CHEMICAL HERITAGE FOUNDATION

JOSEPH PANETTA

Life Science Foundation

Transcript of a Research Interview
Conducted by

Mark Jones

La Jolla, California

on

1 September 2015

(With Subsequent Corrections and Additions)

The Life Sciences Foundation and San Diego Technology Archive
Oral History Interview Release Form

The Life Sciences Foundation (LSF) is a nonprofit organization created to capture the history, preserve the heritage, and share the stories of biotechnology. The Foundation, whose headquarter is located in San Francisco, collects and organizes historical information to educate and inspire future innovators, to engage the general public, and to provide lay audiences with a robust understanding of life sciences and biotechnology.

The San Diego Technology Archive (SDTA) is an initiative of the UC San Diego Library created to document the history, formation, and evolution of the companies that formed the San Diego region's high-tech cluster, beginning in 1965. Through the collection of oral history interviews, SDTA capture the vision, strategic thinking, and recollections of key technology and business founders, entrepreneurs, academics, venture capitalists, early employees, and service providers, many of whom figured prominently in the development of San Diego's dynamic technology cluster. As these individuals articulate and comment on their contributions, innovations, contributions, and entrepreneurial trajectories, a rich living history emerges about the extraordinarily synergistic academic and commercial collaborations that distinguish the San Diego technology community.

I agree to be interviewed by Dr. Mark Jones, representing the Life Sciences Foundation and the San Diego Technology Archive (SDTA), on September 1, 2015. I understand that my oral history interview will be made part of the LSF and SDTA collections and will be made available in accordance with standard Oral History Association procedures. I also understand that this document is intended to inform me fully of what I am being asked to do and of my rights as an interviewee.

The Oral History Interview

This interview will be recorded within the period of time previously agreed upon by me and Dr. Mark Jones. Should Dr. Mark Jones feel that more time is needed to complete the interview, arrangements can be made to extend the interview at my convenience. Once my interview is complete, it will be transcribed and edited for readability in accordance with standard Oral History Association guidelines and policies. I will be given an opportunity to review the transcript for correction of transcription errors or other factual inaccuracies before the final transcript is completed. No one outside of the Life Sciences Foundation, the San Diego Technology Archive, its affiliates, and Dr. Mark Jones will be able to access my interview until the final transcript is finished.

My Rights

I understand that I have the right not to answer any of the questions asked of me during the interview should I consider them uncomfortable or inappropriate. If I need to take a break from the interview or if I have a question or point for clarification during the interview, I can ask that the recorder be turned off temporarily. My participation in this interview is completely voluntary and I am free to withdraw consent and cease all participation in this interview at any time prior to finalization of the transcript without any consequences whatsoever.

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Oral History Interview Release Form

Risks, Benefits, and Costs

The Life Sciences Foundation and the San Diego Technology Archive knows of no risks or negative consequences associated with participation in this interview, and I may not receive any direct benefit from my participation, but I am fully aware that others may benefit from the knowledge I provide in this interview for the Life Sciences Foundation and the San Diego Technology Archive's oral history collection. I understand that there is no cost to participate in this interview and I will not be paid for my time; I will, however, receive a copy of my interview.

My Obligations

Once the Life Sciences Foundation and San Diego Technology Archive has sent me a copy of my oral history transcript, I agree that (a) I will return the transcript with my edits to the interviewer within three months of its receipt by me and that (b) should I not return the edited transcript within that time, I agree that the Life Sciences Foundation and the UC San Diego Library may complete the processing of the transcript and make it available in accordance with the Life Sciences Foundation and the San Diego Technology Archive's normal practices. I also agree that if I should die or become incapacitated before I have reviewed and returned the transcript, all rights and title to and interest in the recordings, transcript, photographs, and memorabilia, including the literary rights and copyright, shall be transferred to the Life Sciences Foundation and the UC San Diego Library, who pledge to maintain the recording and transcript and make them available in accordance with general policies for research and other scholarly purposes.

Questions or Concerns

Should I have any questions or concerns about participating in the creation of this oral history before or during the recording of the interview, or about the processing of the transcript, I can contact the President and Chief Executive Officer of the Life Sciences Foundation or Director of the UC San Diego Library:

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The Life Sciences Foundation and San Diego Technology Archive
Oral History Interview Release Form

Agreement

I have read the information contained within this release form, and Dr. Mark Jones offered to answer any questions or concerns I had about this document or the interview.

This document contains my understanding and agreement with the Life Sciences Foundation and the UC San Diego Library with respect to my participation in the audio and/or video-recorded interview conducted by Dr. Mark Jones on September 1, 2015.

1. The recordings, transcripts, photographs, research materials, and memorabilia (collectively called the "Work") will be maintained by the Life Sciences Foundation and the UC San Diego Library and made available in accordance with general policies for research and other scholarly purposes.

2. I hereby grant, assign, and transfer to the Life Sciences Foundation and the UC San Diego Library all right, title, and interest in the Work, including the literary rights and the copyright, except that I shall retain the right to copy, use, and publish the Work in part or in full until my death.

3. The manuscript may be read and the recording(s) heard/viewed by patrons of the Life Sciences Foundation and the UC San Diego Library and the general public via any medium now known or hereinafter created unless otherwise agreed in writing and attached to this Release Form.

4. I understand that I will receive no compensation for my participation in the interview.

This constitutes my entire and complete understanding.

Signature _ Signed release form is on file at the Science History Institute
Dr. Mark Jones

Date 9/14/2015

Signature Signed release form is on file at the Science History Institute

Date 9-22-15

This research interview is designated **Free Access**.

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> Joseph Panetta, interview by Mark Jones La Jolla, California, 1 September 2015 (Philadelphia: Chemical Heritage Foundation, Research Interview Transcript #0041).

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The Chemical Heritage Foundation (CHF) serves the community of the chemical and molecular sciences, and the wider public, by treasuring the past, educating the present, and inspiring the future. CHF maintains a world-class collection of materials that document the history and heritage of the chemical and molecular sciences, technologies, and industries; encourages research in CHF collections; and carries out a program of outreach and interpretation in order to advance an understanding of the role of the chemical and molecular sciences, technologies, and industries in shaping society.

INTERVIEWEE

Joseph Panetta was raised in Syracuse, New York, where he attended Le Moyne College for his undergraduate degree. While he originally wanted to attend medical school, he opted to join the work force instead and began working at Byrne Dairy in their quality control lab. In the latter half of the seventies, Panetta took an interest in environmental science and attended the University of Pittsburgh for his PhD in public health with a concentration in environmental and industrial health science. He aspired to work for the Environmental Protection Agency [EPA] and after traveling to Washington D.C. in 1979, began working for them in their pesticides and toxic substances group. At the EPA, Panetta ran teams of toxicologists, environmental scientists, economists, and industrial hygienists to determine the health risks of pesticides. Enjoying the policy aspects of the job, Panetta moved to the EPA's policy office, where he worked as a senior policy analyst for two years. Panetta then decided he wanted to gain experience in industry and left his job at the EPA to become the manager of regulatory affairs at the Pennwalt Corporation in Philadelphia, Pennsylvania. While at Pennwalt, Panetta was enlisted to encourage the company's CEO and president to approve the production of bacteria in a fermenter for recombinant proteins.

When Pennwalt's plans for producing recombinant proteins was turned down, Panetta was recruited by Mycogen in San Diego, California, which wanted to produce the first genetically engineered pesticide. He joined to company in a regulatory position and the pesticide was approved in 1991, with the help of Panetta who worked with the EPA to get approval. After getting approval for their pesticide, Mycogen began working with seed companies, looking to commercialize genetically modified seeds with the anti-pest properties of their pesticide. The seeds were approved in 1995, after which Mycogen was purchased by Dow AgroSciences. With Dow AgroSciences, Panetta accepted a position as a global leader of government affairs, but a year later left for Biocom. At Biocom, Panetta promoted San Diego as a biotech hub, visiting venture capitalists to help raise money for biotech investments and creating a training program for executives. Biocom also helps to purchase supplies and services to its members at a discount.

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.

The Center for Oral History, Science History Institute, is committed both to preserving the recording of each oral history interview in our collection and to enhancing research use of the interviews by preparing carefully edited transcripts of those recordings. The preparation of interview transcripts begins with the creation of a verbatim typescript of the recording and proceeds through review and editing by staff of the Center; interviewees also review the typescript and can request additions, deletions, or that sections be sealed for specified periods of time. The Center keeps track of all changes that staff, interviewers, and interviewees make to the original typescript. Please contact us if you would like additional information about these materials. We have established guidelines to help us maintain fidelity to the language and meaning of each recorded interview while making minor editorial adjustments for clarity and readability. Wherever possible, we supply the full names of people, organizations, or geographical locations mentioned during the interview. We add footnotes to the transcript to provide full citations for any publications that are discussed, to point to extant oral history interviews, and to clear up misstatements or provide context for ambiguous references in the transcript. We use brackets to indicate the addition of material that was not in the audio, and bracketed ellipses to indicate the deletion of recorded material. The transcript also includes time stamps at one-minute intervals. We omit without noting most instances of verbal crutches and all instances of nonlexical utterances. We also make small grammatical corrections where necessary to communicate interview participants' meaning. Finally, staff of the Center create the abstract, chronology, and table of contents. With the availability of online full-text searching of our transcripts, the Center for Oral History opted to discontinue the practice of preparing a back-of-the-book index for each oral history transcript in 2020.

