CHEMICAL HERITAGE FOUNDATION

MILLARD G. GAMBLE

Transcript of an Interview
Conducted by

Arnold Thackray

in

Wilmington, Delaware

on

17 July 2002

(With Subsequent Corrections and Additions)

Millard Gamble

CHEMICAL HERITAGE FOUNDATION
315 Chestnut Street
Philadelphia, PA 19104

Oral History Program

RELEASE FORM

This document contains my understanding and agreement with the Chemical Heritage Foundation with respect to my participation in a tape-recorded interview conducted by Dr. Arnold Thackray on 17 July 2002. I have read the transcript supplied by the Chemical Heritage Foundation and returned it with my corrections and emendations.

1) The tapes and corrected transcript (collectively called the "Work") will be maintained by the Chemical Heritage Foundation and made available in accordance with general policies for research and other scholarly purposes.

2) I hereby grant, assign, and transfer to the Chemical Heritage Foundation 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 tape(s) heard by scholars approved by the Chemical Heritage Foundation subject to the restrictions listed below. The scholar pledges not to quote from, cite, or reproduce by any means this material except with the written permission of the Chemical Heritage Foundation.

4) I wish to place the following conditions that I have checked below upon the use of this interview. I understand that the Chemical Heritage Foundation will enforce my wishes until the time of my death, when any restriction will be removed.

a) ✓ No restriction for access.

b) _____ My permission required to quote, cite, or reproduce.

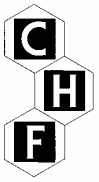
c) _____ My permission required for access to the entire document and all tapes.

This constitutes our entire and complete understanding.

(Signature) M Gamble

(Date) June 13 2003

Chemical Heritage Foundation
Oral History Program
315 Chestnut Street
Philadelphia, Pennsylvania 19106



MILLARD G. GAMBLE

1919 Born in Brooklyn, New York on 8 March

Education

1941 B.A., social science, Wesleyan University, Middletown, Connecticut

Professional Experience

United States Navy

1941-1945 Various positions. Resigned as Lieutenant Commander.

E.I. du Pont de Nemours and Company

1945 employee, Rayon Department
1946-1947 Rayon Filament Salesman, Charlotte, North Carolina
1948 Rayon Staple Salesman, Charlotte, North Carolina
1949 Northeast Sales Representative, Providence, Rhode Island
1950 Assistant Manager of Cordura® Rayon Industrial Yarn
1951-1952 Manager of Cordura® Rayon Industrial Yarn
1953 Manufacturing Supervisor in training, Seaford Nylon plant
1954 Assistant Sales Manager of Acetate, Wilmington, Delaware
1954 Assistant Sales Manager of Nylon, Wilmington, Delaware
1956-1959 Regional Sales Manager, Charlotte, North Carolina
1959-1961 Director, Industrial Marketing Division
1961 Director, Marketing Services for Apparel and Home Furnishings
1962-1965 Assistant Director, Marketing Divisions
1965-1969 General Director of Marketing, Textile Fibers Department
1969-1972 Director, Spunbonded Products, Nomex® Division
1972 General Director, Marketing Divisions
1973-1983 Assistant General Manager, Textile Fibers Department
1983-1984 Vice President, Textile Fibers Department

Honors

Member and former President, Board of Governors, Wilmington Club
Member and former President, Board of Directors, Wilmington Country Club
1986 Elected Trustee, Winterthur Museum, Garden & Library

1991	Elected Vice Chairman, Board of Trustees, Winterthur Museum, Garden & Library
2001	Elected Honorary Trustee, Winterthur Museum, Garden & Library

ABSTRACT

Millard G. Gamble capped his thirty-nine year career in sales and marketing of fibers at E.I. du Pont de Nemours and Company as the vice president of the Textile Fibers Department. Gamble begins the interview by discussing his family life and education as an undergraduate at Wesleyan University. He talks about his post-graduation experiences working for the United States Department of Agriculture and as an officer with the United States Navy. Gamble reflects on joining Du Pont in 1945 and his sales experience in the Rayon [later named Textile Fibers] Department. Gamble was moved to various marketing and manufacturing jobs before becoming the director of the industrial marketing division and eventually the general director of marketing divisions. He elaborates on a number of contributions that the Textile Fibers Department made to the Du Pont Company and discusses the development of various fibers. He also talks about the influence of several leaders in the Textile Fibers Department. Gamble's final years at Du Pont were spent as the general manager for textile fibers, where he was responsible for developing worldwide apparel and home fabrics. He became the vice president of the Textile Fibers Department in 1983 and then retired in 1984.

INTERVIEWER

Arnold Thackray is president of the Chemical Heritage Foundation. He majored in the physical sciences before turning to the history of science, receiving a Ph.D. from Cambridge University in 1966. He has held appointments at Oxford, Cambridge, Harvard, the Institute for Advanced Study, the Center for Advanced Study in the Behavioral Sciences, and the Hebrew University of Jerusalem. In 1983 he received the Dexter Award from the American Chemical Society for outstanding contributions to the history of chemistry. He served on the faculty of the University of Pennsylvania for more than a quarter of a century. There, he was the founding chairman of the Department of History and Sociology of Science, where he is the Joseph Priestley Professor Emeritus.

TABLE OF CONTENTS

I was born 8 March 1919 in Brooklyn, New York, the son of a then naval officer. I spent fifteen years in Westfield, New Jersey, graduating from Westfield High School in 1937. I had two siblings, a brother four years younger than I was who died very tragically when he was about ten or eleven. He fell out of a tree and contracted bone cancer, which spread to his bloodstream and killed him. I also had a sister who was seven years younger. That was the extent of our family. My mother was an artist and my father, when he got out of the [United States] Navy, went to work for the marine department of Standard Oil Company [in New Jersey], which is now Exxon Mobil [Corporation].

