SCIENCE HISTORY INSTITUTE

CONSTANTINE E. ANAGNOSTOPOULOS

Life Sciences Foundation

Transcript of an Interview
Conducted by

Mark Jones

via phone

on

6 August 2012

(With Subsequent Corrections and Additions)

CHEMICAL HERITAGE FOUNDATION
Center for Oral History
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CONSTANTINE E. ANAGNOSTOPOULOS

1922	Born in Turkey on 1 November
2018	Died in Bloomfield Hills, Michigan, on 20 January

Education

1949	BS, Brown University, Chemistry
1952	PhD, Harvard University, Organic Chemistry

Professional Experience

Monsanto

1952	Research Chemist
1957	Monsanto Fellow
1962-1968	Director of R&D, Organic Chemical Division
1975-1980	Vice President, Rubber Chemicals Division
1987	Corporate Officer and Vice Chairman of Corporate Development and Growth

Gateway Ventures

1987-2006	Managing Director

ABSTRACT

Constantine E. Anagnostopoulos was born in Turkey in 1922 to parents of Greek descent. Due to Turkish expulsion of the Greeks when he was three months old, the family left for the Greek mainland. Because his father was in the Greek diplomatic service, the family moved to British East Africa (now Tanzania) for seven years. Anagnostopoulos returned to mainland Greece for high school, attending Athens College. When World War II began during his senior year, he volunteered to join the Greek Army like all of his classmates. Because he spoke English, he was attached to British forces. Later in life, Anagnostopoulos wrote a book about his experiences during the war called *Athens in Black*. Although he had planned to study in South Africa and England for undergraduate and graduate education, he was offered a full scholarship to attend Brown University in the United States, which he accepted. He had been interested in chemistry since high school, so he selected that as his major. He excelled, earning highest honors in chemistry. Anagnostopoulos then attended Harvard University for his PhD in organic chemistry, working for Louis Fieser and finishing in three years. One summer during his PhD program, he worked at Monsanto and was offered a full-time position at the company upon graduating. Although he considered academia, he decided to accept Monsanto's offer because he found the project he worked on, which was figuring out how to make methionine in chicken feed cheaper, interesting.

Anagnostopoulos moved up in the ranks at Monsanto, eventually overseeing the new enterprise division. Because Monsanto was interested in getting into new industries and new businesses, he started the first corporate venture capital group, InnoVen, in 1972 to "look to the outside." Monsanto started to pursue new ventures, including biotechnology after some staff members attended a biotechnology conference at Asilomar and came back saying that biotechnology was going to revolutionize a number of industries. Monsanto also decided to get out of the petrochemicals industry and pursue biotechnology instead. They hired an outside man, John W. Hanley, as the new CEO around that time. Anagnostopoulos discusses the origin and development of Roundup weed killer, Monsanto's decision to avoid putting bioengineered products on people's tables due to concern about public displeasure, and the company's restructure in the 1980s. Anagnostopoulos talks about the acquisition of Searle, marketing Celebrex, and Richard Mahoney's development of Astroturf. Anagnostopoulos concludes by discussing his involvement with other pursuits like Advent International and Gateway Venture Partners, mentioning his professional relationships with Peter S. P. Brooke, David J. S. Cooksey, and Moshe H. Alafi. He talks about his service on the board of Deltagen, his work with Curios, which wanted to use chemotherapeutic products in a targeted way, moving to Detroit, Michigan, in 2007, and his decision to only serve on Genzyme's board after it went public.

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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INTERVIEWER: **Mark Jones**

LOCATION: **via phone**

DATE: **6 August 2012**

JONES: [. . .] Maybe we could start out with your background. You're from Greece, and you came over to attend Brown University. Can you tell me a little bit about your family and your background growing up in Greece?

ANAGNOSTOPOULOS: Yes. I would be happy to. I was born in Turkey, 1922, and three months . . . from parents that were of Greek descent in Turkey. There were about a million of us. I had to leave there when I was three months old because as you probably know, Turkey decided to expel all Christians. One million Greeks had to leave Turkey and go to Greek mainland. My father was in the diplomatic service, Greek diplomatic service. He was Governor of North Africa, of Northern Greece.

Then at about the age of . . . by the way, the Greek king, the queen were my godparents. Then when I was seven years old, we moved to British East Africa because Father was, at the request of the British government, called Governor of British East Africa. It's a long story. I don't need to go into it. But I was in what is now Tanzania in Dar es Salaam, [Tanzania], were the head of the British territories Zanzibar and Tanganyika then. I was there until the age of fourteen—seven years.

Then I went back to Greece what's called Athens College, which is the Greek American high school and prep school. I was in my senior year there when the war [World War II] was declared. I volunteered as all my classmates did to the Greek army. The Greek army . . . the British had come over, so we with English language capabilities were attached to the British. To make a long story short, I fought against the Italians who attacked us, and then as a second lieutenant, and then I fought with the Germans. In the last moment, when we were ready to evacuate to North Africa, I was asked if I can stay and become . . . go underground, and long story short, I was a member of MI6, British intelligence. I was taken by submarine to North Africa from occupied Greece. I fought at El-Alamein.[1] Then I was parachuted back to Greece, and I was there until its liberation. I published six months ago a book, a personal novel, biographical novel of my days in the German factory in Greece and as a spy.[2] The last moment, I was about to go to Africa when I got a scholarship from Brown University. I came to Brown

[1] See A. Gilbert, "Battles of El-Alamein," *Encyclopedia Britannica*, June 24, 2022. Accessed at https://www.britannica.com/event/battles-of-El-Alamein on 4 October 2022.
[2] Constantine E. Anagnostopoulos, *Athens in Black: A Story in Life in Nazi-Occupied Greece* (Athens: Anavasis Press, 2011).

University, and they gave me credit for the freshman year. Three years later, I went to Harvard [University], and get my doctorate degree in organic chemistry. Then I joined Monsanto [Company].

JONES: I have a couple of questions here. First of all, the memoir that you wrote, what's the title of that? Is it available for us to—

ANAGNOSTOPOULOS: Yes, you can get it at Amazon, if you type in Anagnostopoulos, Athens, Black. The title of the book is *Athens in Black*.

JONES: *Athens in Black*. Okay.

ANAGNOSTOPOULOS: Yeah. Because that's the expression of Greek when you are in mourning.

JONES: I see.

ANAGNOSTOPOULOS: It's a hardcover book, and outside the leaflet is my painting—I'm a painter **<T: 05 min>** as well—is my painting of the Acropolis with the swastika.

JONES: You came from a prominent family, so you had opportunities, the best educational opportunities. I guess your life was disrupted. Everybody in Greece at that time, life was disrupted by the war. But had it been expected perhaps that you would go to the United States to . . . was there a sense that the United States had the best universities and you would end up here?

ANAGNOSTOPOULOS: No. I was planning to go to Witwatersrand University in Johannesburg, [South Africa], for my undergraduate and then go to [University of] Oxford for my graduate work.

JONES: I see.

ANAGNOSTOPOULOS: Those were the original plans. Obviously, I had a British citizenship as well as a Greek citizenship, so it was obvious that I was looking to Britain for my education. Then all of a sudden, I was called to the American embassy and told that I had a full scholarship plus one hundred dollars month to come to Brown University. It was because many American

colleges at that time wanted foreign students from Allied nations, and that was the reason I got it. As soon as the American embassy called me and told me that, it was obviously there was no question in my mind. By that time, of course, don't forget that before the war, America wasn't a prominent country. The British Empire was.

But during the war, obviously, America became. It was obvious, probably, if I had gone to Johannesburg for my undergraduate, I would have gone to America for my graduate work, because by that time, America became the prominent country in the world. So that's the situation.

JONES: Right. As an undergraduate, you majored in chemistry. When did you first become interested in science?