The Science History Institute is committed to the responsible presentation of the history of science by addressing evidence of inequality and oppression as well as the subsequent silences in our collections. To that end, we recognize there may be language in our oral history collection that is outdated, offensive, or harmful, such as, but not limited to, the following: racist, sexist, Eurocentric, ableist, and/or homophobic language or depictions.

INTERVIEWEE: **Joseph Panetta**

INTERVIEWER: **Mark Jones**

LOCATION: **La Jolla, California**

DATE: **1 September 2015**

PANETTA: IMED were the first medical device company here.

JONES: Back in the seventies, yeah.

PANETTA: Back in the seventies, right. So who the heck do we go and get? I didn't get here until 1988. So my history with that company was more when it was, I think it was Alaris at the time, and I said, "I don't know any of those guys from the seventies." We went to the UCSD [University of California, San Diego] Library archives, read about IVAC [INtraVenous Automatic Control] and IMED. Now unfortunately, the guy who founded it, I forget his name now—Richard [A.] Cramer, I think, something like that—passed away about four years ago. We can't get him, but there were a lot of names mentioned in there, so it was good. We could track down some of those guys and get them to show up hopefully. So, it's a good source, a good resource.

JONES: Well this will be an oral history and go in the archive and be available to history of biomedical sciences and biomedical industry, and so it's actually important stuff.

PANETTA: Great.

JONES: So we're recording. We want to get your story. So maybe we can just start at the beginning, and you can tell me—

PANETTA: Where do you want to start?

JONES: Well tell me just about your family, your background, education, start early years.

PANETTA: Well I grew up in Syracuse, New York and went to high school and college there. When I graduated from high school, I planned on going to medical school. I went to school at very good small Jesuit college in Syracuse called Le Moyne College that had a great reputation

for students entering medical school. But by the time that I had gotten to my senior year, I had lost interest in medical school. [I] didn't really know what I wanted to do. I graduated, and kind of thought, "I'll work for a couple of years and decide what I want to do from there."

I got a job with a very large dairy products company based in Syracuse and they were starting their—believe it or not, this company had been around for fifty years, and they were starting their first quality control laboratory. They'd never had a quality control laboratory before, so—

JONES: So this is also back in late seventies, yeah?

PANETTA: Yeah, something like that.

JONES: I don't think we had company on the—

PANETTA: It's called— yeah, it's not on there. I don't even put it on there anymore, but it's a company called Byrne Dairy, [. . .] Byrne Dairy products. Started way back in, I think, the early twenties by a family, the Byrne family in Syracuse. I don't know what they were thinking, but they hired me fresh out of Le Moyne college with my biology degree to start their quality control laboratory.

JONES: That's a great opportunity.

PANETTA: Yeah. I mean, I didn't know the first thing about quality control or dairy products or about the only thing that I did know was that Le Moyne had given me was a very good practical grounding in working in the laboratory. We spent a good balanced amount of time in class and in the lab, something that today has given me a real appreciation here in San Diego, [California,] for a good, practical training in the biosciences in our schools here. . .

JONES: And you're thinking in terms of cultivating a workforce—

PANETTA: Yeah.

JONES: —for this industry?

PANETTA: Yeah. Cultivating a work force that can come out of school and especially the students with the four-year science degrees who are able to hit the ground running, function in a laboratory. You know, it's not all book learning, book science.

JONES: Sure, yeah.

PANETTA: So they actually know how to use laboratory equipment, and a lot of our companies really appreciate that. I won't name schools. [laughter]

JONES: Right.

PANETTA: But some are good at it, and some are not so good at it and are improving all the time.

JONES: So that's your start. [. . .]

PANETTA: I went to work in this laboratory and I had a great time purchasing such primitive equipment as test tubes. [laughter] Just really basic stuff back then. I did that for about a year and a half, and all that time was thinking, "I don't want to work in a dairy lab for the rests of my life in Syracuse, New York."

JONES: Were you working with regulators?

PANETTA: I was working with the New York state regulators, and I actually had a milk tester's license that I had to study for and take a test for, and so I was a certified New York State milk tester, at the time **<T: 05 min>**. I don't know where that would have led me in terms of a future career, but I actually had an offer before I left to go back to school. I had an offer from someone who did some of our testing for us, our overload testing for us on the side.

He said, "Why don't you stay here and come into a partnership with me on the lab, you can help me to build the business."

I'm not sure if that would have been a good idea. Because when I look at the dairy business today and the efficiencies that we've created through biotech in a lot of ways, things like BST—that's another part of my story—that kind of work probably isn't as lucrative, as it was back when we'd collect milk farm by farm and test it farm by farm. We had seventy-five dairy farms at Byrne Dairy. Today—I got on their website – today they have about twelve. So

that's what efficiency has done. They produce much more milk than they did back then. So anyway, it became a matter of trying to figure out what I wanted to do. I had kind of this duel interest scientific research and I began to become more interested in the environment. Back in the late seventies, the environment was becoming a matter of very grave concern because of damage from things like acid rain and pesticides in the environment. I mean, every day you'd see a story in the paper.

JONES: I guess, especially upstate New York. That's acid rain country, right?

PANETTA: Acid rain country up there, yeah. Also manufacturing country, steel mills, and chemical manufacturing plants. I applied to graduate school, and I applied to a couple of schools to go on and get a PhD in research and a couple of schools to study in environmental science.

JONES: Where did you get the PhD idea? Where did that come from?

PANETTA: It came out of…The reason I didn't go to medical school was that I had worked in the hospital and I loved the patient interaction, but what I was seeing more in the hospital was that doctors were becoming so reliant on tests. I worked in the lab in the hospital part time as well. I thought medicine was going too much in the direction of technology and not so much in the direction of patient interaction, and that wasn't for me. I decided I didn't want to do that, but I was still interested in the human aspect of it, I guess you'd say.

I applied to a couple of schools and got into a couple of schools to go and get a PhD in, in human anatomy. Then I applied to a couple of schools in the environmental health area. And got in, and I kind of weighed the two. My then-fiancée, now-wife [Karin Panetta], who is also a biology major and actually became a laboratory researcher herself said to me, "I don't know what kind of a future there is in studying human anatomy, but I bet you there's more of a future in environmental health and environmental science."

I kind of took that as a signal. "You know, if we're going to get married, maybe you ought to think about something that you can support us on." [laughter] Then I got into a couple of schools—a bunch of schools actually. And was thinking about going to the University of Michigan; had a great program at the University of Michigan, and drove out there to see it. There was a two-year MSPH [Master of Science in Public Health] program in water quality, and I thought this was okay, but we looped through Pittsburgh, [Pennsylvania,] on the way back because I had also got into the Graduate School of Public Health in Pittsburgh. Looped through there and talked to the people in the school of Public Health. And they gave me this real sense of being connected to some of the real practical problems in environmental health, in Pittsburgh, which of course—

JONES: I'm sure at that time—

PANETTA: —is a steel city, Alcoa [Corporation], US [United States] Steel [Corporation], Gulf Oil [Corporation] and I saw that a lot of the lecturers at the school were folks who were professionals in those various corporations as well. I thought Michigan's great, got a great reputation. But I think I'll get a more practical education at [University of] Pitt[sburgh]. I went to school at University of Pittsburgh and in **<T: 10 min>** two years got my degree, my master's in public health with a concentration on environmental and industrial health science.

I had another decision to make. My program in industrial and occupational health was kind of a dual degree in the sense that I had training in occupational health, and I had training in environmental health. I could have gone in two directions. I could have gone into manufacturing and that kind of thing. I could go to more the environmental side: water quality, air quality, and those kinds of things. Actually was made an offer to go to work at the Allegheny County Health Department on the environmental side. I thought, "Well, this is great."

But something in me said, "I want to do something more on the large policy level."

I got in the car one day out of the blue in August, my final year, and I drove down to Washington, DC [District of Columbia], drove down to EPA [Environmental Protection Agency]. Now, this was 1979. So you could literally walk into any government building in DC without having to show any ID, without having to go through a scanner, nothing. I walked into EPA, and I actually just started knocking on some doors and said, "I'm looking for a job." Actually knocking on doors in the water quality program because my concentration in environmental health had been in water quality.

EPA was hiring like gangbusters back in 1979. I mean they had—

JONES: Three Mile Island, all kinds of things.[1]

PANETTA: Oh my gosh, Three Mile Island, and I don't know if we had Hooker Chemical and the incident up in Buffalo, New York.[2] I forget what that was now with all the buried chemicals, but—

JONES: Right.

[1] "The Meaning of Three Mile Island," *The New York Times*, April 12, 1979, 22.
[2] Donald G. McNeil Jr., "Study at Hooker Plant Found '75 Emissions Dangerous to Health," *New York Times*, April 17, 1979, 1.

PANETTA: —all the big environmental laws were being passed: the Clean Air Act, the Clean Water Act, the Toxic Substances Control Act. They were just hiring up with gangbusters. I was given an offer in the water program, but it was a one-year temporary job. They said, "Don't worry, it'll convert over to a permanent job." But as I was walking out, just out [of] complete serendipity, I ran into a woman who ran part of the program in pesticides and toxic substances. She said, "We've gone full time jobs because we're not as glamorous as water." They're a pay grade higher than the water jobs."

I said, "Sign me up. I don't know anything about pesticides, but I'll learn."

