycogen if we have a guy that would be active in BIO [Biotechnology Industry Organization], big biotech trade association. Jerry was—I think he might have been head of BIO for a year or two, and was on the board, and all that. He was getting a fair amount of publicity, and became a spokesman for ag biotech, to a large extent, because we were one of the leaders, as was Monsanto. I think that probably rubbed Monsanto a little the wrong way. They were a big company. They don't seek the spotlight—

JONES: How did you feel about this entire field that's sort of growing up, and you've got some—I guess pharmaceuticals, you've got huge corporations that populate that field. But they really didn't take over the way Monsanto took over—did you **<T: 65 min>** see that happening? Or did you see—

BARNES: We saw it as an opportunity because there was really only Monsanto, and then there was us. Now [E. I.] DuPont [de Nemours and Company] was trying to get involved, and the Pioneer Hybrid they were the big dog seed company at the time, they weren't part of DuPont at the time. We were talking about aligning ourselves with Pioneer Hi-Bred [Corn Company] and then competing against Monsanto, because they were acquiring seed companies—we acquired some small seed companies, but nothing like they were able to do. We were deciding we needed some partners if we were going to battle against Monsanto there. We learned a lot. You know

having the technology is one thing, but you have to have the germplasm. You have to have high yielding corn, or—

JONES: Did you have it, or—

BARNES: We didn't have it. No. We couldn't compete with Pioneer. DeKalb [Genetics Corporation] was the company that Monsanto ended up buying, was the number two US seed company at the time. We ended up doing a collaboration with Pioneer, where they wanted access to our library. We were going to be paid royalties on their transgenic crops with our traits in them, and that we were going to also be able to commercialize those traits in our germplasm, in our seed varieties that we sell. We were a very small market share compared to—But at least we'd have the technology on that. You know it became a much more complicated and larger dollar value game once we got into the transgenic crops.

JONES: You felt like just you had to go this way, or—

BARNES: We did. Once we've got afoul of Monsanto—well, I won't say afoul. Once we had the conflicts and we were suing each other there, we needed—

JONES: So, what were the suits about?

BARNES: Well, they were about ability to put *Bt* in plants, because we believed we had the basic patents from Agrigenetics. They were the first ones to put it in plants, and Monsanto didn't think so. They didn't think the patents were valid. The usual arguments about validity, or who did what first.

It was very complicated. So, one of the things—several things happened. Jerry—we brought in an attorney, Carl Eibl, in house, to help us, because legal was going to be a bigger part of our business going forward. Carl got promoted to president of Mycogen, I believe, and Jerry became CEO/chairman. Carl ultimately was the president, and Jerry ended up leaving. Then we also decided that we needed a deep-pocketed partner. Pioneer didn't seem to be willing to do that. They wanted the collaboration, but—so that's when Dow Chemical—

JONES: So, you did try to talk to them about that?

BARNES: Oh, yeah. Yeah. Dow Chemical ended up making an equity investment in us and getting on the board. Because they wanted a little window on the biotech. They had a good-sized and very successful agrichemical business, but they saw the threat of bio-pesticides, and—

JONES: Was this their first foray into this, or—

BARNES: I think it was. It was their most significant, if it wasn't their first. That gave us a pretty big gorilla, there. But then Dow got more and more involved, got to a 40 percent ownership position, and sort of forced Jerry out there. Then they took a 50 percent position, and maybe that's when he got out. Then they ran the company as a majority shareholder, with Carl Eibl as president. He ran it for a couple of years, until they bought the whole thing.

JONES: So, what did that mean for you at that point? You're talking—how did you—you must have had discussions with Jerry about that.

BARNES: I had decided to stay on, just because we were still doing some interesting things in terms of collaborating with different companies. We were looking at buying some seed companies. I was running the bio-pesticide business at the time, which was small. We had acquired a little company in Salinas Valley called SoilServ [Incorporated], which was about a thirty million dollars business. Applied pesticides.

JONES: Locally?

BARNES: Yes.

JONES: Regionally?

