

HENRY HILL

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History of Chemistry Div.

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In February 1961, when I was 29 years old and leaving the monthly meeting of the Northeastern Section of the American Chemical Society, I saw Henry Hill, and told him that I had just started my own chemical research and development company and had rented 2400



square feet of laboratory and office space on the second floor of a building at Kendall Square, Cambridge. He indicated that he was leaving National Polychemicals, and also planned to start his own research and development company, which he was calling Riverside Research Laboratory. We recognized that our goals were similar and non-competitive. I asked him if he wanted to join me at Moleculon, and he responded affirmatively. Our close personal and professional relationship continued for the next three or four years.

For almost the entire first year, our income was negligible, and neither of us received any salary. I was paying for all the laboratory and administrative costs and those of a secretary/administrative assistant, and an occasional chemist. Our bookkeeping was from a single checkbook. Previously, I had purchased at auction for \$25 a whole stockroom of about 1000 chemical reagents from a commercial analytical laboratory that had gone out of business, and kept them in the garage of a friend until I had my own lab space. My initial interest was in heat resistant polybenzamidizoles for missile heat shields, and my first experiments were in the kitchenette of my bachelor apartment. Our laboratory space had formerly been occupied by a paint manufacturing company, and adjacent to our building was a giant coal pile used by Cambridge Gas & Electric Co. Not infrequently we would have to clean surfaces from coal dust and paint pigments. The building itself was erected in 1862 on a pier which extended out into the Charles River, but much of the land had been filled in, and now it was on Main Street about 100 yards from the Charles River and 100 yards from Kendall Square right where the subway comes out from underground.

Until we received our first contract, we built no walls within our facility, and the separation of office from laboratory area was provided only by metal shelves erected by Henry's young son, Tony. They were filled with Henry's extensive collection of bound volumes of Chemical Abstracts and Journal of the American Chemical Society, Henry's proudest possession. Shortly thereafter, Daggett Chocolate Factory, which was located on the other side of Kendall Square, went out of business, and we purchased at auction their stone lab benches and fume hoods. They were more than adequate for a number of years, but during the first six months, the fume hoods smelled from chocolate. Without walls neither Henry nor I had much privacy.



Henry was ambitious but respectful. He was outgoing and had a positive attitude toward life. His professional, business and personal connections were very important to him, and he wanted to be respected and accepted by a predominantly white community. Henry was a good negotiator and knowledgeable businessman. Previously he had gained broad experience not only in research but also in building a chemical plant, overseeing operations and selling products to the polymer industry. Finally he decided he had the necessary experience to build his own company rather than work for someone else. During our first year together he did some consulting related to his previous work at National Polychemicals on blowing agents. These were principally azo compounds that give off nitrogen on heating and were added to polymers to produce foams.

Above all, however, Henry was a professional in the true sense of the word. He was concerned with responsibilities of chemists to society, to their employers, and to their peers. He wanted to see chemists recognized as true professionals and not just as employees or tradespeople. It was primarily as a result of this dedication to professionalism that he became increasingly active in the American Chemical Society. He also spent considerable time building relationships within the chemical profession eventually leading to his election two years later as chairman of the Northeastern Section of the ACS.

He lived in large stately Victorian house on Riverside Street in a neighborhood of smaller houses in Watertown, not far from where the shoot-out ending the Marathon bomber's escape took place. His wife, Adelaide was a Harvard Ph.D. sociologist who taught at Boston University and was from an elite black family. Sen. Ed Brooke was her first cousin, and her parents and grandfather were professors. He was always well aware that he did not have the

same cultural and professional family background as his wife. When my wife and I had dinner at the Hill home, he did most of the cooking. I specifically remember how he would use a laboratory separatory funnel to efficiently remove the oil phase of gravy from the water phase because he was concerned with reducing the fat in his diet. Unfortunately, his concern was justified, since he died at 63 from a heart attack.

Henry did his undergraduate work at Johnson C. Smith University, a highly regarded black university founded in Charlotte, North Carolina in 1867. He then wanted to go to MIT and had good enough grades and recommendations. However, when he initially applied, he was rejected, but chemistry Prof. James Flack Norris of MIT was concerned about the prejudice against Henry. Norris had been president of the ACS and was able to put enough pressure on the MIT decision-makers so that they admitted Henry to the graduate program the following year. Henry was eternally grateful to James Flack Norris. When the Norris Award for the Teaching of Chemistry given yearly by the Northeastern Section of the ACS had excess funds, Henry made the personal effort to have the national ACS initiate a regular James Flack Norris Award in Physical Organic Chemistry.

In 1961 Arthur C. Cope, another chairman of the MIT Chemistry Department (who was on my thesis committee and a personal advisor) also became president of the ACS. He was a very talented and strong leader, but antagonized some faculty members resulting in his losing his job as department chairman. Henry Hill reacted with one of his common expressions, "He who lives by the sword shall die by the sword." Henry's road to success was through positive connections with other professionals. He definitely felt that people who were overly aggressive would lose out in the end.

My two previous jobs were with small companies that had government contracts in the nuclear field. Because of this experience I also sought government contracts describing our professional staff as consisting of myself, Henry Hill, and some local post-docs, graduate students, and other chemists who expressed a willingness for me to use their name and to work for us part-time or more if we received funding from these contracts. I distinctly remember sometime later the site visit by someone from the National Institutes of Health. We brought in everybody we could find -- friends and people from neighboring businesses -- so that it would look like an active, busy laboratory. The visitor walked through the laboratory, glanced at the people, fortunately did not ask them any questions, and then sat down with Henry and me to discuss technical matters.

