Chapter Four

The University Years

After finishing high school, Athelstan entered the University of Capetown at the remarkably tender age of barely sixteen. He enrolled in the engineering curriculum, and studied mathematics, physics, chemistry and various engineering subjects.

Like most college students Athel had a car, a 1914 vintage Model-T Ford. The University was situated high on the side of the mountain overlooking Capetown, and his car was equipped with a simple gravity-feed tank that sat above the engine. When Athel traveled up a steep hill, the gravity feed wouldn't work. With his infinitely logical and practical mind, he promptly solved the problem the simplest way he could.

"Being a 'clever' inventor, I decided that I wasn't going to do anything about it at all—no fuel pumps or any of that nonsense. I simply drove to the bottom of the hill, turned the car around and backed it all the way up. The gravity feed worked beautifully in reverse. My maneuver became a performance—me backing up the hill daily to reach the University."

Athelstan enjoyed Capetown University, where he says he became acutely aware of the importance of excellent teachers. Although the school was not well funded by modern standards, academically, Athel found it excellent. The University's fiscal condition kept it from providing extensive laboratory and vocational facilities to students. Instead, Capetown made sure its students received an intensive grounding in fundamentals.

"I went through four normal years at Capetown University. Realizing student engineers needed practical experience, they insisted we find approved engineering jobs during our long summer vacations."

Many civil engineering graduates in Athel's day went into the South Africa Highway Department. Often, mechanical engineers were hired by railroads as apprentices. Electrical engineers went to work in the power stations. That was the conventional career plan for Capetown engineers, but as usual, Athelstan was an exception. He went to sea alone, because he felt the land was becoming overcrowded. These three themes are repeated throughout Athel's life - being apart from society, seeking new challenges, and the sea.

"I began at sea as an officer on the British ship Luxme of the Andrew Weir lines, based in Scotland. She was a vessel of opportunity that took coal from Natal and traded it for gunny sacks from Calcutta, as well as teak from Burma, and other cargoes as they came along. It was a great experience, although I doubt that it broadened my engineering knowledge. I did write a paper about maintaining diesels at sea, and was very proud of it.

It was my first publication and that is always a big thing."

The most impressive aspect of Athel's maritime experience was that he sailed almost everywhere in the world. His second seagoing experience was on German ships out of Bremen. His father had shipped his cargoes on these same lines.

Athel was a volunteer engineer and these ships were more comfortable than the first voyage he took to India, because there were passengers aboard. On this second trip, he went from Capetown through the Red Sea and the Mediterranean, then back down to Capetown along the west coast of Africa. By the age of seventeen, Athel had seen quite a lot of the world.

Athelstan graduated from Capetown University in 1931, and was runner-up for a Rhodes Scholarship. He was very disappointed when he was not chosen for that honor, but later, realized it was fortunate he did not end up going to Oxford, because at that time, it was not very strong in science.

Now that it was time to make a career choice he displayed the singular quality so common throughout his life. He always wanted to do different things, as well as to do things differently. Naturally, Karl Spilhaus wanted his son to stay in South Africa. But, Athel wanted to get into the aircraft business, which was just beginning to expand. He felt that because of Africa's vastness and because its roads were few and primitive, the continent could only be opened up by air. During this period, distance records were being set and broken almost daily. Sir Pierre van Ryneveldt, the "Flying Dutchman," had just made an extraordinary flight from Croydon [London] to Capetown. Later, he and Athel were to become good friends. Five or six years later, Imperial Airways was running their flying boats all the way to Capetown, and even landing on Lake Entebbe near Victoria, Nyanza in Uganda.

Because the aircraft industry was expanding rapidly, Athel, through his father's influence and connections, became a volunteer engineer at Junkers Flugzeugwerke in Germany. Around 1931, the world famous firm of Junkers made the best commercial planes in the world. They were curious looking and can be seen in vintage black and white movies. Junkers used corrugated aluminum for wing skins and fuselages, a design that gave planes great rigidity and strength.

At this time, Germany was still constrained by the Treaty of Versailles from building military aircraft. This was just before Hitler took power.

For Athel, his time at Junkers was a major learning experience, but the need for further education was brought home to him when he failed in his first endeavor for the Junkers factory. When he went to Germany, he stayed with the Weinlig family in Hamburg for a month to brush up on his German. Then, he was off to Dessau, which was very much a workman's town. Its one big industry was Junker's Aircraft Works, where, for the next six months, Athelstan worked as a volunteer engineer.

Margin quote:

"I don't know why I always chose to do things that were so far removed from friends and home. It wasn't that I was antisocial, but I just seemed to choose these curious opportunities——rather lonely things to do—like working at sea with people who spoke a foreign language, and now here I was in Germany."

In his own words, "I worked pretty hard at Junkers, learned a lot, and became thoroughly intrigued with aircraft. I was a mechanical engineer from Capetown, but aircraft had captured my interest. This led to my decision to study aerodynamics. That I chose not to go to graduate school immediately proved a good decision, since I had the opportunity to get fired up about something that interested me. People are lucky if they can do this rather than going straight into graduate school without having some practical experience that helps with their career decision.

"This flashes forward to my experience both in World War II, and after the Korean war. The students we got who had been to war, and then returned to college, were some of the best we had. They had learned by experience what they wanted to do, and were darned good workers. I have often thought how good that time was for me, and what a pity it is that apprenticeship, mainly as a result of union actions, has gone out. Now young people can't learn by doing. Again, the idiocy of mankind never fails to confound me."

In my apprenticeship at Junkers, I went all through the plant, starting in the sheet metal shop. Junkers was outstanding, and there was no denying the fact that German workmen of the 1930s were extremely skilled. Their sheet metal workers were so good they only drew the detailed drawings on one side of the plank, then the workmen made two panels. Any of them could make a mirror image of the drawing——but not this young apprentice. I was doing a kind of trapezoidal panel, and trying to recreate the mirror image from the drawing. It simply wasn't working, and my boss, an old German master craftsman came over to help me. After trying fruitlessly to get it to work for several minutes, he looked at me and said in German, "turn and twist as you will, your bottom is always behind you."

"The biggest job I was given at Junkers was to design a venturi, a device to suck foul gases from the toilet. There weren't too many toilets on airplanes in those days. Junkers was highly advanced in putting one in their newly designed airplane. I remembered from my time at sea the venturis that were called zaugerbrassen, the big horizontal tube going down to the galley or the engine room. These were turned into the wind, and as the wind blew through, the tube sucked out the hot gases from below. Of course, the wind speed on the ships was very low, and the venturis were very large, so, I just scaled down my design a bit for the airplane.

"On the test flight, a member of Junkers board of directors went along. He was a great, fat German, and was royally treated to sausages, sandwiches, and beer. After partaking generously of the fare, he requested to use that new innovation, the on-board toilet. He

closeted himself in the head, and after an inordinately long time, we began to hear shouts for help coming from the toilet. We were able to open the door only with great difficulty, whereupon we saw that suction had him glued to the seat. We had to slide him off the seat—I had over-designed the venturi. Only after I left Junkers to study aerodynamics at MIT did I learn that suction is proportional to the square of the velocity—the V2 Law.

"Junkers suggested I find employment elsewhere, which was fine with me since the political conditions in Germany were becoming very unsavory. Dessau was quite close to Berlin, and Hitler was gaining power in the surrounding towns. In 1932, he challenged Ernst Tharlman and von Hindenburg for Chancellor, but lost. Even though Hindenburg was elected, Hitler became a figurehead, and Nazism began to be noticeable in Dessau."

"I never knew much about the Nazis during the first months of my stay in Germany. I lived in a rooming house with another man who worked in Dessau, and I found him interesting intellectually. He read a great deal, loved music, and spoke German to me, so I was improving that language skill very rapidly. This was therefore, a pleasant enough situation for me.

"At about the same time, I made an acquaintanceship with a young German couple when I went into Berlin. He looked the "ideal" German-blond hair, blue eyes, all that stuff. I felt he was a perfectly nice fellow, until one day he said, "you really must move out of that room." When I asked why, he replied quite simply, "the man is a Jew."

"This was the first time I had paid attention to such things. I hadn't known my roommate was Jewish. It didn't matter to me, but I was still a young kid and naive about such matters.

"That's where being much younger than the crowd caused some disadvantages as well as advantages. I wasn't drawn into the conversation about, 'oh, geez, he's a kike, he's a wop, he's a nigger.' Even though I had finished college and was sophisticated in that sense, social and political prejudices had not been impressed upon me. Anyway, to my eternal shame, I moved out, and went to live in a little place by myself.

"Once I moved out, the people who had influenced me to do so began to open up, as they hadn't before. The "ideal" German told me about the meetings he attended. Hitler, apparently in 1932, began to infiltrate around Berlin. He was very successful, and the beginnings of his gangs, the Storm Troopers and the Brown Shirt Movement, were already well underway.

"I can't say that the Nazis were the main reason I left Germany, but that certainly contributed to it. My real reason was my desire to study aerodynamics. I must say, however, I was rather happy to leave. Even though I was unaware and unwise politically, I had an uncomfortable feeling just being there. I like beauty and peace, and Germany had become ugly.

"Gottingen in Germany, was the greatest aerodynamics school in the world, and I could have gone there if I'd wanted to, as well has having the opportunity to go to Cambridge, but once again, I chose a place I hadn't been—America. I decided once again to combine adventure and education, so I planned to enter MIT or Cal Tech. After looking at MIT catalogues I decided to go there, not even considering Cal Tech, because I didn't have enough money to cross the U.S.

"I think my mother liked the idea that I was eager to study. She wouldn't have dissuaded me, as long as I was learning, but my father was not so keen on the whole thing. He couldn't understand why I didn't come back to Africa and go into business with him. Fortunately, my parents never tried to choose my life for me to any great extent. Instead, they always tried to help me make my own decisions. I remained as financially independent as possible, but I needed a little help from time to time. Money didn't flow in too fast in those days.

"So, I left Junkers and decided to travel around Europe by bicycle before going to America. By this time, I could pass myself off as German, and as a youngster I was a good mountain climber, so this skill helped me earn my way around Europe. I went through Austria and down through the Dolomites, dressed in Lederhosen and looking very much the part of a mountain guide. I never let on I could understand English, which would have destroyed the foreign atmosphere for the English speaking tourists. So, for a week at a time, I earned a little money as a guide guiding people up rock falls which I had never climbed before. Then I was off to Venice and across to Milan where I met up with a friend of my father's who was a Reuter's representative.

"I went on up to Switzerland, sometimes putting the bicycle on the train. I bicycled down to Basel, where I got on a barge and worked my way down the Rhine to Holland. When I got to Rotterdam, I remembered a friend of my grandfather's named Willem de Sitter, who was the Astronomer Royal at the Leyden Observatory. He was the first man to use the occultation of Mercury to substantiate Einstein's Theory of Relativity early in 1919 . He was a scholarly fellow, and I had a great meeting with him.

Margin quote:

"Einstein had only one theory - one idea in his life" - Athelstan

Again, my bicycle went on the boat, and we crossed from the Hook of Holland to Harwich where I sold the bicycle, and got enough money for the train journey to Liverpool. I took steerage on a triple expansion British steamship, the Adriatic. Steerage as a class wouldn't be around for very much longer. You actually lived near the steering engine and ate very crude food. However, this didn't bother me. I found it interesting to experience the way immigrants came across to America many years before. So, off I went to America, and my future.

Chapter Five

The MIT years——1932-1936

For Athelstan this was an era of contact with some of the greatest minds in science and technology. These meetings further stimulated a mind already poised and eager to learn and experiment. His first inventions were appearing, as well as some of his first contacts with the worlds of industry and education.

"I landed thirteen days later at Atlantic Pier in Boston, bags in hand, and walked, as was my custom, straight to the Massachusetts Institute of Technology. On arriving, I proceeded to dump my bags outside of Dean Lobdell's office—he was the Dean of Admissions. This has become a famous story at MIT, or maybe they've forgotten it altogether! They used to tell me about it when I was on the corporation committees there.

"It was getting on to the start of the term, and I got in to see Dean Lobdell. First he said, "Do you have an application in?" I replied, "No, I wrote for a catalogue and just decided to come here." "You know," he remarked, looking me over, "We get a lot of applications, and we have to process them." I said, "Look, I've come all the way from South Africa." Dean Lobdell said, "Well, did you go to school? Which college?" I answered, "University of Capetown." "Never heard of it," he said. I'm reported to have replied: "You will."

"They were very decent about the irregularities and admitted me as a graduate student on probation, so if they found I needed to take undergraduate courses, I'd have to take them. Before long I wasn't just studying—I was working like a dog.

"At the University of Capetown I'd had professors I still remember—Alexander Ogg in physics, Sammy Skewes in mathematics, who had discovered the Skewes number which is the largest natural number that had ever appeared in a mathematical proof—great professors! At MIT this experience was multiplied. It was a pleasure to work very, very hard for these outstanding people.

"I started out in the dormitories and then one of the fraternities asked me to stay with them. I told them I couldn't afford to stay in a fraternity house, but they let me into the fraternity so I could eat there and I lived in a room across the street. They were very good to me. It wasn't solely that I couldn't afford to live there, since I could have had I wished; but I didn't think I'd get as much studying done as if I had a room of my own. I was really a student in those days.

"After six months, MIT gave me a small scholarship and they also admitted they'd heard of the University of Capetown. When I did well in math, one of the math professors said,

"Why didn't you tell me your grandfather was Sir Thomas Muir?"

"MIT, which is still, of course, a superb place, was really magnificent for me in my student days. One of my fondest memories was the mathematics course I had with Norbert Wiener, the originator of cybernetics. It so happened there were only three of us in Professor Wiener's class. He used to walk down the corridor and come in a door on the right. We would be sitting there, and he would take up the chalk and put his equations down from right to left and then, from left to right—no lost motion at all.

"Wiener's blackboard technique seemed curious at first, but then one suddenly realized that an equation had no preferred direction. Wiener's mathematics was very abstruse. Our little group in this math class included Charles Stark Draper, with whom I was sharing an apartment. Stark and I worked together on some of the first papers we wrote on gyroscopes, a topic he pursued throughout his career. He started the instrumentation labs at MIT, and devised the inertial guidance systems that got man to the moon and played a large part in modern aircraft navigation guidance.

"Stark was a great student, and he really had an influence on me. I was sort of a young playboy, but Stark kept disciplined hours. In hot weather, he'd wear nothing but his drawers and a green eyeshade while studying. When you roomed with such a fellow, you studied, too.

"The third member of our mathematics class, a fellow named Samuel Saslaw, was a brilliant mathematician who'd come to MIT from the poor Lower East Side of New York. Stark and I would invite him over for a good evening meal, prepared by Mr. Ed, an elderly black man who cooked our dinners. The three of us followed dinner with a review of Professor Wiener's lecture of the day. That way, we got it twice, and so the math stayed with us. Saslaw became head mathematician at the Naval Academy. When I gave a commencement address there in 1960, I ran into him for the first time since our MIT days.

"I really got excited about being a student at MIT and worked very hard, enjoying it thoroughly and enjoying the people with whom I worked. There was Manfred Rauscher, a young Swiss who taught me the first introductory course in theoretical aerodynamics, and professor Hurd Willett, who gave an absolutely excellent introductory course in meteorology. That got me interested in meteorology, which I went on to study after aerodynamics.

"I had never enjoyed chemistry very much because of the way it was taught at most schools, as a sort of cookbook chemistry. At MIT John Slater interested me in chemistry in a course he called Chemical Physics. Slater wrote the first book on chemical physics, where molecular structure and the reasons for chemical combinations were related to physics. He treated them not as separate disciplines, but as one subject. That was very memorable.

"Apart from working and studying, I would sail in the summers and ski in the winters. Willett, who was an ardent outdoorsman, on occasion took some of us young meteorologists up to Mount Washington, New Hampshire, where there was a weather observatory at the summit. The hike proved challenging, what with the high winds and winter conditions, but we were young. The interesting thing was that somebody there was experimenting with a fairly modern kind of aerodynamic windmill for the generation of power. In fact, the hut at the mountain top had observers all year round, and it received its electricity from this windmill, when it worked. It's interesting now, more than fifty years later, we are experimenting with power windmills again.

"At this time I invented a couple of fairly serious little meteorological instruments. We had, in meteorology, a technique called air mass analysis. The air masses, the cold air mass and the warm air mass, were best distinguished on a weather map by their specific water content. That's not relative humidity, but the actual amount of water, which doesn't change when temperature increases or decreases, unless there's condensation.

"So I developed what I first called an "air mass indicator" denoting where temperature and relative humidity cross, and because specific humidity was a function of relative humidity and temperature, lines of specific humidity could be shown. Then I realized that humidity and temperature are two factors in comfort, so I just decorated the dial with comfort zones and called it a "comfortometer." It became an instrument to tell people whether they were comfortable or not.

"I put the comfortometer in the home of Mrs. Henry Hornblower, the grandmother of the girl I would later marry. I often went to Mrs. Hornblower's house for Sunday dinner. One Sunday, I put the comfortometer on the mantle and left it there for a week. "When I returned, Mrs. Hornblower said she'd never spent a more comfortable week. The pointer had stayed right in the comfort zone. "I took my comfortometer away, examined it carefully, and found the pointer was stuck! This gave me an inkling into placebos and their effect on people.

"An air conditioning company expressed an interest in the comfortometer, so I sold it to them. Air conditioning was pretty primitive then, and when the air was cooled there was much condensation. This meant the actual humidity from that cooling would often be far too high to really be in the comfort zone.

That was the last anyone ever heard of my invention. Whether the company suppressed the instrument on purpose, I don't know, but I suspect they did. They bought it outright and it was never produced. I was, however, glad to get the money. I suspect they were much more interested in selling air conditioners than they were in selling instruments that would show whether the air conditioner was designed properly or not.