BARNES: Regionally there on vegetable crops. It's a real big on lettuce and other crops. We were thinking we were going to be able to get a lot of our products applied through there. It didn't turn out **<T: 70 min>** that way. We got some, but not a lot. That was an interesting asset.

I had been involved in a number of deals. We had Japanese investors. Japan Tobacco [Incorporated] was an investor. We had a collaboration with them. Kubota [Tractor Corporation] was an investor. They had the Japanese rights to our bio-pesticides, which were deals I had worked on. The other person I didn't mention was we had—well, several other people. We ended up having a pretty good executive team at Mycogen. Jim Glynn was our chief financial officer. He came to us out of Lubrizol, when we bought—before we bought all of

Agrigenetics, but right as we were doing our initial public offering, he joined us as our financial officer. He and I were responsible for doing a lot of different deals. We did a lot of acquisitions and collaboration agreements. I'd work with Jim.

Al Kern joined out of Monsanto. He worked for Jerry at Monsanto. He was our commercial development person. And then Leo Kim we hired out of Shell [Oil Company]'s biotech group. He was a head of research, like. I was one of the five executives Mycogen had for a number of years. It was very interesting stuff. We hired Joe [Joseph D.] Panetta as our regulatory guy.[14]

JONES: Oh, I didn't realize that.

BARNES: I forget where he came from. It was a chemical company back east. Pesticide company. He really cut his teeth on the whole bio-pesticide biotech thing at Mycogen, and then he became—translated into him being head of BIO here for a year or so. He was a really good guy, and he did a lot of pioneering stuff with the EPA, getting our CellCap product registered, the first genetically engineered product the EPA ever registered. Because he has the regulatory side down cold. I'm sure he still remembers that really well. We had a good team of people there. I stayed on until Dow's ultimate acquisition, and then they offered me a job back in Indianapolis, [Indiana,] which I didn't want to do. I left at that time.

JONES: Right.

BARNES: But I still had an equity position, so I was financially pretty well set after that, but it was quite a ride. It was sixteen years there, and we did lots of things. We had five rounds of private equity. We had three public offerings, initial public offering, two follow-ons. We did a bunch of acquisitions, a bunch of joint ventures, a bunch of collaborations. Went through the whole process of having a major minority shareholder become a majority shareholder, and then we tried to force the ultimate acquisition, because we just didn't want to sit there with them owning sixty percent of the company. We didn't want to sit there forever. So, we—

JONES: Even though that's going to make—that will mean big changes for you personally, and—

BARNES: We all had—well, I had some founder's shares left obviously, but that ten percent was a lot less than that by the time it got acquired, clearly, with all that equity dilution. But

[14] Joseph D. Panetta, interview by Mark Jones on 2 September 2015 at La Jolla, California (Philadelphia: Chemical Heritage Foundation, Research Interview #0041, in process).

everybody saw the handwriting on the wall. They weren't happy working under Dow's organization and framework. It was a huge company that had all the systems in place—

JONES: And they were changing things for you operationally? They were—

BARNES: We were used to making decisions. You get the five guys together and you make a decision and go.

JONES: So, it's not as much fun.

BARNES: Right, it wasn't as much fun. It was a very unique experience, I think, to structure that whole thing. The timing is everything. The venture capital was available at the time. We started—biotech was just getting started. It was a sexy technology. I was in the right place at the right time. And—

JONES: And what were your thoughts at that time about what you would do next? Have you been retired since '96? Is it—

BARNES: No. Well, I said—I did retire. Well, no, I didn't—I'm getting these things confused. As soon as I left there, I was going to retire, for a while, anyway, but then Jerry contacted me, and at Myelos thing. He was on the board of this new company, Myelos, which was, ironically, leasing space there in the Mycogen complex that Dow took over. I knew it was there. I didn't really know what it was doing or anything. They were having a problem between their founder and—John [S.] O'Brien, who was a university professor, and—

JONES: John O'Brien is the founder?