During the first year we were desperate enough so that we would accept income from almost any reputable source. I previously had had a lot of experience in working with radioactivity, and concluded early on that we needed to go through the long process to obtain a license for handling radiotracers on a laboratory scale. Tufts Dental School wanted to do some radiotracer research involving the saliva of dogs, but they did not have a license for laboratory use of radioactivity. They did not need any research help from us; only the occasional use of our facilities. I was going to let them use our facilities for a \$300 payment (equivalent to \$2400 today), but Henry encouraged me to set a price based on the value to them, since they appeared to have no realistic alternative. After expressing my concern that they would turn down too high a price, I deferred to Henry's more extensive business experience. I told them with a straightforward face that it would cost \$1500 (or equivalent to \$12,000 today), and they

immediately said “yes”. As a result I thought Henry was a negotiating genius. That represented most of our sales in the first year. In order to carry out their experiments each week they brought up to our lab in burlap bags what appeared to be dead dogs, but were only anesthetized, and injected them with radioisotopes. After taking saliva samples they would put the dogs back into their burlap bags and remove them.

Our major break came on December 12, 1961, when on the same day we received two government contracts, one from Air Force Cambridge Research Center for the synthesis and evaluation of benzamidazole derivatives for organic semiconductors. The other contract was from the Air Force Special Weapons Laboratory in Albuquerque, NM for the development of sophisticated, chemically-oriented technology for participation in an underground nuclear test at the Nevada Test Site. These contracts and follow-ons essentially provided full-time employment for Henry and me for a couple of years. Although his income during those years was almost entirely from Moleculon, he was fiercely independent and wanted to grow Riverside Research Laboratory. He did some research on fluorocarbons with a friend at the National Bureau of Standards and had good connections with the Quartermaster Lab in Natick, MA and the Boston Branch of the Office of Naval Research. He also carried out some studies on the synthesis of potential cancer chemotherapy drugs, and about the time he was leaving Moleculon he started on work related to consumer product safety.

The Air Force contract, which involved our participation in an underground nuclear test in Nevada had the code name, Marshmallow. It was a major test costing tens of millions of dollars, and took place in a tunnel over a mile within Yucca Mountain. (In recent years, there was extensive discussion about storing nuclear wastes under Yucca Mountain. I smile when I hear concern about contamination of the environment because I know that the interior of Yucca Mountain is already badly contaminated from the products of nuclear explosions.) Our experiments were very sophisticated, and they took place within 26 foot long, 2" diameter thick-walled steel pipes whose interiors were facing the nuclear device. We needed to design a structure to hold these steel pipes in perfect alignment and assemble it within the Yucca Mountain tunnel. Henry worked with a Boston area metal fabrication firm to build the ideal structure to meet our stringent requirements. Both of us, as well as some other Moleculon personnel, went to Nevada to assemble this structure. The Nevada Test Site entrance is 65 miles from Las Vegas, and after passing through security, it was another 40 miles to Area 12, where the test took place. We lived in trailers near the tunnel entrance, and worked in nearby sheds. There was a train that transported people and equipment on tracks for the one mile trip into the region where a variety of equipment was located.



Moleculon was by far the smallest company involved in this program. We were working with engineers from major defense contractors such as Lockheed, Sandia Corporation, and GE as well as Department of Defense and Energy technical personnel. In the next photo, you see Henry, Bruce Norcross, a Harvard post-doc, and myself cleaning the inside of pipes before they

are loaded and sent into the tunnel. We needed to meticulously clean the pipes so there would be no residual contamination inside, but it was difficult for us to convince the plumbers' union to allow us to do it. The following photo is of Henry and an Air Force captain and me attaching our equipment. Henry went back to Boston before the test took place, but I stayed on. The next photo is of our equipment installed prior to the explosion. The pipes had many donut ring-like explosive closures to seal off segments of the pipe in a small fraction of a second after the nuclear explosion. The white wires leading off from the pipes are electronic detonators. The last photo is our equipment before recovery after the nuclear explosion. The disarray was caused by



the explosive closures, which protected the pipe interiors from the ambient environment after the nuclear explosion. The region where the equipment was placed was not radioactive after the nuclear test because the tunnel was designed to close in on itself before radioactive gases and particulates could escape. However, recovery was carried out by people wearing self-contained respirators masks. Although this was hardly the environment in which most chemists work, when the pipe segments were brought back to Cambridge, we successfully carried out some complex, quantitative chemical experiments. They included a radiotracer experiment where we distinguished the fate of five differently emitting radioisotopes in the same sample. We also measured the kinetics of gaseous reactions and ultra high temperature polymer degradation.

Eventually Henry and I amicably parted ways. I wanted him to work full time for Moleculon, but he wanted to retain his independence with Riverside Research Laboratory. As his relocation announcement put it, Riverside was moving from the banks of the Charles River to the banks of the Merrimac River in Haverhill. Thereafter we remained friends, but maintained separate business activities.

The industrial chemical research world for small businesses has changed a lot since Henry and I got started. Then there were no angel investment groups, no small business incubators or accelerators, no public forums, no crowd sourcing and only one high tech venture capital investment company in the entire U.S. Patent title under government contracts stayed with the government and the Small Business Innovation Research program did not exist. It was much riskier to start a new chemical business then, and the time it took for each of us to get established was typical. Our mutual support during those early years allowed both of us to be successful.