We lived in Westfield because it had top-notch public schools and was a wonderful town within easy commuting distance to New York. The school system was unique and no one went to prep school unless they had a problem. From our high school class, my wife and two others went to Wellesley [College]. I went to the Naval Academy, but was only there two days when they flunked me out on a new test that was supposed to predict how eyes would hold up after four years of engineering studies. They said mine would become bad and flunked me. I appealed and lost, but the ruling was repealed when World War II started because the navy didn't care too much at that time whether you wore glasses on or not on the ship's bridge. Now out of the college of my choice, I had to go hunting for another. As I had been a fairly decent student in Westfield High School, I was accepted at Princeton [University], Dartmouth [College], Wesleyan [University], and everywhere I applied, but the admissions offices said that there were no rooms. "Well," I said, "I know I can find a room." I went door to door and I couldn't get a room in Princeton, or in Hanover, New Hampshire, or Middletown, Connecticut. Finally, the director of admissions at Wesleyan said, "I will take care of you even if I have to put you up in my house. I want you to come here." Finally, he squeezed four of us into a room, and although the first year was uncomfortable, I was very happy there. It was a great school. I graduated in 1941 with a B.A. in social science. I attribute a lot of the good things that happened there to the Westfield, New Jersey, schools and to one Wesleyan professor.

Looking back it was probably lucky I didn't have to face the Naval Academy and an engineering education because I sensed I was no engineer and about the dumbest guy that ever lived mechanically. I was not scientific, basically, and in high school the little chemistry and physics I had I hated. At Wesleyan I really didn't know what I was going to major in for a long time, but a fantastic professor changed me. He was Sigmund Neumann, a German Jew who, had escaped from [Adolf] Hitler and taught all kinds of subjects that opened my mind to studies that I didn't think I'd be interested in. The degree you received, if you majored in his department, was social science. The topics varied from philosophy to the economic history of Europe, to European political history.

As graduation approached in 1941, it was obvious that jobs were very scarce. Early that year, I learned that the U.S. government had started a program in 1939 to lure top-flight college students into the U.S. government. One of the first U.S. departments of the federal government volunteering to aid in meeting this objective was the Department of Agriculture, which had one new division whose purpose was to dispose of surplus foods created by the many agricultural subsidies. This new division, The Surplus Marketing Administration, became the guinea pig. In 1940, it first hired about fifty college students from all over the United States who had been top students in their schools, and in 1941, this was repeated. I was not in that category, but the fellow who was chosen from Wesleyan was one of my best friends. He'd been telling me about this program and had decided instead to go on to Harvard Business School. I said, "Would you mind if I try to work in on your spot?" And he said, "No, go for it." Well, at first I was told, "Oh, no. We have plenty of candidates." I said, "Well, I think I can meet your objectives and want it badly." I smelled a good job, so I was pushing hard and had to sell myself with a visit to their Washington, D.C. headquarters. Eventually, I was accepted. Immediately upon graduation, I was sent to San Francisco. The caliber of the other men hired was indeed top-flight. Although a government job sounds horrible to me today, in those days the associations and everything about the program was first-class. Upon reflection, this experience helped me in learning the importance of very capable people working together and getting along. You had to be adaptable for this work to be successful. Food was either given away to the needy or

distributed to public schools for a school lunch program. We were calling on every kind of school in California. We also visited small community welfare organizations to insure that they were aware of the program. That frequently led to participation in other parts of the surplus foods program, such as "direct distribution."

Calling on the schools was interesting because there was a wide difference between them. Therefore, it required varying approaches to convince them to become a part of the school lunch program. It was a selling job. After six months of valuable experience, half in the San Francisco area and half in the Los Angeles area, I suspected that war was coming. This assumption was based on my Wesleyan exposure to Sigmund Neumann's theories and I felt that I should be militarily involved in some fashion.

I didn't want to be drafted or to volunteer to become an enlisted man in the navy. If at all possible, I wanted to become a naval officer. One key reason that I hadn't married was that I didn't have any money. I knew that the salary for a naval officer was pretty good so I worked hard to try to get a commission. I thought my chances were fair, partially because of one and a half years in the Naval Reserve during high school, when I was seeking approval for the Naval Academy. I first decided Naval Intelligence was a possibility, so I applied there. I had to appear before a board of ten admirals, and they grilled me. I was obviously not equipped or experienced enough, but they said, "Look, we think you'd make a good naval officer. Apply in San Diego." So I did and was commissioned. It was a real miracle. I didn't have to go through any of the naval training schools or the equivalent of ROTC [Reserve Officers' Training Corps].

In late October 1941, I married my wife Gloria, whom I had dated through college. I reported for active duty 1 November 1941 and was assigned to the commandant's office at the Naval Operating Base, San Pedro, California. Pearl Harbor took place five weeks later. About that time, I was approached by a neighbor who was a naval squadron commander on an aircraft carrier, awaiting his assignment. He said, "Look, you're a DVS [Deck Volunteer Specialist] officer, you should try to become an AVS [Aviation Volunteer Specialist] officer." Because my

eyes were weak and I had never flown, this seemed to be a great option, as I was becoming interested in aviation. He said, "Switch to AVS and I'll take you out to the Pacific on an aircraft carrier." He took me flying and convinced me that the aviation end of the navy was the *crème de la crème*, with the best officers and career opportunities. So I applied for a transfer and was successful.

I then went out to the Pacific with the commander. We were assigned to a carrier that was a recently acquired converted oil tanker, purchased from the British. It was in the Southwest Pacific, and just before we got to it, it was sunk in a disastrous battle in early 1942. On top of Pearl Harbor, that was devastating. I was sent back to San Diego and then assigned to Washington, D.C. in the office of the chief of naval operations for air. I was put in a staff position. My immediate boss was Douglas Dillon, formerly of Dillon, Reed [& Co.], New York City, later to become secretary of the treasury under President [John F.] Kennedy. Our job was to insure that the fleet was supplied expeditiously with aircraft carriers, the best planes, plus well-trained pilots and crews for operations in the Atlantic and Pacific. We were also part of the War planning through the office of Admiral [Ernest J.] King, who was the commander in chief of the U.S. Navy.