BARNES: He was the founder. He came up with Prosaptide, the peptide that had neurotrophic properties, came out of his research at UCSD, and they licensed that. That was the basis of Myelos [Corporation]. That was all it was. They **<T: 75 min>** had a president in there, and they had some scientists in the lab, and they were developing that as a drug. But the president and John O'Brien got crossways over stuff, I don't know—John was a difficult guy to deal with. And so—

JONES: Was this before or after Jerry Caulder's involvement?

BARNES: I think Jerry came in probably to help try to smooth things out, I think, but he was there while they were having the problems, and they just came to the conclusion they were not resolvable, so they ended up terminating the president. They were looking for someone else, and Jerry said, "I know this guy. Andy Barnes just became available here." So, I got sucked into that with Jerry. But it was interesting. I got back in the pharmaceutical side of things.

And a chance to run. I was going to be the president, making the decisions there. They had venture—Vanguard Ventures was on the group, not David Ramler, some new partners, younger partners, but—so they were investors, as well as several other firms. And they had a drug that had started a Phase II clinical trial. Maybe it didn't start until after I was there. But it had completed Phase I, and it was going into Phase II. We ended up doing a Phase II trial on it, and the results of the trial were—well, it was for treating neuropathic pain associated with diabetic neuropathy. They get pain in their feet. The results of the trial were mixed, I would say. They weren't statistically significant if you looked at the overall population, but if you looked at a subset of the population, it was pretty compelling. There's nothing out there to really treat this disorder. And—

JONES: So how was the FDA [US Food and Drug Administration] looking at results like that at that time? This is before—maybe they've changed now. Everything is personalized—

BARNES: Well, everybody was—well, they don't like that, when you go back and review your data after the fact. They like when you establish the endpoints up front, and you either meet them or you don't meet them.

It was a difficult—the venture investors were tired. They weren't really interested in putting any more money in. I was sort of chartered with figuring out something to do.

We decided to see if we could partner or sell the company. The partnering, we talked to lots of big pharma companies, small biotech companies, etcetera. We had come up with what we thought was a fairly compelling story, but of course, we always had that issue with the fact that the results weren't statistically significant when you looked at the population at large. But if you looked at the population whose nerves weren't already dead or essentially dead before you [the trial] they were pretty robust.

To make a long story short, we were finally able to find a company, which was called Bio-Technology General [Corporation] at the time—they've changed their name now. But they ended up purchasing the company. They were going to—they did a buyout where there was a certain amount paid up front, and then there was contingent payments based on the success of the drug going through the trials.

Well, of course, we learned the—or reinforced the experience there, that when you do that, you lose control of the trial. They switched from diabetic neuropathic pain to HIV [human

immunodeficiency virus]-induced neuropathic pain, because they could get some funding from the HIV research group, so it was a lot less expensive. They did that trial, and then they did not get positive results. We don't know to this day whether the drug didn't work, or whether the—it would have worked in the diabetic neuropathic pain.

The venture investors were happy. They got their money back, or maybe a little bit more, with the initial upfront payment. John O'Brien died shortly after that. There's a question whether he committed suicide or not. He suffered from polio, so post-traumatic—post-polio syndrome. He took the drug himself. He developed it. He treated himself. He was a testimonial to the drug working, because it relieved his pain. There's still some question at this point, the soundness of the scientific results, because he was so invested in it as the—

I don't know to this day whether his bias—the fact that maybe it was being discovered by the trial as not working as well led to him taking his own life or not. It's all speculation. Anyway, that was **<T: 80 min>** a success only in—I was like a minor hero to the investors, because I got their money back there, and—

JONES: So, they'd be willing to back you on something else, but at that time, did you—what happened then?

BARNES: Well, at that time, I retired, I believe.

JONES: What was the year?

BARNES: That's a good question. Mycogen was '96? Is that when that was bought out? So, a year—a couple of years at Myelos. So, it was late nineties, '98, '99, probably. So, I retired for a year and a half, was playing golf and doing some traveling, and my kids were still in high school, so I was spending some time with them. But I got introduced to a woman that used to work for me at Myelos, Charlotte Clark, a friend of her father's was working with these medical device engineers who had developed a device for injecting drugs without using needles, needle free injection system for self-administering drugs.