I went to work at the EPA in the pesticides and toxic substances group and was part of a incredible group that for the first time was reviewing all of these different kinds of chemical pesticides that have been approved over fifty years by the Department of Agriculture with almost no data at all. Because that was the way it used to be done. I ended up running teams of scientists and environmental toxicologists, environmental scientists, economists, industrial hygienists to review the health risks of all these various pesticides. And to make decisions on what was needed from the manufacturers in the way of data; whether they were enough of a threat to workers of the environment that certain uses ought to be pulled off the label, making recommendations to our assistant administrator on all that stuff.

Then ended up working on one that was incredibly, incredibly controversial called—ethylene dibromide or EDB—that was being used to fumigate citrus. It was being shipped to places like Japan to disinfest it of of the eggs laid by the Mediterranean fruit fly, which was an issue out here in California.

That became such a big issue that I ended up in meetings at the White House with policy makers over there because citrus fruit was such a huge market for the US. I got more exposed to that kind of policy and ended up then looking for a job in the policy office at EPA. Spent two years as a senior policy analyst in that office working on pesticides and toxic substances, policy overall for the agency. Five years of that, and I thought—

JONES: Tell me just a little bit about the substance of that work. How the policy formulated? What's the process?

PANETTA: The process was basically, take a look for the—**<T: 15 min>** so the agency at that time was about twelve years old. Policymaking was kind of a foreign thing to the agency at the time. [laughter] They were so busy trying to implement laws that they weren't really focused on what their policy should be from an implementation standpoint, you know? In other words, what was their policy going to be on the number of permits that they wanted to issue for new drinking water plants? What was their policy going to be on turning over responsibility to the states for managing these various laws?

The substance of that work was literally to for the first time, set a system under which we would measure and report out and work with our regional offices on implementation of all of these different laws and regulations in a way that we could actually measure our progress and report back to the President on our progress. It was very controversial in the program offices because no one had ever made them do any of this before. It was kind of a free-for-all in the program offices; just do whatever you want to do. Come to work every day. Nobody ever asks you what you did. Nobody asked you how much of it you did. Nobody asked you what your plan was to turn it over to anybody else.

When I went to work for Anne [M.] Gorsuch, the administrator at the time, and we began to implement these programs, the folks who had been there for a while got pretty ticked off. Then my boss ran into some issues around, some of her assistants who were less than above board about some of the meetings they were having with industry. She didn't hire any of those folks. They were all given to her by political appointees, and so she was finally kind of forced to leave the agency. After she left, that was the end of what we were doing on policy. Then after she left, I decided it was time for me to leave too.

My wife as a researcher at the Red Cross Blood Research Lab in Washington. She was working on a test for a new type of hepatitis that had been detected that they were calling non-A, non-B hepatitis at the time. Of course, now we know it as hepatitis C. She said to me, "You know, we want to have kids, but I feel really uncomfortable coming to work in a hepatitis research lab every day if we're going to have kids."

I said, "You know I want to leave EPA. Maybe it's time for me to go get some experience on the corporate side." I looked around and I had all this experience interfacing with my program office folks at EPA. The ideal opportunity that came up was to go to work for a chemical company and kind of be on the other side of the fence.

I took a job as a manager of regulatory affairs for a company called Pennwalt Corporation in Philadelphia, [Pennsylvania]. Pennwalt at that time was probably more than one hundred years old. It original had been called the Pennsylvania Salt Company, so that's how far back their history went. But by then they were just a very diverse group of companies that made everything from centrifuges to piezo electric film to agricultural chemicals to dental equipment. I mean, incredibly diverse—

JONES: Conglomerate, yeah.

PANETTA: Yep. Great opportunity to go to work in a ten thousand people Fortune 100 Company. I decided to take the job and go there. My wife at the same time got a job with what was then called ICI Americas [Incorporated] their pharmaceuticals division, now called AstraZeneca [plc]. And she became a clinical data analyst with AstraZeneca. We lived in Wilmington, and I commuted up to Philadelphia every day to go to work at Pennwalt, which was great. It was a great opportunity to work for a global company; gave me great management

experience; gave me a great opportunity to understand working with regulators from the industry side. Great management in the company.

One day I got a call from the research folks at Pennwalt, they said, "We'd like some help from you on the regulatory side in Washington because we're <**T: 20 min>** doing some experiments with bacteria, trying to grow up bacteria in a fermenter to see if we could potentially use these bacteria to produce proteins. That's the next big thing." They said, "But we don't know much about the containment rules. We don't know much about— "
"

JONES: These are recombinant proteins?

PANETTA: They weren't recombinant yet, but they were thinking about how they could get into recombinant proteins. I started to work with them a little bit. We got to the point where we needed to get senior management approval to begin to work with recombinant organisms. Because they said, "You know, we understand fermentation, and we want to move to the next step."

We went to make a presentation to the president and the chief operating officer or the CEO and the president and chief operating officer. I went with them because I had to explain the safety issues. We made this presentation about how we thought biology could really benefit Pennwalt Corporation in the future, and that this was the next big thing.

These two folks were chemical engineers. They were probably—I'm guessing they were sixty years old at the time. [laughter] And they looked at us and they said, "Gentleman, Pennwalt Corporation is a chemical company. We don't do biology here." I thought, "Well, gee, that's not very— "

JONES: Not very forward-looking.

PANETTA: Not forward-looking, and it's not very futuristic, but okay. I've got a good job. I'll go back and do my job. About a month or two later, just out of the blue, I got a call from a recruiter who I knew, and in passing one time I had mentioned to him that we were working on this.

He called and said, "Hey, you know, I'm working with a company called Mycogen Corporation out in San Diego, and they need a regulatory person, and they're working with growing up microbes in a fermenter to produce proteins. Didn't you say you were interested in that stuff?"

I said, "Yeah, absolutely interested in it."

JONES: I've got Elf Atochem [North America, Incorporated] here.

PANETTA: Well they became—Pennwalt became Elf Autochem later.

JONES: I see, all right, okay.

PANETTA: They were were acquired by ELF in France, and that's what they became. That's what they are today still.

JONES: Oh. So, Mycogen was looking for—

PANETTA: Mycogen was looking—little old fledgling Mycogen—

JONES: Two years old at that time, yeah?

PANETTA: Five years old.

JONES: Five years old?

PANETTA: Five years old was, not even five years old probably. They knew they were doing something really tricky because they had a bacterial organism, pseudomonas fluorescens that they were creating a recombinant organism with by taking the protein that it comes out of bacillus. Bacillus thuringiensis that was traditionally from the forties used as a topical spray insecticide, but not very effective when you're up against the hardcore organochlorine types of insecticides. But it was becoming more popular because of the environmental issues around pesticide use.

Of course, I had that experience in working at EPA and he said, "You know, they really want to talk to you."

I said, "Okay, where are they?"

"San Diego."

I said, "Where is that? It's somewhere in Southern California. I go to Sacramento, [California,] a lot. Where is San Diego? South of Los Angeles, [California,] somewhere?

"Yeah."

"Down on the Mexican border?

"Yeah."

I said, "Alright, I have to be in Sacramento in a couple of weeks. I'll fly down and talk to them," which is exactly what I did, I'll never forget the conversation I had with these folks. I had never talked to anyone in a biotech company before. The first time. Here I was coming out of a Fortune 100, you know, back then three billion dollars in sales chemical company.

Ten thousand people, well established in Philadelphia and around the world, and I said to the CEO, Jerry Caulder, "Now, tell me if you can, please so that I can understand this, what's your business model?"[3]

He said, "Well we're going to produce the first genetically-engineered pesticides. They're going to replace **<T: 25 min>** a whole class of chemical pesticides. The plan is to have these commercial within three years." At the time he said, "The plan is for the company to be profitable by," I think, 1995. Of course, all biotech companies were going to be profitable within five or six years, right?

I said, "Well, what are your revenues right now?"

He said, "Our our revenues are really the revenues that we receive from,"—the company had gone public the year before I got there— "from our stock sales and our investors. He said, "We've got eighteen million in the bank, and that should last us at least a year." He said that like, "We're in fine shape. We've got a year of capital in the bank."

I said, "What happens after that?"

He said, "We issue more stock and we raise more money."

I said, "Huh. That's an interesting model." But I was intrigued with the technology, and I was intrigued, as I had been at Pennwalt Corporation, with the idea that there was the potential to create this new class of environmentally friendly pesticides.

We went back and forth for about a month and I decided to take the job.

JONES: So you had to assess the risk, counterbalance the risk. Did you have to sell it to your wife? What were your deliberations like?

[3] Jerry Caulder, interview by Mark Jones on 20 and 27 March 2012 and 9 May 2015 at San Diego California and Rancho Santa Fe, California (Philadelphia: Chemical Heritage Foundation, Oral History Transcript #0986, in process).

PANETTA: I went back and I told my wife about this, and she said, "Wow, that doesn't make a lot of sense to me." They invited us both back out her for a weekend and we came back out and spent the weekend on the beach and enjoying the 72-degree weather in San Diego while it was 95 degrees with 95 percent humidity back in Wilmington, [Delaware]. We went back and my wife actually said to me, "Maybe we should think about this." She said something funny. She said what a lot of people who come out here say to me now. She said, "You know what? We'll do it for a couple of years and we'll come back. Just go out and enjoy the beach out in California for a couple of years."

I mean, she and I both had grown up in Syracuse. I went to Le Moyne. She went to Syracuse University. We met working in the hospital lab together. We were East Coasters and so we thought, "Well, this would just be kind of a fun little diversion for a couple of years."

JONES: That could work though, right? You think it could?