My military career was amazing. I had so many lucky things happen that it was a most positive experience. The carrier being sunk without warning just prior to my boarding was one of about five episodes where, just by luck, I escaped death. I changed airplanes one time on the West Coast when I was flying out to Pearl Harbor and the one I got off crashed an hour later. I was traveling with a senior fellow officer who said, "What are we doing? We have high priority orders and we're heading out to the Pacific. Let's switch to a commercial airline in Los Angeles which we are entitled to." I tried to talk him out of it but didn't. We switched and arrived safely in San Francisco despite a serious thunderstorm. The plane we had just gotten off crashed. Later in the War, in the Pacific I had similar experiences.

One of the best parts of my Washington assignment was that, again, I was learning how to get things accomplished through others. There were many internal battles. For example, Artemis Gates, secretary of the navy, was always doing what he should have been as an administrator, trying to hold down costs, while we in operations were trying to win the War as fast as possible. Those two objectives conflicted in unimaginable ways. We were trying to get new carriers, squadrons, better aircraft, and wanted to move fast. So my job was to expedite the paperwork and red tape and obtain approvals. Usually the final step was for Admiral King to go to President [Franklin D.] Roosevelt to obtain his approval. So I was mixed up in staff work including lots of paperwork and getting line organization approvals.

Following the War, my arm was twisted to stay in the navy. They said, "You were dedicated to the Naval Academy, your father was a naval officer, you've done well and ought to stay in." However, I smelled bureaucracy of the highest order, which I disliked. In wartime, you could push bureaucracy aside a little, particularly in the area I was in. I said to myself that I wouldn't any more become a regular naval officer than fly to the moon and I didn't want any permanent part of regulation. That's why I was determined to get out of the navy. After four years of varied assignments in the Pacific and Washington, I resigned my commission and was released 15 November 1945—released early, partially because of my extra one and a half years of service in the Naval Reserve while in high school.

I left the navy as a lieutenant commander, a higher rank than my Naval Academy class, which made me feel pretty good. I was lucky, working for key people at the right time. I did well in the navy and was making an excellent salary. Changing to the E.I. du Pont de Nemours and Company meant a big cut. For example, I started in Du Pont approximately at two hundred fifty dollars per month, and my salary as a lieutenant commander was five hundred dollars per month.

My mother and father were divorced in the early 1930s. My father married again in the late 1930s and a third time in 1960. Through these marriages, I acquired a half brother who

graduated from Georgia Tech [Georgia Institute of Technology] and worked for the Du Pont Company. I also acquired, from a Swedish mother-in-law, a half sister Sonja, younger than my youngest.

My wife and I had two sons [Millard G. IV and Robert H.] and two daughters [Lynn H. and Joan F.]. None of them would consider a career in anything that looked like a big company. I think observing the kind of life their grandfather and I had in the trenches of large corporations seemed too encompassing for them. My oldest became a very successful entrepreneur in Florida and the younger is an environmentalist in the San Juan Islands in the state of Washington. This younger son is low-key where his older brother is a three-shift, seven-day guy.

My first daughter is five years younger than my younger son. She was born in January 1949 and today is a tenured college professor of anthropology and archeology at San Diego State University. My next daughter, eight years younger, lives in Rutland, Vermont. She's an officer in Central Vermont Public Service Corporation, the largest electric utility in that state.

My wife felt strongly about making the kids independent and they have certainly turned out that way. They're as different as night is from day and have all done well in their varied careers.

My older full sister was academically oriented and taught at a girls' boarding school, then earned her master's degree at Columbia. I introduced her at this time to another Du Pont salesman in New York and she ended up marrying him and has had a very fulfilling life.

Following World War II, I began to work for the Du Pont Company. It came about because another naval officer, who was a close friend, said to me one day in 1942, "What are you going to do after the War?" I said, "I have no idea, but if I'm alive, I've got to work. I have a family to support and very little money." By that time, I had two young sons. My friend said that he had been working for the last eight or nine years for the Du Pont Company in

Wilmington, Delaware, his home city, and urged me to consider working for Du Pont after the War. My reply was, "Well, frankly, I've barely heard of Wilmington, Delaware, and never the Du Pont Company." So he told me a little bit about the company and fortunately said, "I'm going to write to my boss and tell him about you;" suggesting that I contact him following the War. And so in September 1945 when I was considering various jobs, I did apply to Du Pont, and my match with them seemed good, so I did accept their offer.

I started to work 1 December 1945 in what was then called the Rayon Department, but later became the Textile Fibers Department. My first assignment was at the Spruance plant in Richmond, Virginia, where for three months I was in an orientation program in the rayon manufacturing operation. Cellulose film, viscose rayon for apparel, and a new rayon tire yarn were produced there. Following this introduction, I was sent to Wilmington for a four- or five-week orientation on the Du Pont Company and Fibers Department. In April 1946, I was assigned as a rayon filament salesman in the Charlotte, North Carolina, office. Two years later, I changed to selling rayon staple in the same office. For three years, I called on prospective customers in twelve states in the southeastern United States.

There was a change on 1 February 1949 when I became the northeast sales representative in Providence, Rhode Island, in charge of selling rayon staple in New England, New York, and Pennsylvania. In November 1950, I was transferred to Wilmington as assistant manager of Cordura® rayon industrial yarn for the rubber industry. I was made manager of that group in August 1951. In April 1953, I was moved to the Seaford Nylon plant as a manufacturing supervisor in training. In May 1954, I was promoted and moved back to Wilmington as assistant manager of acetate sales, and in December, I was made assistant manager of nylon sales. As background, the Textile Fiber Department was becoming very large within Du Pont. This was significant, because for many of the next several decades it composed about one-third of the company sales and one-half of the profits. However, when I joined in 1945, I would guess the Rayon Department [later changed to Textile Fibers] had only about 15 percent of company sales.