I was intrigued with that, because Proceptin at Myelos was an injectable, and that was one of our challenges, was it was going to be injected, and that was going to limit the market. A lot of drug companies were turned off by that right away, because they'd rather have it be a pill or something. I saw the device. We began talking about it was clever technology. The patents were issued. I started kind of a part-time thing with them, helping them out, and then I kind of got sucked into president of the company. Ended up staying there for five or six years. I thought it was going to be like a year thing. The initial technology didn't pan out, because it wasn't reliable enough. You need to get a drug essentially 100 percent of the time, and particularly if you're doing an expensive biotech drug that maybe a dose is five hundred dollars.

You don't want to leave a drop on the surface or have a failed injection. Also, it caused bruising, more bruising than a needle, surprisingly so. You could feel a little pain. But it had a lot of promise early on, but only after we did a lot more testing did, we find this out, but it turned out there that we were able to salvage something there, because we came up with an alternative. A lot of drugs are delivered as prefilled syringes now. Ambril from Amgen is an example. So, you get a prefilled syringe you take out of the refrigerator, let it warm up, and then you inject yourself and throw it away. Throw it away properly in a medical waste container.

So, we had come up with a technology, a fully automated way of taking a prefilled syringe that had the needle on it, but snapping it into a cartridge, or having our device, which was about the size of an electric toothbrush, and then the patient would never see the needle, put it up against their skin, press a button. A motor would insert the syringe at the—or insert the needle at the proper speed. Another motor would deliver the drug at the proper rate. When it was complete, it would retract the needle and tell you it's all over with. Then you would just pop the cartridge out of the device, and you throw it away. It was already in a containment device, so the needle was never exposed. It was very clever. We developed a working prototype of that.

JONES: And you—you're on that patent, too, right?[15]

BARNES: I am on one of—yeah.

JONES: One of those?

BARNES: There are several patents around that. I'm not a key inventor on that. The engineers did the work there. So, we ended up selling that to a biopharma company who wanted to get into—deliver their own drugs. I'm not at liberty to say who it is. But—

JONES: You're not?

BARNES: Well, I signed a confidentiality agreement. They haven't commercialized it yet. So, this has been two and a half years now, so—whether they're ever going to or not I don't know. But it was a major biopharma company. And I don't know if the agreement's run out or not yet, but I'd rather not say—

[15] John B. Slate, Michael W. Burk, Richard J. Koerner, Corey M. Magers, and Andrew C. Barnes. Cassette for a hidden injection needle, US Patent 8177749 B2, filed 20 May 2008, issued 15 May 2012.

JONES: Sure, that's fine.

BARNES: So that was kind of interesting. It was a little medical device experience. But it was frustrating, because the initial technology didn't pan out. But there, we got our money—investors' money back again there, and we were looking like we were going to get nothing there for a while. It wasn't that much money, but—there wasn't a huge amount. It wasn't like a pharmaceutical—

JONES: Yeah. Well how does that feel, when it looks like this might be a total loss? And you're sort of—

BARNES: Well, I didn't like it at all, because these guys, the investors here were people that I had **<T: 85 min>** brought in. There was John Patience and Jack [W.] Schuler. Jack Schuler is the former CEO of Abbott. My father worked for him. But he's been a very successful investor. He was on Amgen's board early on. He on the board of Medtronic [Public Limited Company], and. . . What was the name of the company? He sold his company that was out in Tucson got bought by [F. Hoffmann-La] Roche [AG]. It was a diagnostic company. Hundreds of millions of dollars, and he's a very successful guy. So, they had invested because of my contacts with them. So, that's what you don't like, when you get—and we had some other investors. I forget who they have, people you know, and they put money in because you were involved in the enterprise, you don't want them to lose money. You'd like to see them make lots of money, but it doesn't always happen. I think I can safely say that of the four companies I've been involved with, nobody lost money.

Mycogen, they clearly made money. Zymos, I think the early investors made money there, too. But the last—

JONES: Well, that's a nice track record.

BARNES: Yeah. Yeah.