ANAGNOSTOPOULOS: I was intended to be an engineer, for some reason or another, but at Athens College, which is the name . . . still a prominent high school in Greece, and I had a chemistry professor that just totally changed my mind. From almost from my sophomore high school year, I was dedicated to chemistry. I learned everything I can during chemistry. During the war, I carried two chemistry books with me. That is the reason why in part of my education and part of my studying from those books—organic chemistry primarily—why I was chosen. By the way, I registered at the university as we do in Greece and took the exams before you graduate from high school, and I came first in the class. So when Brown University wanted a chemistry major from Greece, you went to the university and to Athens College, of course, but went to the university and asked who is top of the class to be admitted, and who knows good English? My name popped up, and that's how I got the scholarship at Brown. At Brown University, I got a chemistry prize, highest honors in chemistry, graduated magna cum laude, and it was a cinch to go to Harvard.

JONES: And at that time, Harvard, did it have a reputation as the best or one of the best chemistry departments?

ANAGNOSTOPOULOS: In organic chemistry. Professor [Robert B.] Woodward and Professor [Louis] Fieser were the top chemistry professors at Brown, and well-known, world known. I worked for Fieser, Professor Fieser, who was the top steroid chemist. Then he and Woodward decided to develop the total synthesis of cortisone. Cortisone was something new then. It was obtained from plants **<T: 10 min>** in Mexico. But we wanted to elucidate its total structure, and I contributed to that. Then Professor Woodward got the Nobel Prize for it.

JONES: Yeah. Did you work with anybody at Syntex [Corporation] at that time?

ANAGNOSTOPOULOS: At Syntex, no, although I was familiar with Syntex because other professors, other graduate students did some work for Syntex, which was, of course, the steroid top person at that time. Yeah.

JONES: You went through graduate school pretty quickly. You graduate from Brown in 1949. You have a master's the next year. Just two years later, you're awarded a PhD. That's pretty rapid.

ANAGNOSTOPOULOS: Yes, it is, for a number of reasons. One is a funny one. But the one is obviously that nitration of alcohols, which were important for the eleven oxygen of steroids, which is a difficult and blocked position. So I did have luck in doing my project within about a year and a half, I'd say. The other thing was that Professor Fieser was—as his books always indicate—a lover of cats, and my wife [Malika Sesi] was also a lover of cats. There was that relationship as well. He might have favored me. But yes. One summer, I worked briefly for Monsanto that had laboratories in Everett, Massachusetts. They were impressed with me, and I was impressed with them. They said to me, "As soon as you graduate from Harvard, you're welcome to come to Monsanto." So I really didn't interview. I went directly to Monsanto.

JONES: Did you ever consider an academic career?

ANAGNOSTOPOULOS: Yes, I did. My professor, Woodward, had nothing to do—although he worked with pharmaceutical companies—he and Professor Fieser told me that I would be best if I go to academia for my talents, etc. I had interviewed in a couple of universities. One was Columbia [University]. The other one was Wayne University here in Detroit, [Michigan]. I was accepted by both. But I had done some work at Monsanto in a project that eventually became a two hundred-million-dollar product, and I was intrigued with it, so I went to Monsanto.

JONES: What was that product?

ANAGNOSTOPOULOS: That product, believe it or not, is a . . . do you have any chemistry background?

JONES: No, my background is in biology.

ANAGNOSTOPOULOS: Oh, okay. Well, they're not dissimilar. But in chicken feed, the limiting amino acid is methionine. [E.I.] DuPont [de Nemours] made some methionine and

added to chicken feed, but most of the methionine came from byproduct of the fishing industry. It caused some problems with the taste of chicken. I looked at the amino acid, and I was wondering whether we can make it in a cheaper way. I was a summer student there. I thought that perhaps transamination might be possible. Actually, I and another fellow. I didn't get the credit, only me. So we made the hydroxy analogue instead of the amino acid analogue, and low and behold, the body converted it into the amino acid which was the active, d-methionine, which was **<T: 15 min>** active. Still that product is used in all chicken feeds today. It's about three hundred million.

JONES: Yeah. Did you have to do a taste test to confirm the results? [laughter]

ANAGNOSTOPOULOS: Yeah, we had chicken by the hundreds. The control, we always had controls, obviously. The controls were taken by us, and our freezer was full of chicken.

JONES: Yes. Well, you had a positive experience then working for Monsanto, and you didn't think twice about taking a position as a PhD chemist. You were assured that you would be doing work that was exciting and innovative?

ANAGNOSTOPOULOS: Yes, of course. And after about three years, four years with them—I forget now the exact amount—I was made a scientist, lead scientist, which was a high level of independent research. But then one day, the head of the research department came to me and said, "Would you like to try administrating research a bit?"

I said, "Yes, I would love to try that." They send me to Charleston, West Virginia, where there were the rubber chemical laboratories of Monsanto. I was head of those labs. I enjoyed managing research. I was there only four months. I did so well, Monsanto called me back and gave me the job of my boss, which was the head of the research department. I was there for a while, or not for a while, but quite a few years.

JONES: So director of R&D [research and development], organic chemistry?

ANAGNOSTOPOULOS: Director of R&D in the organic chemical division of Monsanto. Monsanto had three divisions. I enjoyed that very much. Then they said, "Well, can you now manage some companies, some divisions?"

I said, fine. I started with the functional fluids. I went to textiles. I went to rubber chemicals. It was obvious that they were training me for better jobs. I became vice president of the rubber chemical division when the divisions separated as independent.

JONES: Right. That's 1975, I believe? But this is after . . . you went into that position after the new enterprise—after doing the venture?

ANAGNOSTOPOULOS: Yeah. The new enterprise division—let me look at my experience. The new enterprise division was from '71 to '75. Then the rubber chemicals division was until '80. In '80 was the year that we decided to restructure Monsanto. Probably . . . did you read my write-up on managing change?

JONES: I haven't looked at that yet. No.

ANAGNOSTOPOULOS: Okay. That describes a lot about me as well. But when we decided to change Monsanto . . . now Monsanto had a very interesting objective that at the end of every ten year—every decade—the profits, the bottom line, 50 percent or more of the bottom line must be in products and businesses we did . . . we were not in ten years ago. So every decade, we changed, and successfully, we did that. We were first in chemicals after the war. Then we went into plastics. Then we went into textiles. Then we went into **<T: 20 min>** agricultural chemicals. Then we ventured into pharmaceuticals. So in 1980, after we . . . let me go back for a minute. Our venture capital group, which I started in the new enterprise division—

JONES: Can you tell me how that came about?

ANAGNOSTOPOULOS: Yes, I would be happy to. When I took over the new enterprise division, which was by that time about one year old, the first year was just a test to see whether it is worth having a separate division that creates the next business for the next ten years. I took over the new enterprise division, and I soon realized that while there were enough ideas within Monsanto to start new businesses, and we always wanted to start new businesses that had some acquaintance or some umbilical cord to our present businesses. We did not want to go into business we knew nothing about.

After I took the new enterprise and looked around, I found some ideas, but I said they're not enough for the new enterprise to become [an] important, viable enterprise for Monsanto. I said, "I need a set of eyes and ears into the outside world." At that time, the large companies, like DuPont and General Electric [Company] and the Monsanto were, kind of, isolated islands. They were so self-sufficient that they did not look to the outside for much. I thought, "I need to look to the outside." I said, "I have to set some eyes and ears into the outside world." I went

about doing that in two major ways. First, I started the first corporate venture capital group, InnoVen.[3] I started that in 1971 or [1972]. I don't remember exactly now. I think '72.

I brought in a venture capital—a guy with some experience in venture capital—because in 1972, although venture capital was in existence, it wasn't very broadly recognized. Certainly not a venture capital group that was funded solely by one corporation and asked to look around for opportunities that might be pertinent to the corporation. The charter I gave to InnoVen was looking outside, seeing whether there are any companies that can be pertinent to Monsanto's existing businesses, but also look at technology that might be emerging that would be pertinent to Monsanto that they have an umbilical cord to Monsanto's technical capabilities, market existence, etc. Market service, etc.

JONES: I have two questions. One is the idea of looking to the outside. Were you looking at any corporate models of other large corporations who were doing the same thing? Or did this come about as a recognition internally by you of the need to do this?