The economy, broadly, was expanding slowly at this point. But what really took off within Du Pont were fibers and their importance within the company. It was an age of unbelievable enthusiasm because of our fibers success and our accomplishments.

Fast growth meant frequent opportunities and the system paid off in its results. Those who were working like hell and doing a good job were moved around to check their adaptability in totally new environments. The men developed through this policy usually did handsomely career-wise.

When there was a really brilliant technical man, *á la* Bob [Robert C.] Forney, he didn't have to go through quite as many degrees of change. He was transferred from research into marketing, then moved several times into a variety of assignments, performing outstandingly in all of them. Somebody not as technically qualified, like myself, with just a B.A. and with zero technical knowledge, was tested in a wide variety of jobs. I was in and out of manufacturing twice and luckily passed muster. In my first assignment, when I had the manufacturing personnel and the research Ph.D.s reporting to me, I was able to adjust and learned to work well with both disciplines productively. The system of moving people around extensively worked well for the Fibers Department.

After almost ten years, in a wide variety of locations and responsibilities, I was promoted to assistant sales manager of acetate and then nylon. In March of 1956, I was promoted to the newly created post of regional sales manager in Charlotte, North Carolina, for all our department's products, then five fibers. This became my second tour of duty in Charlotte, each one for three-and-a-half years. This was the first time that the customers didn't have to deal with salesmen from the five different fiber sales organizations, with each salesman pushing his own product and somewhat downgrading the others. Now one organization sold all the fibers, so that a single authority could recommend the most appropriate end uses for each fiber.

I was promoted to the newly created job of director of the industrial marketing division on 1 September 1959. I was responsible for all sales and merchandising for the company fibers in industrial marketing. The major customers were the key rubber companies in Akron—Goodyear [Tire & Rubber Company], Firestone [Tire & Rubber Company] , [BF] Goodrich [Company], U.S. Rubber [Company], and General Tire [and Rubber Company]. I stayed in that business for several years and then in April of 1961 became director of all marketing services for apparel and home furnishings. This included all merchandising activities dealing with women's wear, men's wear, home furnishings, converter relations, the chain stores, retail store relations; plus all advertising and promotion. This division had only been in existence for a year or two, and at this point, it was primarily for apparel. It was an education for me to understand the importance of all the downstream manufacturers, because each had an important role in selling our converted products to the retail customer.

To be successful, you couldn't just sell your product to a customer and then assume everything would turn out right. Our fibers were wonderful if handled and processed properly, but specific quality standards must be adhered to. For example, synthetic fibers are not as versatile as cotton. You can make a cotton item that's poor in quality and it still does relatively well. But you make a Dacron® cotton item, or a nylon one, that isn't processed well, and the result is much poorer than with natural fibers. To make sure that products were being processed correctly, we had to get into the details of manufacturing men's wear, women's wear, et cetera and then follow the results right to the retail counter.

In March of 1962, I became assistant director of all the marketing divisions. That included everything—the regional sales, the merchandising, et cetera. Then, in January of 1969, a new Spunbonded Nomex® Division was formed to manage research, manufacturing and marketing activities for four new products—Nomex®, aramids, and three newly invented spunbonded sheet products: Reemay® polyester, Typar® polypropylene, and Tyvek® olefin. This was the first time management had placed all three disciplines—manufacturing, marketing, and research into the same division. A few years later, it was done for other businesses like

carpets. I was in the job for three years and then promoted to general director of marketing for Du Pont's Textile Fibers Department, which included all the fibers again, except Nomex® and the spunbondeds.

In early 1972, the general director of the marketing division died and I took his place. He happened to be the same man whom I'd known in the navy. A promotion followed, and I was made one of two assistant general managers of the Fibers Department in July of 1973. Bob Forney was the other assistant at that point, and that's when we grew to know each other well. I was in that job from 1973 until 1984 when I turned sixty-five and retired. By 1984, they had reclassified the job to vice president of the Textile Fibers Department.

My impressions of what Fibers contributed most to the Du Pont Company's success over my thirty-nine years experience are as follows: first, there was an all-encompassing integrity emphasized on my first day of work in December of 1945, when my top boss lectured to me that integrity, along with safety, always had top priority. Later, in my many varied assignments, this philosophy was constantly repeated. I soon realized that the whole Du Pont Company had the same emphasis.

Secondly, following nylon's success in the 1940s, the leaders of the Fibers Department management were outstanding. They had the vision, courage, and determination to back research and to launch, in the 1950s and 1960s, costly new fibers such as Orlon® filament and staple, Dacron® yarn and staple, nylon tire yarn and staple, Lycra® filament, Qiana® filament, Nomex® filament, Kevlar® filament, and Teflon® yarn. There was very little knowledge about these fibers and it took great guts to push them because huge sums of money were involved and the Du Pont Company took enormous risks in backing their ventures. There were some major disasters, such as the failure of Orlon® filament and then Qiana®, which had entailed very large investments in those years. Qiana®, an outstanding apparel fiber, was the most silk-like synthetic fiber ever made. The world's experts could not tell Qiana® from silk when it was in

its fabric form. It failed mainly because the cost of its raw materials was escalating more rapidly than nylon's or polyester's. It simply wasn't economically feasible.