"At MIT these funny inventions of mine got noticed—the comfortometer, for one, and some research on human hair as a hygrometric element. MIT put out the publicity—all universities like to do that—that I wanted untreated human hair. I got wads of hair from

blondes in the Midwest—with, I must say, some covert suggestions—such as if I wanted the hair, I should come and get it personally. The purpose of the hair experiment was to measure how quickly the hair hygrometer would respond. The fancy title of my paper was, "The Transient Condition of the Human Hair Hygrometric Element."

"As a result of these experiments and inventions, I began to know and to like the press people. The comfortometer even got mentioned in Dahl's cartoon in a Boston newspaper. I soon realized these press notices weren't doing me any harm. They were all nice stories. I had a humorous attitude toward my own doings, and it's important that you don't appear too pompous, because people don't care for that. They're apt to prick overinflated balloons pretty quickly.

"When I was at MIT, like many other students I eked out the tuition and living expenses on a fairly small amount of funds. We'd consider it a terribly small amount today. After I received a fellowship, though, I had a thousand dollars a year, plus free tuition, and I lived pretty well.

"We also supplemented those meager funds by whatever means came to hand. One little operation involved bringing liquor into the United States. This was in 1932, before Prohibition was repealed. Cases of Scotch and other whiskeys with floats around them were dumped outside the three-mile limit off Cape Cod. This enterprising gang, whom we never knew since we never met the people who did it, organized a small group of students to bring the cases ashore. The contact for the students was a fellow who was studying philosophy at Harvard for his Ph.D., and he rounded up a few of us from several other schools in the area. Those of us who could sail small boats, went out to the three-mile limit at night to bring back the liquor.

"The operation was amazing, because we would simply pick up whatever floating cases we could, and write our mark on them. We were paid in cash—absolutely honestly—at the end of each time, with never a question, and all we did was pick up the cases. We had an idea what was in them but we just dumped them on the beach, preferring not to know for certain, and we never waited around. We never saw who picked them up. The liquor was possibly from Canada, or maybe from Europe. We never knew, and we didn't want to then, but I have a good idea now who it was.

"We made a lot of money on this operation, as long as it went on. So we were quite ambivalent when Mr. Roosevelt repealed Prohibition. That was my only brush with rum running, but it was kind of fun, and it certainly helped pay my way through MIT.

"Preston Bassett, chief engineer and later president of the Sperry Gyroscope Company in Brooklyn, New York, gave me my first employment opportunity in America; a summer job as a junior research engineer in 1933. Oddly, Bassett never wrote a book, but there is a collection of his papers, printed privately by his relatives and friends."

While working for Sperry Gyroscope, Athel lived on $200 a month and swears he has

never lived better before or since.

Margin quote

"A lunch of Boston baked beans, frankfurters, and some vegetable was 19 cents, so those were the days. The entire concept of money was so different from how it is now."

"During this time I lived with Diego Rivera, the great Mexican muralist in his studio in Brooklyn Heights. This was when Rivera was painting the murals in the RCA building. I'd met him when I was looking for a room. He wanted to know if I could cook. When I told him I could manage, he seemed happy to take me in. I cooked while he sketched huge outlines for his murals. Rivera's housekeeping left much to be desired. Paint was splattered everywhere, including the living area. He didn't seem interested in cleaning up. He was a great painter, though. Later, after I moved to Manhattan, I was shocked to read a headline in the Herald Tribune, 'RCA bans Christ from murals.' I felt for Diego losing his cook and Christ in such short order."

Athel moved uptown to International House, a place where foreign students stayed. It cost six dollars a week to live in what was a very nice place for the price.

Margin quote:

"At that time one of my great pleasures, if I could get a long lunch from Sperry, was to get on the Hoboken ferry, which cost a nickel. Off I would go to a bar to get a beer which cost a nickel, and then there was a free lunch. I would take the ferry back, total cost 15 cents, and a hell of an expedition."

"While I was at Sperry's, I obtained a patent with another research engineer, Carter, on an instrument called the "artificial horizon." Our patent permitted the gyroscope to have 360 degrees of freedom. Previously, if a pilot banked too steeply or rolled the airplane, the gyro would hit a stop and "tumble," making its indications worthless.

"In 1933, I finished my degree in aerodynamics, at MIT, then studied meteorology there for about two years. What made me jump from aerodynamics to meteorology is the thing I worry about to this day. When the Wright brothers flew for the first time, a distance not as great as the wing span on a modern 747, engineers claimed "man had conquered the air." When I went to MIT, I learned that planes were going down because of ice on their wings, their fates determined by weather conditions. Man hadn't conquered the air at all - he'd only invented a flying machine. I thought it would add to my ability in aerodynamics if I studied the medium in which the airplane had to fly.

"Engineers are apt to be arrogant and to disregard the medium, but a really good engineer understands the machine, the medium, and marries them. In the David Taylor Model Basin, where the Navy tows ships to find the right hull designs, it was a long time before they put waves in. They didn't realize waves are terribly important to the drag until

1951. The drag coefficient of a ship in a wavy ocean is totally different from the drag in calm waters. Perhaps in a way this is what we're now doing with good engineering. It also involves good environmental practice whereby we don't do violence to the medium, and we try to prevent the medium from doing violence to our airplane.

"On finishing at MIT, I decided to go back home to South Africa, and I returned there for a year. That had always been my plan; and, I thought about going into the airplane business there. Before I left, however, I married Mrs. Hornblower's granddaughter, Mary Wrisley Atkins."

Chapter Six

Return to Africa and an Unusual Honeymoon Trip (1936)

The trip to Africa after his marriage to Mary Atkins was probably the last time Athelstan had much personal time for himself. He remembers these experiences well:

"Mary Atkins and I were married in Belmont, Massachusetts in June 1935. I'd been at MIT a fairly long time, and so immediately after our marriage we embarked on a honeymoon trip that brought me back to the place of my birth. We flew—in that time quite a thing for a Bostonian to do—down to New York, in a little Stimson, the forerunner of American Airlines. From New York we took passage on an Italian liner bound for Genoa. We disembarked at Gibraltar and crossed over to Tangiers. From there we went to Fez, which had just been opened to non-believers, and to Marrakesh where we took hair-raising rides in Moroccan buses driven by Bedouins. We had a lovely time and then took another Italian liner down to Capetown. I remember it well because there were some little cockroaches in our cabin. I pointed them out to the steward, and he said, "Oh, those are very little. By the time we get to Capetown they will be that big," and he indicated about four inches and roared with laughter. We loved it."

On returning to South Africa, Athel was made Assistant Director of Technical Services in the South African Defense Force. "Showing the importance of my position, I received the impressive rank of Temporary First Lieutenant."

"Mary and I lived in Pretoria. We had a lovely house on Church Street, just below the beautiful government buildings. As a Temporary First Lieutenant, I didn't wear a uniform very much. The old Colonel in charge gave me a lot of freedom, and the available airplanes weren't being used for any warlike plans, so we could use them for other purposes. I started the first routine upper air ascents to make meteorological measurements in the Southern Hemisphere. We went up without oxygen to about 16,000 feet in open cockpit biplanes. We'd try to get to 18,000 feet with our little meteorograph attached to the wing. When we began to black out we would dive to breathe. I got the first records in the Southern Hemisphere like that."

Athel was extending his MIT research while trying to keep up with developments in meteorology that were being made in Europe. Germany was especially advanced in the field at the time.

One of Athel's favorite professors at MIT, Carl Rossby, had brought some European meteorological ideas from his native Sweden to the United States. In fact, there were no U.S. schools of meteorology until Rossby set them up at the Guggenheim.

"The Europeans were advanced over the United States in the mid-1930s. The U.S. had

no weather services for the airlines that were just beginning to develop. One of my classmates in meteorology at MIT, Horace Beyers, became Chief Meteorologist at one of the airlines. The air weather service soon began to develop. Up until the late 30's the Weather Bureau was focused primarily on Agricultural Meteorology. Gradually this focus shifted, and safety in the air became the primary task. Meanwhile, there I was in South Africa, blacking out in open cockpits in the name of meteorological research."

Of the many interesting assignments Athel had, one stands out in particular. "In addition to the upper air ascents, I was certified as an inspecting ordnance officer, about the only one authorized to fool around with explosives. One of my jobs was to destroy old Boer War ammunition which was plowed up occasionally by farmers. There were lots of regulations governing this activity but it mostly amounted to attaching gelignite and detonators to 35-year-old bombs and then running like hell.

Margin quote:

"On one occasion a Boer farmer came right into my office in the Army Headquarters building in Pretoria with a sack on his shoulder. Without much ceremony, he dumped the sack on the floor and it hit with a thud. When I opened it, I found it was full of unexploded shells."

"I also had charge of the shifting around of the ordnance, little as it was. In doing this, I goofed once and mislaid an entire armored train. An armored train contained rail mounted guns, munition cars, tanks, and other heavy weapons. The train was a huge, cumbersome string of cars that needed to move on side tracks by circuitous routes so as not to interfere with the regular railroad schedules, and I was organizing its movement from the Cape up to the Transvaal. During the procedure I somehow lost track of it. My Colonel simply said "You can't lose an armored train, damn it—find it!"

"Then word came from the engine driver that he had abandoned the train on the wrong side of the border with Portuguese East Africa. Borders were pretty ill-defined in those days. He had panicked and left the train so he could get safely back to South Africa. We took a little airplane, picked him up in Nelspruit, and landed in a clearing near the train. The pilot took off and left me and the engine driver there. We simply got up steam and backed the train across the border, running caboose-first into the Union of South Africa. There were no diplomatic exchanges and it's easy to mislay things!"

Athel and Mary became friendly with a very influential officer. "Sir Pierre van Rynevald, the "Flying Dutchman," was the Chief of Staff of the South African Defense Forces. He had two servants who had been with him for a long time. One was a thin, six-foot-six Masai from Kenya, and the other was a very short man from Basutoland. These two could not understand each other's language, and Sir Pierre could not manage their family names. So, as was common in Africa, he "christened" them. If he wanted the Basuto he would call, "Whiskey." If he wanted the Masai, he would call, "Soda."

When he wanted them both he'd call, "Highball."

"I had a good year in South Africa, but I wanted to get back into science, and I didn't see too much opportunity there. That was the year of the Italian-Ethiopian war, and we in South Africa very much wanted Great Britain to go in on the side of the Ethiopians.

"Sir Samuel Hoare was the Chief of the British Foreign Office, and he decided to appease the Italians. He applied sanctions so no one could eat Gorgonzola cheese in the Athenian Club, but he didn't go further than that. Meanwhile, many of the British colonies were supplying the Italians with meat. Sanctions only seemed to work one way. We were all disgusted with the whole thing.

"A curious thing about this episode was that my Colonel, the Director of Technical Services in the British Army, was Freddie Hoare. Sir Samuel Hoare was his cousin. When he heard that his cousin had applied sanctions instead of letting us loose on the Italians, he said "Well, that damned cousin of mine—Hoare by name and whore by nature."

"I always thought the main purpose of an army was to fight wars, and here we had one right on our doorstep. We could have been useful, since South Africans knew the territory.

"By this time I was ready to get back into research. I cabled Professor Rossby who very kindly arranged a job for me, where I'd be working at MIT and being paid by Woods Hole Oceanographic Institution; but, before we left, my wife and I decided to do a crazy thing. We decided to return by first driving our car up the spine of Africa. This was the first time this had been done"

"The trip involved just the two of us with an ordinary convertible, a 1932 Buick that already had 40,000 miles on it, and no four-wheel drive or special equipment. We drove this car up through Africa from Capetown to Cairo and Alexandria. Obviously, there were many physical difficulties. We had to use a compass in driving across the Serengeti plains. There were roads near the big settlements along the way. In Nyasaland there were roads, but once we got to Tanganyika we were on our own. We struck another road near Kenya, a thousand miles later. Our travels took us across Uganda, across the northeastern part of the Belgian Congo. On the trip we lived with the natives, never really having to use the canned food we had taken along. Each village welcomed us and provided fresh fruits and vegetables, as well as an occasional live chicken. We'd give them some canned goods and it was a good trade for all."

The trip led them into the company of an unusual tribe. "The Pygmies lived at the base of the Ruenzori Mountains, called the Mountains of the Moon. Those mountains although almost on the equator are always snowcapped. The Pygmies lived in a rain forest at the base of the mountains, and, as in many of these forests where the heavy rainfall leeches the salt out of the vegetation, these Pygmies severely lacked salt in their

diet. This deprivation caused them to have enlarged spleens, and they craved salt mightily.

"When we drove through that forest, we had a little trouble. Because of the rain, we bogged down in the mud. One Pygmy arrived, carrying a spear much longer than himself, looked the situation over, and called others to the scene. Cars were not then a common sight. We had a tow rope which we tied to the car, and when enough of them had assembled, jabbering and laughing and having great fun at our plight, we gave them handfuls of salt, which they ate like candy. They think that the white on top of the mountain is salt, and that when they die they go up to the top of the mountain and have all the salt they can eat—a lovely idea of heaven."

"We then tried to get them to pull on the rope. It was a big game to them. They lived by hunting, and never engaged in any form of organized work, so we couldn't get them to pull together, until we started some kind of song I had heard being used by a road gang earlier on the trip. Pulling to the beat of the song, they all joined in. They were just the happiest little people, stark naked, and finally, with a song, they pulled us out of the mud."

Car trouble continued to plague the travelers. "Our Buick roadster became stuck several times, and natives pulled us out on those occasions. They also made rafts for us to cross the rivers that had no bridges—a common circumstance".

"Another event which proved amusing was going to Gungalla-nabodio, in the northeastern Congo. (I'm using the old names of the places at that time.) At this place there was an African elephant training camp. Most people believe that only Indian elephants can be trained, and to a certain extent this is true; but at this Belgian Congo camp they trained African elephants for work on the farms. A baby elephant would be caught and assigned to a young boy who was going to be the trainer. Apparently the African species is a one-man animal and the boy was to be with that elephant all his life. The training took place at a station run by a Belgian Commandant with an all-native staff."

"This is the reason African elephants don't appear in circuses. It is one man—one elephant. The Commandant told me "If the boy dies, we shoot the elephant." I hoped if the elephant died first the reverse would not be true.

"Then, from Gungalla-nabodio, a little side trip took us to the fine kraal of Ekibondo, chief of the Mangbetu. The Mangbetu are known for their elongated skulls, and we wanted very much to go and see them. All the little Mangbetu babies had their heads bound to elongate them. These people were cannibals, as the word was used in Africa. They didn't kill for food but when people were killed for crossing tribal frontiers they were "recycled". We sent word of our desire to visit, and the Chief welcomed us.

"After an excellent European style dinner which Ekibondo's chef had learned to cook while they visited King Leopold in Belgium they put on a dance for us. We were all

drinking beer and the dance got wilder and wilder. I began to get a little nervous and wound up sitting up all night with my Smith and Wesson. As it turned out this was an unnecessary precaution.

"The next morning, having kept this vigil through the night, I discovered that Ekibondo had placed one of his guards outside our hut, because he'd already thought to protect us in case one of his men got carried away.

"We did see human flesh hanging in the Aba meat market, on the border of the Belgian Congo and Sudan. It didn't look much different from anything else. I sampled it once—it's very stringy, like venison— needs to be larded.

"We finally reached Juba, at the headwaters of the White Nile, and floated our car down the Nile to Khartoum, where we could drive again. The whole trip took about nine weeks. We broke every spring on the car so that finally we didn't even have them fixed. We put wet hide around them, and the hide shrunk and kept the springs together.

"We did Cairo in approved tourist fashion, and as we sped along the beautiful new military road across the Libyan desert, we soon stood gazing at the Mediterranean at Alexandria. Finally, our car was loaded onto the ship which took us back home to Boston.

"Our costs from Cape to Cairo were 206 pounds, 15 shillings, and nine pence—approximately 42,000 at 5 to 1 on the pound in those days. Cheap? My lieutenant's salary in the South African Army was 30 pounds a month—eight months pay for this trip. Expensive, but worth it."

CHAPTER 7
Massachusetts Institute of Technology and Woods Hole
1936—1937

"While I was at MIT in 1936-37, I invented some funny things in my spare time. One of these inventions was the Bathythermograph. People often seem puzzled by my multifaceted career, as if they wonder how I could have such differing interests. I personally don't see any great conflicts. When I invented the BT, I was studying meteorology at Woods Hole and doing model experiments on the Gulf Stream under the direction of a great theoretician, Professor Rossby. He needed someone to perform measurements that would check his work. Since there were no instrument known that could perform these checks, I invented one."

Later it was discovered that the BT could be used to detect submarines. This came about in an unlikely way.

"I've always been saddened that the Woods Hole Marine Biological Laboratory and the Woods Hole Oceanographic Institution don't work more closely together. There was hardly any permanent staff to speak of. Henry Bigelow, from Harvard University's Museum of Comparative Zoology, was the Director. Columbus Iselin from Harvard was there. And there was the crew of the research ship Atlantis. There were not many personnel until the BT came along and got us into the Navy business. Then came the spin-offs from that original Navy work which led Woods Hole into becoming the preeminent laboratory for the Navy during WWII. I saw science, industry, and the government really working closely together."

Athel told me that the great reputation in oceanography at Woods Hole actually began with Columbus Iselin whom Athel described as a man like himself, not only a scientist but an expert in practical seamanship. "In Copenhagen, Iselin supervised the building of the research ketch, Atlantis, which at 147 feet was the largest in the world, and then he sailed her home from Sweden. Those were the days when we had real deep-sea guys in oceanography." Athel told me that a crew member aboard the ketch helped him solder and tinker with the BT while he was inventing it. "We had to cobble things up on our own," he said. "We didn't have any money—it was a lot more challenging in those days. Real bankruptcy was when we ran out of ideas." The BT went on to become "the most widely used instrument in oceanography during the first half century of its evolution," according to Robert Abel of the New Jersey Marine Sciences Consortium. Athelstan was also very involved with his work on the BT at his lab at MIT. He described his experiment this way:

"At MIT, I had a six foot diameter "dishpan" with a six foot shallow cylinder on a very thick steel bed, running on three rubber wheels, rotating in the manner of the Earth from the Northern Hemisphere. At the center of the pan a jet of water shot out of a small slit. This jet was deviated by the rotation of the pan. I photographed the resulting patterns of flow, trying to simulate the Gulf Stream in the way it curves past the eastern coast of Florida."