ANAGNOSTOPOULOS: Both. When I decided to establish an InnoVen, I went around to see if there are other companies that are looking **<T: 25 min>** outside. There were none in the very beginning when the idea came to me first. But I soon realized, and because I went to MIT [Massachusetts Institute of Technology], and I wanted MIT to tell me what—as you probably know, MIT was closer to industry than Harvard ever was—I went to MIT, and I was asking if they knew anybody else that was doing what I was doing. They said, "Yeah, I think GE and Exxon [Mobil Corporation] are trying to do the same thing." I contacted them, and sure enough, there was Exxon Enterprise and Genencor [Incorporated], two companies that were trying to do similar things. But they were only looking at companies that they could acquire.

Yeah. So it was in essence a venture capital group, but it was directed not to move in different business for GE and Exxon, but related to their present business for expansion purposes. When we got together, by the way, we had a major argument. I always believed that venture capital cannot be run by a corporation. It requires quick actions. It requires actions with minimal knowledge. And it can't. Genencor and GE Enterprise said, "Of course we can run the business ourselves." Well, the result was that in ten years, they were gone.

Monsanto today has two venture capital groups. Venture capital became a permanent fixture with Monsanto. Anyway, so that was the first thing. I said, "Look outside and see what there is primarily for us to start the business of the next decade."

JONES: Yeah. The idea of venture investing, were . . . you went to MIT, and this is at a time when venture capital is getting going around Boston, [Massachusetts], Route 128, and I guess at

[3] Mariann Jelinek and Diana Day, "InnoVen and the Monsanto Paradox: Strategic Exploration with the First External Corporate Venture Capital Fund," in *Handbook of Research on Corporate Entrepreneurship*, ed. Shaker A. Zahra, Donald O. Neubaum, and James C. Hayton (Cheltenham, UK: Edward Elgar Publishing, 2016), 235-258.

the same time, getting going also on the West Coast in Silicon Valley, [California]. How aware of those developments were you at the time?

ANAGNOSTOPOULOS: I was quite aware of those developments mostly in the East Coast, Route 128. But many of them were not relevant to Monsanto. Although because of them, we started a number of things in Monsanto's new enterprise. We started things that were . . . still had some relationship, but the umbilical cord wasn't big enough, or short enough, whatever. That was our venture into silicon wafers where we became the first producer of silicon wafers in the United States. We were contributory to the first light emitting diodes. We worked with General Electric to make CD, to record things on a plate instead of a tape, etc. We tried that. And we thought that would be our next major thrust because after all, there was chemistry involved. It might have been inorganic chemistry, but it was chemistry involved.

At the same time, we started doing nonwoven textiles and things like that—all testing the opportunities for our next decade. This went on until 1975, when InnoVen came to me—I remember the breakfast we had with the head of InnoVen. He came to me, and he said, "There is a new term out there, and there is a new conference to be held, and the term is **<T: 30 min>** biotechnology, and the meeting Asilomar [Conference on Recombinant DNA]—hold on a minute. I forget the name of it. There's a conference in 1975, which we attended—I forget the name now—at Asilomar. Hold on. I have it here. I'll look at it in a minute.

But anyway, he said, "There is this conference going on where biotechnology is going to be discussed." I immediately sent to that conference the closest I had to people with knowledge pertinent to that technology. They came back, and they said to me, "There is a genetic related activity going on, and I think we'd better pay attention to it.

JONES: These are people within the company that you went to, within Monsanto?

ANAGNOSTOPOULOS: Yes, mostly the people that came from our agricultural division. Because at that time, we did not have with the exception of make . . . we were the largest producer of aspirin in the United States, and we made the DOPO intermediate, etc. We were involved to some degree in intermediates, so to speak. Not very sophisticated pharmaceuticals. We felt that would be the agricultural division, who at that time was trying to find ways to quickly evolve our agricultural products, the products that we're working in like soybean and other products.

They went to the conference, and they came back and said, "That seems to be a totally new technology that is going to revolutionize certainly medicines. It's going to probably revolutionize agricultural plants and products." We had some nutritional capabilities by then. We had some products that went into baking soda and something like that we were making. They told me that they thought they were going to revolutionize these three products. So our

decision immediately was to start looking into the biotechnology. We said, "How are we going to do that?" So . . . let me go back, however.

When I said that in 1972 I started the venture capital group, I also did another thing. I went to three major universities, and I decided to give each—the board decided, at my recommendation—to give each of these three universities about fifteen million dollars each and do the following. Let the professors in those universities bid for these funds. The three universities were Oxford, Harvard, and Washington University in St. Louis. Of the people that bid for those millions, in Oxford were Professor [Raymond] Dwek, who became prominent into the sugars that surround all proteins. At Harvard was [Moses] Judah Folkman, who was the pioneer of **<T: 35 min>** angiogenesis. At Harvard was Dr. [Howard A.] Schneiderman—

JONES: At Washington?

ANAGNOSTOPOULOS: I mean, at Washington was Dr. Schneiderman, who developed Celebrex. With that background of those universities, we decided to go to each of these universities and direct the taking of the part of the fifteen million dollars in areas that were biotechnology-related. That's why Dwek became a major taker of those millions, Folkman, and Schneiderman, all of them biotechnology-related projects. We did something else when we realized that the biotechnology revolution was real. We decided to invest in every major biotechnology company, and we invested in Genentech [Incorporated], we invested in Genex [Cooperative Incorporated], we invested in Biogen [Incorporated]. Actually, Genex, we started it. We helped start it. Our venture capital group helped start it. In Biogen, we had our vice chairman sit on the board of it.

We also did another thing. We went and got Schneiderman from the University of California at Irvine, and we made him head of our central research, which then the central research directed all its efforts to biotechnology-related products to the tune that by 1980, five years after the conference, we were spending about on hundred million dollars in biotechnology.

We soon realized that biotechnology would impact two industries in which we liked to be in—one of which we were in, and that was agriculture, and the other one was pharmaceuticals. Monsanto always wanted to be in the pharmaceutical industry. Then soon after that . . . actually, quite a few years after that, we acquired [G.D.] Searle [LLC] to become the center of our pharmaceutical . . . but let me go back for a minute, back into 1980.

After we made the decision that biotechnology-related or impacted products in agriculture and pharmaceuticals are going to be our major next thrust, we decided to split the company because until then, all of Monsanto's products were based on petrochemicals. The situation in petrochemicals of 1972 when the new enterprise division was created told us that perhaps at one point in time in our history we should divert from products that are based on petrochemicals. So biotechnology-based products for our future were advantageous, or met that decision to veer away from petrochemical-based products.

In 1980, we had to make a decision, or the board had to make a decision. That decision was whether we enter biotechnology as we began to do very intensively in parallel to everything else we were doing and wait until our biotechnology created enough <**T: 40 min**> business and profits, then we can get out of some of the products that were based on petrochemicals, and we were not number one or two in it. Or the alternative was to dispose of those products and get into biotechnology in parallel with whatever we retained. We decided to do that. I was asked to pioneer that corporate movement.

I went to Europe. When I went, I was asked to go to Europe and become the chairman, CEO, and managing director of Monsanto Europe, Africa, Middle East, India. It was about almost half of Monsanto's business. It was about three-and-half billion dollars. I went there, and I stayed there for two years. When I left, the businesses in this area of the world was less than a billion. We disposed of almost all our petrochemical operations. Some went to buyers, and some went to ICI [Imperial Chemical Industries]. Then I came back, and I was put in charge of the restructuring of Monsanto.

JONES: Yeah. I have a question. During this period, this seems like—and maybe it felt this way I don't know—it seems like a risky strategy to get out of established business into this new technology, which at this time really hadn't been entirely proven, correct?

ANAGNOSTOPOULOS: That is correct. That's why I told you it was a major decision that we had to make. But we did make it for a number of reasons. Let me go back to 1971. And all this is summarized in the document I've sent Cassandra. So you can refresh your memory, reading that. Nineteen ninety-one, we brought in for the first time ever a CEO from the outside world. I was actually on the committee that were trying to find one from the outside. The reason for that was this. All of Monsanto's previous CEOs, they were not necessarily members of the founder's family, but they came from inside the company. They were to a large degree entrepreneurs in their own right. Monsanto was managed in a more personal, entrepreneuring way. It was managed in a professional way in the sense of by an experienced individual who would be more of a classical CEO than an entrepreneur.