To launch this product and others like it, one had to have a catalyst, a man who was loaded with conviction and courage. The Fibers leader we had in the 1940s, 1950s, and 1960s, who stuck his neck out and persuaded the executive committee to make huge investments, was our Fibers general manager, Andrew E. Buchanan. He was not well liked by many executive committee members who had been his peers and had been promoted but were irked by his air of superiority. It made for a difficult situation. Andy was an unusual individual. On a personal note, he was a renowned amateur magician, aircraft pilot, and sailor. In the late 1950s, he took over the departmental management, and kept it until he retired in the early part of the 1960s. Big investments and big risks were taken in that period, and the successes, fortunately, more than paid for the failures. Buchanan had the uncanny sense of the importance of timing versus competition. It was essential to be first to keep market share and profits high. That meant more risk, but Buchanan was unwavering in his beliefs. Other departments were jealous of Textile Fibers as we suddenly had become the golden-haired boys of the company. Buchanan was a hard-driving, brilliant, and fearless leader. Most Du Pont managers trembled when scrutinized by the executive or finance committees, but Buchanan was never in awe of them, and his batting average of approvals was very high. In my opinion, he was one of the strongest men in the Du Pont Company.

There were approximately ten or eleven other departments in Du Pont. Explosives, Dyes and Finishes, and Plastics were large ones, and the others were Paints, Photo Products, Pigments, Agricultural Chemicals, Biochemicals, Elastomers, Film, et cetera. As the Explosives business declined, the department evolved into Petrochemicals. It manufactured many of the ingredients that Textile Fibers used and we grew together.

Interestingly, the Film Department was a spin-off from Fibers. In the late 1940s, it became obvious that both fibers and film were going to be much bigger businesses than

originally believed. Our leaders could also envision other fibers emanating from the [Wallace H.] Carothers' polymer research work and at the same time management forecast the film business being greatly expanded.

All the Du Pont departments competed with each other for investment dollars. Many of them were upset with Fibers because we seemed to be obtaining more than our share and often achieving major success.

Increasing sophisticated marketing and merchandising was another contribution in the 1960s and 1970s. This compared with the relatively simple selling of the 1940s and earlier 1950s. The products were also simpler in those early decades because the manufacturing processes for rayon filament, staple, and tire yarn were much less complicated than for nylon, which was the only pure synthetic in large production. Our competition was also quite different in those early decades. The strongest competitor we had in the 1940s and 1950s was the American Viscose Company that disappeared, as rayon did, in the 1960s. In the next two decades we had stronger companies like Chemstrand [Company], American Enka [Company], Celanese [Corporation of America] , Hoechst [AG], ICI [Imperial Chemical Industries, plc], Bayer [AG], as well as a sophisticated American Cotton Council. Overall, the textile business became much more sophisticated in the decades after the 1950s.

In the 1940s and 1950s, we concentrated on selling our fibers to our customers. It was a relatively simple transaction. Then, in the 1960s and 1970s, it became more complicated. As another example, the wash and wear concept gained momentum in the 1950s. It was then that the blend level battles began. The problem started with a few unscrupulous customers manufacturing 5 and 10 percent Dacron® cotton blends only to take advantage of the Dacron® name but falsely promising better performance all the way to the retail trade. Legally, Du Pont could not dictate to our customers how to process our products, yet we had to persuade the better fabric manufacturers to use at least about 65 percent Dacron®, particularly in the lighter weights such as broadcloths and batistes. In heavier fabrics, it wasn't necessary to have a much higher

percentage than 50 percent to live up to customers' expectations. Unfortunately, there isn't any scientific way of gauging exactly which blend level is right, because it depends on so many other factors—the number of ends and picks in wovens, the dyeing and finishing, and so on. Therefore, in general, one has to look at the blend levels based on fabric weight, et cetera. For example, the lighter the weight, the higher percent of Dacron® was required. Some of our major customers like [William A.] Klopman of Klopman Mills felt strongly that 65 percent Dacron® was the minimum and even pushed 80 percent Dacron®, 20 percent cotton, but other loyal ones didn't agree. This created bitter fights between Du Pont and its best customers. The quality issue in wovens even spread to the number of ends and picks in certain woven fabrics.

For example, there was a bitter one-year battle over fifty-six pick poplins. Many customers felt that fifty-six picks was enough for quality and others thought sixty was necessary. These were all quality issues that were magnified as customers merchandized their fabrics downstream through apparel manufacturers to retail customers. Starting in the mid-1970s, I started doing my own laundry to make my own judgments on these various issues. I'm still doing it today, to my wife's delight.

My quality examples have concentrated on blend levels and fabric manufacturers, but there were also quality problems through three additional operations downstream to the consumer. These included yarn preparation; degree of texturing or twist that is put in the yarn before it's woven or knit. Lesser amounts of either can ruin a fabric. There is also dyeing and finishing where using a less costly process will affect the performance of the final product. Sewing is the third operation, including the thread quality and how it's sewn.

These same principles are also true in home furnishings such as draperies, beddings, upholsteries, and carpets. As mentioned earlier, all of Du Pont's fibers are wonderful, if at all stages everything is processed correctly. But if it isn't, wool, cotton, or silk are much more forgiving in fabrics, giving these natural fibers the edge if corners and costs are cut. The Fibers Department provided incentives downstream to try and keep all participants doing the right

thing. Usually these incentives were in the form of advertising and promotion, and sometimes at retail level, providing clerical training.

A natural question is: why is it necessary to have so many separate functional steps independent of each other? Why can't they be combined or forward integrated, which would seem to be less costly and simpler? Many companies have tried to forward integrate to varying degrees and have usually failed. An exception would be occasionally combining two operations like weaving and knitting with dyeing and finishing.

One famous example that interested me because the leader, Royal Little, who went all out in his attempt, lived across the street from me in Providence, Rhode Island. His company, Textron, made its try in 1950. Sadly, the massive and thorough attempt ended relatively quickly in huge losses. Textron not only wove and knit fabric and then dyed and finished it, but followed by manufacturing garments and home furnishings; and then retailing them in a large Textron store on Fifth Avenue in New York City. All the garments and home furnishings sold were completely manufactured by Textron, but it was a disastrous failure. I talked to Roy Little afterward; in fact, by chance I flew down to New York from Providence the day that Textron was going to shut the whole system down. Little told me what he was going to do, and I asked him, "What went wrong, because it makes so much sense on the surface?" He said, "It's really the speed of the fashion industry changes that controls the success of the business." Textron couldn't keep sufficiently abreast of the color and fashion style changes quickly enough for their manufacturing and retail merchandising.