PANETTA: Oh yeah. We didn't know where it was going to go, but we thought we could always come back. I have to say, you know, at the same time I thought, "This technology is incredibly promising. If we can make this work, this could be a huge thing." We came out here in 1988, and the first thing that we did at Mycogen was we had a challenge on our hands. The microbes that we were growing in the fermenter that produced the recombinant protein were then going to be released into the environment as a formulated pesticide product, but as a live organism.

Things were happening in places like Monterrey, [California,] where ordinances were being passed where you couldn't release genetically modified organisms into the environment. So we had a problem. We didn't know what we were going to do about it until one of our scientists, Frank Gartner, and one of our founders, Andy Barnes, came up with an ingenious idea.[4]

They said, "What if we kill these organisms? Keep the protein intact. We can still use them for the same intended purpose." They came up with the idea of using an iodine fixative that would kill the cells and the iodine fixative also acted to harden the cell wall. We kind of got a double benefit out of it the sense that it took care of the environmental question of releasing live organisms, but it also created a product that would last longer on a leaf surface because of the hardened cell wall.

JONES: The bugs are going to consume it and then break down the cell?

[4] Andrew Barnes, interview by Mark Jones 8 July 2013 at San Diego, California (Philadelphia: Chemical Heritage Foundation, Research Interview #0014, in process).

PANETTA: Yeah.

JONES: Yeah, okay.

PANETTA: The problem with DDT as a natural product is it typically only lasts on a leaf surface for a couple of days. If you don't catch the bugs on the right stage of their life cycle, it doesn't work. But this product could last for fourteen days. It would last through the various cycles of growth of the insects. **<T: 30 min>** We got approval. It was not easy because we had to do a lot of the same kinds of tests that you would do for chemical pesticides. But we didn't have to do any of the long-term toxicity tests that take years.

JONES: Yeah, so when Mycogen first talked to you, I mean, they came to you because they saw this problem looming, and you were brought in to solve this problem or—

PANETTA: Yeah, they saw this—

JONES: Or to manage it? Yeah.

PANETTA: The problem that they saw was they didn't know the first thing about taking products like this to EPA to ask for approval.

JONES: Sure.

PANETTA: So…

JONES: Nobody did, right? Because—

PANETTA: Nobody did, but they knew that I had been there, and they knew that I knew the whole agricultural chemicals/regulatory world from my time at Pennwalt. They really kind of took a chance on me, and I took a chance on them was what it came down to. I was brought in to figure out how to get these things approved and to get them approved. So, we began to do the testing around 1989. It took us a little over a year. Made the submission of all the data to the pesticides group at EPA. They had to be satisfied that we in fact, had a process that would kill

all these organisms and that there wouldn't be any that would escape into the environment. We had to prove that.

Of course, because they were proteins and they broke down, and there wasn't any concern about chronic toxicity, cancer, or any of those things we didn't have to do any of the typical tests that you have to do on a pesticide. It only took us about a year to get the data packaged together. But by 1991, we had approval, and we began to sell the product, and it actually—the sales went pretty well. There's only one problem. By 1991, a company called Monsanto [Company] was already beginning to take the genetic sequence that we were putting into the bacterium to express the protein to spray out onto corn crops and cotton; they were already inserting it into the seeds themselves, and getting the plant to express it on its own. We realized we better shift gears pretty quickly and—

JONES: At that time, it must have been still a long way off before it improved. I mean, you could get into the market and still, you know, get five to ten years, right?

PANETTA: We thought. But Jerry Caulder, our CEO at Alkern who was my boss at the time and ran commercial development said, "Joe, you better go learn more about what it's going to take to get these genetically engineered seeds approved because we might find ourselves going in that direction." I went to meetings in Washington and wherever there were meetings being held on the planning [and] the process for doing the various tests that would be required to get those kinds of products approved.

In the meantime, we bought a couple of seed companies that had some great technologies in Texas and in Wisconsin. Particularly one in Wisconsin in Madison, [Wisconsin,] called Jacques Seeds that had a laboratory that was working with the same kinds of things that Monsanto was working with. In fact they had also acquired a company that had this technology themselves that Monsanto had been working with as well before Monsanto apparently. Before Monsanto acquired the technology, which is another story because we ended up in court over the whole thing with Monsanto. In the end, we won a three hundred and seventy-five million dollar judgement over who actually owned the technology, and it turned out that—

JONES: Was it patents? Were—

PANETTA: It was patents. It was over patents, and who owned the patents. We went on then from that point around 1991 to beginning to work on genetically engineered seeds using some of the same sequences that we had.

JONES: Yeah. I have a question. Where did that technology—it was Jacques? Is that what you said?

PANETTA: It was Jacques and it was a couple of small companies also that Jacques had acquired and I'm not sure. They're small seed companies in the Midwest that—

JONES: Yeah, did they get the technology out of some university? Did they get molecular biologists?

PANETTA: Yeah, I'm not really sure.

JONES: That's fine. I can look at the patents.

PANETTA: Yeah, I'm not sure where they got it from, but they owned it, and they had some great scientists in a lab in Madison, Wisconsin who were working with it.

We kind of got into this race and we teamed up with what's now Syngenta [AG] and what was then **<T: 35 min>** Novartis Seeds [Incoported]. Teamed up with them and also teamed up with a very well-established corn seed company in Iowa, Pioneer Seeds [Pioneer Hi-Bred no DuPont Pioneer], to commercialize the technology. Just went into an all-out race to do the regulatory work the field trials. Everything we needed to put together a business around genetically engineered crops. By 1994, we were ready to go to the federal government to ask for approval about the same time Monsanto was. So we—

JONES: So, well, how did you feel about this race because you're under-resourced seriously, in comparison to Monsanto I would assume?

PANETTA: Yeah we were. It was David and Goliath, though we enjoyed it. It was fun. It was fun from the standpoint that it was all for one and one for all great comradery within the company. Our CEO created a great environment that—

JONES: Was it Jerry?

PANETTA: It was Jerry, yeah. It was hard work and at the same time, we did a lot of things to come together, and have some fun. We all enjoyed each other's company for the most part. There are always little social issues within any biotech company, but for the most part, we had a great time. I mean, we were there from 7:00 in the morning to 10:00 at night sometimes. We were working hard, and we knew who the opposition was as well. [laughter] We were all in it to win the race or at least, to come in at the same time.

We did. We ended up doing what we had to do, working with Novartis and Pioneer who were great partners for us. By 1995, we had obtained approval or our genetically modified seeds.

JONES: Ahead of Monsanto?

PANETTA: Same time. They came out literally within a week of each other, and then it was off to compete with each other. But we realized our new CEO, Jerry—after we got that approval, Jerry decided to kind of back off and do some investing in some other things and Carl Eibl became our CEO. Carl had been our general counsel, and Carl said, "You know…" he and a few other folks, Jeff Guise over at Wilson Sonsini and a few other patent lawyers looked at the patents and said, "You know, we think we own this technology, not Monsanto." And had the guts to say, "We're going to sue them."

We did. We took them to court, and it was a battle here in San Diego in US district court, and we won. We won the patent battle and a three hundred seventy-five-million-dollar judgment.

JONES: And again, this is a very risky thing to do because Monsanto, they could string this thing out and, what— you know— what was your strategy for—

PANETTA: Strategy was to hire the, again, to hire the best, hardest working outside patent lawyers we could find. That's what we did. We set up a war room where we spent day and night putting together our case. Monsanto, of course, sent in their lawyers in their two-thousand-dollar suits, who kind of thought they'd make us look like fools, and basically the opposite happened. We ended up with the right. Here we were kind of the cat that ate the canary and by 1997 or so, we were drawing the attention of some folks at one of Monsanto's rivals, Dow AgroSciences [LLC] in the Dow Chemical Company, and for two reasons. The Dow Chemical Company was interested in our fermentation technology, which we had literally put on the shelf because we were working with the seeds.

The Dow AgroSciences folks were interested in the seed business because they to saw that as the wave of the future. We began working with them more, and by 1998 they made our board and our shareholders an offer to acquire the company, and I was on the senior management team by then. I was a corporate VP [Vice President]. We decided that the offer that they made was one that we wanted to take. We went along with it. **<T: 40 min>** It was good. It was good for the shareholders. I mean, by that point, Mycogen was fifteen years old you know, still not profitable. A lot of investment had been made in growing the company. By that point, we had about six hundred employees, about two hundred and fifty million dollars in business.

But it was a good time to sell for the benefit of the shareholders who had waited so long and invested so much in the company. We sold the company to Dow AgroSciences, and so part of the business went to Midland, Michigan, the fermentation business, and the other part of the business went to Indianapolis, [Indiana,] where their agrosciences group was based. Within a year, they asked me to move there. After they'd acquired us, they'd given me a great position as global leader of government affairs in their biotech group. Great opportunity for the future.

JONES: And that was because they were just getting started in biotech and they really didn't have it all put together?

PANETTA: Yep. I took the job, but what I found within a year was that going to Dow AgroSciences was almost like going back to Pennwalt in a sense that it was a large corporation. I found myself constantly in meetings. I found myself kind of I thought, kind of boxed in terms of the decisions that I could make on my own that I'd been able to make on my own at Mycogen before. At the end of a year, they also said, "We want you to move to Indianapolis."

I said, "I don't think that's what I want to do."

Within about two or three months, Jerry Caulder and some of the folks on the Biocom [Life Science Association of California] board came to me and said, "You know Biocom is a great organization." I knew Biocom because at the time we housed Biocom at Mycogen. Biocom's offices were at Mycogen.

JONES: So Jerry was involved in organizing?

PANETTA: Yeah.