Athelstan's assigned lab space turned out to be a large men's room in a cellar. His giant dish was often mistaken for some kind of fancy urinal. This humble beginning ultimately led Athel to sea again to study the real Gulf Stream and its eddies.

"I'd detected the eddies from my experiment with the dishpan. This led me to realize that I couldn't really measure them without a rapid temperature measuring instrument for the ocean depths. This in turn led to the BT, which was actually a bomb-shaped device that was lowered on a long piano wire while the ship was going full speed. As it went down, it traced the temperature-depth profile on a little glass microscope slide. It gave the temperature-pressure profile of the ocean, and had many practical uses in oceanography."

Athel later decided to get together with Columbus Iselin to sell the device to the Navy. They sailed aboard the U.S.S. Sims, out of New London, the crew of which was experimenting with submarines at Guantanamo Bay. The engineers were involved in developing the use of sonar. They were missing their targets, blaming their equipment, and Athel was typically direct about the problems:

"It was the old arrogance of engineers who worry only about their equipment and fail to consider the medium they're working in. Having had a touch of training in engineering and physics, I realized these sonar waves were bending. With their secret codes exposed, all hell broke loose when the Navy discovered I was still British. Things soon calmed down and we were able to work well together. The BT turned out to be very important to the course of the war."

Margin quote:

"There is no true invention. It is the synthesis of dissimiliar things in the mind that leads to invention. It is only taking old ideas and combining them for new purposes."

The invention of the BT changed the course of the war and led to further work at Woods Hole that helped establish the Institute as preeminent in oceanography to this day. Around the end of 1936 the Dean of Engineering at New York University, Thorndike Saville, went to MIT to find someone to start a Meteorology Department. He found Athelstan Spilhaus.

Chapter Eight
The New York University Years
1937—1941

At twenty-nine years old, two years after his arrival at NYU, Athelstan became one of the youngest men ever to be given a full professorship at a major university. He moved into Oceanography and Meteorology, and his invention of the Bathythermograph was being used in the military.

" All of our work in meteorology was to be developed at the University Heights campus where, in 1937, I started a Department of Meteorology which became very shortly a Department of Meteorology and Oceanography. This made NYU the third place in the United States where students could study these fields. There were only Cal Tech and MIT before I started the department at NYU.

"The study of meteorology brought on by the needs of aviation was an exciting new field, but very few schools offered it yet. Also at NYU, which I thought very appropriate, was the Guggenheim School of Aeronautics, again with MIT and Cal Tech as the only other places that had such schools.

"In 1937, I was still a youngster—only 26 years old. I started this department, which at the beginning consisted of exactly two men, the other being Robert C. Hutchinson. I was told that he and I were the youngest people in the country at that time to have full professorships. He was a prodigy, and became very famous at the University of Chicago as Chancellor. I operated as the "theoretical mathematical instrument" man. I soon added Gardner Emmons to the staff. He was unquestionably the best weather forecaster in the country, and was to be in charge of the synoptic side of things as well as forecasting. Emmons had been with me at MIT and had gone to the Weather Bureau before I got him for NYU."

Margin quote:

"One might say there's a lot of art in weather forecasting, and as a matter of fact there still is, in spite of all the computers. In those days there was a lot of guesswork in watching the outdoors and in being a successful weather forecaster. Emmons was the best, so he and I formed the core of the department."

"With meager resources, we added a couple of assistants who were sent to us and paid for by the Weather Bureau to get some training. A part of the exchange, however, was that they would plot our weather maps. At that time, the maps had to be laboriously hand plotted from data that came in from all over the country and occasionally from all over the world by Teletype. These weather maps were very important, because the students

practiced daily and learned the art of forecasting.

"That was our little department, and at that time, I was still developing the Bathythermograph. The only deep water I could find was at one of the big docks down on the West side, toward Fulton Street, where the huge liners were docked. Even then, I could only get forty feet of water, which wasn't very much——just enough for the job. Mary and I went down there and held our noses and dunked the BT alongside the ocean liners in that filthy water. She was a great help to me with these experiments.

"The department flourished, and as a brash young man, I wanted to make the department better known, which one has to do when starting anything. The Weather Bureau was in a confused state at that time, with the New York forecasts for the city actually concocted in Washington, D.C. I thought that was bad, and to prove my point we set up a forecasting program so the students could practice forecasts every day. Gardner Emmons would put out a university-wide forecast which was phoned downtown, and was also pinned on bulletin boards all over the University.

"Soon the press heard that Emmons and the students were making more accurate predictions than the Weather Bureau. Picking up on my flair for publicity, the press began to run the New York City Official Weather Bureau forecasts and our forecasts side by side; they also kept a running box score of who had the better prediction record. Generally, thanks to Emmons, we did pretty well.

"Some things were a little contrived. I remember Emmons had put out a forecast of freezing rain for the morning of the next day and said, "Those people living in the suburban areas ought to be careful driving." I lived in Fieldston at that time and drove to the University. That morning I slid off the road and had minor damage to my car, arriving late for my lectures. Having the chairman ignoring his own department's warning was great fun for the press to pick up on. I probably helped the publicity, but it was a good story to tell against oneself. The fierce competition was very good for getting the weather business known, and so we developed quite a good school.

"Another project I did while at NYU was to take whole sky pictures, with what was called a fish-eye lens. I had made the first lens myself. For the second one, I obtained a grant and brought it over from England. I took fish-eye lens pictures of the whole sky in the evening, sunset on one side and the New York skyline all around. They were published in **Fortune**, in color, and I think they were probably the first color whole sky pictures ever taken. That was when I met Jerry (Gerard) Piel, now the publisher of **Scientific American**. Jerry once said to me that the story on New York weather which accompanied my whole sky pictures was his first scientific story.

"Many students of mine from New York University days have come up to me since and said, "You started my career," just as I've pinpointed people who started my own career. Many years later in the 1970s, there was a reception at the Aerospace Corporation, when I was on the Board of Trustees, for the Secretary of the Air Force. I hadn't recognized

who the Secretary of the Air Force was. He was a fellow by the name of Alexander Henry Flax. There was a reception line and the trustees were in it, famous men like Jimmy Doolittle and Pat Partridge and other Generals from World War II days. I was also in the line. Suddenly the Secretary came over to me and said, "Professor, how are you?" I hadn't seen him since New York University, where he was a young student in aeronautics and meteorology. He obviously thought that my interesting him in the science of the air had started him on his career. Of course, one never knows. People are often over-generous in their estimation of what was done for them. But I think that at New York University, in finding good people and in backing them, I was more conscious of the effort than later on.

"What impressed me about NYU was its night school. It was a city university, and the Washington Square activity gave opportunity to people, like Alexander Flax, who worked all day, and then studied like mad in the evenings. I have always admired those people and think highly of the people, such as Flax and Jules London, who by hard work went from a poor background to a distinguished career. I've always admired city universities that pay attention to city folk. Some great universities still don't pay much attention to the talent that's buried in their towns. The fact that NYU did this made me proud.

"Unfortunately, one of the great disappointments of my life was when New York University, through some kind of financial mismanagement or something, sold off the University Heights campus, or possibly traded it to some other school. It looked as if the meteorology department might be eliminated. Fortunately, the College of the City of New York, as it was then called, took over many of the good people for its department It still has a small department of oceanography and meteorology with my former students, these men who are now old-timers, as its core.

"After two years our department added a man from MIT, Raymond Montgomery, an excellent theoretical oceanographer and a friend of mine from student days. As soon as we added him, we became a small department of meteorology and oceanography. I received great satisfaction from this development, because I believed the weather couldn't be understood without studying the ocean. I felt that one shouldn't have a department just for meteorology without attacking oceanography.

"Some years later, I was on the MIT Corporation Visiting Committee for the Earth Sciences. I had previously been on the Committee for Meteorology and had proposed that the earth sciences should be grouped. I was disturbed about the separation of disciplines. I do not believe in separating the disciplines - they should be grouped. MIT accepted this and Cecil Green, a member of the Committee and a founder of Texas Instruments, generously provided the monies for a new Earth Sciences building. Those of us concerned were invited to the ceremony where Cecil broke ground with a souvenir spade for the occasion. James Killian, then President of MIT, hosted a nice dinner that evening at the Ritz. Killian thanked Green for his generous gift and courteously acknowledged that I had pushed the concept of grouping the earth sciences. In reply I said,

"You still haven't got the concept. You just had a ground breaking ceremony." They all looked a little startled. "For a true combination," I continued, "you break ground for geology, break wind for meteorology, and pass water for oceanography."

Chapter Nine

The War Years
(1941 - 1945)

Spilhaus describes the tense atmosphere that existed at the Meteorology Institute at NYU where he was training 1000 Cadets for the Navy. After the bombing of Pearl Harbor his mission had changed and it became his duty to prepare his students for war. This assignment was made more difficult by the status of his citizenship: he was still a British subject.

"I couldn't understand why the United States didn't go in and help the British. That's when Columbus Iselin and I decided to leak the secrets of the BT to British Intelligence. This could have been very tense for Columbus so I went to New York to carry out the mission. When we arrived, we arranged to meet the British Naval Attache, a Captain in the Royal Navy. We had to do this very discreetly, because this was a peculiar situation—America wasn't in the war. I met the Attache in the apartment of a friend in Sutton Place, Manhattan. It seems pretty funny now, but it was actually a very tricky business for a Britisher like me, who'd been involved in secret sonar research, to be giving those secrets to the British. It could have also caused great trouble for Woods Hole. I took the responsibility without any qualms or consequences. I remember that old Naval Attache saying, "Well, it will all go into the lion's maw, and what will come out, we don't yet know."

Dr. Spilhaus later learned that, as a result of this meeting, there was a request by the British to President Roosevelt for 200 BTs. "That was well before the United States entered the war. I didn't know all the details, but I was delighted. Of course, I gave them the rights to manufacture the Bathythermographs." Athel soon became a soldier in uniform himself. He describes what happened to the BT.

"I didn't find out what went on until after the war. Then I found that nearly every damn ship had one of my devices on it, so I collected a few royalties from the Navy because I had patented the BT in 1937. As that was the first time I ever had any extra money, I built a house on Cape Cod at Bourne with the royalties, thinking it would be a nice place close to Woods Hole for summers, and near enough to NYU for the winters.

"As soon as World War II began, I went straight to Washington in early September 1939 when the Nazis invaded Poland. Technically, I was still in the South African Army and I reported for duty at the South African Embassy. They told me I'd better remain a professor and sent me back to NYU. With typical British complacency they said, 'You'll be more useful as a professor, and the U.S. will join us one day."

"Eventually, I received more official word that I'd better stay where I was, but as time passed I became very restless. It was a most uncomfortable period for a Britisher in New York, with all the activity in Yorkville involving the America First groups and the German-American Bund.

"Before the war came along, I used to go to Yorkville, a predominantly German neighborhood on Manhattan's Upper East Side, because I loved German food. My discomfort resulted from being British and from not being back home doing something. It was also an uncomfortable time for good German-Americans. People forget we had Nazism in New York.

Margin Quote

"I think when your country is at war, that's where it is. I have nothing bad to say about the useful people who had to stay home. There must be good people at home too—supplying and manufacturing; but, I was young and able-bodied, and the only place for me was at war."

Athel and his friend Columbus Iselin continued to seek other opportunities to put the BT to military use. An ideal opportunity arrived when the British began losing destroyers at the entrance to the straits of Gibraltar, a natural site for the German U-boats to hunt. "The Germans were pretty well versed on oceanography and meteorology, and knew enough to realize that the fresher water from the Mediterranean, being lighter, flowed out of the Strait on top, and the heavier, more saline Atlantic water flowed into the Mediterranean along the sea floor. Between those two layers was a discontinuity of density that acted like a mirror to any sonar waves transmitted by a destroyer, and the German U-boats were lurking right below that mirror. Columbus said my little invention would help the destroyers know where the "mirror" was, and when conditions were dangerous, they would not be such sitting ducks."

"Before long, Pearl Harbor was attacked, and I found myself in the United States Army Air Corps. Meanwhile, Maurice Ewing, later a famed geophysicist, and Allyn Vine, one of the really imaginative ocean engineers for whom the research submersible Alvin was named, worked on my crude prototype design and improved it greatly. The United States went into the mass production of BT's and put them on every destroyer. During the defensive stage of the war, when the Germans were harassing our destroyers and convoys, the main purpose of the Bathythermograph was for evasion purposes. Once the tide of war turned, our antisubmarine forces used the BT on the offensive. Apparently, the Germans never found out about it.

"The BT was classified Top Secret, of course, which was rather pointless, since I had invented it in peacetime. That is one of the funny things about science. I delivered a paper on the Bathythermograph at an international meeting of geophysicists in 1939, yet it wasn't noticed or picked up. The Germans were busy with their Blitzkrieg and

apparently didn't think they'd have to worry about little inventions like the BT.

Hitler had a blind spot as far as science was concerned. That was his great contribution to the war.

"Once World War II began, something peculiar happened to our department at NYU. Until then, meteorology had been thought of as a minor aid for farmers and cooperative observers all over the country, and not a very significant activity.

"The summer before Pearl Harbor, however, Captain Arthur Merriwether—aptly-named head of the Weather Service of the U.S. Army Air Corps— flew himself up to Woods Hole in one of those little fighter planes that was started by firing a blank shotgun shell into a cylinder. He landed on a cow pasture where Hyannis Airport would later be built. The purpose of this visit was to see Rossby and myself, and the man who ran the Meteorology Department at Cal Tech. He wanted to determine if we could gear up to train officers for the Air Corps in meteorology—an abbreviated graduate training program, perhaps within a year's time.

"Well, this made meteorology boom! A fourth institution had begun by then: Jacob Bjerknes, the Norwegian expert, had moved to the University of California at Los Angeles, and the four of us had formed a little group of the heads of all the university departments of meteorology. We planned how to direct our efforts to training aviation cadets as meteorologists. By the end of 1942, when I left NYU to go into the Air Corps myself, I had a thousand cadets studying on the University Heights Campus.

"Meanwhile, Rossby had left MIT, and Henry Houghton took over the program there. Rossby started a school at the University of Chicago. So now we had five schools training weather officers.

"The curious thing in this was that we all had very high standards. We agreed, "We're going to demand that the entrance requirements be the same as any other graduate school. It may be quicker, but it won't be easy." We had people search out the good youngsters who were going into uniform, and took them right out of basic training schools, so we got a brilliant bunch of students. Among the thousands of cadets there were also several women. There were also women in the program at the other institutions. They had met the same standards as the men. New York University, whether in peacetime or at war, was great fun. Starting something from the ground up is always satisfying.

""At first, I had a tough time in the military, because I was relatively young. I wanted to go into the real war, not just be a professor in uniform. The Air Corps wanted me to work at places like the Special Devices Center on Long Island, which would have been nice, but was not much different from working at a university. Soon, however, I had a series of assignments that put me very much into the war effort.

"One early assignment was to take new instruments and techniques dealing with weather

observation and prediction out into the field and test them right there. If they worked, I would get a commander in the field to request them, so that we could cut through all the garbage of field testing and get the instruments manufactured quickly and out into the war. That was a marvelous job for me, because I was officially attached to General "Hap" Arnold's office in Washington. I never had to go to Washington because I was the Air Corps Liaison with the Signal Corps. I could travel, and I was soon on my way to just about every part of the war.

"Before long we put a number of important instruments into the field. We developed radar wind finding, and the long range radio detection and location of thunderstorms for the Pacific, where we got no observations. If we'd left it to the Signal Corps and the Army, they would still be testing those damn things for field suitability.

"I took the first radar targets up to Iceland, and we tested them in the field with the radar the artillery people had, making them compatible with those radar sets. I was sending back reports of winds above the clouds, which the meteorologists didn't believe. They said, "There's cloud cover, you can't measure winds—that's a mistake," and threw the reports away. It was some time before we could get them to believe us.

"What finally turned the trick for our reports was a request for them from the field commander in Iceland. Of course, a field commander's request is a demand, and radar wind finding quickly reached the theatres of war.

"We concentrated on Europe first, because that's where the fighting was. The Pacific war was straggling all over the place, and the admirals didn't want any fancy technicians mucking around in the early days of the war—and quite rightly, too. They had to fight with what they had.

"I used to travel fairly illegally everywhere. My Commanding Officer, Colonel Marc Duffy, had an aide, Moss Yater, whose job it was in Washington to cut our orders after we let him know where we'd been. Marc and I were in New York shortly after I got my commission, and he said, "I want you to go to England immediately." "I haven't got any orders," I replied, "and more importantly, I haven't got any money. " We checked our pockets and managed to pool about $45. "Go up to Presque Isle, Maine," said Marc, "where Art Merriwether is the boss of the Weather Reconnaissance Squadron. Art had been head of the entire Weather Service when the service was small in 1941. "We don't need any orders; Moss will cover you in Washington. Go to Art and tell him you want to ride a reconnaissance plane."

"On the way over I stopped at Keflavik, Iceland, where I met Berndt Balchen for the first time. He was a Norwegian and thought as I did, that wartime was a poor time to change nationalities. There was a third, a Frenchman named Paul Emile Victor. A little act was put through Congress that allowed us to get Air Corps commissions and yet retain our citizenship in our native countries. We became U.S. citizens only after the war was over. I went all through the war as a British subject with a commission in the British army

(inactive) without a wartime exemption and in the U. S. Army Air Corp.

"I ended up sticking around for three weeks, because the weather was horrible. The Germans would be sitting ducks if the weather ever cleared. I guess the only danger to us would have been in going down on the ice cap or something like that. The only thing we could do was play poker and wait for better weather. I had never played poker before, and all I had was the $45 I had brought from New York. Boy, was I cautious. Berndt and his pilots taught me the game. I did have some beginner's luck and the legend grew that I played poker all the way through England and North Africa and came home with $1,600. Anyway, I waited around in Iceland with Berndt and his crew, eating pony steaks which came from ponies they actually raised to eat, drinking bourbon, and playing poker, until the weather at last cleared and we went on this little raid and bombed out the pockets.