However, forward integration has remained a lure that's still out there today. Du Pont even tried it after I retired, and I was very disturbed when I heard about it. They carried out some garment manufacturing in Mexico and that failed, but not being around I don't know the whole story. It's always fascinated me that forward integration doesn't seem to work. In less free-market countries, where rapid fashion changes are not the norm, perhaps there is more chance of success.

The question is asked why did I, and many others, spend our total careers in the Textile Fibers Department and not get transferred to other Du Pont endeavors. There were more transfers within the company broadly, and the fact that our top managers weren't as cooperative in this area was one of the things that upset the other departments. Many of our general managers wouldn't let our people go. I think the Executive Committee may not have enforced broadening Fibers' personnel to other departments because of the textile industry's breadth and uniqueness. As time went on, there was more transferring at higher levels. For example, when there was an assistant general manager of the Fibers Department with potential, the company might move him to another department, possibly as head of it. Employees would also leave Fibers at a high level to manage the company's Planning Division. There were several instances of that. We also had people transferred in to Fibers at various points in time. It was very interesting that with one or two exceptions—Dave Barnes being the best example—the transfers in from the other departments who had been quite successful there, didn't look as good in Fibers. The reason, I think, was that they were not as well trained and tested. They hadn't been moved around to the degree that our people had. Fibers' policies developed leaders for the future.

These personnel development practices were ingrained into our people. Our leaders and personnel directors had been trained to move people around to find the best leaders of the future. Each transfer was a test in adaptability and breadth. When I was moved from Providence, Rhode Island, to be assistant manager of tire yarn sales, my boss was Pierre S. du Pont III, ten years my senior, the father of the future governor of Delaware. He kept meticulous records of all family members working in the Du Pont Company. He had a book on them that he showed to me. He had their ages and data on their performance and how much varied experience they had. So I know that from a du Pont family and as well as a company standpoint, this movement was an approved policy. In fact, Pete du Pont himself was an example. Shortly after I arrived, he was moved to the Elastomers Department and then he later became secretary of the Du Pont Company.

Another contribution that Fibers made to the company was within marketing. Their great success was in building very close relationships and extreme loyalty with our customers. They took major risks in manufacturing our products and then promoting them to the consumer. Frequently these customers refused to lower quality with our fibers, despite financial incentive to do otherwise. Many refused to buy any competing products, an almost unheard of practice.

Examples of these types of customers were Vanity Fair [Company], Klopman, Milliken [& Company], Goodyear, Dixie [Yarns Inc.], Davenport Hosiery [Mill], West Point, [B.F.] Shaw [Company], H.D. Lee [Company], Malden Mills [Company], et cetera. That's just a handful of them. High priority was placed in nurturing these close relationships.

Important to the company was marketing management's appreciation, early on, for the necessity of merchandising through the distribution chain to the retail consumer, not just selling to our direct customers. A large marketing service organization in the new Merchandising Division was created. As mentioned earlier, it had groups for men's wear, women's wear, home furnishings, converter relations, retail, plus advertising and promotion. Normal salesmanship had become a complex, sophisticated, and broad marketing task. It wasn't just pure selling anymore.

Another major contribution is that Fibers extended the success of our products in apparel to many diverse end uses such as tires, belting, hose, carpets and rugs, bedding and pillows, automobile upholstery, medical, et cetera. Our products were found in just about every end use imaginable.

The recognition that there was a necessity for a textile research organization to advise which fibers were best for specific end uses was another big contribution. It first became necessary when we initiated five-fiber selling. We had to learn quickly first hand by our own experiments and simulation of processing problems, what our customers were to experience in

completing successful marketing to the final consumer. We had to avoid downstream problems that could be disruptive and time consuming, and we had to be positive that the final product would be useful and saleable.

Our research organization was also unique by working to try and invent totally new products—not just a new fiber or an offshoot of any existing products. Such inventions like the spunbondeds would keep Du Pont rising and successful. Our separate textile research organization was managed initially totally within the Research Division but it gradually leaked over to a degree into marketing and manufacturing.

As an example, nylon came straight from Central Research and Wallace Carothers' polymer work. This basic research led to new products like Dacron® and Orlon®, Nomex®, Lycra®, et cetera. Of course, at some point you start to run out of totally new fibers. The last one Textile Fibers came up with, that is increasingly successful, was Kevlar®. In recent decades, the invention of modifications of one of our existing products became all-important. It meant everything to keep the venture profitable and to keep the trade excited. We probably had hundreds of variations for each one of our fibers and this is still true today. The activity is basically carried out by Ph.D. chemists in the various Fibers research divisions.

Another Fibers contribution before my retirement in 1984 was continuing to be successful in developing our own backlog of people for promotion. This made Fibers recruitment much easier when going to a university like Purdue, where Howard Swank, Bob Forney, and many of our other leaders graduated; we had a fantastic story to sell. In fact, I suspect that many top candidates were chasing Du Pont. There was no other company that had that kind of success in the fibers field. There has been little change in management philosophy and strategy today. The Du Pont Company's last three CEOs [chief executive officers] were developed by the Textile Fibers Department and all grew up in the system I've outlined.

Although all three had strong personal feelings about Fibers, they could see that we were fighting a long-term and losing battle in the world market. This is 2002, but when I retired in 1984, and even in the late 1970s, we knew then that our competition in the future was China. It wasn't a Celanese, Monsanto [Company], Hoechst, Enka, or ICI, but the Chinese who were wise early on in getting into the technical side. They built fibers plants based on Du Pont's and our competition's technology. Their labor cost was virtually zero, and with their control worldwide of a high percentage of apparel making, it was apparent that they were the future and "when" was the only question. It was inevitable. So when Du Pont decided in 2002 to sell the business, it didn't surprise me at all. It's not that we were not still making money, but that profit was steadily declining. The company couldn't afford that.