JONES: Yeah. Jerry, David Hale, Bill Rastetter, Duane Roth, David Robinson.[5] It was some of the early folks in biotech here. And they asked me if I'd come and take over, and the reason was that, while Biocom at that time was about four or five years old, it was essentially a great networking group for local companies and CEOs. And it had been very successful in beginning to develop relationships with city government the permitting department downtown, the fire warden, anybody locally who had anything to do with helping to streamline the process of constructing biotech facilities. But they realize that they needed to have more advocacy interface in places like Sacramento and Washington. I had had that experience both by being in Washington and by working at places like Mycogen and Pennwalt. I didn't want to leave.

[5] David Hale, interview by Mark Jones on 21 April and 29 November 2012 and 9 July 2013 at San Diego, California (Philadelphia: Chemical Heritage Foundation, Oral History Transcript #1016, in process) and William Rastetter, interview by Mark Jones on 22 June and 17 August 2011 at La Jolla, California (Philadelphia: Chemical Heritage Foundation, Oral History Transcript #1030, in process).

I looked at my wife Karin and I said, "I don't know the first thing about running a trade association." I've been active in trade associations, like bio, and at the time it wasn't even called bio. It was called the Industrial Biotechnology Association, and Biocom, "But I don't know anything about running a trade association," At the same time we said, "You know what? If we want to stay in San Diego, we'd better jump on the opportunity because there doesn't seem to be much else for a guy who understand ag biotech in a town that's developing drugs." [laughter] I said, "Alright. I'll take the job."

JONES: And that was important to stay in San Diego? You settled here? You like it?

PANETTA: Oh, we love it here, yeah. Our kids were just starting high school. Our daughter was just starting high school. Our son was just starting middle school.

JONES: Yeah, that's a tough time to move kids.

PANETTA: We loved being here. We had pretty much become immersed in San Diego. We didn't really want to leave.

JONES: Let me ask you; you've been here you know, since mid-eighties or late—

PANETTA: 1988.

JONES: Eighty-eight okay. Still there had been a lot of growth in the local industry.

PANETTA: Oh, absolutely. **<T: 45 min>**

JONES: Yeah, so maybe could you just talk about your observations?

PANETTA: Yeah.

JONES: And what your sense of what was going on here and how it was taking place.

PANETTA: One of the things that there were one or two other guy who did regulatory work here when I came here. One of the things we always used to talk about was where are we going to go if our companies fold because at that time there weren't a lot of biotech companies here. There weren't a lot of jobs in regulatory affairs because so many companies were early-stage research biotech companies and weren't even thinking about clinical trials or anything that would involve regulatory work at the time. My other hat at Mycogen was that I ran facilities, environmental health and safety, all of our quality assurance as well. Which was not a small job.

I could have stayed on that side probably and looked for a job in that area, but back in the late eighties, early nineties, it was hard to recruit people here because the industry was still very much in its infancy. The concern was a) it was incredibly expensive to come here, buy a house. We had a house in Wilmington, Delaware that was a twenty-two hundred square foot house that we had paid eighty-five thousand dollars for a couple of years before. To buy anything close to work even back in 1988 that size was about three hundred and fifty thousand dollars. People aren't going to make four times what they're making back there.

It was tough, but the industry itself back then, we were still kind of celebrating the success of Hybritech [Incorporated], which had been sold to [Eli] Lilly [and Company] by then. But it was one of the first companies to actually produce a biotech product, the PSA test for prostate cancer that they commercialized back in the late seventies and 1980. There were some companies that were well along in clinical trials, but back then it was still tough to raise money. I've heard this story a bunch of times from Bill Rastetter about how IDEC literally was out of cash until he had, he made a phone call to someone at Genentech [Incorporated] to fuel the company through getting their approval their Rituxin product.

It was really kind of a touch and go wild time for the industry here. Also a time when we didn't yet have the experienced senior management folks and CEOs that we now refer to as the group of serial CEOs and serial entrepreneurs. But there wasn't any serial yet to be had back then. [laughter]

JONES: Right, right.

PANETTA: So not a lot of experience. Yet San Diego was becoming back then one of the big centers of biotech in the country, and yet Boston, [Massachusetts,] and San Francisco back then were more well- known as biotech centers than San Diego was. I think it would be fair to say that back in the late nineties for the most part, we were here kind of working in a very insular way to develop the biotech industry here. Not a lot of connections outside of San Diego.

JONES: Yeah, and there was not a lot of capital here.

PANETTA: No, the capital was all up in San Francisco. There were only one or two venture firms here primarily forward ventures that Ivor Royston started after Hybritech and enterprise ventures that Drew Senyei had started that was more focused on investment in medical devices.[6] In some ways, back then the medical device industry was probably as large as the biotech industry here as well.

JONES: A lot of docs at UCSD inventing things?

PANETTA: Yep Alaris was big. But a whole slew of other types of products in ophthalmology, and diagnostic testing. Gen-Probe had gotten off the ground by then. Which Ivor Royston was involved in as well. By 1999, we were, I think, just kind of on the brink of really becoming well-known as a biotech cluster here.

JONES: Did you have ideas about what needed to be done **<T: 50 min>** in order to promote this the right way?

PANETTA: Yes, yes, and when I came to Biocom, my idea was because I had been at Pennwalt and Mycogen, one of the things that had almost become a part of my everyday life was working internationally. At Mycogen we had offices in Europe, in South America. We worked a lot in Australia and Japan, had Japanese partners. At Pennwalt we had the same thing, offices all over the place. Even at Mycogen I spent a lot of my time flying around the world to our various sites working with folks, getting the regulatory approvals we needed through the European Union, working with the Argentinians and the Chileans—where we would grow seed in the opposite seasons that we have here, they have down there. We could grow twice as much seed by taking advantage of places like Chile and Argentina.

JONES: Was Monsanto doing that too?

PANETTA: Monsanto was doing the same everybody was doing that. When I came to Biocom, I thought, "Gee, one of the things I'd really like to do is to give this industry some global exposure." I came here with the idea that we needed to build this organization so that it would act ask a real marketer for San Diego biotech. Fortunately, I had a great partner in Julie Meier Wright who ran the San Diego Economic Development Corporation [EDC] at the time. She had been Pete [Peter B.] Wilson's secretary of trade and commerce when he was governor, and Pete had started a group called The Governor's Biotechnology Advisory Council back around 1993 or so.

[6] Andrew Senyei, interview by Mark Jones at 19 April 2012 at La Jolla, California (Philadelphia: Chemical Heritage Foundation, Oral History Transcript #1036, in process).

My boss, Jerry Caulder, served on it. But Jerry used to send me to the meetings because he felt that I had the experience dealing with government folks. I'd go up and sit in these meetings that Julie would run for Pete and we'd talk about things like "How could the state help to grow the biotechnology industry? What was the industry shaping up to look like?" When Pete served his two terms and retired, Julie came down here to run the EDC. Julie and I began to work together from the start to create a presentation that we began to give to folks here, and outside of San Diego that we titled: San Diego, the Life Science Ecosystem of Innovation.

Our first big opportunity came when in 2000, the Biotechnology Industry Organization decided that it would have its annual conference in 2001 in San Diego. Bio itself started the conference back in 1994, and its predecessor had had a couple of small get-togethers in San Diego, but this conference had grown to become a big international conference by that point. Bio decided to have it here in 2001. One of my first tasks right out of the gate was to work with the Biocom board and with the industry in San Diego to make sure that we took advantage of this convention as an opportunity to really showcase what was happening here in biotech.

That was a big part of the goal, and Julie and the EDC were great partners. Another goal was to begin to establish a presence, more of a presence in Sacramento where we had built relationships through the Governor's Biotechnology Council. In Washington because the concern that I had and our board leadership had was that while bio was a great organization in Washington representing the industry, we felt that we needed our own representation as a San Diego biotech industry in Washington.

JONES: Was there any way that interests weren't completely aligned there or you just— you felt it was important to get San Diego to get some face time for San Diego specifically, yeah?

PANETTA: We felt that our local legislators, our members of congress, should have the interaction with our local biotech industry in Washington. That they could help to drive a lot. Now we'd also had some experience in that regard because when, Lynn Schenk was a member of congress from San Diego in 19—she only served one term from 1992 to 1994, but she was largely responsible for the passage of the Prescription Drug User Fee Act **<T: 55 min>**, the first Prescription Drug User Fee Act. That was largely through relationships that companies here in San Diego had with Lynn.

We thought that it was important to kind of continue having that kind of relationship and having a presence in DC, which with an organization at that time [. . .] We only had six people on the staff, and our only public policy person was a person who dealt with city hall for the most part. One of the thigs that I began to do is to travel to Washington more. We had an assistant who had—she was here when I got here April Bailey, who got her degree in polysci [political science] at San Diego State and spent a year as an intern on Capitol Hill.

I said, "You're going to be the foundation of our Washington, DC program, April." [laughter] "Let's figure it out."

JONES: You felt she had the talent to do that?

PANETTA: She had the talent. She had the drive, and she was here. She was at BioCom. We began to build that program. We began to do more to largely beginning with the Bio conference to promote San Diego. I began to travel more to places around the country. I became engaged in a group called The Council of State Bioscience Associations that was sponsored by Bio. Moved into more of a leadership role there, and began to travel around to the different state organizations and talk about what we were doing here in San Diego.

It began to pay off. I mean, it began to pay off in the sense that we got more attention for what was happening here in San Diego. When I came here, there was one pharmaceutical company, Johnson & Johnson that had a presence here. We began to see more pharmaceutical companies taking an interest and having a presence in San Diego. We would talk to these folks at conferences. We would invite them here. [. . .]