"The Germans put quite a lot of importance on weather information for their shipping and U-boat activities, but I don't think they were concerned so much with aircraft in the more isolated parts of the world. They had these men, little groups of five or six, completely isolated. Later on, we too had pockets of men up there. Some of the groups had really bad experiences from psychological stress to cannibalism.

"While waiting for the bombing runs we had time to spend, and so we'd go into Reykjavik. We were driving along from Reykjavik back to Keflavik, on a road that had just been carved out and was mainly loose lava. This was the time when the sun was first coming up. When the sun comes up in Iceland, it's for the season, and the sun was returning after the long Arctic night. Accompanying me in the jeep was Major Howard Cox, who many years later would become Tricia Nixon's father-in-law.

"At that time, I'd been over in Greenland for a couple of months, and had found it a pretty terrible and lonely place. As the sun came up in Iceland, however, we were greeted by a vision. We saw a beautiful, flaxen-haired girl working in the fields, naked to the waist, forking up the hay and bouncing around.

"Major Cox and I couldn't take our eyes off of what we saw. The Jeep slid on the loose rubble of the road, and we turned over. I cut my scalp from bow to stern. The major was also somewhat injured and we were both put into the hospital near Keflavik.

"I managed to get out of the hospital quickly. In the Army, you don't get out in the field unless you're fit for duty again, but I managed to persuade them that I was going to London, and if I had a bandage on my head I could check in there at the hospital so they let me go with my head bandaged up. I always claim that this injury was incurred in line of duty and I should have gotten the Purple Heart.

"I brought the sferics idea, of finding and analyzing storms by their electromagnetic

emissions, back to the United States on one of my trips, and we began developing the instruments. The Allied relationship made a good partnership, a sharing of their inventory of ideas and the big American factories and major institutions such as MIT, which could be turned over to wartime research.

Another assignment took Athelstan to Cagliardi, days after the invasion of Sicily and just before the landing in Naples. "I tried to get to these places early, and capture the German meteorological stations intact to see if they had something we didn't. As a result, I was really in on a lot of things, not usually in the first wave but very shortly thereafter. The same thing was true when D-Day came along. Colonel Duffy and I went over to Europe and drove in a Jeep, from Cherbourg to Paris. Paris had been liberated, although the Germans had not entirely moved out before our arrival. Our objective was a factory said to have made meteorological balloons for the Luftwaffe. These German balloons were crucial in obtaining upper air measurements, and any improvement of the balloons was something we wanted to know about. We arrived at the factory and found, indeed, that they did make rubber balloons, much the same as ours. The main output of the factory, however, was other kinds of rubber goods for the soldiers. It had been a doll factory prior to being taken over by the Germans and transformed to these other purposes. Sometimes war can be very funny. You risk your life, at great expense, to get to some place and then find the Germans were making prophylactics— but, that was all in the game.

"That was the European phase of the war, which was fascinating to me. Of course, I could get around very well, because of my assignment to General Arnold's staff. My orders generally said to go somewhere and then proceed as opportunity afforded."

Colonel Marc Duffy, Athel's Commanding Officer relates: "I first met Athel at Ft. Monmouth, New Jersey., where then-Captain Spilhaus was assigned to my office. "During WWII, Athel and I flew "The Hump" (the Himalayas) from India to China, and had occasion to take equipment into Yenan where the Chinese Communists, with their leader Mao Tse-Tung, were living in caves prior to taking over Nationalist China. They had a reception for us during which they invited us to participate in a dance called the "Yanga". As the dance became faster and faster, everyone but Athel and General Yang fell out. We learned later that this was very unsettling to the General, who previously had never had a serious competitor.

"Once in India, Athel and I had some of the hottest curry I have ever tasted, and that night I had the wildest dream—that Athel had worked up a scheme to have the earth and the moon change places—and it had worked. I guess this indicates the confidence I had in Athel's ability to achieve the impossible.

As Athel himself recalls: "After the Paris excursion, just after the Germans had gotten out of the city, we turned our little outfit, which was attached to the Signal Corps, to working on how we could help in the Pacific. My commanding officer, Colonel Duffy

and I flew out to the West Coast in the plane he had for his use. There we obtained a couple of pilots and a DC-3 and flew around the Pacific. The DC-3 had ordinary tanks which just about made the distance from island to island. This was really an extraordinary trip because we were inspecting our weather stations and finding out what kind of equipment they had. We tried to supply what these fellows needed, where we could put in new kinds of equipment like radio sondes (for upper air measurements), and the sferics equipment, and learning just what we could do to help the weather business in the Pacific. Sferics was invented by the inventor of radar, Sir Watson Watt. This was reverse radar. The lightening gave the signal when we zeroed in on the lightening storms where we couldn't have stations out there. We would go thousands of miles out, find lightening and know a storm was there. The interesting thing is that I brought it from England to the U.S., and we took it out to the Pacific where it would be useful in the war.

"This tour took us all over the Pacific, up to Saipan, Palau, Guam, and Iwo Jima before the Marines secured it—into a lot of the pretty active areas. Then, having done the Pacific and gotten what we needed in the way of information there, we went down to towns in Australia, flew across Australia in our own DC-3, and then took what later became Quantas Airlines. A B-24 flown by the Australians, loaded with extra gas tanks, flew us nonstop from Perth to Colombo, the capital of Ceylon. That was the longest hop in the world for us, because the Japanese held all the islands below us. It was something like 22 hours in the air without stopping. The plane was just a flying gas tank with a few people in it. We landed in Colombo, then went to the headquarters of the China-Burma India Theatre, which had one weather service.

"The 10th Air Corps base was outside of Calcutta, and our 10th Weather Service Headquarters—an immensely extensive weather service—was based in Barrakpore, further out from the city. The 10th Weather Service extended south as far as the Maldive and Laccadive Islands, westward to Karachi, northwestward to Tiwa Urumchi on the border of China, Russia, and Mongolia, and, of course, the whole of China and the whole of India. It was an immense territory.

"Col. Duffy and I did the same kind of job as we had done in touring the Pacific, and found the 10th desperately in need of equipment. It was pretty hard to get things in and out, and we also needed observations from territory the Japanese held to the east. We needed to get weather information from the Japanese-held territory, and one of the tricks was to put sferics stations in there, which could at least get some kind of a fix on thunderstorms, near the Japanese islands. We organized a sferics network, which entailed putting up a couple of stations, perhaps a thousand miles apart, simultaneously and in one communication. They would then triangulate on a storm at one and the same time and fix the position. If the storm was a thousand miles away, a good intersection was needed to pinpoint it.

"When we'd finished our inspection, one of the finest officers I ever met and served under, Colonel Dick Ellsworth (he was killed after the war; Ellsworth Air Force Base in South Dakota is named for him) told us of a problem he had. He said, "I've got to get

weather information for the bombing of the Japanese islands from this area up in north China which is in Mao Tse-tung's territory, and that means that someone has to go there, without benefit of Chiang Kai-shek's sanction, because Chiang doesn't want anyone to go up there."

"There was at that time a small, very carefully controlled American observer group in Yenan, Mao's headquarters. We flew up to Yenan and visited with Mao and his men. We found out that three things were needed to get the weather observations from behind Japanese lines. First was to get portable kits of rudimentary weather instruments and radio transmitters; second, to set up a school to train Mao's Chinese communicators how to read and make weather observations; and third, to make aircraft available to fly them into Japanese-held territory. They were familiar with their own radio equipment, but we had to teach them to work the Signal Corps hand-cranked generators and transmitters. I thought that this was an intriguing job, a really necessary job: to get out to the Shantung Peninsula, the closest to Tokyo we could get, and get that information back to Guam for the bombing of Japan.

"Colonel Ellsworth said, " I need someone to go up there, and I just don't want to assign someone." He had a regular weather officer in Yenan, but this volunteer would have to go in and out over Japanese-held territory, and put his men in to set up the stations. I thought it would be a fun job for me, so I volunteered, and they graciously accepted my offer. Ellsworth said that he couldn't assign someone to this dangerous job behind the lines where even Chiang Kai-Chek will be your enemy. Chiang was my bug-a-boo later on.

"Before I went to North China, Colonel Ellsworth said, "Spilly, you'd better have some jungle training experience. " I went to the British Jungle Training School in Ceylon. That was a great school and they gave us two days of lectures by a Ceylonese Malay. All he said was, "Ixomyelitis teach you what not to eat and you can eat anything else." The final examination in this typically British school was to be taken forty miles out into the jungle. We would be given a compass, a machete, and leech boots, and told to get back to the school. I said to the commandant, "How do you rate this examination, on the time it takes to get back?" "Oh, no," he said. "If you get back, you've passed."

"I returned to the United States and very quickly assembled hundreds of knapsack kits, commandeered radios and all the equipment, about 100 sets, and sent them on their way within a month to the north of China. I went back to Yenan and started to train the communicators whom Mao supplied us with, in the rudiments of weather observing. First we worked in a cave, then we trained them outdoors, working the radio equipment. When they were thoroughly checked out, we would have a B-25 drop them on the way to their assigned stations. We had a weather squadron of B-25's but had to do this pretty carefully because we actually had two enemies, the Japanese and Chiang Kai-Shek. When we checked an airplane out of Chengju, in Chiang's territory, and wanted it to come to Yenan to work for us, it would go on a combat mission out of Sian, where we didn't have to say where we were going. It would dogleg and land in Yenan. We had to

be devious with our own "great ally," Chiang Kai-Shek.

"Mao was really fighting the Japanese. Chiang, in my opinion, was just storing up military goodies for his war, which would come at the end, after the Americans and Mao had beaten the Japanese. At least that's the way I would put it; but, that's essentially the way it was, and the admiration those of us in Yenan had for Mao and how he did things was tremendous. The State Department was under the impression that Mao was completely with Moscow. If they had looked at the map, they could have realized that there was no way for anyone to get from Yenan to Moscow without going through Outer Mongolia and right across the Asian Continent. The only fellow who really did go to Moscow frequently was Chou En-Lai, one of the big boys. Nobody else had contact with Moscow.

When Col. Duffy and I were flying out to the Pacific after we had gone to Paris on the condom spy mission, we landed on the island of Palau. The Japs held the island and were all circled around the island. We landed on the airstrip, the only thing we held there. Our Sergeant was typing a report and got shot in the butt by a Japanese sniper. He got the Purple Heart - should have gotten the Purple A—.
It was so bad, the tough, good Marine Commander took Seebees to rout out the Japs that were holed-up in caves, bulldozed the mouths of the caves, and then took flamethrowers and stuck them through holes they had drilled into the caves and either burned the buggers up or burned up the oxygen in the caves. We didn't know which they died, of, and we didn't care.

"There were many difficulties in establishing the weather network in China because Chiang Kai-Shek was so much against anybody working constructively with Mao Tse-Tung. He felt this way even though Mao was against the Japanese and was fighting very hard against them with his limited resources.

"When we were trying to supply Tiwa Urumchi with radio sound equipment, we had to stash gasoline and supplies along the route from Chengju through Su Chow and up to Tiwa. Su Chow is a very remote place in the desert, right on the great wall. I stayed in a very big hotel on one trip with General Joseph George and Dr. "Doc" D'amato. The pilot was Lt. Col. Crawford.

"We finally got to Tiwa on this trip, and the local consul who didn't get to see Americans very often greeted us. They had a 9 P.M.. curfew and shot anyone on the streets after that. There was a private little border war going on with the Russians at this time. The consul explained there were two factions. One was the bankers who were pro-Russian, and the other was the Governor's pro-Chinese faction. They were both vying for the dubious honor of entertaining us.

"The banker tried to outdo the Governor and gave us a very fine lunch—a very liquid one. Joe recalled later, "You took a shine to his wife, Spilly. She was a doll. Her purpose seemed to be to try to get us drunk, and you were susceptible. You managed to

take down a hundred foot section of fence while we were leaving, and to lose your shoes. We had a hell of a time finding shoes for you to wear to the Governor's party that night.". Another Spilhaus performance in the line of duty.

"The consul at Tiwa Urumchi asked us to take out a bunch of people because they were about to have an uprising there. Such an evacuation was strictly against all the regulations of the 14th Air Force but routine for the 10th Weather Squadron which had its own rules. Joe agreed to take out about thirty Chinese. We couldn't take all of them over The Hump, so a number got off at Su Chow.

"One of the people to be evacuated was a Chinese lady who was persona non grata with Chiang's government. As I understood it, she was a particular friend of Chou En-Lai's. Since I was never able to repay Mao for his kindnesses, even in symbolic gifts or anything, because of Chiang's absolutely adamant position, the least I could do was to get this lady out of Chiang's China, where her life was endangered. I would be able to tell Mao that we got her to India, and maybe that would repay some of the things he had done for us.

"We put her on the plane and had a long, long flight from Tiwa Urumchi back across the desert. We had to stop overnight in Lanchow City on the way to Kunming and India, and here we faced a problem—where do we put the girl for the night?

"I guess I wasn't very practiced in the secret agent business, because I should have bunked her in our barracks with the men, and nobody would have known. However, having pretenses of being a gentleman, I took her to the Red Cross, which had a little station there. Of course, the Red Cross had Chiang's people working in it, as I found out later. We then flew her through Kunming, with the plane sealed, just taking gas and then flying it across The Hump to safety.

"When I got back to China, I found out that Dai Lee, Chiang's Chief of Secret Police, had put a price on my head, $20,000, dead or alive. I was warned, without much explanation, that I'd better get to Yenan and carry out my business without stopping in South China.

"It was only later that I finally understood why all this had happened; I discovered that it was because of my helping this woman get out of China. I don't even remember her name, but I still have a photograph of her. She had obviously broken with Chiang, and that would put her on Mao's side, for in China whoever broke with Chiang was automatically on the wrong side.

"This incident led to my having to be very careful thereafter when I was in American-held parts of China, or South China, which was very strange. I was in military uniform most of the time in China. I wore the U.S. Military uniform when I was flying around, and a Chinese uniform when I was up with Mao. My Chinese uniform had no rank or insignia, but was the same cap with little white star on its peak, and blue denims, that they all wore. Everyone looked like sacks. I only learned later from General Joe George,

who heard the whole story, why I was subjected to this. Chiang ordered General Albert Wedemeyer to get me down to Chunking, and I went through the formality of a court martial, because I was up in North China "illegally." I hadn't told Chiang I was there. Of course, to tell Chiang would have been to endanger the operations. It was a curious kind of mixed-up business. I had no problem with General Wedemeyer or his staff. They wanted to fight the war too, and in fact they were busy doing it, but they understood the political nature of the problem.

"They ordered me to Chunking , and I flew down at my leisure, because they had no planes to go up there. My plane had to bring me down, and I made sure I arrived exactly at the time that Colonel Ellsworth, head of our outfit, arrived in Chunking. I wasn't going to be there as a lonely civilian in uniform. Everything turned out all right. I explained to Wedemeyer's G-2 what we were doing, and what stations we had up there. They had never been informed about any of this. We had kept it apart from them, since it wasn't any of their business. Our job was getting the information to India and down to Guam, a cross-theatres operation. Once Wedemeyer's staff saw what we were doing, they got a "hoo chow"—a sort of passport—from Chiang. I already had a hoo chow from Mao. These hoo chows went into my boots. I wore Mao's in the left foot and Chiang's in the right, and had to guess which one to produce at the right time. I could legitimately go back to Yenan so this was all formality, because in actuality I remained on Dai Lee's hit list until I left China. The whole episode served as another example of the curious events that happened to many people in that mixed-up war.

Margin quote:

"Having Chiang's passport in my right boot and Mao's in the left boot, when I was confronted by a Chinese, I had to decide whether he was a Chiang guy or a Mao guy. I had been tipped off by our intelligence guys to ask them an embarrassing question. So I asked if it would be all right to ask them how Madame Chiang got syphilis. He said "perfect." The Mao guy would laugh like hell, and the Chiang guy will shoot you dead.

Later, I asked Dean Atcheson how Madame Chiang got syphilis and being diplomatic as ever, he said, 'Well, not from me!'"

"There was no question that Mao was a communist, in the sense that he felt they had to have some kind of communal government if he was going to rule China——he was amazing. We would eat fresh tomatoes and fresh lettuce in Yenan, whereas in Kunming we'd get amoebic dysentery immediately. We were safe in Yenan simply because Mao enforced elementary public health rules. When a farmer picked vegetables in Yenan, he had to blanche them in boiling water. The seller in the town at the stall where we bought the vegetables had to blanche them again, and it was recommended we blanche them or boil them when we got them home. It was the simplest darned public health measure in the world, and it worked. That was characteristic of Mao's thinking.

Margin qoute:

"One time I got amoebic dysentery in (Kang Me?) and had to sit so long in an "8 holer" that my comrades brought me comic books to read and I lost 25 pounds in one sitting."

"The services generally kept pretty much apart, for our own safety. Air/ Ground Aid Service was an outfit that was very important up in Yenan. They were the ones who coordinated with Mao's people on helping downed pilots in enemy-held territory. My outfit also became very important in that kind of work, because while Mao's underground would keep these men safe in the interior, there was no practical way they could march for thousands of miles to get to Allied lines. When we took in our communicators and landed at a disused Japanese air strip known as Varoff field in the middle of Japanese territory, we would unload our ten or fifteen Chinese communicators whom we'd crammed into the back of the B-25, and we'd load up with whoever had been assembled there, our own men, to carry them out to Yenan.

"In such ways, the services worked very well together. I never suffered under the bureaucracy of Chunking, except going there to be court martialled. I imagine it worked well because there were so few of us. The maximum number of Americans in Yenan when I was there was forty, and the minimum dwindled to about twelve.