Fibers made another important contribution to the corporation by providing outstanding corporate profits—for many years, 50 percent of the total earnings and about one third of the sales. This was true from the late 1960s into the early 1980s, when products like Lycra® established new standards of profitability.

From the company's origin in 1802, all the CEOs were from the du Pont family, but that ended after Lamont du Pont Copeland. Brel McCoy, who came out of Explosives, was the first non-family CEO. Irving [S.] Shapiro from the Legal Department followed, then Ed Jefferson, who had been very successful in Plastics, and next Dick [Richard E.] Heckert.

Ed [Edgar S.] Woolard [Jr.] was the first totally Fibers oriented head of the company [Woolard was CEO from 1987 to 1995]. Earlier, other Fibers directors reached the high level Executive Committee, but were runner-ups to the CEO job. Bob Forney was a very good example of this, along with Les Sinness and David Barnes.

Another Fibers contribution to the company was the consistent demonstration of its ability to stay ahead of competition and retain high market share. This required top fiber quality, reliable delivery, technical service, new fiber variations to keep the trade excited, processing

improvements, dependability, and integrity within the company. The trade realized that it could trust and depend on Du Pont, and appreciated that we also owned all the well-known trademark names. Because of our experiences with nylon, which had become a generic, we realized that to have a competitive edge, we had to have trademarks. These were not easy to come up with or agree upon and the number of conflicts was amazing. We missed our first opportunity with nylon but never missed again. Acrylic came next and as a result of experience, we had two or three trial names as trademark back-ups. Orlon® was finally settled upon. Then there was Dacron®, first named Amilar®; afterward Lycra®, and so on. The reason these trademarks were so important was to distinguish ourselves from generic competition, which usually quickly followed our lead. Now, as time has gone on, prices have become so important that the merchandising is not in the forefront as much as in the 1970s and 1980s. The trademarks, however, have kept their importance.

One of Fibers' greatest contributions to the Du Pont Company was our outstanding manufacturing success in producing consistently high quality products while simultaneously lowering costs and investment per pound—a truly great manufacturing achievement. At the same time, Fibers successfully avoided serious labor relation problems or work stoppages. Over many years, seemingly insurmountable processing problems were overcome with all our products, including the spunbondeds. In my experience, there were some days I felt that we couldn't continue using a process one day longer, and in the middle of the night, someone seemed to come up with an invention to pave a way around a serious dilemma. Manufacturing was not just dedicated to excellence and completing the job well and safely, but to quickly overcoming many small technical problems.

One might wonder what motivated these people. In the Fibers Department, I felt, we had an *esprit de corps* and the type of employee that in today's world seems to be rare. Everyone pulled together in an unusually healthy working climate. In a way, you can say it might have started with integrity, with a forthright and honest way of looking at things as the norm. Safety always remained a primary concern—very important when you're working with a great many

people, some in potentially dangerous situations. You didn't find slackers staying very long in Du Pont Fibers, particularly as we got into greater cost reduction, and more recently in the steady contraction of the number of employees. We had grown top-notch individuals of our own and policy originated, I think, with the du Pont family. It certainly believed in excellence and personally lived this way. There had been strong du Ponts going back to at least the 1920s with Pierre, Irenee, Lamont, Walter Carpenter, et cetera. This group set the stage.

It may be a prejudiced view, but I believe that the Fibers research talent, growing from Carothers' discoveries, was unusually creative, steadily producing a backlog of new fibers and variations. Because of our early successes, the entire textile trade, from direct customers down through retail, wanted to work with Du Pont Fibers because they had seen the steady stream of new creations emanating from our research. And our researchers kept inventing! Combined with our manufacturing team's success, a team was formed that customers wanted to work with. Furthermore, our marketing organization didn't let it down. Corporate Du Pont executives had faith in and support for Fibers that could be depended on throughout my career—with the good reason that we performed.

As touched on before, Fibers personnel policy was outstanding. We had excellent hiring practices and human relation's policies and there were always clear objectives laid out. It was easy for everyone to work together, knowing the same goals. I felt very lucky when I compared what I was hearing about other companies and throughout the trade to my own Du Pont experience. There was an uncanny ability to choose outstanding leaders for all levels, right up to the CEOs.

We provided industry leadership and some success in controlling textile industry imports, mostly of apparel, but also fibers and fabrics. The first significant increase in imports started in the 1960s, and by the mid-1970s, for us to compete at all we had to reduce costs drastically. This trend has never reversed.

To a degree, Fibers led the way in the early 1950s in having the courage and vision to tackle uncharted international waters with very large manufacturing investments and expensive marketing reorganization to try and repeat our U.S. successes. Our investments grew from Canada and Europe to South America, Mexico, the Far East, and Australia. In the last few decades, we had shifted the emphasis from independent ventures to cooperative ones, partnerships, technology sales, and so forth. That's the name of the game today—it's seldom to go it alone in any part of the world. This trend has magnified greatly since the mid-1970s.

When we started to expand in Europe, our customers were faced with pioneering with us in that marketplace. Fibers needed somebody we understood and trusted, who could be depended on to buy our product and merchandise it downstream. Fortunately, we persuaded Klopman, the largest division of Burlington Industries, to build a plant, first in Italy, and then in Ireland. Together we formed a close relationship with the large and successful retailer, Marks & Spencer [Ltd.] in Great Britain providing a great start.

I first became acquainted internationally in the early 1950s. I had one of the industrial marketing jobs at the time we decided to expand Ducilo [S.A. Productora de Rayon], our Fibers subsidiary in Argentina. I went to Buenos Aires to investigate a project we had for a high-tenacity rayon plant, which we did go ahead with. Then, in the 1960s, we began to expand in Europe. Whether it was industrial, or on the apparel side, I frequently went over as part of a team and took part in the examination of everything from manufacturing in a specific area, to the potential market.