JONES: Lots of people—

BARNES: Right, well, it's hard. I mean, I think the key thing I realized is timing is everything, and you've got to be lucky. You can be as smart as you can, and, you know, work as hard as you can, but some things just don't work out, because the timing's not right, or somebody else does something that preempts you, or whatever. You've got to be lucky, and you've got to have good

timing. It's always surprising to me, that people think because they were successful in one startup venture, they're going to be successful in another. I know people have, but it's—

JONES: It's always risky business.

BARNES: It's always risky business.

JONES: And you are now fully retired?

BARNES: I am.

JONES: And seriously golfing?

BARNES: I'm a professional golfer. I play five dollars Nassaus five days a week. It's not very lucrative, but—yeah, I don't really have a desire to get back involved. I mean, I would probably do some consulting, but—advising, if somebody was to ask me, but I haven't been asked. I've looked at some things, but I don't really want to get sucked back into doing something on a full-time basis. Like the last—Avant Medical [Corporation] was the little medical device company, and that was just too much work for too little. At the end of the day. I hung in there till the end, just to see if we could get people's money back out of it or make something out of it. Fortunately, we did.

JONES: Great. Is there anything else that you can think of that—did we skip over anything that was important?

BARNES: I'm sure we did, but not that I can think of. I was obviously in the right place at the right time with the Technology Licensing Office thing at Stanford. That was a great opportunity for me, and I happened to make the right choice to do that. I remember agonizing over it. It wasn't the flashy thing. Everyone else is going to big companies or venture firms, and here I'm staying at the university. It didn't pay that well, and all that. But it was a matter of being patient.

I remember something that Pitch Johnson told me in the venture group, or told the class, was that key, and not just in venture capital, but he thought about in your career, was making sure you put yourself in the deal stream, which was put yourself in a position where you'll see a lot of opportunities. That's what he needed to do as a venture capitalist, and that's what I think the Technology Licensing Office job did for me at Stanford. It put me in the deal stream. I saw a lot of different companies, and the interaction with Aldo Test led to the ZymoGenetics thing, which led to Mycogen ultimately, and Cable, Howse, those investors there, and all that.

JONES: No, it is about making those connections.

BARNES: Right.

JONES: And being involved in—

BARNES: And that's what people have asked me, going into Stanford Business School, you know, what I take out of that. It was a very good program. I don't dispute that. But I'm not sure the classroom stuff was any better than other schools. But you're in the deal stream there. You're in Silicon Valley. You've got venture capitalists all around. You have classmates that are really high-powered, high caliber people that are going to do things, or have done things, that you can benefit from being exposed to. That was a little bit of putting myself in the deal stream as well. I think a lot of kids today, they want to—expect they're going to **<T: 90 min>** have the ultimate job right out of college or something, and it doesn't always work that way. It takes some things just to put yourself in a position to get exposed to the good job.

JONES: Listen you were here in San Diego for all those years with Mycogen—and these other—Myelos is here. Was Avant?

BARNES: It was here, too.

JONES: So, you've been here the whole time? And you've seen this particular region grow up. While this was happening, what were your thoughts about that? You know, maybe somebody like Jerry was more involved in it, but, you know, he was doing the civic stuff, but—

BARNES: I didn't do—Jerry was our front man, kind of intentionally, and he was good at it, and we wanted the CEO to do it, and it benefited Mycogen to have our name out there. It's been very impressive to me. Obviously, we did not use the university structure here that much for Mycogen. Clearly Myelos was based on it, but we didn't use it that much. But a lot of other companies have. There wasn't the ag resource that would have benefited—

JONES: But were there better places to do an ag company, or—

BARNES: Davis might have been a little better. But, you know, we needed to have the molecular biology/biochemistry talent, and we could access that here, from the labs and it was a great place to recruit people in from, you know. If we wanted to hire an etymologist or a plant pathologist, getting them to come and live in San Diego was a real positive. As opposed to Mississippi or— someplace—New Jersey or wherever. But the other thing that spun out of Mycogen was our fermentation technology, because when Dow took it over, that was one of the assets—it wasn't a prime interest of theirs, but one of the ones they kept. The fermentation group is run by a guy named Hank Talbot here, and they spun that out into a separate company. Because what they had done, or we had done, was we had become really good at genetically engineering and producing proteins in pseudomonas, which is a different path than *E. coli*. It had some advantages there. We had developed a system where we could grow the cells up to very high cell density, and then initiate expression, so the protein would be expressed, and there would be large masses of the protein in the cell, and we could harvest the fermentation.