JONES: Did you put them in touch to say, "Hey, you need to go to Scripps [Research Institute], UCSD, and…"

PANETTA: Yeah, "Come and see what we've got going on here. Can we set up meetings for you? Can we bring folks into Biocom who you can talk to?" Really, really began to work to get some exposure, and it began to pay off. So the other thing we began to realize at that time was that capital was still pretty scarce. We thought we should build some program to help companies to raise investment capital. We began to focus more on the venture world. We created a whole suite of sort of visiting offices for venture capitalists from out of town who might want to come to San Diego and spend a week, and we'd give them office space that they could work out of at BioCom. That paid off as well because in the end we got two or three venture firms that moved down to San Diego: Domain Ventures, Thomas McNerney [& Partners] up in the Bay Area. Sofinnova [Ventures] came down here as well.

JONES: And these are people who would come into your offices?

PANETTA: Yeah. And Domain, of course, still has its headquarters here, moved down from Orange County. The other thing that we realized was that we needed to continue to grow the talent base here as companies were evolving and maturing. What had at that point evolved into a pretty solid research and development cluster was still not yet a development in commercialization cluster. One of the things that we began to focus on was what we still call

creating the homegrown workforce; training people in manufacturing. Training people in basic management. Putting together programs that would help young CEOs and young executives to be mentored by more experienced CEOs and executives.

Those programs continue now. We've got programs in for scientists in management. We've got programs that we helped to create at San Diego State, degree programs and regulatory affairs programs. One that start out as a two-year program at one of the community college and is now a four-year program **<T: 60 min>** because that community college is one of the first in the state to have been given approval to go to a four year program degree program in fermentation engineering. We've continued to try to keep pace with what the professional development needs are of the industry. By 2008 or so when the economy began to turn, and we saw a whole change in the focus of investing in biotech companies—

JONES: And venture capital just kind of evaporated, yeah?

PANETTA: Yeah, venture capital evaporated and venture capital that was invested was being focused more on acquiring technologies and trying to get those technologies developed by experienced outside experts; not building companies with three or four hundred people in them and building facilities that were monuments to the company.

JONES: And San Diego hadn't really had an anchor?

PANETTA: No, San Diego had not had an anchor. What was great about that was a lot of people who had come out of biotech companies had a chance to work as experts, became contract researchers. A lot of the folks in these biotech companies were now within companies with no more than twenty-five or fifty people in them because the investors didn't want to invest in creating these huge companies that would potentially be acquired. What would you do with all the physical facility and all the people that you'd hired? Better to contract out and have experts do all of this work.

We began to focus more on, at that point on building the framework around the contract research community here in San Diego. Connecting companies with the best talent that existed, which is good for small companies because at that time and even today we've got seven hundred members today at Biocom. The majority of them are companies with twenty-five or fifty people. If you try to spread across that number of companies, the ability to hire experts in every field at each company, they're just not out there.

Now, if you can find an experienced contract researcher who can go to work for five, ten, twelve of these companies at one time, they can all benefit by that experience, you know? That's a much more successful way to do things. We'd been working a lot in that arena as well. Then the other thing that we realized was that these small companies especially with the need to

conserve capital could benefit by a program that would allow them to purchase everything that they needed to run their companies successfully and supply their companies. If we could provide it on a discount through a large group purchasing program. We created a separate for-profit entity within Biocom called the Biocom Purchasing Group that provides thirty-five different types of supplies and services under contract to our members.

JONES: To all members? And how many of them make purchases, what percentage would you say?

PANETTA: Ninety-five percent take advantage of it. The largest contract is for laboratory supplies. The next largest is for office supplies. One of the larger ones that we created about three years ago is for healthcare benefits. And it essentially gives our small companies the ability to purchase at a discount level that only a large corporation would be able to negotiate. That's been really successful for our members here in San Diego.

JONES: Yeah, and the inflection point for focusing on this kind of collective stuff and contract research, did you say 2008? Is that really—

PANETTA: About 2008 would really be it.

JONES: Or even before that had you gone? I mean this is a conscious strategy at some point where you say you're going to. And was it your thinking that, you know, maybe we've got to give up the idea of building a Genentech here?

PANETTA: That's always been a controversial topic in Biotech in San Diego. At one point, a lot of us were wringing our hands about how we didn't have a Genentech here, and asking would we ever. What's it going to take to have **<T: 65 min>** a Genentech here? Companies like BioGen [Incorporated] Idec or what was Idec back in 1999, 2000. We thought would become the next Genentech or [Sanofi] Genzyme. But they did kind of a reverse merger with Biogen and ended up shutting down here and moving to Boston.

There have been a couple of those, and there's never been a successful evolution here of a biotech company to becoming the next Genentech. On the flip side, the reason that that's not happening is that companies are being acquired because they're creating some very attractive science and technology. They're getting to mid-stage where they're in Phase II clinical trials, and we've got every pharma company under the sun, kind of, watching what's going on here now with a presence here.

JONES: So, it's just the recognition that the industry has gone in this direction. We have to go with it?

PANETTA: Yep.

JONES: And we can.

PANETTA: And we can, and it's okay. What's great about it is that the folks who are selling these companies. The CEOs of these companies and I mean, the shareholders are selling the companies, but the CEOs of these companies are, for the most part going out and starting new companies, and bringing along their talented senior management teams and starting new companies. I think that's okay, it's creating the potential for new drugs to be developed hopefully through the acquiring companies. But the landscape's changed a lot here.

You know, when I talked about the way it was back in the late-eighties, early-nineties. The biggest change today here is the presence of all of these pharmaceutical companies, whether it's Pfizer [Incorporated], Lilly, Celgene [LLC] with large research facilities here or AstraZeneca, which operates essentially through an acquisition that they made here of a biotech company.

JONES: What company was that?

PANETTA: Not Acadia [Pharmaceutical, Incorporated]. I can't remember the name of the company now, but they've largely kept it intact. Then you've got Johnson & Johnson, which is just doing remarkably well with it's JLABS here with forty-seven companies incubating within their JLABS. Every model under the sun. A couple of companies like Merck [& Company, Incorporated] have had scouts here and nobody else. I think the two examples are Sanofi-Aventis [SA] and Merck that have one or two people here.

GlaxoSmithKline [plc] teamed up with Avalon Ventures, and invested about four hundred million in the creation of ten new biotech companies here recently, and they've already created six with Avalon. It's a much different landscape from what it was, and it's a different model than probably than you see in places like Boston or San Francisco. The opportunity that these companies have to be a part of what's going on in biotech in San Diego is much different than what it was ten or fifteen years ago.

JONES: Yeah, so does that make your activities more national, more global, the fact that, I mean you're talking about, you know, AstraZeneca or, or whoever? You know, they could be anywhere, right?

PANETTA: Yeah, so about five years ago we created a brand-new conference that's been growing every year that we call our Global Firm of Biotech Partnering Conference, and it takes place at the end of February each year. All of the major pharma companies send their licensing and business development people here. Some of their very senior management people come to speak at this conference. It's set up as a partnering conference between primarily our biotech companies in San Diego, and the licensing folks at these at these— [. . .] **<T: 70 min>**

That's been a huge change. I mean, and I think it's going to continue to happen as well. Look, the folks from Japan. We've got an office in Tokyo, [Japan] that we opened about six months ago. We've got twenty companies from Japan that are members of Biocom now. We think there are huge opportunities in Japan for San Diego, not only in terms of our companies entering the Japanese market, but in terms of bringing Japanese companies here to take advantage of the venture community that we have in California. Japan doesn't have much of a venture community, but their biotech industry is evolving pretty quickly.

We do a lot in regenerative medicine here, of course. One of my other hats is that I sit on the Independent Citizens Oversight Committee for the California Institute for Regenerative Medicine. Recently the grants that we've been approving have been for products that are going in a later stage clinical trials and potentially commercialization. That's a huge thing here for us in San Diego. And a priority—

JONES: Is it a lot of grants are coming down here?

PANETTA: A good number. I'd say about half the grants are coming down here, yeah. So, it's a good split. One of our most advanced companies, BioSite down here has been working with developing pancreatic stem cells that secrete insulin. They've been able to insert them into a pouch that can be implanted under the skin and basically act as an artificial pancreas. We've got high hopes for BioSite becoming successful and getting that product approved. They're in late stage clinical trials now.

JONES: Yeah, that could be huge. That could be Genentech. You know, diabetes is huge.

PANETTA: Yeah. You know, people have asked me, "Is this three billion dollars that the state voters decided to invest in stem cell research worth it?"

My answer is, "If for three billion dollar all that we get is an artificial pancreas? Yeah, it's been successful. I think three billion is a pretty good investment in curing diabetes." We'll keep our fingers cross for BioSite being successful. But all sorts of other areas: Alzheimer's, Parkinson's Disease, osteoarthritis, that are coming into later stage trials now.

JONES: Yeah, all fascinating stuff, and speaking of Alzheimer's, I mean, what's your take on the dispute between UCSD and USC [University of Southern California], and how does that impact? I mean, you're talking to people working in the field. What does it mean for you?

PANETTA: First of all, it's unfortunate that there wasn't a more collaborative approach to how that study might be jointly managed by USC and UCSD. This happens all the time. I mean, researchers are given better offers to go somewhere else and they go. But I think the bigger question for us is: what is USC's end game? About a year ago, they came very close to acquiring the Scripts Institution. Here. Fortunately, that was thwarted at the last minute, but I know because I've been up there—Los Angeles wants to create a biotech community. They're actively working to create a biotech community. They've created a plan for a biotech community up there.