"I've always thought the stories of the weather predictions connected with D-Day were grossly overblown. I would not want to say that the bombing of Japan could not have been carried out pretty effectively without this information. I would certainly say that it probably contributed mightily to scheduling and success. Weather is just a part of total planning, although an important part. More important, we were fighting a war far away from civilization, as we found in China, and we lost a lot of planes thinking they were going through a cloud. The cloud sometimes had a rock in the middle of it, a mountain peak. Weather information is quite important.

"Major Kuntz was a good-looking young Major who flew up to Yenan and signed a combat flight plan out of Sian to Duck Dai Lee, Chiang's Chief of Secret Police. In this way nobody knew he was landing in the river bed at Yenan. I'd have my Chinese communicators trained with their backpacks and radios, and we'd load them into the B-25. Kuntz would take them to Varoff field and we'd off-load them and take off immediately. Back he'd go to Sian as though he had come from a combat mission. The communicators would go underground, and some would travel up to 500 miles to the area I had assigned. I'd have to wait for their first report wondering if each communicator was dead or if he was going to come through. Then a "beep-beep" on the radio, and I could put another pin in my map. These observers had to dodge around because the Japanese would use direction finders on them. My communicators were damned brave people.

'Varoff field was built on a Chinese graveyard. The Japanese had never occupied the nearby town. It was too dangerous for them, because Mao's underground army had mined everything in the area. The peasants would drill holes in stones and put in black

powder, with Mao supplying the detonators. The Japanese would come in and sit on a stone by the roadside, and boom! So they didn't come in and it was quite effective. They also had wooden one-shot cannons made by drilling a tree trunk down the middle. Of course, it would split once it was fired, but it worked. Once I flew in with Kuntz, and we broke a nose wheel when it went into a Chinese grave. We always had a cover plane, and when it came down we sent it back to get another nose wheel. We made the decision to stay there overnight and put on a new wheel in the morning.

"Knowing that a B-25 was disabled, the Japanese thought it was worth the price of a few lives and made plans to attack. The commander of the underground army assured us he could stand them off until we got the nose wheel on. The cover plane arrived early the next morning with the wheel, and we faced the problem of getting it on the B-25. We had no tools, and there was no way to jack up the plane. The only available materials were ropes and chains gathered from nearby wells.

"The first thing we had to do was drag the plane out of the hollow into which the two main wheels had sunk. The propeller was bent in the dirt, so we teetered the plane up on its two back wheels by loading Chinese into the tail, one by one, like using lead shot to weigh something down. Finally the plane teetered and balanced, enabling us to get ropes over it. Then we put stones and great weights into the tail to keep it down. There was nothing we could do about the propeller, which was bent beyond our ability to repair it. We didn't dare fly into Yenan, because we didn't know if we could take off again with this darned propellor. For the first time we flew directly from the interior to Sian. I guess we had plenty on our minds, worrying about the propellor and everything else.

"Kuntz, experienced as he was, may have been a little shaken by our narrow escape. He forgot to turn on his IFF, identification friend or foe, when we neared Sian. A B-25 looks like a Japanese Betty, and so out came our own fighters from Sian ready to blast us out of the sky. Fortunately, they recognized the B-25 in time and we made it in. Later, on a routine mission to support me in Yenan, Major Kuntz ran into one of those clouds with a rock inside and was tragically lost.

Margin quote:

"Major Kuntz was a true hero to me. The calmness of that fellow was legendary. I was so scared I would have to wash my underwear when I got home. He and I had flown in and out of Japanese territory to land my communicators, and was killed coming home. There weren't any good maps of the mountains in those days."

Chapter Ten

Mao and the End of WWII

Perhaps the most remarkable relationship Dr. Spilhaus developed during the War years was the one with Mao in China.

Margin Quote:
"How like contemplating an empty bag it is to reach in and pull out a description of an old friend. Nothing comes out to describe one's feelings. There are no adequate words in the bag. Nothing suffices. All that comes out is inadequate, as if a hole had let the substance leak away. There are few ways to get hold of a man and make him understandable."

I gathered from Athelstan after hours of discussion just how difficult he found it to fully describe this unlikely relationship. He suggested that a non-political travelogue approach which avoided invidious comparisons might be best.

"This is a picture of what I saw while in Yenan. I call these recollections, My Time in Yenan at Chairman Mao's Headquarters."
That title sounds pretentious as if I shared a cave with Mao. Nothing could be further from the truth. My cave in Yenan was at least 500 yards from his!

"Mao was the big shot and I was just a young major with a job to do at his headquarters; but I did see him a number of times. My job depended on his good wishes and the help his troops could offer.

"There are many others, such as our downed pilots, who saw more of the interior of North China, but not many Americans were in Yenan. The number varied from five officers and nine enlisted men to perhaps 40 men total during a short peak period.

"The picture I carry with me of those days is a simple one. It is evidence of the strength and discipline that only those who were there at the time saw so clearly; and, which were the underlying factors in Mao's remolding of the new China we see today.

"The small group of Americans called the Yenan Observer Group was established to gather information to help B-29 raids on Japan from a base in Chengtu, China. The B-29s crossed the Japanese-occupied territory, which was not really occupied by the Japanese but was where Chinese control was in the hands of Mao's so-called "Communist" troops.

"China was split in two—South China was Chiang's and North China was Mao's. The Japanese occupied part of both.

"In Mao's North China, gaining knowledge of Japanese air dispositions and the rescue of our downed airmen could not have been accomplished without the enthusiastic assistance of Mao and his armies.

"Where is Yenan? About 500 miles southwest of Peking, 800 miles west northwest of Shanghai and a thousand miles north northwest of Kunming, which was the main American base and staging point for China after planes crossed The Hump (the Himalayas). Perhaps the best way of locating Yenan is that it is 800 miles northwest of where our hero and friend General Jimmy Doolittle landed after his heroic 1942 bombing of Tokyo.

"Yenan is 50 miles west of the Yellow River. The Huang Ho (Yellow River) runs north to south in that area.

"The regular front ran roughly north and south, too, about another 50 miles west of the Yellow River. About 700 miles further east was the tip of the Shantung Peninsula, the eastern-most point of China closest to the center of the Japanese Home Islands.

"Who was who in Yenan? Chairman Mao Tse-Tung died in September 1976 at 82; Marshall Chu Teh, General of the Army, died July 6, 1976, at 90; Vice Chairman Chou En-lai died six months earlier. This trio of leaders was in Yenan in 1944 and 1945 as they had been for some years. In 1976, the year of America's Bicentennial, these three giants had worked together for 40 years, ever since the famous "Long March," and they all died within six months of each other.

"Also, there was General Yeh Chin-yin, Chief of Staff, and two closely attached foreigners as advisers to Mao, Michael Lindsay (now Lord Lindsay) who was in charge of the technical radio and scripts that were Mao communications with the outside world, and Dr. Ma Hai Teh, who was medical adviser to Mao. He was an American and he became a friendly adviser to me.

"Michael Lindsay was a friend, too. He was an Englishman who had been a professor in Peking. Lindsay had attached himself to Mao's causes. Why was I there?—to get weather information from that territory to assist the bombing of Japan. First, it was for the
B-29's from Chengtu in South China; but, when I was there later, the weather helped plan the massive bombing operations of the Japanese Home Islands from Guam and Saipan.

"My assignment was dictated by geography and meteorology. Weather generally travels from west to east in those latitudes. If you begin at the west (Yenan) and run along the 37th Parallel, it goes directly from Yenan through the tip of the eastern-most point of China (the Shantung Peninsula), through the southern tip of Korea, then due east straight

to Tokyo.

"My job was to train Chinese 8th Route army communicators (North Chinese under Mao's command), who already knew Morse Code and radio operation. They had to learn how to observe the weather, so we gave them hand-cranked generators and portable radio transmitters and a musette bag of simple weather instruments. After training, we would fly them over the regular Japanese front to a North China guerrilla-held area with a disused air strip called Varoff Field. After we off-loaded them there, they made long journeys by foot, mule, cart, truck or whatever, to their assigned positions. Some traveled hundreds of miles, some never made it. What joy and relief it was to me to receive their first transmissions.

"To accomplish our purpose, we flew into Yenan in a B-25 from Chengtu. The landmark for the pilots was a beautiful pagoda atop a high hill. The air field was a river bed which was rolled regularly with a huge stone roller larger in diameter than the height of the men who dragged it back and forth. I saw Mao, in sincere symbolism of his aim toward communal work in what he called his "Work Together Party" (Kung Khang Tang), put in his stint at pulling the roller. This kind of thing was very much part of Mao's style, to emphasize personally the "work-together" aspect of his party. It was fore-runner of the famous 1966 episode, where he was widely reported and photographed swimming in the Yangtse River to give lie to rumors of his illness.

"From the airport, we went to our caves. Each cave was dug into the mountainside and had a light paper-covered wooden door at the entrance. Each cave was big enough for two cots, and I shared my space with Lt. Winston Guest of OSS. The caves were heated by charcoal braziers.

"This base was set up early on, right after Mao's Long March, when buildings in Yenan were largely bombed out. We trained the Chinese weathermen in the caves and Mao's headquarters was in caves, too.

"United State policy blocked material aid to Mao, although he was fighting the common enemy and keeping the Japanese off-balance in the north. Geography prevented significant aid from the U.S.S.R. Our sanctions and the geographic separation from Russia forced Mao to be independent of any material aid and made him strong. His transport was just too primitive to handle supplies from Russia.

"There was a constant energy crisis. Simply put, Mao had no fuel at all. Automotive vehicles ran on producer gas made from green wood in improvised generators—55-gallon drums attached behind the vehicle. Even the charcoal residue from these generators was used to heat the caves we lived in—nothing was wasted. We Americans flew in a little gasoline, used sparingly to run our eight trucks and the generator that powered our radio communication with headquarters in India. Mao got some gasoline by raiding Japanese supplies; but this was mostly on the other side of the regular front and so was used there.

"A little coal was mined in shallow underground mines with man or horsepowered bucket hoists. Factories, such as they were, were horse or waterpowered, or powered by men working treadles.

"The power for Mao's main radio station was a big, jacked-up Japanese truck. An electric generator was driven by a belt from the jacked up back wheel to a pulley on the dynamo. Fuel was from a wood gas-producer. Some large radio condensers and resistors were in big home-made ceramic vats with metal plates that slipped back and forth in dielectric brine.

"The simple public hygiene of blanching vegetables permitted the use of the only fertilizer readily available: the Chinese way, with human excrement.

"There was a hospital with 80 beds. Here, I saw the only Russian supplies—Red Army field surgical instruments. The day I was there, 30 eye operations had been performed in the morning. The training cadavers were preserved in the same kind of alcohol (Bygar) that we drank. I hope we did not drink it recycled! They were also attempting to culture penicillin.

"There was an arsenal where knee-mortars, crude rifles, ammunition and detonators were made. This arsenal was pitifully insufficient—but Mao recycled all captured Japanese equipment. His claim, "The Japanese are our supply lines" was no vain boost. Some of us have only recently discovered the common sense of turning waste to use—Mao did it 45 years ago. One example: Chinese bronze and brass coins, which would have made a treasure for museums, were removed from ancient tombs to make cartridge cases.

"Paper was made laboriously by pulping the leaves of the lilies that abounded in the vicinity. The sheets were then individually silk screened from the pulp and dried by sunshine on whitewashed walls. Thus, Mao used solar energy. Soap was made from a recipe of half mutton fat and half castor and hemp oil boiled with lye and salt. Local fiberouswood, cotton, and wool were woven with treadle power looms. Glass and porcelain were fired using local sands with clays and minerals added for coloring.

"Everyone worked at appropriate tasks, from children to the most elderly. When I visited Japanese-held territory which was really Mao-held territory behind the Japanese main front (but surrounded by Japanese), the Chinese, young and old, were drilling holes in innocent-looking stones and boulders to be filled with black powder and detonators. Any place the Japanese traveled Mao territory, they never knew which boulder at the side of the road, which stone bench by the fireplace, or which stone in a wall would blow up. Home industries behind the regular Japanese lines even made wooden cannons, obviously a one-shot proposition, but marvelous for psychological warfare.

"Chinese hospitality was heartwarming—particularly in the country. On a drive 200 miles east of north to put a weather station on the Great Wall, I discovered the friendli-

ness of the country people. They had to exercise their hospitality and show it without a common language and without the usual ingredients of food and drink. Nevertheless, their hospitality shone through. We learned it was always "tea time" for a guest even though the tea was without leaves, just hot water. We learned to enjoy this custom of serving hot water, and it must also have helped from a public health point of view. In the countryside, one could always supplement available grain and vegetables with pheasants, pigeons, and rabbits.

"On VE day, there was a party at Mao's headquarters and his wife Ching Chang danced with most of the Americans. She was nice looking then and wore a pretty dress. Some of the other ladies wore the usual quilted, more practical clothes. Dancing with a lady in quilted clothes was like dancing with a stuffed mattress!

"Once, were invited to Mao's headquarters to see a Russian movie called "A Day in Russia," produced to look like the good life. A town crier translated in Chinese for all sitting around, and Huang Hua, who was my liason with Mao and spoke very good English and later became Foreign Minister of Mao's Mainland China, explained it to us in English. We Americans then thought we should show them an American movie, and after asking Chungking for one, they sent us up "This Night and Every Night" with Rita Hayworth. I was given the task of explaining the movie as it went along to Marshal Chu Teh and General Yeh. The town crier again was listening to my explanation and translating in a loud voice for the Chinese watching. I finally had to admit even I could not follow the plot, which the crier translated to "Even Sho Jhedahn" (my Chinese name) does not know what's going on."

"On one occasion we landed at Varoff Field, almost within sight of the Japanese positions, to put down a load of our trained weather observers. The air field had been constructed over an old Chinese cemetery and when we taxied, the nose wheel of the B-25 went into one of the graves and broke. We radioed our cover plane to come down. We transferred four of the downed pilots who had assembled at Varoff to be taken out and sent them back to Sian to get a new nose wheel. This meant we had to stay overnight; but, Mao's troops were deployed to hold off the Japanese. Planning to replace the nose wheel, we loaded Balogin Route Army into the tail until the B-25 teetered like a seesaw and the tail came down lifting the nose wheel out of the grave. We then got some ropes from the wells of the village and strung them on either side to pull the plane out of the hole. We put forty Ming Bing along one side and 60 Balogin on the other. The soldiers numbered off and advanced to the ropes and on the word "la" they pulled simultaneously, both ropes broke and Min Bing and Balogin were sprawled on the ground. We shortened and doubled the ropes and added chains from wagons.

"This time, the airplane came out and was on level ground. We weighted down the tail with six huge mill stones so the Chinese human ballast could leave. The 100 villagers watching this extraordinary operation all cheered loudly. The plane, nose up, was ready for quick replacement of the nose wheel assembly. After a good dinner of chicken, honey, bygar and tiger bone, we slept soundly on boards, with no fear that the Japanese

would attack.

"Morning brought the new nose wheel and we took off with a bent propeller with some more downed pilots; one had been in North China, making his way to safety, for 98 days! Mao's cooperation saved many American lives.

"If I have painted a sympathetic picture of Mao, it was not merely because I was dependent upon him; but, because I felt that Mao was truly a great world leader. I really believe that."

"Early on, I saw what happened if one did not do this. We had a senior officer acting briefly as liaison between the fine colonels who led the group. This man's idealistic prejudice against the North Chinese were so strong they became evident to everyone. Cooperation deteriorated and made all of our work more difficult.

"For instance, Lao Keh, an irascible old Chinese interpreter, often came to our American mess in Yenan. On one occasion, he was wearing a hat as he entered the mess and this senior officer quickly asked him to remove it "as was the American custom." Lao Keh politely removed his hat, but after the senior officer had left the mess, he stated that it was we who were the guests there and wearing a hat to meals was the Chinese custom.

"We obeyed the restrictions about not supplying material aid, but I bent the rules a bit and was instrumental in getting some penicillin cultures, a great deal of atabrine, books on thermodynamics and things like that. Small as they were, these indications of good will helped us work together with the North Chinese.

"If one could describe Mao's success in one word, it would be "discipline." I expect there were severe punishments for infractions, but it seemed that Mao's rules were generally accepted wholeheartedly. For example on no occasion when we visited Mao's headquarters did we ever see any guards or policemen. What other ruler in the world would go unguarded?

"In July 1945, I had made contact with Wa Tin of the Korean Independence Movement and we had discussed putting weather stations in Southern Korea. This would have been still closer to the Japanese Islands and would have been extremely useful, but a few weeks later, the war ended. The party on August 15, 1945, celebrating the end of the Japanese War was very polite, subdued and formal."

"Mao and his generals were clearly thinking, "Now comes the next step of our interrupted long march." The lessons I learned from this period were that sanctions on nations often strengthen them. That we need our greatest ambassadors with the most influence on our policy makers where we are <u>not</u> with friends. We need to use our ambassadors not only as "Good Housekeeping Seals of Approval" in the capitals of friendly nations, but we need them most where bonds must be made from tiny little beginnings, then strengthened.

"The people in the United States who made the decisions about North China had not at that time seen or listened to reports of Mao's strengths; and, we few who had been there and seen them were duty bound not to open our mouths. Had it been otherwise, U.S.-Chinese communications could have been maintained many years before Nixon's visit.

"As in any theater, including a theater of war, your view of the scene as the curtains begin to part depends on where you sit. In North China, I had a grand seat."

Mao's ambition was to rule China. I think when you deny a person help when you are fighting the same war, you put him in the place of a second class citizen. I think anyone resents being put down that way, and when they are it leads to violent thoughts and things.

We know that Mao took over China even though we helped Chiang. Mao would have certainly taken over China more easily if we had helped him, if he had had some equipment.

He may have felt less beleaguered if we hadn't cut him off from the United States. This purge of people opposed to him may have been less violent. It might indeed have made the transition that he spearheaded in China, which I think is a permanent transition in spite of recent setbacks. I do believe that China will move towards "democracy," or possibly socialism without communism, and private enterprise.

That might have come about more smoothly had we had normal relations with Mao instead of the hiatus of thirty years.