So once we decided to bring in a professional CEO, we looked around, and obviously, Procter & Gamble [Company] was the example that we wanted to copy. We went and we got the number two man from Procter & Gamble [John W. Hanley]. We brought him in. He came in, and it was about the time that we were considering changing, considering bringing the next decade in. So he came in, and he looked at the company, and he spoke primarily to the new enterprise division, who is looking for the next decade, etc. <**T: 45 min**> It was about the time of the oil embargo situation we had. He made mind up that he would try to get into a business that has a lower dependence on petrochemicals.

He was prepared for the advent of biochemistry, which is an important consideration any time the company wants to move into a new field, that the top CEO is totally committed to

doing that. It's vital for that change to happen. And so yes, in 1980, ten years later, when we decided to go with the approach of divesting the petrochemical-based products that we were not number one or two, that our top CEO was committed to doing that, and so we proceeded in spite of the fact that there was a greater risk of failure than otherwise. We are now in the process of splitting up the company. Originally—

JONES: Yeah. And this is—I'm sorry—this is after 1980 when the split occurs, yeah?

ANAGNOSTOPOULOS: That's correct.

JONES: Can I ask a few questions about prior to 1980?

ANAGNOSTOPOULOS: Please do.

JONES: When you're making investments, and you mentioned the companies, Biogen, Genentech, Collagen, Genex, I would like to hear how you evaluated these technologies and these particular companies. One company that's missing from the list is Cetus. Was Cetus [Corporation] on your radar at all at that time?

ANAGNOSTOPOULOS: No, it was not. Cetus later . . . we became—as I will mention later—we became . . . we came to know Cetus a bit. But no, Cetus was not in that area. We were primarily involved . . . although invested in Genentech . . . . I'm trying to get—just one second. The conference in 1975 I was mentioning was the Asilomar—

JONES: Right. This is where the question about recombinant DNA and yes.

ANAGNOSTOPOULOS: Asilomar conference.

JONES: Right. Yes.

ANAGNOSTOPOULOS: That was what triggered us. Yeah. Biogen was the closest we were with. As I said, Schneiderman, who was then head of our central research, was in their planning or execution committee. Our vice chairman Fernandez, Lou Fernandez, was on the board. Genex was a company that our venture capital group established—funded, rather—became the major funder in it. Also, of course, Genentech. I recall the heads of these like [Herbert W.]

Boyer and [Robert A.] Swanson from Genentech, who was invited many times to talk to our board.[4] So they were very nice—all of them—in terms of interacting with our top management and, kind of, give them some confidence that this new technology would have a major impact in . . . . I remember talking to them, and while they said obviously it's going to have an impact on your pharmaceutical venture, I don't know about agriculture. But we looked into it, and our agricultural group looked into in great depth, and they said, "Bioengineered **<T: 50 min>** products will undoubtedly dominate the world in a couple of decades. We want to be deeply into it." I can talk about that in some detail at any time you wish.

JONES: Yes, please. I would like to hear more about that, especially considering that Monsanto was the first to recognize that and in agriculture—at least, this is my perception, I could be wrong—but Monsanto was way ahead of everybody else in the field in terms of getting into recombinant DNA.

ANAGNOSTOPOULOS: It sure is today. Well, yes. The way it came about, we were hoping that agriculture would be one of our major products in one of the decades, and in the beginning, we started with making some weed killers, etc. We became quite prominent. Then one day in my organic research lab, when I was in charge of organic research [. . .] from '72 to '76, one of our research chemists came in and said to me, "I have developed a product that will kill anything that has leaves."

I said, "That would be important. It will kill all weeds." I went to the marketing department of the organic chemical division, and I told them about this product, and their answer was, "What we need a product that kills every plant? Why don't you give us more selective products?" Which we had some.

I still thought that that would be a major, major product, but I didn't know how to go about it since our marketing department and our management didn't consider it as a major development. It wasn't until I was in the Far East that I was asked to go to one of the rubber chemical plantations because organic division was deeply in rubber chemicals. We were the prominent . . . we had about 80 percent of the market. I went to the plantation, and I noticed that they had about twelve individuals cutting the grass around the rubber trees. I said to them, "What if I give you a product that will kill everything that's on the ground? Obviously not the rubber trees because their leaves are way up high, and they wouldn't be affected." They said they'd love that, and that's how Roundup was created. From there on, it was easy to go . . . and the next was Missouri's Highway Department, who used it to kill weeds by the road, etc. Roundup was created.

[4] Herbert W. Boyer, interview by Arnold Thackray, Sally Smith Hughes, and Mark Jones at Michigan Molecular Institute, Midland, Michigan and San Francisco, California, and via phone, 28 March 2000, 24 April and 21 May 2013 (Philadelphia: Science History Institute, Oral History Transcript # 0129, in process).

JONES: Right. What was the duration between the time that the chemist first came to you and said, "I have this compound," and you said there was a problem getting it adopted, and this is after 1980, when you're in the Far East . . . how long did it take before there was action on Roundup?

ANAGNOSTOPOULOS: Well, the chemist came to me, I think it was in 1970. I'm sorry, 1960. I was research director '62 to '68. It came in 1965. The product was not ongoing until about nine years later.

JONES: I see.

ANAGNOSTOPOULOS: As a major product. And of course, it became a billion dollar product. **<T: 55 min>** the agricultural division all of a sudden had money coming out of their ears. Using some of that for the next opportunity in biotechnology was not something that they had to beg for money. They could go about it. We decided how to go about it. We recognized early on that there would be a tremendous resistance to having bioengineered products.

JONES: Did you have this idea from Asilomar? Is that the fact that there was controversy about it?

ANAGNOSTOPOULOS: No, no. We thought that people who sit at the table and have bread placed before them if you told them that the wheat that was in that bread was genetically engineered, they will revolt. What we decided to do was attack products that are not recognized by people as coming from bioengineered products. Those were . . . we say definitely not wheat. We started with cotton. Create cotton resistant to cotton weevil. We said, "Nobody will ever ask whether cotton was made from bioengineered plants or not." Then we decided to go to soy because not too many people associate soy with the table.

JONES: In the US [United States] at least.

ANAGNOSTOPOULOS: In the US, anyway. Then we said, "Okay, we will also go to some of the other products." At that time, [H.J.] Heinz [Company] came to us at that time and said, "Could you genetically engineer tomatoes so they won't have that much water, which we have to, kind of, pay for when we move tomatoes around?"

We said, "No, we won't do that because tomato is something that is on the dining table, and we're not going to do that." We started with soy, and then we went to corn, and we went to corn that was for animal feeding because that way also, it will not be recognized at the table.

That is the reason for that—the reason for us staying away from wheat and staying away from products, vegetables, etc. We did then progress quite rapidly, and we now of course are—or they are now—I'll go with them—they're now the prominent. They have about 60 percent of soy seeds in the world. The resistance was very strong, even in some of the countries. For example, France was dominating in Europe in terms of resisting bioengineered products. Brazil said they would never make products that are bioengineered. They decided not to do soy until they found out that they were not competitive in the world. They changed their minds.

JONES: Did you anticipate that kind of resistance?

ANAGNOSTOPOULOS: Yes, we did. That's why we stayed with products that cannot be identified on the dining room table.

JONES: Yeah. Although, the company wasn't able to avoid that kind of controversy, and agricultural biotechnology has run up against quite a few obstacles from public resistance. And you anticipated that?

ANAGNOSTOPOULOS: Yes, we did. That's why I said we were trying to **<T: 60 min>** avoid a major catastrophe by the products we made. But we thought that eventually with the world demands for products coming for wheat and corn and other things. We felt that eventually, this thing would die away, and it has practically died away. It is no longer. I know Monsanto agriculturals, I still keep in touch with them. I know that that is not a major concern of them anymore.