They also have a good number of biotech companies in the Los Angeles area already. Los Angeles is going to push hard and ever harder to bring to A the assets that they need to create a biotech community. Our strategy is to sit down with them and to say, "Look, we can do this in a way that we can both benefit. Because we've got a lot of folks, down in San Diego whom you could tap into and who are more than willing to do business up in Los Angeles to help them to build a biotech cluster up there." We at Biocom for the last six or seven years have referred to ourselves as the Southern California Life Sciences Association. Which means for us that we've got members all the way up beyond Los Angeles ourselves as an organization. **<T: 75 min>**

We really think that there's a better opportunity if we work together to create one Southern California Life Sciences cluster that reaches from LA to San Diego, than for these kinds of battles to go on. I think it can be done, and I think if we do it successfully LA will benefit and San Diego will benefit. You've got great research universities, UCLA [University of California, Los Angeles], USC. Some excellent biomedical research institutions up there, private institutes. A great base of investment capital up there.

An international airport that we don't have here in San Diego and people don't always believe that that's an important thing, but I can't tell you how many times I've been in places around the world talking biotech at San Diego where people have said to me, "I can't fly directly to San Diego. There's no non-stop flight to San Diego. I can go to San Francisco. I can go to Los Angeles, but I can't fly non-stop to San Diego."—

JONES: Is that something you ever had conversations with the city about just beyond, you know, the pale of—

PANETTA: There have been conversations, I understand, and I was on one of the airport planning committees. There have been conversations going back to 1950 about building a new airport in San Diego. None of those ideas haven't panned out for various reasons. The latest was to build an airport at what's now Miramar Marine Air Station, and the [United States] Marines said "We're not really interested in that idea." That didn't go anywhere. There were plans at one point to put a bi-national airport down along the border. That didn't get anywhere. So right now there's no plan for an airport.

The airport we have is being renovated and upgraded, but it's only being upgraded in terms the number of gates and the facility. The runway isn't being changed. It's basically a short one runway airport. You can't fly the jumbo jets in here. But fortunately with some of the new planes like the 787, they can land here. We can have non-stop flights out of here out of that airport. There's an opportunity there. We've got a non-stop flight every day in between here and Tokyo now, which is helping us with some of the Japanese companies that we're trying to bring in.

JONES: Who's flying that?

PANETTA: Japan Airlines. We've got about twenty or so new Biocom member companies from Japan. I think part of the reason for that is, in addition to the great partnering opportunities there are here, they can get here now.

JONES: Yeah, and so you're spending a lot of time up in LA talking to people?

PANETTA: A little bit, a little bit of time, yeah.

JONES: Who are you talking to? Who is really—

PANETTA: Oh, we're talking to the LA County Board of Supervisors. We're talking to the Economic Development Corporation. We're talking to their local biotech group. Essentially the folks who are at the core of trying to plan this—

JONES: And their local biotech group would be?

PANETTA: It's interestingly a group called Southern California Biomedical Council, but it's LA. We're talking to some of our members up there too, folks at places like LA Biomed Research Institute, and some of the companies up there. We think there's an opportunity to

expand up there and provide a lot of the services that we provide here to the companies that are up there.

JONES: Could you talk a bit about the North-South split? I mean the BayBio just turned into—what is it? California Life Sciences?

PANETTA: That's an interesting name. They call themselves now The California Life Science Association. We thought that was a very interesting choice of names for their organization. San Francisco needs a Life Science Association. I don't think San Francisco needs a California Life Science Association as much as they need a Bay Area Life Science Association. We had a very strong partnership with BayBio. We were sister organizations. Did a lot of the same things, worked in partnership in a lot of programs, mirrored **<T: 80 min>** each other on a lot of programs.

I'm not sure that there's a reason to have a California Life Science Association when you've got a group, first of all, as strong as Biocom down here with offices in Washington, DC. With the California Biotechnology Foundation that we have up in Sacramento that works to educate the public and legislators throughout the state about the value of the biopharmaceutical industry here. It's a curious endeavor that I think our board as well questions in terms of what the end game is there.

It's not the California Life Science Association. Because we've got an entity here, Biocom, that's celebrating its twentieth year as the advocacy organization for San Diego and Southern California. It's not the San Francisco Biotech Association, so companies up there suffer by not having a Biocom they can go to in San Francisco. It's not a North-South split. It would be nice if it was a North-South split because the North-South split that we've had with BayBio functioned very well. It wasn't a North-South split. It was a North-South partnership. I'd like to try to go back to that. I think that would be a lot more successful of a model than the California Life Science Association and Biocom. I don't see those two as being reciprocal in most ways.

JONES: Let me ask you to look back over the, you know, this is from 1999 to the present. Locally with San Diego and maybe some of these other places. Carlsbad, [California] has got a lot of stuff going on, right? But working with people locally in government. Maybe if you talk about some of those people and maybe how has it changed a lot over time? What have the policies been? Have they been trouble? Those sorts of issues, also Sacramento too with locally here, and then working with—what kind of grades would you give? [laughter]

PANETTA: I think I'd give locally I think the grade I would give would be somewhere between a B+ and an A-. Going back to my time here, our mayor when I came to Biocom was Susan [G.] Golding. She was a great supporter of the biotech industry. Within city government

back at that time, the city created a biotech economic assessment team that would help with things like basic things like expediting the approval of permits to build biotech labs here.

JONES: Did you have problems with that when you came to Mycogen?

PANETTA: Oh yeah.

JONES: Was Mycogen having—yeah?

PANETTA: Yeah. We had a classic problem at Mycogen. As I said, Mycogen was an agricultural biotech company located in the heart of the biotech cluster here. The difference, of course, with Mycogen was we were working with seeds and plant and crops and things like that. We needed a research greenhouse back in the early-nineties, and we wanted to put the research greenhouse right out behind the laboratory at Mycogen.

I went to the city with a permit application to construct a greenhouse, and the city permitting department responded we could not build a greenhouse. Because you can only build greenhouses in zones, and areas that are zoned for agriculture. This was zoned for laboratory research.

We said, "No, but it's a laboratory research greenhouse."

They didn't understand what that meant. They'd never seen anything like that before. We eventually got it approved, but it took a long time before the city kind of came around and began to work more with us. We would go down and make presentations and sit around the table with Mayor Golding with all of our biotech executives to inform her more about what was happening in the industry here.

Our county Board of Supervisors was also very engaged in wanting to understand what we would need to be able to grow here. **<T: 85 min>** Basic stuff like when I was running the facilities group at Mycogen, they came to me one day, and they said, "We can't get our laboratory approved by the fire warden because we've got too many chemicals. The city only allows a certain number of chemicals in a laboratory."

I said, "Well, what do you mean?"

They said, "Well they're more focused on fifty-five-gallon drums than pint bottles, and you know, we've got one hundred pint bottles instead of five fifty-five-gallon drums, and they don't know how to deal with that."

So we had to change basic stuff like that. I think the good thing is that all of our mayors from Susan Golding to Dick [Richard] Murphy to Jerry [Gerald R.] Sanders even Bob [E.] Filner for the time that he was mayor, and now Kevin [L.] Faulconer has just been fantastic. Have been our partners in ensuring that we've got the kind of environment we need. One of the things I think that we could do better here, and I've talked to city government and county government more is to create more in the way of tax incentives and even possibly some investment in the biotech industry here.

County Pension Fund, for example is a very large and well-sustained pension fund that could invest in biotech very easily here, and it doesn't have to be in the most risky biotech either. I'd give them a good B+ or A-. Sacramento? We spend more time in Sacramento killing legislation that could potentially be harmful to us.

JONES: For example? And has this always been true?

PANETTA: Been true for as long as I can remember. Initiatives to require labeling of genetically-modified foods—

JONES: That doesn't really impact San Diego that much.

PANETTA: No, it doesn't, but it impacts the industry from the standpoint that it casts a negative shadow on biotech in general. We're all in the same pond. Legislation that is more focused on some of the environmental challenges around building biotech facilities making it more difficult to get approval to build manufacturing facilities here. At the same time, I think under this governor, in particular we've had at least one big success working with the legislature with him, that gives biotech companies an exemption from the state sales tax on the purchase of research and manufacturing equipment. For large companies that's a big help and even for some small companies.

But I think, Sacramento our local legislators and some of the folks up in the Bay Area, you know, the one hundred and twenty legislators in the assembly, in the Senate, a fraction of those folks work with us day in and day out and know us and understand the industry. A lot of them don't understand the value of the industry. We've, I think, made some headway with the governor's office relative to them gaining more of an appreciation of the value of the industry here, and the importance of the state investing in the industry here. Realize that you point to the stem cell initiative and three billion dollars. That wasn't an initiative of the legislature or the governor. That was a citizen's initiative. The voter's passed to fund stem cell research. My guess is we could never have gotten a legislature to pass something like that. But we should. When I started at Biocom in 1999 the US was it when it came to biotech. That's not true anymore. China's making huge investments in biotech, and we had for three years—Biocom had a program in China trying to look for opportunities to take advantage of the Chinese market.

We decided that protection wasn't there. That their regulatory approval process wasn't mature enough yet, and at the same time, that their business practices weren't well evolved yet. [laughter]

JONES: So, corruption problems?

PANETTA: Yeah, all kinds of things like that, just—

JONES: Wild West?