I am not sure that China is a communistic country today. You could almost say the same thing about communist Russia. I don't believe the ordinary folk in Russia are politically minded. They had a Communistic government.

This is Monday Morning Quarterbacking, of course. My mother used to say, "If if's and and's were pots and pans, what would the tinkers do?"

Chapter Eleven
The Post World War II Era
1946-1948

Athelstan returned to civilian life somewhat reluctantly. But after the war he forged ahead to the most productive stages of his life. When Dr. Spilhaus returned from the war, just before Christmas of 1946, he went back to his professorship at NYU. He had made quite a name for himself with his combat exploits, and his scientific and diplomatic contributions to the war effort. He began being asked to be on advisory committees and continued his work of joining the universities and the government in research efforts. He reestablished his family life, and continued his work in education.

Margin quote:

"The beautiful thing about science is not all the things we know, but all the things we don't know. To a scientist, the only things worth explaining are the hitherto inexplicable. The only things worth doing are the truly impossible."

'I was in China when the bomb was dropped—I was in on all that. I knew they were preparing the bomb back in the States, but I did not know they were going to drop it on Hiroshima and Nagasaki or when. We had put this team together to develop the bomb, and poor old Truman had the dreadful decision of whether to drop it or not. Of course, he made the right decision. We had to win that war. If we had not dropped it, hundreds of thousands of Americans would have been killed in the Pacific. The war would have dragged on and on and on. I suppose we would have won it in the end, but it would have been so costly, that the decision was absolutely right. You can't second guess. The decision to do the research in the first place was a good one. '

Margin quote:

"Science is amoral. It is only when society applies scientific discoveries that questions of right or wrong come in."

"Those people who had guilt feelings about working on the atomic bomb were full of baloney. The inventor has nothing to do with whether his inventions are used for good or evil purposes.....he just invents. There have been some screwballs who say research shouldn't continue on these subjects. They try to ban research in areas they don't agree with. For example, the automobile is a wonderful boon to mankind, yet can the inventors and builders of the automobile be held responsible for the careless slaughter of drunken drivers on the highways? Lately, there has a great furor about genetic research. How

ridiculous! You can't stop people thinking about anything. Censorship of what the mind applies itself to is the worst kind. You can't do that. You can control how society uses the outcome of the inventions—you should be able to control that—even though the human race doesn't do the controlling very well. People can create LSD in their bathrooms and use it for bad purposes, but that's not the fault of synthetic chemistry. It's the same kind of chemistry that is used to make healing drugs.

"I didn't come straight back home from China. I had orders to go to Switzerland and then go into Germany in connection with an operation known as Operation Paperclip. This was where we tried to persuade the great German scientists to come over to our side. The Russians were doing the same thing. The big game was to try and grab the best scientists faster than the other guys.

Margin quote:

"Many people wonder why von Braun and the other German scientists we brought over after the war were not considered war criminals. They were completely different from the war criminals - they worked for their country. The others were policy makers - the scientists were not."

"It's not difficult for a scientist to change horses. When we brought the German scientists over after the war, a stupid little Vice President questioned having a German scientist at Minnesota. Many of the scientists had had to pretend that they were Nazis, but they were good people. They had to work for their country just as we did. When the Vice President made his idiotic remark, I simply replied, "The war is over." Those of us who had been in the war were much more tolerant than those who were not.

"I was sent into Germany because I could speak German fluently, and was well known there in scientific circles. That made me a good candidate to approach these scientists. I was responsible for talking quite a few of them into coming over. I traveled all over Germany during this trip and I wound up in Hamburg, where I visited the Weinligs with whom I had stayed before going to Junkers.

"I have taken part in three wars in my lifetime—served in three armies, and I have never regretted a minute of it.

"During the war, my wife and the children stayed at our home in Fieldston, New York. Though Mary had been a very faithful writer, letters took a long time to arrive, particularly to Yenan. Despite her writing, we seldom received mail up there. Our family was growing—we had four children. Fred was born in 1938, Molly in 1940, Nellie in 1942, and Margaret Ann in 1943. A fifth child, Karl, was born in 1947.

"I suppose Mary went through a lot of misery during the war. It must have been difficult for her because of the way I was jumping around, never being able to say where I had been, where I was, or where I was going, or what I was doing.

"One loose end left over from the war was finally wrapped up in 1946. I was in uniform, a Lieutenant Colonel with a lot of decorations, because I'd been overseas a long time. I asked Colonel Marcellus Duffy and a colleague, Major Peterson, to be witnesses for me at Columbus Circle when I took the oath of American citizenship. I hadn't passed any exams or anything, but I had to become a citizen because I knew too damn much to get out of uniform. I think it would have been awkward if I had remained a British subject, and I had no objections to becoming an American now that the war was over.

"The three of us went in—a full Colonel, a Lieutenant Colonel, and a Major. I had put on every medal and decoration that I could legitimately wear to impress the court and to get to be a citizen with a minimum of fuss. The judge took one look at us and said, 'Wait a minute.' He took us into his chambers, because in open court it would have caused too much of a stir to perform the ceremony. 'Now, which of you wants to become a citizen?' I told him that I did. The judge looked into his little book, and announced that it was impossible, because I could not be an Air Force officer unless I was a citizen. I replied, 'Well, I am, and I want to be legitimized.' He did it forthwith right there in his office.

"In 1946, I had the privilege of meeting Dr. Albert Einstein. I was a little kid professor during Einstein's time, and I met him through Von Neumann after WWII. Van Neumann was a good friend and associate with whom I was working on computer weather prediction. I only saw Einstein once or twice, but it was a great privilege to meet him. He had been talking not only to me, but to other people about how a sailboat made way against the wind. He got it from one guy, then he asked me, "Do you sail?" I replied that I did, and went through the whole thing again. It was extraordinary to me that such a brilliant man was interested in a simple thing like that. He lived in the ethereal values of mathematics, and this was such a simple thing that he never bothered to understand it. I think later on he actually sailed. It took quite a while to help him understand it, but we talked vectors and things, and then he understood it completely. He was just like a little kid, full of glee at finally understanding sailing.

"After the war, I went back to my job at New York University. The University was in the process of demobilization, getting the campus out of the meteorological training program I'd begun for the military. It had taken over almost the whole campus, and it was now time to get back to normal. Gardner Emmons was still there, as was Raymond Montgomery. The old place was still going, but we had to retrench and retread. I had been chairman of the department I had started, and when I got back, I found that dramatic changes had occurred.

"The structure that Vannevar Bush of the Office of Scientific Research and Development had put together to weld the universities in with the war effort had worked magnificently. People like Jerome Hunsaker of MIT contributed to this achievement. It was a great tribute to Hunsaker and a lot of other good people, because anybody would be honored to work with him. I'd known Hunsaker up at MIT. He was the fellow who was first to hear

of my inventing the Bathythermograph. I had entered his office, a youngster, starry-eyed, saying, "Every oceanographer is going to want one of these. Would MIT want to patent it for me?"

"Hunsaker had taken my idea to the MIT patent committee, after which he wrote me a letter stating, "We agree every oceanographer will want one, all six of them." That's how small oceanography was in those days. He concluded, "You may keep the patent, MIT has no interest." Well, as it turned out, during World War II, thousands of Bathythermographs were made. The patent turned out to be quite valuable, and Hunsaker and I have laughed about that ever since.

"After I went back to New York University in 1946, I found that Federal funding of research in universities had been invented. Although there had been some grants to universities before World War II, they were really nothing to speak about. We soon became experts in contract research, whether for good or bad, I don't really know.

"At that time, though, it seemed mostly good, and because of my military connections, I was made the first Director of Research at NYU. That may not sound like much now, but after two years, I had built up a two-million-dollar research factory at The Heights. In fact, once again I'd practically taken over The Heights. Then I did what I later came to think was a dreadful thing. I paid the people who did my research on contract more than they received from the academic side. In effect, I raised their salaries. In that way, I could get the best people on the research. Later on, when I was a Dean, I swore I would never have a Director of Research, because he had ways to skim off the cream of the crop. This tactic happened in lots of universities—men going into contract research and as a result lost to teaching. Nevertheless, I was on that side, and I made a great success of contract research. I was still able to do some teaching in meteorology, though not very actively, and I still worked with the Air Force.

"The success of teaming up university people with government in wartime was apparent to Vannevar Bush and the rest of us. We recognized the importance of continuing this cooperation in peacetime. Bush set up advisory boards using the professors in what became the Department of Defense, a practice which had been successful. Then, the government began funding universities to do military research, veterans administration, and all other kinds of research. We created some interesting programs and projects. My newly formed research division was engaged in studying how to make better artificial limbs for amputees, for the Veteran's Rehabilitation Administration, with Dr. Howard Rusk of NYU's famous rehabilitation unit in charge of the program.

"Artificial limbs have come a long way. Before then, there hadn't been so many amputees, and I suppose a patient got a wooden leg that was little better than a peg leg. That was the state of the art. We had people working on instrumented platforms so we got accurate pressures and everything, which led in time to these marvelous limbs companies produce now.

"During the time I was at New York University, the South African government requested that the State Department send an expert there to reorganize their meteorological service. Dr. Francis Reichelderfer, head of the U.S. Weather Service recommended me, so Mary and I went down for six months in 1947. I took a leave from NYU.

"General Smuts was still Prime Minister. This is the same General Smuts who had interned my father during World War I and then subsequently appointed him Ambassador to the Hague. On seeing me, he roared with laughter. He said, "We ask the mightiest technological nation in the world to send an expert, and who do we get?—a boy from across the street." I had only been an American citizen for one year at this time and I was damn proud of my appointment from President Truman.

"During my visit, the South African officials treated me well. There was a royal visit of King George VI and Queen Mary, and I was given the opportunity to join their party on the Royal train as it passed through the native territories. One great African chief rose to the occasion and greeted the King and Queen with an hour-long oration in Swahili, which King George and Queen Mary had not learned in their good schools in England. Simultaneous translation had not yet been invented, but at the end, a broadly smiling interpreter got up and translated the speech. "The Chief there he say he mighty damn glad to see you, King," he said, and sat down. I thought it an excellent translation, and everyone appreciated its brevity.

"They gave me a good time in South Africa. I went all over the place, including Tristan da Cunha and other outlying islands—weather study being a lovely excuse to go to unusual places. They put one-third of the South African Navy at my disposal, which was then a total of three frigates. I made a report, and they fixed up their Weather Service.

"I then went back to New York University. Experiments were being conducted flying balloons across the Atlantic. The Japanese had flown fire balloons from the Japanese Islands to the Oregon forests, and we were emulating these balloons, thinking we might use them for meteorological purposes. The prevailing winds were west to east, and we succeeded in having controlled altitude balloons that landed in Europe.

Margin quote:

"At this time, around June 1948, Henry Hartig, head of Electrical Engineering in the Institute of Technology at the University of Minnesota, came to see me at NYU and asked me if I'd be interested in becoming the Dean of the Institute. I, being a typical Easterner, didn't think there was much west of the Hudson River, other than the University of Chicago and maybe Cal Tech. I didn't know about "deaning", but I had demonstrated I was a fairly good administrator, so I said yes, I'd be interested. Then I promptly forgot all about it."

"I went to London as a consultant to my old buddies in the Air Force, and we were invited to a party at the Ministry of Supply. One of the British admirals at the party told

me I was going to receive the Order of the British Empire for drawing the attention of the British to the Bathythermograph at the beginning of the war; but, he added that he wished I had strengthened the winch wire that lowered the BT from the ship because so many of them were lost when the wire broke. "Hell, Admiral," I said, "You know I get a royalty on each one that you lose." I never got the O.B.E..

"During this party, I received a message saying I should call President Lewis Morrill of the University of Minnesota. The cocktail party was going on at six in the evening. It was Friday. I then recalled that was the day the Regents met, and Morrill had told me they were going to make their decision. I hadn't let him know whether I'd accept or not, and he didn't know what to report to the Regents.

"Six P.M. in London was eleven A.M. in Minneapolis, so I asked the young British Commander if he could put through an urgent call to the University President. I said, "Pull him out of that meeting he's in. It's about that, anyway." He answered, "Yes, Sir, His Majesty's call, priority"—and boy, did that call zip through.

"President Morrill, whom I'd get to know and admire later on, accepted the call and asked where I was. I replied that I was in London, and he nearly fell off his seat. People didn't just pick up the phone and call from London so casually in those days.

"He told me that the Regents were meeting and wanted to know if he could propose me for Dean at the University. "Yes, by all means," I said. "By all means, put me up for it." I returned to the U.S. and found I'd received the appointment, to take effect in six months, at the beginning of 1949.

Chapter Twelve

The Minnesota Years
1949-1967

"The time you are living in is always exciting. It is the only time you have."
Athelstan Spilhaus

The Minnesota years were by far the most productive and satisfying for Dr. Spilhaus from a professional and personal standpoint. This was a time when his tri-continental upbringing and lifestyle became most useful in his life and work. He was brought up in Africa, educated in Africa, Europe, and the United States, and had an entrepreneurial background from the Spilhaus side, and an intellectual and educational background from his mother's family, the Muir's. He became more and more Americanized as he became well known in industry, science, academia, government, international diplomacy, politics, and the world of arts. He became a leader in America's entry into space. His involvement in world events at this time became his life.

"After the War I kept up my military connections in science and enjoyed it. I was in on such things as the first ice island in the Arctic that was sighted by Joe Fletcher, who had been an officer with me during WWII. He was doing these patrols from Alaska, and he sighted Fletcher's Island which is still floating out there somewhere. Such ice islands move circularly in the Arctic Ocean, and Fletcher's Island was in an ideal place for research. The Air Force slapped a security lid on it, and since I was Chairman of the Scientific Advisory Board at the time I declared this ridiculous because of the size of the island. The secrecy was broken, and we were able to use it for research. We have since identified more of these islands. They were so interesting for study, that I often took time from my academic duties, got into uniform, and went up to Alaska.

"Until then, I'd been used to this life of traveling to Europe with the Air Force and doing many varied activities, which people do much more today. In those days it wasn't so common. I took over the Institute of Technology on January 1, 1949, and no sooner had I settled in my seat than I found I had a commitment to go to the Pacific and New Zealand in February.

"I decided, if they appointed me, they'd better get used to my way of life, so I went, having first stirred the pot nicely at the Institute. The only thing I did in the first month was simply to say to the faculty, "I have to go on this trip, and I'm not going to change anything, or stir up anything, prior to my leaving. I'm simply going to say that I do not know what the rules of the faculty are in regard to many things, but you do have rules. I have noticed that in flunking students for low achievement, the rules have not been applied precisely in every case." I paused and then said, "They will now be applied."

Then I left for New Zealand, where I had a hell of a good time.

"The New Zealand trip involved working in geophysics. We had a group called the Pacific Science Council, which was trying to help advance science in the Pacific, and incidentally help itself by getting to do scientific research there. The meeting was not only enjoyable, but included a few surprises, such as the little volcano on the North Island that conveniently blew up for us.

"I went around with Sir Peter Buck, the Maori anthropologist, who had been honored by his people because he was the first Maori to be knighted. We were standing in a bar in Napier, having a gay old time, when an earthquake occurred and rattled the bottles, making the place sway quite a bit. I don't know what force it was; perhaps five or six on the Richter scale. The thought went through my mind: is it really shaking, or am I?

"The Institute of Technology at Minnesota was in the upper ten or fifteen best technical schools in the country when I was there, and some of the departments were the best. Chemical engineering was outstanding in the country. Physics was excellent, because we had Dr. Al Nier, who did the first separation of uranium. We had John Williams, a pioneer in linear accelerators. We had some outstanding people at the University, and I just built around them.

When I started as Dean, the salaries were absolutely pitiful. I think I received, as Dean, $12,000 a year which actually was very good in those days.

"The first thing I did was to pick out four or five people on my faculty that nobody could say were not preeminent. These included Lee Smith, a Nobel prize winner who had first synthesized the vitamin; Lorenz Straub, the outstanding hydraulic engineer; Al Nier, for separation of uranium, and Bud Davis, a mining engineer who first produced taconite pellets for making steel. I recommended that their salaries, for the nine-month terms, be elevated to above mine for my twelve months as Dean.

"I did this on purpose to establish a principle in which I firmly believe: that good people in science shouldn't have to become administrators to command their worth. The idea worked very nicely, because it costs very little money on a big faculty to elevate five people, and the payoff was that every good person around said, "If they can do it, that can happen to me, too."

"Having mentioned the fine people I hired for our faculty, it would give a false impression if I omitted how I really goofed once. In the case of senior positions, we always interviewed the man personally, but when a position was needed to carry the load in very large undergraduate classes in mathematics, physics, and chemistry, we had to accept credentials only. We hired a young assistant professor of chemistry with a common name like John Smith. Smith had flunked out of Columbia's graduate school and had

written for his transcript. Because of his common name, he had received the transcript of a brilliant John Smith. He had traded on this inadvertent benefit for a year or so from college to college. He also told me he had learned the other John Smith had died, so he felt safe in using his records. I suggested he try a totally different walk of life.

"Well, our President, Lou Morrill, was a great favorite of mine, and I felt I should immediately tell him about the Smith episode. So I went to his office and said, "Lou, I really goofed this time." he said, "I can stand it. What have you done now?" "I hired a dead professor," I confessed, thinking to shock him. Morrill's face crinkled all over into a broad smile. He said, "Spilly, with some professors, how can you tell?"

"Our move to Minnesota made us very happy, so we found schools for the children even before we found a house. Mary thought I was slightly eccentric not picking a house first, but then she often thought I was eccentric. The first school we chose was the St. Paul Academy kindergarten for Karl. We chose Summit School for Molly and Nellie, and Margaret Ann was in another place. The big St. Paul Academy where Fred would go was in still another location. I said, "Fred is old enough to ride a bicycle to school," so I took a compass and centered on St. Paul Academy, drew a circle, whose radius was the distance for a reasonable bicycle ride. The girls were too little to ride bicycles, so we drew a smaller circle around that school for them to walk to later on. Then we drew a very small circle for little Karl, who was only three or four— kindergarten—and where the circles most nearly intersected, I said, "Here's where we'll look for a house."