JONES: Yeah. You don't think it's an obstacle, the regulatory—

ANAGNOSTOPOULOS: No.

JONES: Yeah?

ANAGNOSTOPOULOS: No, it is not. As a matter of fact, as evidence for that, Monsanto is trying to change that opinion of not having anything on the table—genetically engineered melons now.

JONES: Yes. Did you ever consider doing any kind of education and sort of—

ANAGNOSTOPOULOS: No, we did not.

JONES: Yeah?

ANAGNOSTOPOULOS: We thought that education would bring the project in front of everybody. We'd rather try to have it disappear gradually by itself.

JONES: I see.

ANAGNOSTOPOULOS: Okay. We come to 1980. Any more questions until . . . ?

JONES: No, no. Go ahead, please.

ANAGNOSTOPOULOS: Yeah. We come to 1980 when we decided to restructure the company. Again, in the article that you have there, you will find out the conditions under which we decided to restructure the company, restructure in what we called a parallel way. In other words, continue our existing businesses and in parallel create the biotechnology-based products. We decided to do it in parallel because we did not want to disrupt whatever products we kept. We wanted that to run without interference from the growing biotechnology businesses. We didn't even want it overlapping of managers or management teams. What we did is we selected thirty- to forty-year-olds, our top performing younger executives. We took them away from the main thrust of the company. We brought them to the biotechnology-related activities after we trained them to understand the biotechnology and to understand . . . it was an extensive training period of these two dozen young executives. And so in essence, we had two separate companies running at that time.

Then in 1984, I believe—yeah, about 1984—we decided to do . . . no, it was 1986. Yeah, '86. We decided to literally split the companies and to keep the agricultural division as Monsanto—really the name, Monsanto. Then to put our pharmaceutical activities in Searle, which we acquired by then, and then to have the remaining chemical products of ours—petrochemical based products—to externalize them in a company called Solutia [Incorporated]. So all of a sudden, three companies were formed. We soon realized . . . by the way, let me talk a little bit about Searle. <**T: 65 min**>

We acquired Searle and negotiated with Don [Donald H.] Rumsfeld, who was then the CEO of Searle. We went to him, and we asked that we buy the pharmaceutical business of Searle. Besides the pharmaceutical business, they had the NutraSweet business, the aspartame business, which was a very profitable business. This is the NutraSweet that you get on the table.

JONES: Right. You had been following that from Genex? Genex was involved with that early on and got into some trouble there, right?

ANAGNOSTOPOULOS: Yeah. That's correct. Right. But that had all gone when we went to Searle. Originally, Don Rumsfeld said, "Unless you buy the whole company, we can't split it up and give you the pharmaceutical." We went back home, and I remember we went back home, and about twelve o'clock that night, my financial guy called me up and said, "You know something? Let me come over and show you something." I said, "At one at night?" He said, "Yeah, I'd like to come over."

He came over, and he had one graph and a transparency to put over the graph. And the graph showed Monsanto's cash flow, which had a major dip because of the fact that we sold a lot of businesses and are spending a lot in biotechnology. Then he put over the transparency, which were the cash flow from NutraSweet, and it filled the gap. We went the next morning and acquired Searle.

JONES: How much more did you have to pay for that piece of the company?

ANAGNOSTOPOULOS: We bought it for 3.2 billion [dollars].

JONES: What had been the figure that you were talking about for just the pharmaceutical arm?

ANAGNOSTOPOULOS: Well, that was about . . . we thought—because we didn't know the whole story—we thought that the pharmaceutical yield would be about 60 percent. It was the other way around. Yeah. We acquired Searle, and we then had the three units, the three parts of Monsanto, the Searle, we put our pharmaceutical, and of course at that time Celebrex, developing Solutia to be the remnants of past Monsanto. Of course, the agricultural to be Monsanto. Then we soon realized that Searle was too small. It didn't have the critical mass required for a company to grow and survive in the industry.

JONES: Even with the new technology? You didn't think that the new technology could leverage . . . they didn't have genetic engineering, right? But you had it elsewhere in the company.

ANAGNOSTOPOULOS: That is correct. But we still thought that we needed a critical mass of pharmaceutical industry to compete in the marketplace. We went and negotiated with

Pharmacia [Corporation], and Pharmacia and Searle united. This was of course after my time. Pharmacia and Searle united, and by the way, when we started to market Celebrex, we immediately realized that we did not have the field group—

JONES: Marketing?

ANAGNOSTOPOULOS: Large enough to market Celebrex. We went to Pfizer, and we asked them if they would co-market it for us. They agreed to do so. Of course, that was why after Pharmacia and Searle united, Pfizer **<T: 70 min>** acquired them. And so that—

JONES: Did you have an idea of how big Celebrex was going to be?

ANAGNOSTOPOULOS: No. We thought it was going to be much less than what it was.

JONES: Would that have made a difference in terms of the strategy for reorganizing?

ANAGNOSTOPOULOS: That's an interesting question. Yes, it would have been. Perhaps Searle could have had the critical mass through it.

JONES: Yeah, it's interesting. Yeah.

ANAGNOSTOPOULOS: But Searle could have acquired some companies to increase. Especially emerging biotechnology companies to increase its size. But at that time, we didn't dream that Celebrex would be what it is, especially after Vioxx disappeared. It was a mistake by Merck [& Company Incorporated]. It was a major mistake.

JONES: Yep. Before we move on from this period, I would like to ask, during the eighties, starting in the early eighties as you're building up the agricultural piece with new biotechnologies, you mentioned that you put the best and brightest, the young executives into this area. You are a very high level here. Can you name some of the names, some of the people that you brought in, and some of the executives, some of the research managers, some of the scientists that were important to developing this part of Monsanto?

ANAGNOSTOPOULOS: Yes. Let me see for a minute. Well, the number one guy is the man that became the CEO of Monsanto, Mahoney, Dick [Richard] Mahoney. Dick Mahoney at that time when we were selecting young executives—is that my call or yours?

JONES: I think it's yours. Do you want to take it?

ANAGNOSTOPOULOS: Hold on a minute. [. . .] When we were selecting the young, promising executives, Mahoney was selling doormats. You remember, Astroturf was created by Monsanto. There were doormats made out of Astroturf. You probably remember.

JONES: I do remember those. Yes.

ANAGNOSTOPOULOS: And Mahoney was in charge of those out of Springfield, Massachusetts. He was in the new enterprise division because that's where Astroturf started.

JONES: Where did you find the technology for that or the process for making—

ANAGNOSTOPOULOS: The Astroturf?

JONES: Yeah.

ANAGNOSTOPOULOS: That was very interesting. We were of course deeply in textiles. Monsanto was in the process . . . the new enterprise division was in the process of making unwoven textiles. When the Astrodome was built, they were planning to plant grass. They soon found out that grass could not grow because there wasn't enough sunshine coming.

They were in a predicament. They went to DuPont, and they went to us, and they went to all the textile companies, and they said, "Help us. Is there any way we can make something to pave the grounds?" They had come to me, for example. I was then in the new enterprise division office. Well, that wasn't quite what I **<T: 75 min>** had in mind for the division to do, and the textile division was not interested.

I brought it up at a technical meeting we had, and one guy popped up and said, "Costas, on the side, I was creating a flat fiber for making baskets, weaving it and making baskets. It's yellow," he said, "but we can paint it green, and I think we can put it together with our machines and make something that looks like grass." That's how it came, the Astroturf. And we called it Astroturf because of the Astrodome.

JONES: Right.

ANAGNOSTOPOULOS: Yeah.

JONES: But you probably didn't anticipate a large market for that.

ANAGNOSTOPOULOS: No, we didn't. But nevertheless, it was a favor, really, more than anything else. Then all of a sudden, there was a high school in St. Louis, [Missouri] who said, "I'd love to have that instead of me maintaining grass and all that." So we put one of that for their football field, a small actually portion. Other universities saw it, etc. Astroturf first went to universities.

JONES: Yeah.