Dow's thought was we could use that to produce other proteins besides *Bt*. And so they kept that as a private company, and it's—well, as a division of Dow, and then they spun it out into a private company that's still here in San Diego, and—

JONES: What's it called?

BARNES: Well, I'm going to tell you here, as soon as I find the—Hank Talbot is the key scientist there. It's called Pfenex [Incorporated], P-F-E-N-E-X, which is pseudomonas fluorescence, P-F-E, Pfenex. So, they are contracting now with companies, pharmaceutical companies, to produce potential drugs in this system.

They had a number of advantages. They sequenced the whole pseudomonas fluorescence genome, and they know everything about it. It's a very high efficiency system. When I was involved in managing the group—Hank was running it—our interest was producing as much *Bt* protein as we could, because we were—in our CellCap system, we had to compete with Abbott, who was a big—they were the leading *Bt* producer. They had a bio-pesticide division.

JONES: Abbott?

BARNES: Abbott did. Because they had excess fermentation capacity. Same reason Novo got into it. They had fermentation capacity left over from the production of their antibiotics and other drugs.

JONES: When did they do that?

BARNES: They were in it before we were. They were the leading product of *Bt*. They had Sandoz [Incorporated], who were the two big *Bt* producers in the US—well, probably in the world.

JONES: So, did you know about Abbott—doing that before you got—no?

BARNES: Didn't know anything about it. It was only a way for them to fill fermenters. They also produced a substance called gibberellic acid, which is a fermentation product that's used to treat table grapes. Table grapes grow all clustered, and if you treat them with gibberellic acid, the grapes separate out, and they're not all stuck together. If you don't treat them, sometimes you buy a bad batch that weren't treated properly, and they're all the **<T: 95 min>** grapes are mushed together. But if you treat them with gibberellic acid, it's a growth regulator. It's a very high value product, and Abbott dominated that market and sold it—I think they're out of that business now. We had to compete with them economically, because we didn't have 80 percent gross margin on bio-pesticide products like—we might have had 50 or 60 percent. We needed to be economic.

We had developed a very efficient pseudomonas system, I guess was my point, and so Dow recognized that, and continued that group. Now it's a separate company. They raised private equity and—I don't know—I haven't talked to Hank in over a year, but I don't know how they're doing. But it was something that spun out of the Mycogen—and Dow still has Mycogen Seeds as their trade name for their seed business. I know that, because I'll watch a Purdue basketball game sometimes on the Big 10 Network, and they'll have an advertisement coming back there from Mycogen Seeds.

JONES: Well, thank you, Andy. Great stories.

BARNES: All right. Yeah, it's a long-winded one there, I guess.

JONES: No, it's good. And we'll put a transcript together and get it back to you, and you can review it. We'll be incorporating it into—the magazine. We've got a book.

BARNES: The magazine, is it going to—the book going to be kind of a companion to the magazines? Is it—

JONES: The book is going to be the story of origins of commercial biotechnology. So Mycogen's part of that, in 1982, getting the ag chem started.

BARNES: I don't have a recollection of all of the—I remember when I was marketing the Cohen-Boyer for Stanford, there was a conference back in Cold Spring Harbor that I was attending and giving an explanation of the license. And there were researchers there. And I think there may have been pushback from them at the time, now that I think about it. But I remember riding from the airport out to Cold Spring Harbor in a limo, in a car, you know, I was this young guy just out of Stanford, and here are these famous scientists. I don't recall who they were, but it was somebody like [James] Watson and [Francis] Crick and those guys and they were going out to this meeting. And it was the—I think Wally—

JONES: Wally Gilbert?[16]

BARNES: —Gilbert was there. So, it was kind of fun. Some of the guys that I—they weren't colleagues of mine, but I did interact with them a little bit back in those days, and they became kind of the foundation of biotech.