"The location happened to be in St. Paul on Goodrich Avenue, so we found a house there. We had great fun doing this planning. We didn't have much of a backyard in St. Paul, so I bought twenty acres of land in south St. Paul and we called that our backyard because it was only five miles away. I got an old caboose from John Budd, the president of Northern Pacific, and put it in the backyard and took the wheels off. We'd go there in winter and light up the wood stove inside. There were ladders for the trainman, going over the top, which we used for a jungle gym. We had great fun in our backyard.

Margin Quote:

"My years at Minnesota were exciting. It was a challenge to take over an engineering scientific school, which had some very good people in it. It was a pretty darned good state university, so there was something to start with and try to bring it up to excellence. The way I bullheadedly went into these things, I know I irked all kinds of people, but standards did come up very markedly."

"I also had other jobs at the same time, but the University was generous in giving me flexibility. For example, they let me take off for Paris four months of the year for UNESCO meetings, and there were frequent conferences called by various U. S. government scientific agencies.

"When I went to Minnesota, I got to know the news people very well indeed. I knew John Cowles, and Bill Stevens, the owner and editor respectively of the Minneapolis Star and Tribune. They just loved it when I had any story. They would pick it up, and that was good for the University. We provided stories about the first computer we put in at the University, which took place in 1951. People were amazed then that I would spend $61,000 on a little electronic computer—think about today.

Margin Quote:

"When I was Dean at Minnesota, my job was to facilitate the people under me and to get them support from Washington. I helped others to get to Washington—delegating always. I became an ideas man. I began to pry basic science out of the labs and into the real world. No one should go so far as to say that I am an eminent scientist. My contributions were more in the appreciation of the work of other scientists—the encouragement of their work in a meaningful way."

"I really had a hard time with the football issue at Minnesota. One of the excesses of football mania was the Rose Bowl. Minnesota was very good then, and it got a bid to the Rose Bowl in 1961. Many of the Regents flew out to see the team play. Now, I had them where I wanted them. I said, "How can we afford to fly the Regents out to see the Rose Bowl, when I can't get $20,000 for a new electron microscope in my laboratory?" Well, that hit the headlines. Here was a professor criticizing the Regents.

"That happened in 1961, and in 1962, Minnesota again went to California for the Rose Bowl. I was then at the World's Fair in Seattle, preparing it, and the press in Minneapolis, as soon as they learned Minnesota was again going to the Rose Bowl, called me and said, "Now what comment do you have on this?" I replied, and this was absolutely tongue in cheek, "All I can say is that last year, not all the Regents went to the game. I don't want to see such spotty attendance again."

"At the end of my time at Minnesota, because I'd been such good copy for press and television, a couple of chaps started a radio program that farmers could listen to at five o'clock in the morning while milking their cows. I was immortalized in this comedy as Professor Milkhaus who pontificated on the most unlikely subjects, such as daylight saving time and "udder" topics. I only heard the program once—when I stayed up all night to catch it."

Margin Quote:

"The great President of the University of Minnesota, Lou Morrill, had only nine deans running the school. When he left, the new man expanded that number to fifty. You can't get anything done running a university by committee. That's when my interest in being a dean at Minnesota declined.

"I had only one case I can remember where I really regretted what I'd said, even though it was true. When I resigned from the University of Minnesota, I gave an interview, and I said that although I'd had many wonderful years there, I did not regret going because I felt in those times, 1967-68, the university was bogging down into "a great grey green mediocrity"—so of course, 'great grey green mediocrity' was the phrase the newspapers made the headlines."

"The interview went on as to why I thought that. I said the multiplication of vice presidents, so that a dean like myself no longer could even visit the President, put all kinds of bottlenecks in the way. I spoke about it then, and of course it's worse today, the idea that decisions were not made by the leaders of the academic departments for the university any more, but by committees—appointed committees, faculty committees, student committees— everything. I saw it coming, and it was true. I had been very decisive, and I wouldn't want to operate as a dean today or even as a president, because they really can't make decisions themselves.

"In any event, I regretted having said that, for the simple reason that it was the wrong time to say it, when I was leaving. It was absolutely true, but I should have said it a year earlier. I don't think one should ever say bad things about a place when leaving it.

Chapter Thirteen

Atomic Testing -1950

"In 1950 I took a leave from the University of Minnesota for a year. I shuttled between Washington, Minnesota, and Nevada. That was only two years after I had taken over the deanship. Taking leave prompted stories of a secret mission. I had been invited by the Secretary of the Navy, Matthews, to go to Washington—but it wasn't concerning the oceans at all, even though everyone thought it was. Oceanographic research was a very astute kind of cover, though, because what I was going to do was to direct the first atomic bomb tests that were military weapons effects experiments. The Atomic Energy Commission had done all the bomb tests up until then—Bikini and others, with military support. These tests were to be dedicated to what the military wanted to know about the atomic bomb, whether it would knock down concrete structures, what an underground shock would do to dams and foundations, and other targets.

"Admiral T.G.W."Tex" Settle, an expert at balloon ascensions, was the military commander of the task force that was supposed to go to the Aleutian Islands to conduct the tests, and I was Scientific Director of the experiments.

"Tex and I flew up to Amchitka, Alaska, to make a survey of where we were supposed to bang off one underground and one surface bomb. It was to be the first underground bomb test, and we went up in a B-29 and had to make a "controlled crash" landing. Amchitka was not a very hospitable island—the wind sometimes seemed to blow from opposite directions at 100 miles an hour. Tex worried about his part of it, the logistics of the operation and the hazards of what was supposed to be a scientific military experiment, and the hazards to the men we'd be taking up there.

"I'd be taking up about a thousand scientists, and he'd be taking up thousands of troops to take part in the exercise. From a technical point of view, on the advice of geologists and others who came up with me, the whole project appeared absurd, because it was not a homogeneous geological terrain, so the scientists couldn't really predict what a bomb exploding underground would do. We also feared it might cause a submarine landslide, creating in its turn a tsunami which could be disastrous to shores as far away as Hilo, Hawaii, and even the northwest coast of South America.

"There was also concern about the large colony of Aleutian sea otters, the only sea mammal smart enough to use a tool. They lie on their backs in the water with a stone on their furry chests and crack oysters and abalone on it.

"When we moved the tests to the United States, to my surprise I became the hero of the

conservation movement. Some people were more concerned with the plight of the sea otters than with the devastating effects of a tsunami on human beings. Admiral Settle, to my everlasting admiration, knowing it would abolish his task force, supported me in going to the Atomic Energy Commission and suggested that we'd better change President Truman's mind—Truman had said no more tests in the United States—and bring the test back to Nevada.

"Getting that decision reversed was quite a battle. Truman was strongly opposed to exploding any more nuclear devices in the continental United States. Admiral Lewis Strauss was then Chairman of the Atomic Energy Commission. I beat the table arguing that despite the military need of this experiment, it would be hopeless to do it in Amchitka. Finally, Sumner Pike, one of the commissioners, said to his fellow commissioners, "Gentlemen, I'm convinced by what Dr. Spilhaus has said to us over the past few weeks. For my part, I'm prepared to eat crow, feathered end first." The AEC took the problem to Truman, and the whole affair was resolved. With AEC assistance, we prepared the testing grounds at Yucca Flats, Camp Mercury, in Nevada.

I was mixed up in the Korean war. Throughout the 1950s, I tried to keep one foot in the University, one foot in industry, and one foot in the government, not too bad a trick with only two feet. I went over to Korea in a group of industrialists, really hot shot electronics communications people, for Secretary of the Army Frank Pace. We went on a very plush expedition over there, and our job was to go out to the front lines. Pace put it very simply, "Look, the Air Force has all the sophisticated gear and the Navy has all the sophisticated gear, and what have our Army boys got? They've got a bag of beans and an M-1 rifle. You hot shots go over there and see what sophisticated gear can do for the Army."

"This was really true—the army had little communications gear for patrols. The front line in Korea was as far as a soldier could see, so close that the North Koreans could be seen on the other side. The result of Pace's complaint was a study called The Eyes and Ears of the Army, "TEEOTA," and it stimulated the development of snooperscopes and special little radars, backpack stuff, which resulted in extending the battlefield from ten or twenty miles up to 200.

"Because we were going straight to the front lines, we had to be put in uniform, otherwise, we could have been captured as spies and shot. We got simulated rank. I was Vice-Chairman of the group, and got to be a Two-Star General. Then I had to rank with the commander of the forces, so for two or three weeks, I was a Three-Star General. I wore the uniform until I got home.

"We went over in Secretary Pace's plane. He told us to keep it——a Constellation, and very comfortable. There were only about twenty of us in it, and they gave us a marvelous place to stay. We were representing the Secretary of the Army, and that was pretty high stuff, so we were treated beautifully.

We took light planes to the front every day—we commuted to work. We lived in a palace in Seoul, up on Walker Hill, and a light plane took us up to a landing patch just outside the front. Then, the helicopters would pick us up and drop us on the front line bunkers, and, of course, mortar shells were coming over all the time. We were under fire from the North Koreans———that was kind of hairy, to say the least.

Margin quote:

"In 1950, the copters were fairly primitive. We were pretty much outside, no fuselage, no bubbles yet; just two seaters, and you sat on the framework.

"Even though we had the best rations there, it was still pretty sparse, and so to vary the diet, I would pal up with the British. They didn't have all the canned stuff we had, which got very boring. The English lived off the land, and would send a little party up in the hills and shoot some goats, which made a great curry. We would all go over to their mess and have them over to eat our Spam. I thought how much more sensible they were to live off the land instead of all the expense that we went through to ship that lousy Spam.

Margin Quote:

"The disgusting thing about the Korean war, in my opinion, was that it was really the UN that was at war. We were fighting with our hands tied behind our backs. The State Department was always wrong. The State Department thought China would come in on the side of Koreans. A lot of Chinese fought for the Koreans, but China wasn't officially at war, and they were so damn busy at home with their own business, that they weren't about to get into the real war, or declare war on the UN. The State Department made the same mistake in Vietnam."

"I went back to Minnesota after the Korean War ended. Later on, the University of Minnesota received, through government funds, a contract to reestablish the University of Seoul, its engineering school, medical and public health facilities, and its school of agriculture. Three of us deans from Minnesota went over there and began building up these schools again, so I maintained a little contact with the Orient."

Chapter Fourteen

UNESCO

"I never was politically very active, but when Dwight Eisenhower was running for president, I became involved in his campaign. He was not on the ballot in Minnesota. I didn't do very much—I agreed to pay the telephone bill for the write-in campaign. Although it wasn't much, it identified me with helping them. Future Supreme Court Justice, Warren Burger, was one of the organizers of the write-in campaign.

"People came to me after Eisenhower was elected President and said, 'Would you like to be Assistant Secretary of the Army?' and offers like that. I said, 'I really enjoy being at the University——no thank you.'

"Then a great lady in Minnesota, Elizabeth Heffelfinger, who was very active in the United Nations Educational, Scientific, and Cultural Organization, proposed my name as the nominee for the first official United States representative to the UNESCO executive board. She was the wife of Peavy Heffelfinger, the son of 'Pudge' Heffelfinger, the famous Yale football player of the 1880s. I thought that appointment would be fun, because it was not a full-time commitment. It tied in with academic work, I thought, and so I took it on and went down to the World Conference at Uruguay in 1954.

"When I arrived in Uruguay, I was quite embarrassed that our State Department's forty-man delegation, had hired all the big cars they could. The Russians had tried to do the same thing, of course. The smaller countries had a hard time finding adequate transportation for their delegates.

"I thought it would be nice if I would drive some of the smaller nations' representatives up to the Palacio Legislativo, where the meeting was held, in one of the U.S. cars. So when this great big car drove up with the United States and UNESCO flags on it, I looked around to see if anybody in front of the Majestic had on peculiar clothing. In those days, the Burmese Ambassador to UNESCO wore a skirt, while some of the Africans were in leopard skins. Indians wore the Nehru jackets; and so I'd pick up anybody who was in strange dress. If they wore ordinary clothes, to hell with them—they were probably civilians or bureaucrats. One day, I saw two fellows out there, one with a red beanie on his head, and the other with a black beanie. They also wore what looked like night dresses, so I beckoned to them and assuming they must be UNESCO, invited them into the car. My total Spanish at that time, and it hasn't improved much since then, was 'Yo ambajador de Estados Unidos.' I introduced myself, and this man came back in perfect English, 'My name is Martini.'

"I chuckled and said, 'Who's your friend, Rossi?' This brought a positive reaction, so I

continued, 'Where do you come from?' The man answered, 'Oh, I'm from the Sante Sede.' Now, can you imagine, I was so ignorant I didn't even know where Sante Sede was, and I thought, that's one of those early concocted little places in Africa, and let it pass. We had a nice drive up to the Palacio. Martini was pleasant, we had a friendly conversation, and we drove up and deposited him and his companion.

"At the U.S. delegation meeting, which we always had about five o'clock in our hotel, I told the story of my ride with 'Martini', just to liven things up a bit. The protocol officer, who had nothing to do, became very upset. He said, 'Oh, this is terrible, we may have insulted the Vatican. The protocol officer then explained that Sante Sede was the Holy See. I'll get a telegram off to Dulles, eyes only.'

"'Nonsense,' I said. 'We had a good time. I'm sure he's friendly.' He mumbled, 'Dreadful mistake,' and all that. The next morning, hand delivered, came an engraved card inviting me to the Papal Nunciate, where the Papal Nuncio lives. I showed this to the protocol officer and said, 'Look, in case I goof again, why don't you come along?'

"We arrived at the Nunciate, walked in the door, and joined the receiving line. Both Cardinal Montini—I'd learned his actual name was Montini—and the Papal Nuncio were there. The Cardinal stepped out of the receiving line, came over to me—the protocol officer was behind me—took both my hands in his, and shook them warmly. He said, smiling, 'You know, at the residence of the Papal Nuncio, we generally only serve wine, but for you I have a dry martini,' and the Swiss Guard brought a silver salver with a lovely frosted cocktail shaker. I said to the protocol officer, 'I guess you can go home.'

"I got to know Cardinal Montini pretty well, and we discussed all kinds of things, like birth control, and the touchy things with the Catholic Church. After all, we were there for science, education, and culture. I found him extremely open-minded. However—and I don't know about the politics of the Church—Montini must have been influenced by the Cardinals, because as Pope Paul VI, I don't think he was as progressive as my association with him for a month would have led me to believe. In fact, he was quite the other way. This, of course, happens when our country gets Presidents, and their performance turns out to be different from their earlier record. It's the 'prison of the office.'

"My time with UNESCO was quite interesting. It was very much a knee-jerking liberal do-good organization. The reason I took on the job at Mr. Eisenhower's request was that the Russians were using it as a marvelous "sloppy jelly thing" you couldn't grab onto, to get whatever they wanted to do in any country, under the guise of technological aid or whatever, and so I was, in that part of the Cold War, trying to offset such Russian propaganda efforts.

"The eighty or so nations in UNESCO would elect the eighteen-man executive board from nominations by the countries. Of course, the U.S., U.S.S.R., and the United Kingdom nominees were shoo-ins. I served for four years. I was elected unanimously to a second term at the New Delhi meeting, and I could have gone on forever, I suppose, in

United Nations affairs; but, I found that generally the UNESCO way of doing business was like elephants making love. It's done with a great deal of trumpeting at a very high level, and then nothing happens for two years.

"I spent three months a year in Paris or some other conference city. At the New Delhi meeting in 1956, I was up for re-election to the executive board. Your government puts you up, and then you get elected by the member states, then about 120 or so; and, of course, more now. At New Delhi, I received a rare distinction as the first American ever to be elected to the UNESCO Executive Board by unanimous vote. This meant that somehow I had secured the Iron Curtain votes. Of course, the votes didn't mean very much, because the United States, the Soviet Union, and Great Britain had to be on the Board. Nevertheless, it was a small triumph, and later the representative from Czechoslovakia explained it to me. As did other groups of nations, they had caucused and, as he put it, 'We have seen you for the past two years and have determined that you are a genuine scientist.' Then he put in the needle, 'Not just a State Department stooge.'

"I at first found the UNESCO work exciting. To a novice ambassador, it looks like such a grand and glorious assignment. Actually, Ambassadors, even at that time, and it must be more so now, were "tape recorders." Some third secretary at a desk in Washington would send a telegram, to which he signed John Foster Dulles' name. The Ambassador was stuck with the order when he was overseas. That was supposed to be his guidance. Nobody really knew what was going on. The Ambassador isn't a fellow who thinks for himself—he's got so much damn guidance.

"Henry Kissinger did a great deal to diminish further the importance of Ambassadors; but, at least he was on the spot very often. In fact, he was usually on the spot. Whether it was good or bad, I don't know. I think now the importance of ambassadors has been diminished so that the job requires a very patient man, which I am not. I enjoyed arguing the position of the United States, when I happened not to have instructions from Washington. Very often, the instructions from Washington were contrary to my own beliefs.

"For example, I had to fight for four years against the admission of Mainland China into the United Nations. Of course, the "camel's nose in the tent," for China to get into the UN, was through UNESCO, which was a much more liberal kind of organization, even more so than the main body. The Russians argued, how could it be called the United Nations Educational, Scientific, and Cultural Organization and exclude the millions of people in China? This viewpoint was, I must say, persuasive to me.

"John Foster Dulles, President Eisenhower's Secretary of State, had written <u>War or Peace</u>, published in 1950. He was at the time inclined toward the recognition of mainland China in the UN, taking the position that "...the United Nations will best serve the cause of peace if its assembly is representative of what the world actually is, and not representative only of the parts which we like." I had foreseen in 1944 that Mao's government would become China 'as it actually is.'

