NORTHEASTERN SECTION,
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Small Chemical Business Symposium
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Because of my personal history, it is a special pleasure for me to speak at this meeting sponsored by the Small Chemical Business Section of the ACS on the day I am being honored for my 60 years' ACS membership and the day on which the Henry A. Hill Award will be given. I have a lot of personal history that relates directly to these three areas. I am tremendously impressed with the entrepreneurship infrastructure that has developed in the U.S. and is demonstrated at this conference – university courses on entrepreneurship, government aid, venture capital, angel investment groups, political clout, and an ACS Small Chemical Business Division and top management support of entrepreneurship.

None of this was available when I started my own company in 1961. I was by nature an entrepreneur but received little outside help. My company was self-funded for its first 20 years. At the beginning it only was my friends and family who recommended attorneys, accountants, and other professionals, but most of them had little or no high-tech experience. Small businesses then were just considered businesses that were not successful enough to be large. When I received my Ph.D at MIT in 1956, almost all of my friends in chemistry took jobs at giant chemical companies and didn't understand why I chose my first job with a small company that was then in the rapidly growing field of producing radio-isotopic chemicals. That company had received funding from the first and only U.S. venture capital organization then supporting high-tech, American Research and Development Company. But change was underway; the watershed event that made our nation aware of the role of small business, and especially its high-tech component, was the 1980 White House Conference on Small Business. My own detailed records of the evolution from these early days are now in eight linear feet of archives at the Chemical Heritage Foundation.

Today I am going to briefly describe three overlapping paths I have travelled down, which relate to my being here. They are my business and professional activities, my American Chemical Society activities, and my political and legislative activities.

Five years after receiving my Ph.D. I started Moleculon Research Corporation in Cambridge. I have always enjoyed the creative aspects of starting an organization and have been frustrated by the constraints of larger bureaucratic organizations. About a month after I started Moleculon, I met Henry Hill at an ACS meeting at a time, when he was considering starting Riverside Research Laboratories.

Henry Hill at MRC

Because we already had a facility and were beginning to attract a small staff, he joined with us, and about four years later moved out of Moleculon to his own facility in Haverhill. As an outgrowth of my previous employment, Moleculon became a military contractor working primarily on nuclear weapons effects and diagnostics using sophisticated chemical methods.

Before and after nuclear test - they survived perfectly from our standpoint

Here are photos of Henry Hill, myself and an Air Force Captain in a tunnel at the Nevada Test Site, a mile underground within Yucca Mountain.

By 1968, I wanted to see Moleculon move away from military contracts into non-military and commercial areas. The transition was difficult, but a few years later we had developed a unique polymer membrane involving nanotechnology, before that term existed. We looked at many potential applications for it and finally settled on the most attractive market being for controlled release drug delivery products. In 1982, we started a spin-off, Moleculon Bio-Tech, which specifically focused on the pharmaceutical market, especially developing transdermal patches. Two years later the spin-off went public. In 1987, we formed a strategic alliance with an Australian pharmaceutical company, and the following year they acquired 100% of the spin-off. The original company, Moleculon Research Corporation, ended up with no facilities or personnel, but it continues to exist as a holding company in my home.

A highly publicized side issue to our company's main business was when a Harvard Ph.D. chemist on our staff, Larry Nichols, constructed a puzzle which we patented in 1972, but

we could not find anyone in the puzzle or game business that wanted to market it. The puzzle was essentially Rubik's Cube, and our patent issued long before Rubik claims to have had the idea. However, the marketers of Rubik's Cube would not take a license on our patent, so we sued them. For seven years, we went through various levels of the Federal court system and eventually reached a partial settlement. I could spend the next hour providing you the fascinating details, but we don't have the time.

The highlights of my ACS involvement are as follows. In the late 1950s, I was chairman of the TV Committee of the Northeastern Section, which had a regular program on Channel 4 hosted by Isaac Asimov. As an outgrowth of this, he became a good friend until his premature death. In the late 1970s I helped Alexandra Melnyk start the Small Chemical Businesses Division. In 1982 I was chairman of the Northeastern Section, and three years later became chairman of the Board of Trustees. During this time Gus Esselen III indicated that he wanted to give an award in memory of his father. At my suggestion he agreed to provide the award for Chemistry in the Public Interest, which as you know, continues to this day. My only other significant ACS activity was initiating the Northeastern Section website in 1996.