ANAGNOSTOPOULOS: And then the professionals came in and took it over, etc. We sold it eventually. We sold it. It wasn't worth it. And we sold it to the people who were marketing it.

JONES: I see. It's interesting.

ANAGNOSTOPOULOS: Yes. It was.

JONES: So Dick Mahoney he was in Massachusetts, and . . . ?

ANAGNOSTOPOULOS: Yeah. we brought him to St. Louis. He was among the young men that was there. By the way, there was an interesting situation. When we decided to have these new bunch of executives trained. Our CEO and chairman said, "You realize that some of you older folks are going to be useless if we move totally into the biotechnology-based product because these young men will be there, and you haven't trained like them to be there."

H said, "Look, some of you might have to retire early, and I will compensate you as if you retired at sixty-five," which we were all officers of the company were obliged to retire at sixty-five. "I will compensate you. If you're only sixty, I will give you five years' salary, and your pension will be accordingly." Everybody was right. He said, "Except one person, and that person is Costas because of his involvement in the technology that is emerging and because of

his technical knowledge of the company, he will stay until he's sixty-five," which I did. But many of my contemporaries left. Some went to other companies. Some retired earlier and were compensated accordingly. So there was no major problem associated with that. But the new bunch of managers took over.

Eventually, they dominated, of course, the Monsanto part, the agricultural part. Some of them went with Searle to Pharmacia and then acquired by Pfizer. It is interesting, and I think quite unique how a company was totally transformed by an emerging technology. **<T: 80 min>** Looking back, there was no way in 1975 that I or anybody else could have forecasted that that emerging technology would change a company so radically as it did Monsanto. Of course, our early awareness of biotechnology made Monsanto what it is today. I think DuPont and the others had to catch up. With our agricultural operation.

JONES: Yeah. I think the same is true, in other industries. In pharmaceuticals, I don't think any of the big corporations adopted . . . . I mean, they were keeping an eye on the new technology, but they didn't integrate. Pharmaceuticals, it was the startup, entrepreneur startups that really commercialized the technology. So Monsanto might be unique, I think, maybe, in all industries in which biotechnology had an impact. What's your feeling about that?

ANAGNOSTOPOULOS: Yes, there is no question in my mind about that. That's why the pharmaceutical companies in the beginning looked at biotechnology as another technology that they'll get to it at some time. Later on, they had to hustle to acquire this company and that emerging enterprise and that emerging in order to get themselves into this new technology. No question about it. That's another example of an industry that is not aware of technology or markets that are going to totally impact them. That's why all innovative things or most innovative things happen through a different company than they did, than they should have. But Monsanto was one that really changed its stripes. As I state in this presentation, which you have a copy of, and which I gave to the *Business Week* executive—

JONES: This is "Biotechnology: The Promise and the Price?"[5] Is that the one you're referring to?

ANAGNOSTOPOULOS: Yeah.

JONES: Yes.

[5] Science History Institute staff were unable to find a citation for this presentation.

ANAGNOSTOPOULOS: The corporate—yeah. Managing change. Yes. I said at the end of that, some people said, "You are totally changing. Can you handle that?" My reaction was that you can tell that what we are really doing is redirecting our talents to where the action is. Because really, we had no trouble understanding biotechnology. It was chemistry, organic chemistry, and we were an organic chemistry . . . we had many specialty products. We understand organic chemistry. We were not just textiles and inorganic type of products. We had organic products. We understood that. We understand that technology.

JONES: But there's also the biological aspect where you're manipulating genes and growing things in bacteria and those sorts of things. I mean, those were unfamiliar territories, weren't they?

ANAGNOSTOPOULOS: Yes, they were. As I said, we were not strangers to it. Let me go back a little bit, if I may, with our venture capital activity.

JONES: Yes, please.

ANAGNOSTOPOULOS: We started, of course, InnoVen.

JONES: Right. And let me ask about InnoVen. Emerson Electric [Company] is also involved in that. What was that relationship?

ANAGNOSTOPOULOS: That's right. When we wanted to start it, my board said to me, "You can only have one million a year, million and a half a year." I said, "A million and a half a year isn't enough. I need three or four." And they would not give it to me. I went to Emerson, which I knew well people there, and said, "Would you like to come in? Because what InnoVen would be looking at for your opportunity and ours do not overlap. **<T: 85 min>** They can look for your opportunities as well as ours." We went fifty-fifty, and I got the three and half million I needed a year. But Emerson wasn't very interested, and so in essence, it was really Monsanto oriented, primarily.

JONES: They put money in, but you were managing the investments? Is that what you mean?

ANAGNOSTOPOULOS: Correct. Yes. I was CEO and chairman of Monsanto's . . . we have a separate division called the Monsanto venture capital division, and I was that until I left Monsanto.

JONES: I see. In addition to other posts that you were holding at the—

ANAGNOSTOPOULOS: Yeah, I always had that as a secondary situation.

JONES: And how did you divide your time? Did it—

ANAGNOSTOPOULOS: I allocated most of this to Greg [Gregory R.] Johnson, who later I took from Monsanto and started my own venture capital group when I retired. He was very good at it. He was actually the man that interacted with Genentech and Genex, etc. I didn't put that much time into it.

JONES: Yeah? Is he around?

ANAGNOSTOPOULOS: As chairman and as CEO, although I had the title of both.

JONES: Right. It was Greg Johnson? Is that the name?

ANAGNOSTOPOULOS: Yes.

JONES: Yeah. And is he around?

ANAGNOSTOPOULOS: Yes, he's around. I'll talk to you about this in a minute.

JONES: Okay. Let me ask about Advent [Venture Partners] and Gateway Venture Partners.

ANAGNOSTOPOULOS: Yes. That's why I'm trying to give the history—if I may.

JONES: Yes, please.

ANAGNOSTOPOULOS: So the first fund was InnoVen, and that was our only fund that we were associated with until I went to Europe in 1980. Then when I went to Europe, I found out

that venture capital in Europe, they couldn't even spell venture capital never mind have one. I decided to start one in Europe and chose Great Britain simply because there they had a secondary market our companies can be involved with like we have in this country. I started Advent UK.

As always, I wanted to have a professional manager manage it as opposed to Monsanto doing it. And it was then that I met [Peter S. P.] Brooke. He arranged for me to get a manager for Advent UK. It was our first real venture capital fund in England. There were others, but they were not really venture capital in the classical sense. My problem was I'm starting a venture capital group, but where is this fund going to be getting its ideas? I thought that I need to talk to Oxford and Cambridge Universities, which I did. They agreed not only to help us eternalize or to use us to externalize some of their technology but also they decided to be investors in it. We raised about sixteen million of which Monsanto put ten, and each of the universities put three million in. David [J. S.] Cooksey was the fellow that Brooke brought in. He eventually became Sir David Cooksey because of his **<T: 90 min>** activities in Advent UK.

But that gave me obviously the opportunity to work with venture capital related environment in the UK. We had some . . . Oxford Oligosystems for example, which was a very prominent company, was externalized and created by the fund. Let me have some water. Can you excuse me a minute? [. . .] Okay, that was my relationship with Peter Brooke.

JONES: Yeah. Could you tell me just briefly Peter Brooke's background?

ANAGNOSTOPOULOS: Yes. Peter Brooke is the founder of Advent International, which is now, as you know, a prominent, large private investment company. Originally, let me tell you how it started, and then I'll talk about Peter. When I asked Peter Brooke to help me identify a manager for Advent UK, he was in charge of a precursor of what is now Advent International. I forgot the name of that company. But it was a venture capital group. He was among the first—he started his venture capital group around 1965 or '66, which was still the early stage for venture capital.

He was willing to help me, as I said, find David Cooksey, who ran and I had written a paper about corporate venture capital, which was the name I gave venture capital groups that cater exclusively to a particular corporation as opposed to venture capital groups who are for-profit groups with multiple investors in them. I called that corporate venture capital. By the time I met with Peter Brooke in 1980, '81, InnoVen had shown some success, obviously. We had developed a model, and I said to him, "Why can't you develop a company that will copy this model? You can go to individual companies, tell them to give you twenty or twenty-five million, and create a fund explicitly aimed at that particular company."