JONES: The book is about them, but you'll be in it, too.

BARNES: Yes, but George Rathmann's a huge story.

JONES: That's right.

BARNES: I'm sure you'll do him. I mean, he's a huge success. He's a great guy. Ran in to him over the years at BIO conventions and things. I often wonder if I would have hung on and hooked up with them, what would have happened there.

JONES: Well, you could have gone lots of different ways. Amgen—actually, it's interesting, that Amgen story, because they were talking to Bill—about—do you recall anything—

BARNES: I wasn't—no, they were talking about scientists. I didn't know which ones. I just knew the guy—I met the guy out at UCLA. I interviewed with him. I was down at Thousand Oaks with George Rathmann. I wasn't that excited about Thousand Oaks, because there wasn't

[16] Walter Gilbert, interview by Mark Jones on 25 May 2012 at Cambridge, Massachusetts (Philadelphia: Chemical Heritage Foundation, Oral History Transcript #0287, in process).

any sailing right there. I was a big sailor at the time. Seattle was fine. San Francisco was fine. San Diego was fine.

JONES: Thousand Oaks is not that—I guess there's no good harbor there.

BARNES: There's—well, I was a small boat—I raced sailboats, small boats. There's no small boat racing out of that harbor, whatever that harbor is there. Across the hills there's a harbor there, but that's—that probably entered my thinking a little bit there. Yeah, it would have been interesting. George would have been a fun guy to work with. A character like Jerry Caulder. You know, similar kind of guys.

JONES: Lots of—lots of great stories. For historians, it's really rich territory.

BARNES: How did you get—how did you get interested in this?

JONES: Well, I was in—I was in the history of science program at UCLA, and actually, I can remember, I was in a meeting with one of extension person, been involved I went to talk to her. I said, "You know, I want to do something local." I remember I used to go down to Torrey Pines and see advanced tissue science. I was just curious about it. What are they doing in there? But I talked to Marian and said, "What are the stories here? I want to do local research."

She says, "Well, you should do either the Qualcomm story or the Hybritech story." And so, ended up choosing Hybritech. I'm not exactly sure why. But that turned out great. I did a lot of research on Hybritech and got to know all those people.

BARNES: That was an interesting—I didn't **<T: 100 min>** interact with David Hale when he was there, but subsequently, we talked a number of times. He was the one I remember that helped me out in the early days. Who was the initial—Ted Greene was—he was there, right? He wasn't just an investor.

JONES: No, he was really early.

BARNES: He was involved. There was another guy. You know, they had that Lilly connection with Hybritech.

JONES: Right.

BARNES: It's funny, because we had been interacting with Lilly, because they—Dow Agrosciences, ended up buying Lilly's ag business. Dow bought that, and so there were Lilly people there that came out of Lilly over to Dow and leaving Lilly, life sciences here.

JONES: That's interesting.

BARNES: All right. I'll let you go here.

JONES: Thank you, Andy.

BARNES: All right, enjoyed it.

JONES: It was a pleasure to meet you.

BARNES: It's jogging my mind here.

JONES: All right. Okay. Thank you very much. Okay. Have a good day.

BARNES: I assume you have a copy of the Stanford license and the—

JONES: I do have that stuff.

BARNES: I still have some of that stuff in a file somewhere.

JONES: So, I'll make sure you're on our mailing list.

BARNES: I appreciate that. I enjoyed—I read those—

JONES: And we'll actually be having some events down here, bring people together for stuff, and—

BARNES: That'll be fun.

JONES: We've actually—we'll have—next year we'll have a book coming out on Hybritech, so—

BARNES: Oh, really?

JONES: —we'll have a book launch party. We'll invite you to that.

BARNES: That'll be interesting.

JONES: Thank you.

BARNES: It was fun.

JONES: Bye-bye.

[END OF AUDIO, FILE 1.1]

[END OF INTERVIEW]