My most unique and testing international experience was in the early 1970s when we were out of oil. Our fibers plants were operating at only about 60 to 70 percent of capacity—devastating to earnings. Our Du Pont Purchasing Department couldn't avoid the cutbacks from Dow [Chemical Company] or any other supplier of petrochemicals. The overall problem was the serious national oil shortage and our fibers business played second fiddle. This was the beginning of a growing feeling that we had to get into the oil business. At that time, in the early

1970s, we started considering buying an oil company and looked at several. Suddenly, we were approached by the Iranians. If we would build an acrylic and polyester fiber plant for them in Iran, they would supply us with oil. So a deal was made—a partnership with individuals in Iran, but approved by the shah.

The plants were built and during this period, I went to Iran quite a few times. When the shah left, that was the end of that game.

We were quick on the draw when the shah lost control and the revolutionaries took over, to begin a battle to recover as much of our invested money as possible. We lucked out, because after we had pulled out our Iranian partners sought further help to expand the newly built plant. They needed credibility in the international fibers community, which Du Pont could give them. A joint Iran-United States Claims Tribunal was created in The Hague. After much tough negotiating, we fortunately recovered our 45 MM [million] equity, which in retrospect was a major success. However, our Iranian partnership was a very costly venture in more than just monetary ways. We found the Iranians impossible to deal with. One of the reasons is that over the centuries the Iranians have been taught, from a young age, never to tell the truth. The person that gets the blue ribbon is the one who can lie the most effectively. That is the way business was conducted. Once we learned this, dealing in Iran became easier. They, of course, were accusing us of lying all the time. This in essence killed the head of our Engineering Department, Bill Cooke, who was a Boy Scout type and took the accusations to heart. They would accuse him of untruths, and he would turn purple with rage, and the impossible situation (for him) caused his death from a stroke.

One of our most effective department leaders at the time was Howard Swank, whom I first met when I was being trained at the Spruance plant in Richmond, Virginia, in 1945. He was the process superintendent. Of many great men I became acquainted with, he was one of the more outstanding. I had never met anybody as sharp and quick at knowing answers to every dumb question our training group could ask. He would answer in the clearest and most succinct

way. As I later observed his career, he moved ahead consistently, but considering his talent, slowly. He was not a pusher. He accomplished many sound and great things for the company and for the department. He was probably the finest engineer of that era. Personally, he bought a motor home, which within two years he had dismantled and then put back together in a better way. Anything that went wrong in the mechanical line—in his house, his church, or a plant—Howard could decipher the problem and correct it. He was just brilliant mechanically.

Ed Woolard was another phenomenal performer of a different ilk. For example, two organizations that were the pride and heart of the Du Pont Company were the Executive and Finance Committees that Alfred [P.] Sloan had created. They were written up by the Harvard Business School, along with our department structures, as examples of a perfect organization for a large corporation. To reduce costs, Woolard did away with the two committees almost overnight and eliminated departments altogether. That move took big moxie. Woolard had the guts that Buchanan had shown in the 1950s and 1960s in commercializing our fibers. Woolard made his changes organizationally within the company—hard to imagine any employee having the courage to do that. He was standing up against the whole du Pont family, the Board, and other long time top executives. His moves turned out to be vitally necessary and most timely.

Jack [John A.] Krol moved on up behind Woolard [Krol was CEO from 1995 to 1998]. He was an example of a bright, hard-working executive who never hesitated to do what was asked despite personal sacrifices. He was our best "people person." I was involved when Fibers was considering hiring Jack. He had been in the navy working for Admiral [Hyman G.] Rickover, our top admiral in submarines. I was approached by a representative from Du Pont's personnel division who said, "Look, you had considerable naval experience. Please give us your advice. We've been interviewing a man named Jack Krol, a Tufts [University] engineering graduate who went into the navy early and ended up in the submarine division working for Admiral Rickover. Now Jack wants to leave the navy and work for a company like Du Pont. We have received a letter from Admiral Rickover saying, 'Don't hire him. He's no good, et cetera.'" I replied, "This is easy. You couldn't have a more positive recommendation.

Whatever you do, don't lose this man, because he is probably the most valuable officer Rickover ever had. Rickover doesn't want him to leave, so he's poisoning any offer." Well, Jack was hired, and from the beginning was transferred around in various marketing jobs. Along the way, somebody said he's got to have manufacturing experience. So he was offered a job in our Old Hickory, Tennessee, plant, in a supervisory role. In those days, there was a lot of excitement in marketing with many promotions, and Jack, who had been in Du Pont for about ten successful years, found the Old Hickory job offer naturally not appealing. But, in essence, Jack saluted and said, "Aye, aye, sir," and went to Old Hickory for three years.

I always think of Jack as being one of our most loyal soldiers, going through a broadening when he might have refused some of the assignments. He was a real company player, totally dependable, never letting the organization down.

There were some hot shots, very high IQ types, who constantly worried about their own personal progress, rather than the company's. They consistently turned down transfers like Jack's to Old Hickory, always demanding more money and faster advancement. In most cases they quit to go to what they thought were greener fields.

Jack's performance paid off. He became one of the best and most popular managers we ever had in the carpet business. He took my job as vice president of Fibers when I retired and gradually advanced to CEO, replacing Woolard.

Unfortunately, I have not known Chad [Charles O.] Holliday [Jr.] [Holliday became CEO in 1998] as well as the others, but early on he was a top flight Fibers manufacturing man, advancing rapidly at a young age. He was sent early in his career to the Far East, where he excelled over many years in various assignments, finally returning to the U.S. on a fast track.

As you can gather, I feel strongly about the significant and important contributions the Textile Fibers Department made to the total success of the Du Pont Company.

INDEX