PANETTA: Wild West, yeah, But at the same time, they've thrown a lot of money at creating a biotech industry in China. We're other areas **<T: 90 min>** that are becoming competitive. Japan under Prime Minister [Shinzo] Abe has made biotech a priority in Japan as well. Things are beginning to happen in some places in Europe. We spend a lot of time in Southern France looking at what's happening with their biotech industry there.

JONES: Southern France?

PANETTA: Southern France, believe it. Marseille, [France,] Nice, [France].

JONES: Really?

PANETTA: Yeah.

JONES: I hadn't heard that before.

PANETTA: It's—

JONES: What's going on?

PANETTA: There's a lot of investment being made, and especially in the Marseille area in companies in immunology and cancer diagnostics in cancer for the most part. And some of those are becoming pretty successful companies.

JONES: They're into that?

PANETTA: Yeah, it's not just a nice place to go on a visit. But you know, I say to people all the time, "I don't need to go to Southern France to experience nice weather and the ocean. We've got it here." There's a lot of competition that we're beginning to see that's cropping up, yeah.

JONES: So, this is something when you started here, that wasn't so much—

PANETTA: No.

JONES: But now, yeah, okay.

PANETTA: Yep, we're seeing it a lot more. I think we also have to appreciate the fact that Massachusetts has made a huge effort in the last few years to attract companies, and talent to Massachusetts. We can't take for granted the fact that we've got the largest biotech industry in the country and in the world in California because other people are beginning to grow their industries and attract companies and people from here. I think the state—I would say that I'd give the state probably a B- in biotech. I think there's a lot of work to be done there
.

JONES: You've been steering the ship here, for fifteen, sixteen years.

PANETTA: Yep.

JONES: I don't know how long you plan to carry on with it, but looking forward where is this going? What are the opportunities? What are the challenges? You know, what's—

PANETTA: We're in the middle of working with our members to create a five-year plan for life science in Southern California. It's our 2020 plan. In our twentieth year, we're working on our 2020 plan. That plan is going to be a lot different from other strategic plans that we've done here, and we've always from the day that I got here relied on our strategic planning process to help to direct us for where we want to be. We think that five years from now, San Diego can be the global capital for personalized medicine big data analytics in biotech, and digital and electronic health. Our strategic planning process is focused on how we continue to build the

infrastructure here at San Diego to get there in 2020, to be able to say in 2020, "We are the capital of personalized medicine." And we—

JONES: What do you need to do that?

PANETTA: We need to continue to grow the resources that we have here the companies like Illumina [Incorporated] that we need to keep here. We need to grow the fledgling companies that are being created in all those areas. The digital health companies, the big data companies. We need to continue to develop the talent base, the different talent base that goes into growing those companies. Then goes into the traditional biotech type of company that we've had here in the past. We need computer scientists, computer engineers, folks who understand the crossroads of electronics and computing and medical devices and therapeutics.

We need to bring that talent here more. We need to interface more with folks in Japan the Panasonics and Toshibas and Hitachis that are moving into that arena. And just as we brought the large pharma companies here, we need to bring the Toshibas and Panasonics to San Diego as well.

JONES: When you talk about opportunities in Japan, is this principally what you have in mind; this sort of future looking that this conversion stuff, IT?

PANETTA: Yeah, that's part of it. The other part of it is we brought on our first board member from Japan this past year. He runs a company called NF Corporation that's a high level electronics company that focuses on development equipment **<T: 95 min>** for laboratory testing. We just had a conversation with Takegawa Electric Company the other day that just recently created a life science division with some very high end imaging equipment, cellular imaging equipment that they've developed.

Part of it is the digital health side in Japan. Part of it is the regenerative medicine and biotech, and a big part of it is the fact that a lot of the electronics companies in Japan are moving into biotech more.

JONES: What's San Diego's competitive position? I mean, you're talking about personalized medicine and electronics, IT and so on. You have to compete with Silicon Valley and—

PANETTA: Well, and Silicon Valley, the Googles, and Yahoos, and Amazons are all creating life science businesses now.

JONES: Right.

PANETTA: Some of our companies actually have partnerships with Google's life science group. I think we have to also find ways to get them down here. The attractiveness, I think here versus places like the Bay Area and Boston is that through. . . no plan that we put together, we've got a successful telecommunications sector down here. We've got a successful electronics sector and we've got these areas of hi-tech that are beginning to converge with the biotech industry. The medical device cluster that we have that that other places don't have. I think there's an attractiveness here in the fact that we've got all of the basic elements that it takes to go forward to create the new era of personalized medicine and digital health that you don't have in other places.

JONES: The academic institutions, the research institutions locally are they assisting you with this? What's their role? Do they see a role for what they're doing fitting into this? I'm just thinking, I don't know if he's still there; Tom Paul, is he still at Scripps? He's like the personalized medicine guy.

PANETTA: He's kind of leading the charge on digital health as both a researcher and a spokesman. The reason that we moved into this new Biocom office that we're sitting in is that we wanted to be close to the research institutes and the university. Because we see a growing partnership between the industry, the research institutes, and the university. Perry Nisen, who has just come over in the last year to run the Sanford Burnham Prebys [Medical Discovery] Institute led their efforts at Glaxo to develop drugs around the world. His reason for being here is to do more to interface what's being done in research and development at the Sanford Burnham Institute with the industry here and hopefully to create more products. Salk [Institute for Biological Sciences] has a reputation, a long-time reputation, for scientists kind of having one foot within the Salk and one foot within industry. I think that—

JONES: More so than Scripps or UCSD?

PANETTA: Scripps. I'll talk about UCSD in a minute, but Scripps was also partnered with some specific companies, like Pfizer—

JONES: I remember that, yeah, yeah.

PANETTA: But I think for the future, Scripps is going to have to kind of figure out where it's going to go. UCSD is making a remarkable effort now under the current chancellor, Pradeep [K.] Khosla, the vice chancellor for research, Sandra [A.] Brown, some of the deans in the

School of Pharmaceutical Sciences and engineering and bioengineering to connect more with the local community. Part of UCSD's challenge has always been that they've had a very bureaucratic tech transfer office. So people don't tend to typically want to try to work with them because it's frustrating to do deals with them.

But they've just created a new position and associate vice chancellor for industry relations. One of his jobs is going to be to fix the tech transfer office. We're going to do everything we can to help to make that happen because UCSD is just **<T: 100 min>** a powerhouse of biomedical research that we could take more advantage of here if we had a closer relationship with them. That hasn't been the case in the past. The chancellor talks about how many biotech companies were created out of UCSD, and I think to a large extent, he's right. Scientists left UCSD and took their intellectual property and went and created biotech companies. [laughter]

We need to have that partnership between university and the industry and get beyond scientists leaving and starting companies, and I think we're going to begin to see that happen.

JONES: Yeah. They did have Connect, right? Wasn't it Connect was trying to do some of that bridging, weren't they?

PANETTA: Yeah, and Connect is getting back to its roots these days. Connect used to be a part of UCSD. Initially Connect's responsibility was to work with areas like tech transfer and scientists coming out of the university helping them to get their companies off the ground, understanding how to get funding and manage companies and things like that. About ten years ago, connect divested itself from the university, became and independent entity began to grow in other areas and create other programs.

JONES: What sort of stuff was going on?

PANETTA: Focusing on areas like began to focus on areas like trying to work more with the biotech industry where Connect's initial focus had been on the technology industries in San Diego. Beginning to—

JONES: That's because that was where Duane Roth was coming from?

PANETTA: Yeah. I don't fault Duane for it because that was Duane's background. Duane realized to build the kind of organization that he wanted to build, he would have to get it out of UCSD to get the kind of funding that he needed from folks like Qualcomm [Incorporated] and others. They created a Washington, DC office. That's great if you're Qualcomm and a couple of

other companies. Most three-person companies don't really need a Washington, DC office. I think Connect is just getting back to basics now under Greg [Gregory M.] McKee. I think Duane raised the image of San Diego and the image of Connect within the community, which was great. I think Connect is kind of retreating back in a positive way to working with the university, working with the Tech Transfer Office, and getting back to doing what it was originally created to do when Bill [William W.] Otterson created it.

JONES: Anything else we should know, Joe? Anything else we should cover as part of—this is your—

PANETTA: I don't think so. [laughter] I've been trying to think as we've gone along here what we've left out, but I think we've been pretty thorough. I just think when you think about where we've come from as an association, as a biotech cluster here. Where we are today and where we have the opportunity to be five years from now. I think we've come from relative obscurity to a high level of awareness of who we are to potentially five years from now, being the global leader. And not in the traditional way. If you look at all these surveys that come out year after year after year over, where's the largest biotech cluster? Which cluster has the greatest number of companies? Which cluster has the greatest number of employees? Which cluster has the highest amount of financing? That's the way that clusters have been ranked up to now. This cluster has the opportunity five years from now to be number one, not so much because it has more companies or more employees or more financing, but because it's moving in the direction of being at the forefront of biomedical research and development, commercialization with the powerhouse that we've got here of technologies. I'm thinking that five years from now, and I plan to be here five years from now because I want to see how this five-year strategic plan. I think five years from now we're going to be very pleasantly surprised with where San Diego sits versus where it's been in the past.

JONES: Okay, and we **<T: 105 min>** should come back in five years and just get your review of—

PANETTA: Absolutely, let's do it.

JONES: —of the strategic plan, and it's been a fun ride. I mean, it's a fascinating industry, right?

PANETTA: Thank you, yeah. Thanks, Mark. [. . .]

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[END OF INTERVIEW]