He said, "That's a good idea," and he formed Advent International. I was cofounder of that. I sat on the board of that company. In about four years, we had nine companies, including Microsoft [Corporation], each of which had its own venture capital group. Over time, of course,

Peter Brooke's still active in Advent International, looked at bigger and better things, according to him, bigger primarily, and went from classical venture capital, which he still operates. He went to private investment corporations. That's the story of Peter Brooke. He was one of the original venture capitalists. He became quite prominent in terms of Advent International. **<T: 95 min>**

Then in 1984, I wanted to establish in the . . . by the way, with Peter Brooke, when he decided to have a parallel fund of his own—and that is the classical type as opposed to corporate venture capital—when he decided to do that almost from the beginning, I said, "If you will start venture capital groups in the world, anywhere in the world, Monsanto will make a major investment in it." He started a fund in Japan, and we invested in it. He started a fund in France, and we invested in it, etc. Monsanto, kind of, covered the whole world, more or less, in terms of the venture capital eyes and ears required.

JONES: Right. And you had full confidence in Peter Brooke?

ANAGNOSTOPOULOS: Yes, I did.

JONES: From Monsanto's point of view, what's the balance in terms of objective between return on investment and access to new technologies?

ANAGNOSTOPOULOS: We didn't have to make that. That's the beauty of it. When InnoVen started investing in Genentech and Biogen, etc., and our couple of millions ended up to be twenty or thirty, I had no problem with the board. The board looked primarily at the profits, the immediate profits, which venture capital yield to us, and realized that there were long-term and short-term benefits from corporate venture capital. I really didn't have that problem. Originally, our intent was to use it as eyes and ears. Not expect much in return. Then when I came back from Europe, I thought now that we were deeply in biotechnology.

I needed a venture capital fund that is exclusively devoted to venture capital. I looked around for an individual with reputation in that field, and obviously, who popped up, but Moshe [H.] Alafi. Now it happened that Moshe Alafi was sitting on the same board with our vice chairman in Biogen. Moshe Alafi was no stranger to us. I asked him would he help me start a Monsanto corporate venture capital dedicated to venture capital alone. That is how Moshe's Alafi Capital [Company LLC] was formed.

The first company we created from Monsanto's technology was Invitron [Corporation]. It was created for this reason. Monsanto in the new enterprise division and jointly with the textile division, they created what we called hollow fine fibers, which we used originally for separation of fluids, fluid separation. Some would penetrate the surfaces of this hollow fiber, and some would not. Then someone from our venture capital group, from our biotechnology

group said, “These fibers look to me like veins and arteries. Can we grow cells and let those **<T: 100 min>** microfibers, hollow fibers act as veins and arteries—arteries to bring food to the cells and veins to take away whatever is undesirable there?” We created this artificial, if you wish, body that cells could grow beautifully around.

JONES: Were the first applications in monoclonal antibody production?

ANAGNOSTOPOULOS: It was in the cell growth. We were not at that time thinking of monoclonal antibodies.

JONES: But it was adapted at some point?

ANAGNOSTOPOULOS: Yeah. It was, because the idea of it used in biological systems was sitting on the side there unattended to, so to speak. That was until Judah Folkman from Harvard found out about it, and he called us. He said, “My work in angiogenesis factor, I have to grow the cells in eggs. Your system would be ideal for me. Would you please allow me to use it?” That is how we came to know Judah Folkman. Of course, at that time, Harvard had the funds from us to help Judah Folkman’s work.

JONES: Yeah. That was from 1974, right? The first contact with Folkman?

ANAGNOSTOPOULOS: That’s correct. Judah Folkman’s work, which of course is now the prominent . . . has a major future was started by Monsanto’s money and technology. Then when those funds were all used up, Judah came to me—that was about in the early eighties, I think, middle eighties, perhaps—and said, “Costa, can I have some more money?”

I said, “Judah, unfortunately, your technology would take about thirty years to develop, and that’s too long for us.” We did not fund him anymore although some of his patents had Monsanto relationship. Of course, I proved right. It took thirty years or so for it to develop.

JONES: Yeah. And number of products have been developed with his technology. Did Monsanto still have a hand in any of that?

ANAGNOSTOPOULOS: No. No. They do not. Well, Monsanto is not in the pharmaceutical—

JONES: Right. Right. Yeah.

ANAGNOSTOPOULOS: I don't know if Pfizer has a relationship. But of course, Judah died. Then Moshe Alafi came over, and we formed Invitron, the first company that will contract this growth of cells. We had big vats that a company will come in and say, "I want to grow this cancer cell to produce product X, etc." It was quite successful until we realized that growing the cells for the production of biologicals will become an integral part of every company. It will not be contracted out. We decided that there is no future in Invitron as an independent company. We put it out for sale, and it was acquired by Chiron [Corporation].

JONES: Right. What were the dates there? Do you recall? The founding and then the sale?

ANAGNOSTOPOULOS: The founding. The <**T: 105 min**> founding was 1985, I believe.

JONES: You had started with Moshe Alafi in 1984?

ANAGNOSTOPOULOS: Yeah. That was Moshe Alafi's venture group's first activity. Starting a company from scratch. Yeah. I think it was around 1985.

JONES: Yeah. Then it was sold to Chiron. Do you recall the year?

ANAGNOSTOPOULOS: After I left, probably 1990. Moshe Alafi and I also created a venture group that was dedicated specifically to technology from Washington University in St. Louis.

JONES: This is Gateway Venture Partners.

ANAGNOSTOPOULOS: No.

JONES: No?

ANAGNOSTOPOULOS: Not yet. No, it was called AW Venture Company, Venture Capital Fund. Alafi, Washington University. That was about the time I was leaving Monsanto. Moshe stayed with us, with the company for about five years—four, five years. Yeah, about four, five

years. Then it was dissolved. Around 1985. By that time, Mahoney was CEO of the company. I was sitting one day, and we said, "We've got venture capital groups all over the world, and we don't have one in St. Louis." We said okay. We said, "Okay, let's form one." We formed—

JONES: Gateway?

ANAGNOSTOPOULOS: Gateway Associates. We brought in then the head of one of the banks in St. Louis and with the understanding that when I retired in two years, I would join him. The charter of the fund was to develop at least 50 percent of its funds in Missouri corporations.

JONES: Was that somebody's requirement? The bank's requirement? Or—

ANAGNOSTOPOULOS: No.

JONES: No?

ANAGNOSTOPOULOS: Nobody's because all the money came from us, Monsanto. It was our requirement. We thought, "If this is going to be a fund located in St. Louis, and the purpose of locating is to help the state, it should have at least a percentage of it in the state." We formed Gateway Associates One. When I retired, I joined them. Then we formed Gateway Associates Two and Three. Then when Four was ready to be formed, I said, "At my age, I do not want to participate other than to advise you." The two other partners because the guy that started it, Dick Ford, and I were the senior members, and we both decided not to be involved in fund number four. The two other younger people, the one was Greg Johnson, who I brought from Monsanto. He and I were the ones that handled the biotechnology-related investments. Then another one, together with Ford, was developing communications **<T: 110 min>** primarily related. They split into two, and Prolog [Ventures] is the name of the fourth fund from the biotech point of view.

JONES: And that's Greg Johnson still?

ANAGNOSTOPOULOS: That's Greg Johnson still, with that.

JONES: Yeah. Throughout the entire period, throughout all four funds, did . . . was the localized focus maintained—50 percent in Missouri?

ANAGNOSTOPOULOS: No. It was not maintained after the first, because then Monsanto did not put in money.

JONES: I see.

ANAGNOSTOPOULOS: Yeah. The first one. Well, Monsanto put some money on the second, but not enough to dominate it. Yeah.

JONES: I'm not familiar with St. Louis, but has a vital high-tech industry or community ever taken route there?