My involvement in politics was minimal until 1968, when Salvadore Luria, the Nobel prize winning MIT biology professor encouraged some of us to support Gene McCarthy for President. I went to Chicago for the Democratic National Convention representing my brother's newspaper. The experience was so disturbing that it motivated me to become politically involved. My specific focus was to oppose our incumbent Democratic Congressman, who was vice chairman of the House Armed Services Committee and a hawk on the Vietnam War. Eventually I had the good fortune to propose and act as Treasurer for the winner in the next election, Father Robert Drinan, Dean of the Boston College Law School. Putting forth Father Drinan's name may have been my most creative accomplishment. Drinan remained our Congressman for ten years. During Father Drinan's initial campaign for Congress, I was asked to testify on the subject of economic conversion at Senator Kennedy's Subcommittee on the National Science Foundation. Economic conversion is basically how companies, how communities, and how the government can convert from a military to a civilian economy, and that is just the process Moleculon Research was engaged in at that time. During that time, I started or was active in a number of small professional organizations related to this field,

including the Association of Technical Professionals, the Federation of American Scientists, the Research Management Association, The American Association of Small Research Companies, and the Smaller Business Association of New England. Because of my technical and political experience, Senator McGovern asked me to join his speechwriting staff in his 1972 presidential campaign focusing on small business, technology, and economic conversion issue. For example, I remember prior to the election drafting his response to questions, which appeared in Chemical & Engineering News and elsewhere.

During this time, I maintained my good contacts with Senator Kennedy and especially his science policy staff member, who had been a classmate and friend of mine at Swarthmore College. The National Science Foundation, until that time, had considered itself a funder of only academic science, but Senator Kennedy recognized that good research sometimes also came from industry. In order to broaden the outreach of the National Science Foundation, he provided legislation that 12.5% of the funds under their Research Applied to National Needs Program go to businesses. As is typical of government agencies, NSF then disbanded that program and continued the activity under a new name, which would not be subject to the same restriction. Senator Kennedy's response was to require a much smaller percentage, one-half of one percent of the entire NSF budget, be directed to businesses. At that point, the NSF realized that they had to come up with a new program, which would allow them to segregate the business-oriented activity from the rest of NSF, and the result was the Small Business Innovation Research Program. When the first recipients were announced by NSF, one-third were California companies, one-third Massachusetts companies, and one-third to the rest of the country. Moleculon Research received two of the 31 initial Phase I grants which were then for only $25,000 each.

During the next six years, I testified at many Congressional hearings and spoke at conferences in support of the SBIR program. In 1979, the Small Business Administration, under Milton Stewart, established a priority to make the SBIR program government-wide, and at the1980 White House Conference on Small Business, we were able to get delegates to vote it, together with other high-tech legislation, to became one of their top priorities. The other legislation that was tied in with it had been introduced by Senators Birch Bayh and Robert Dole. It provides title for inventions arising from government grants and contracts to small businesses

and universities. I had also testified many times in support of the Bayh-Dole Patent Bill, which became law later that year.

However, there was considerable resistance by universities to having the SBIR Act become government-wide. Universities again saw this as infringing on their territory and didn't want someone else to get a piece of their pie. Senator Kennedy continued to be the prime mover in support of the SBIR program the Senate majority changed from Democratic to Republican, at which time he encouraged Republican Senator Warren Rudman of New Hampshire to take over the leadership role because a Republican would have more clout in getting legislation passed. Finally in 1982, after a long struggle, the SBIR Act became law for all government agencies. Here is a photo of Senator Kennedy, my wife and me at the bill signing ceremony at the White House Rose Garden.

President Reagan invited the key people on the various committees that reviewed and approved the legislation to stand with him during the signing ceremony, but he didn't invite Senator Kennedy. At the last minute, Senator Kennedy showed up and stood with the audience. Everyone in the audience knew that for a decade Senator Kennedy had been the guiding force behind the legislation and shook his hand rather than President Reagan or those standing with him.

The Bayh-Dole Patent Act, together with the SBIR Program, have had a profound effect, especially in the pharmaceutical industry. Prior to these laws, almost all pharmaceutical research

was done in the laboratories of the major pharmaceutical companies. Today, much of the best pharmaceutical research is done at universities and small businesses, frequently under government grants because they retain title to patents, which potentially can have great commercial value. Then often a small business is started or expanded using SBIR funds to demonstrate the feasibility of the research. If the patented research shows enough promise, large pharma will buy a license, the patents or the company and conduct the expensive clinical testing prior to market introduction.

In summary what I learned is that a scientist can have many opportunities to do a lot of exciting, important and creative work outside of the lab.