ANAGNOSTOPOULOS: More than that. *The Wall Street Journal* about three months ago mentioned St. Louis as the new emerging biotech center and let me tell you a little bit about that. In 1980, when I came back from Europe, Dick Mahoney and I thought that we should create an incubator in St. Louis because of Washington University's prominence.

I don't know if you know, but Washington University got 60 percent of the funds that government devoted to the genome. Yes. We thought that that and Monsanto being there, it would be a good idea to form an incubator. We formed an incubator. I was chairman of it. It was 1983. Today, that incubator expanded significantly. It has about two dozen biotech-related companies. We also had the idea, which I thought was unique, and that's we say, "Okay, we use an incubator to incubate companies, and they need one thousand square feet, two thousand, three thousand square feet. What happens when they need ten thousand square feet to go away somewhere? They can't find the space here."

I went to the city of St. Louis, and I said, "You've got a lot of land that is sitting there with all these dilapidated homes, etc. Why can't you give the incubator the grounds there? Let us build facilities that will accommodate the next stage of emerging companies." That is now in place, and companies then graduate from our biotech center into these facilities where they can get five and ten thousand square feet.

JONES: You have a couple of dozen new companies? Are they mostly focused in genomics and agriculture, or is it broader than that?

ANAGNOSTOPOULOS: It's broader than that in the sense that any emerging company whether it's in electronics or whatever else—our incubator is only in a broad sense related to life sciences. But the new facilities are for any company that wishes to come into there that is in its early stages of development. That was the requirement by the city. They didn't want to be specific to one industry.

That is the story. Now when I left Gateway—or not I left—when Gateway ended, I <**T: 115 min**> became a, kind of, [an] angel investor. I wanted to still continue sitting on boards and helping companies, etc. I sat primarily on the boards of some of the emerging life science companies in the incubator. Not representing Advent Four, which was really called Prolog now. That was the company. For example, Curios that I was on the board, German fund, from ’03 to ’07. I’m now only sitting on one board, which is Deltagen [Incorporated]. Deltagen is the premier transgenic mouse company. And it was located in San Francisco, San Mateo, [California]. I was called in ’01, to help it get out of chapter 11, which it got out, etc., etc. We are expanding Deltagen now. We were prominent in of course the transgenic mice, but by being in the transgenic mice business, we have a high reputation for service by the industry, the pharmaceutical industry. We thought that we can expand in that particular service area. We built a service laboratory in Pennsylvania.

JONES: Producing antibodies for companies, customized antibodies?

ANAGNOSTOPOULOS: Yes. That, plus also helping them with all of the processes that are involved in a pre-phase I clinical—

JONES: I see. Okay. Right.

ANAGNOSTOPOULOS: A CRL. A CRL operation.

JONES: Yeah. Yeah. Okay. Curios. Tell me a little bit about that company. You were involved with them for a number of years.

ANAGNOSTOPOULOS: Yes. Curios had this idea and came more from Washington University. We had the idea, or rather the professor at Washington University—a group of professors—had the thought that perhaps there are other ways of using pharmaceuticals or using products to attack cancer using chemotherapeutic products. Instead of giving it to the body and having it go all over, can we direct it to the cancer site? Can we do that in the early stages of cancer? So the idea was can we develop what I called a FedEx approach to it? Have a carrier carrying the product that we want to deliver to the cancer? Having a directional identity, something that will direct it there. Having something that we know that is there. In other words, a kind of a response. We created a product that involved—excuse me—let me get some more water.

JONES: Certainly.

ANAGNOSTOPOULOS: But had both the chemotherapeutic agent to tell the monoclonal antibody to go there and that it had a heavy metal, so that the **<T: 120 min>** MRI can detect it. And that's the technology that Curios is pursuing.

JONES: I see. So you're putting a number of different things on the antibody simultaneously.

ANAGNOSTOPOULOS: That is correct. And obviously, we have a carrier for all these. It has proven very difficult. Curios has been working at it for quite a while.

JONES: It's a good idea, but a very tough thing to accomplish.

ANAGNOSTOPOULOS: Yes. Very tough. So that was Curios until '07 when I left St. Louis, and therefore, I didn't feel I could be chairman.

JONES: Yeah. You're in Detroit now.

ANAGNOSTOPOULOS: Yes. I moved to Detroit in '07. The reason for that is my wife has an extended family here. I felt that at my age—I am ninety years old—that at my age, she would need moral support when she takes care of me. So I moved here. We built a nice home here around golf club grounds.

JONES: Very good.

ANAGNOSTOPOULOS: Yeah. And so that's in essence the story.

JONES: Yeah, I have one question, just to go back just briefly to 1982 with Advent. Advent invested in Genzyme. Genzyme was not doing recombinant DNA. They were working with enzymes.

ANAGNOSTOPOULOS: That is correct. Yes. They were working with enzymes, for Gaucher's disease, primarily. They came to Advent International, and Advent invested in them.

JONES: Were you involved in that decision?

ANAGNOSTOPOULOS: Invest in Genzyme? Yes, I was, but in a very peripheral way. I was on the board. Yeah. In an indirect way. Peter Brooke decided to invest in it, and his people went in and brought it up to the board. The board never argued about investing in at all. It was really not a decision by the board. A couple of years later, Peter asked me if I would sit on the board, and I said . . . . I learned about Genzyme, and I found out that they were in the process of considering going public. I did not want to sit on a company that was about to go public. I said no. One of his men sat there with the understanding that after it finished going public, I would sit on the board.

JONES: Why did you not want to go on the [company] . . . on the board while the company was in the process of going public?

ANAGNOSTOPOULOS: I always resisted being at a time when a company went public. The reason was more in terms of time involvement in the company. Yeah, more than anything else. It wasn't a matter of concern about anything else. But I think that to sit on a company when it goes public, it's a very time-consuming project. The board needs to be totally involved in it, not arm's length. At that particular time, I was still at Monsanto.

Yeah. I had gotten permission to sit on the board of Advent International as I had to get for sitting on any board. I thought that I would not have the time to justify . . . to give to the company going public. So as soon after it went public, I sat on the board.

JONES: Yeah. By the time you accepted that invitation, Henri Termeer was already in place was president of the company?[6]

ANAGNOSTOPOULOS: Yes. Let me . . . well, let me say also—it's very **<T: 125 min>** interesting. The founder of Advent International was of course—my goodness—let me . . . well, anyway, I forgot the name.

JONES: I can look it up. Yeah, I don't see it, but I will find it. Are you there, Costa? You were saying?

[6] Henri Termeer, interview by Ted Everson, Jennifer Dionisio, Arnold Thackray, Pei Koay, and Cassandra Stokes at Genzyme Corporation, Cambridge, Massachusetts, 23 May and 7 December 2006, 2 August 2007, 18 December 2008, and 30 September 2011 (Philadelphia: Chemical Heritage Foundation, Oral History Transcript # 0342).

ANAGNOSTOPOULOS: Yes. Just one second. [. . .] No, I can't find. Anyway, I knew the founder before. Genzyme wasn't a stranger for me in the beginning, because as I said, I knew the founder from previous occasions, and so there was some similarity. But yes, Henri Termeer was in place when I joined the board of Genzyme. It was quite an experience, and a very interesting one and very rewarding one over the years. I came to know Henri. He was a great CEO. He turned out to be fine.

JONES: Yes. Have we covered everything?

ANAGNOSTOPOULOS: Yes, I think we've covered everything. You will get some more details about Monsanto's transformation from the "Managing Change" document. The write-up I have there.

JONES: Yes. Thank you.

ANAGNOSTOPOULOS: And let's see. I'm trying to review the subjects. I think we've covered them all.

JONES: Okay. Very good.

ANAGNOSTOPOULOS: Okay.

JONES: Thank you very much for your time. I appreciate your input. What we will do is we will produce a transcript and send it back to you for your review. It's a wonderful story. My pleasure. Thank you very much, Costa.

ANAGNOSTOPOULOS: It was a pleasure talking to you, and please, if you have any questions in the future, Mark, don't hesitate to call me. I would be happy to talk.

[END OF AUDIO, FILE 1.1]

[END OF INTERVIEW]