"By the time I got my appointment from Eisenhower in 1954 as United States Representative to UNESCO, Dulles had reversed his position. In the preface to the 1957 edition of his book, he wrote,
' . . .so long as the Chinese Communist regime shows the character-istics which have been described [military possession of North Korea and Tibet and threats against Taiwan] it ought not to be given representation in the United Nations.' This was after Russia's aggression in Hungary and the British, French, and Israeli attacks on Egypt! Were the actions of these UN members respectable and responsible? I had to argue against the admission of China to UNESCO time after time, the same reiterative arguments, which were made Pro Forma.. Dulles was a very dull man, in my opinion. We got along, but not easily—he wasn't an easy man.

"At the UNESCO meetings, the Russians would regularly come out against the United States' position. The same old tirade, how can you call this a United Nations when 600 million Chinese are excluded? At that time, the schism between the Chinese and the Russians hadn't developed. I would have to make the legalistic point that the United States always used. I forget what it even was, but I didn't believe what I was saying. I had to do it over and over again, as the Russians would use theirs over and over again.

"I got to know Vladimir Kemenov, the Russian Ambassador, who was an art historian. We were quite friendly outside UNESCO. It was getting late one day, and he started his usual tirade about the admission of China to UNESCO. I interrupted him rather abruptly. I said, 'Mr. Ambassador, both of us have made our speeches, you your speech, me my retort on behalf of the United States, many times. Can we just take this as read? You sound like a broken phonograph record, repeating it time and time again, and I don't want to sound something like another broken phonograph record.' He said, 'OK, we'll take it as read.' A friendly decision, considering the seriousness of the issue to our countries. Such behavior was what annoyed me about being an Ambassador. We had to say things sometimes that we really didn't believe.

"Henry Cabot Lodge, the United States Ambassador to the UN, had to make the same speech in the UN, giving the same position. Before I went to the World Conference in New Delhi in 1956, where I thought the admission of Red China might be difficult to prevent, I went to see Lodge. I said, 'We're going to have a world meeting in New Delhi, and the issue of China is bound to come up, and New Delhi is a kind of fertile ground for it to slide through.'

"Cabot said that he had the same feelings I had. 'It's not an important issue, except that our people in the United States have not been prepared for it.' He advised, 'Delay it and fight it all you can, and if it goes through, it's probably the best thing that can happen.'

"I thoroughly agreed with him; but, it was funny to see two high officials who really weren't in sympathy with Mr. Dulles' adamant stand about retaining the isolation of China. Red China's admission didn't go through in my time, of course. It took much longer, until after Nixon made his famous visit.

"I can't imagine what harm admitting Red China would have done to the UN. I can only imagine it might have done a little good, and accelerated the ultimate filling of that political void with China.

"My job was made easier at UNESCO because all the executive board meetings were attended by Caroline Laise. She was a senior foreign officer, and I could absolutely rely on her. In 1956, she also was in the party that flew from New Delhi to visit Nepal. I remarked to her that she would undoubtedly be the first woman career ambassador. I was wrong, she was the second. Of all posts, she was stationed in Nepal.

"When I was on my way to the UNESCO conference at New Delhi, I was invited by Mohammed Ahwad, the Egyptian Ambassador to UNESCO and also Chancellor of the University of Cairo, to visit him in Egypt. I accepted, thinking I might as well go see my parents in South Africa on the way, and so Mary and I went down, visited with my parents, and were out of touch with diplomatic affairs for a while. We didn't worry too much about that. Then we flew up through Nairobi and landed in Cairo.

"By then, we knew something was happening. We were the last plane to land in Cairo, because the 1956 Israeli-Egyptian war had broken out. The British and French were involved, and here I was, formerly British, caught in an area being attacked by the British. Quite a strange feeling indeed. The United States Embassy in Cairo was burning its papers. Mary's step-brother was attached to the Embassy, and he was organizing the evacuation of the families down to Alexandria, but even the Alexandria road was being strafed by the British. Once in Alexandria harbor, we got on an aircraft carrier from the Sixth Fleet. This ship was crowded with women and children, and the Marines were looking after them with great concern. The British were bombing ships in the harbor all around, but they never touched the American carrier. The Egyptian ships would snuggle up close to the carrier, to save themselves from bombing.

"At last we went from there to Cyprus. I think Mohammed Ahwad knew the war was going to occur, which I didn't, and this caused a diplomatic exchange between us later; but, we got to Cyprus and then Naples. From Rome we flew to New Delhi.

"Once in New Delhi, I met Mohammed Ahwad and I said, 'Where were you? I thought you'd invited me, and I certainly had some difficulty getting out of Cairo and leaving Egypt.' Ahwad replied—and this caused some strained relations at the time—'Oh, your government knew, of course, that the war was coming on.' This was his ploy. I said, 'Do you think I would have been silly enough to stop off in Egypt if my government had advised me that the war was going to occur? Obviously you knew, because you got out very safely and comfortably.'

"This exchange took place at a dinner party given by Nehru, a very regal affair. Nehru was a little old conniver, and an absolute bloody hypocrite. I always referred to him as 'Nehru, my God to Thee.' I suppose he put Ahwad next to me on purpose. Anyway,

after this exchange, we ate our soup. Then Ahwad, who had always been a friend of mine, leaned over and said, 'In spite of our countries' difficulties, may I still call you Athelstan?' 'Certainly,' I replied. 'And you will please remember,' he said, 'that my Christian name is Mohammed.'

Margin Quote:

"I recommended to the State Department that we get out of UNESCO, stating that it was a political football game, instigated by the Russians. Thirty years later, when we did get out, it was for the same reason I had suggested. Nothing had changed. It was just thirty years before they took my advice. The same thing existed with China. We didn't need a 30 year break with China. Any of us who were with Mao, could have told them he was going to win and take over China, and we should have recognized that. We back all kinds of bad people everywhere else, and had relations with Moscow—why not China? It was absolutely ridiculous. Chiang was imposed on the self-governing Taiwanese people. I can't understand why the U.S., which believes in the right of self-government, imposed a tyrant and a loser on them——it is the most extraordinary thing in the world."

"One consequence of my UNESCO experience was a brush with Senator Joseph McCarthy's tactics. McCarthyism was very much a Midwestern bred disease. Senator McCarthy came from Wisconsin. When I was appointed to what is now called the Ambassador to UNESCO—then it was just the United States Representative to the Executive Board—the McCarthy outfit put out little pamphlets distributed in schools, where local people were put on the "Commie" list.

"My daughters were attending a very nice little school, the Summit School for Girls in St. Paul. They received this pamphlet in the school, and there was their father being damned as a Communist, because I was representing the United States on UNESCO.

"McCarthy had put me on his 'commie list' by simplistically adding two facts together: I had served in China with Mao, and I was later the U.S. Representative to UNESCO.

"I considered UNESCO a futile organization, but the McCarthyites considered it a kind of "Red" organization in those days. There was some basis for that belief, since UNESCO was a pretty liberal organization and attracted that type of person; but, the very reason I was asked to take the job was to offset the Russian and certain other radical unfriendly countries' efforts to use UNESCO as a propaganda springboard. Now, it took some guts to be able to laugh off that kind of thing, especially when it was spread around the schools. It didn't bother me too much.

"The American Legion was also against UNESCO at that time. I was still in the Air Force Reserve, and one day I found the opportunity to set matters straight with the American Legion. They were having a national convention in Minneapolis, and I said to a friend connected with the program, 'You know, I'd like to go and talk to this Legion convention. Talk to them straight about my association with UNESCO and the necessity of the United States being in that organization, no matter how bad they think it is,

because it won't go away just by our withdrawing from it.' Here I am on a Communist enemy list, and I was trying to quell the buggers.

"So, being a Legion convention, it was legitimate for me to put on my uniform and brass and stuff, which of course went down well with Legionnaires. I just came right out and told them the story, and at least calmed down that fringe of our population—an important fringe—well-meaning people, but just a little bit misguided.

Margin Quote:

"McCarthy was partly right that UNESCO was at least a semi-Commie organization, but I was working to prevent it from going all the way. My job was to represent the U.S.., just as my job with Mao was to win the damn war. When you have a thug on your side, as long as he is fighting your enemy, you don't kick him in the teeth."

Chapter Fifteen

The International Geophysical Year

"After leaving UNESCO, I could have gone on and become a deputy to Henry Cabot Lodge at the United Nations, but I was awfully tired of that kind of nonsense. Even to this day, I admire the patience of people who argue interminably about the law of the sea, or argue about the arms reductions agreement. These things may be terribly important issues, but the politicking is just not to my taste—I simply didn't have the patience. The same arguments would be repeated over and over again, but the rhetoric never addressed itself to the central problems and that confuses a logical mind; so, I bowed out of my post at UNESCO, with the reason that I was on the National Committee for the International Geophysical Year (IGY), which I thought was a tremendously important project. It was also an international activity, but one that was far more manageable and which had a far more central purpose than UNESCO. I knew I couldn't be on IGY and travel all over the world for it, continue working on the UNESCO board, and still play fair with my University by stopping in once in a while.

"This was a full-fledged, world-wide IGY. The work went on for years and years—it set the pattern for much of the subsequent co-operation in geophysics, where the participation of people was needed to cover areas of global geography, not just politically defined areas.

"Another reason for my leaving UNESCO was that all through my peripheral jobs, I wanted to retain and do my job at the University, which I thought these peripheral jobs assisted. I couldn't take on too many. When I was put on the National Committee for IGY, I decided this was a case where, having toured the world for UNESCO, I'd have to go to places like Antarctica for the IGY, and I couldn't do both. So these two things tied in—IGY started in the fall of 1957, and I got out of UNESCO in 1958.

"It was at about this time, 1957, that I was invited to attend a meeting of the Pacific Science Council in Bangkok, Thailand. While I was in Bangkok, I decided to go down and see Antarctica and the IGY activities at the South Pole.

Margin quote:

"When I was in Bangkok I sent a messag to Dufek - 'While I am in the neighborhood.'"

"Rear Admiral George Dufek sent a huge transport plane for my journey to New Zealand, and then to Christchurch, the base of the Antarctic operations. It seemed rather ridiculous that he should send this huge plane for me. Thinking as a diplomat, I asked myself why don't I take along some of our friends from New Zealand and Australia who have helped

with IGY in Antarctica. I then invited a lot of people on the trip.

"I best recall living in a Quonset hut. Space heaters in the hut caused my head to be in absolutely hot tropical air under the dome, while my feet were freezing because the hot air went to the top. The ground was permafrost, but, apart from these discomforts, it was very nice. Then we flew over to Byrd station, which was the station under the ice actually dug into the ice cap at the other side of the ice ledge to the East. We did all the "touristy" things.
I remained on, and spent time at Byrd station. I took a helicopter to the ice breaker which was off the station, and I stayed the night on the ice breaker, the U.S.S. East Wind. Although I slept in very nice quarters on the ship, all night I heard, "oomph, crush, crunch." It was quite an experience for me. The ice-breaking procedure seemed like a terribly primitive way of doing the job. I always thought it might be better, instead of crunching down on the ice in the water, to go under it and split it up, where the atmosphere wasn't resistant. Again, this is Athel's logical thinking.

"I went back from Byrd station to McMurdo Sound, and we then flew to the South Pole. McMurdo is a jointly operated Australia-New Zealand-American camp. Byrd Station was American, as was the South Pole Station. The Russians were off in other areas. The arrangements were all made by IGY, distributing the stations among the different nations. We had to do the trip in two hops—it's quite a long way. We stopped at an American post about halfway there which was quite high in elevation. Of course, we landed on skis, and it was also the first time I experienced a jet-assisted takeoff. They have these JATO (jet assisted take-off) bottles on the sides of the old planes to get off the ice with limited runway. At last we reached the South Pole. It was quite an experience in those times. Now everyone is accustomed to it.

"There was a French station in Antarctica, but I don't know how much contact there was between them and the others. I do know about the Russian contact, because we worried about that. This was still the Cold War period with Russia before they invented the word Detente; but, we invented the essence of Detente, real Detente, in our scientific work. What had happened was that a student of mine from the Weather Bureau, Paul Cartwright, had been sent to Moscow by the Weather Bureau to work with their people, to learn Russian, and to get acquainted. The Russians had sent a man to our Weather Bureau, then Cartwright went to the Russian station, and the Russian came to Byrd station. Now, that was a real exchange. This was the kind of thing we accomplished in IGY, and we did it pretty well.

Margin Quote:

"These were the days when we could work in science without too much interference from the State Department. We tried not to get them involved for two reasons—so as not to bother them, because these simple little things bother them terribly; and, second, so they wouldn't bother us, although we had to work with them. Nowadays, it might be quite impossible; and, yet, the situation then was more tense than it is now with the Russians. That was the extent of our mutual cooperation."

"The Argentines had a station in Antarctica, but I think theirs was more to reinforce the claims the Argentines have on the British-controlled Falkland Islands and the Palmer Peninsula. The South Africans had a station, as did everybody who 'protruded down.' Lawrence McKinley Gould was very active, later on, as a result of IGY, in setting up a treaty that made Antarctica a kind of international zone. Nobody owns any sectors of it, and it is an area for scientific work, not for exploitation. Gould was a geologist and he preceded me as President of the American Association for the Advancement of Science. I knew him well when he was President of Carleton College in Minnesota, and he was very active in the International Geophysical Year.

"I discovered there was a flight going out of McMurdo that would get me to Christchurch, from where I could bum a ride on a MATS plane back to the United States, and get home for Christmas. I thought this would be a nice surprise for my family.

"I made all the connections and got home but it was no surprise at all—some ham radio operator in Antarctica had contacted a friend of ours in Minnesota, who had informed my wife that I'd be home for Christmas. It was most disappointing for me to be cheated of my surprise. Technology cuts both ways: sometimes it gives surprises, but sometimes it takes away nice surprises.

"As a member of the National Committee, I got a good feeling for what was going on down there. Most people, when they go to the South Pole, like to dramatize the discomfort and difficulties. It's just like the people who go to Africa on safaris and emphasize the 'dangers.' Well, I was brought up in Africa, so I know that's a lot of nonsense, too.

"What did impress me, though, when I went on this first class tour, courtesy of the Navy, was an understanding of the rigors the early explorers such as Scott and Amundsen went through. They were hardy souls, not only physically but psychologically, to undertake such tasks.

"During the IGY, in 1958, I honored Moscow by a two-week visit. I spent the night before I took off from New York as a guest with NRAC, the Navy Research Advisory Committee, on the U.S.S. Nautilus off New London, Connecticut. Then I flew straight to Moscow and relished relating that the previous night had been spent sleeping on America's first nuclear submarine.

"Since I was just ending my time at UNESCO, the authorities thought it best to have a Naval officer, a counterintelligence type, accompany me from Stockholm. There was one maid at our hotel who seemed to be assigned to keep track of me. By giving her American cigarettes and inviting her in for vodka martinis, we managed to show her how things are done in the capitalistic world. As a result, we were well supplied with hot water, vodka, lemons, and laundry service, unobtainable by other hotel "guests."

"We also had a Russian Intourist guide who had lived for a long time in Brooklyn. This

guide alternated with the chambermaid, who was the inside spy, as the outside spy on our movements. We soon determined that we couldn't go anywhere without her, so we made the best of it. She took my Naval cohort and me on a visit to Lenin and Stalin's tomb in Red Square. This was before Stalin had been desanctified. The queues of devout Communists waiting to go into the tomb looked miles long. She took us right to the head of the line. I feigned shock and said to her, 'Shouldn't we take our place in line? We always do in America. It's democratic, you know.' 'Oh, no,' she replied. 'We take distinguished visitors straight in with no waiting.' 'I don't think it's fair to these thousands of people,' I remonstrated further. 'Stalin and Lenin are heroes to them. All I want to do is go in and make damn good and sure they're dead.'

"One of my favorites on the faculty of the University of Minnesota Institute of Technology was professor Ed Ney, who invited me to go on an expedition in 1958 to the point of longest totality of a total solar eclipse. That point was in the middle of the then French Sahara. The Navy financed the expedition. Ed had included a French scientist, Jacques Blamond, because of his connections in France, which could get us the support and protection of the Foreign Legion in that territory. I told Ed that if I was going, I wanted to be helpful, and that I could at least be cook and logistics officer. We had a charter airplane from Minneapolis to Tessalit, Algeria. The plane was loaded with scientific equipment, our small party of five, and supplies for at least a month's stay. We had an oversized electric generator so we could have an air conditioned tent and a refrigerator.

"It took us two days to drive to that chosen spot in the middle of nowhere. We had to camp overnight in the desert. I surprised the party by having the French soldiers who accompanied us set up the electric generator and the icebox on the back of a truck while we were enroute. Dusty, parched, and scorched, everybody was cheered when I served them martinis in frosted glasses as soon as the caravan halted for the night. This became a ritual for our month in the desert. When it got cooler but was still light in the evening, we would go hunting for the small desert deer to eat and then have our dry martinis while the soldiers skinned the animals, splayed them on sticks, and roasted the meat.

"We had made elaborate preparations for this eclipse, particularly checking the possibility of clouds and dust storms. Even so, our observations were nearly ruined when something we had not foreseen occurred. A swarm of locusts blotted out the sun before the moon did, but luckily they, like the other species, settled down before the eclipse. The Bedouins, who were camped nearby and much mystified by our activities, had been friendly, but although we had prepared them for the eclipse, they scattered into the desert and cowered when the moon ate the Sun. The Sun is their sole guidance system in the desert.

Chapter Sixteen

Rockets

Margin Quote:
"Back in the 1930s, while I was a student at MIT, I had the opportunity of seeing some of the earliest rocket launches. Dr. Robert Goddard was at Clark University in Worcester, Massachusetts, and he'd been working with rockets for years and years, with no encouragement from anybody. The payload he wanted to put on his rockets, to show they had a serious purpose, consisted of tiny little meteorological instruments, the kind we were accustomed to sending up on balloons. Goddard had great problems guiding his rockets to go straight up. That connected with the research I was doing with Charles Stark Draper, whose gyroscopes later guided the rockets to the moon."

"By 1958, the United States had a well-developed rocket program, which carried instruments into the upper atmosphere, and this was a big part of a major program in the International Geophysical Year. We conceived the idea of having a rocket that would put up a satellite at that time. It was this plan of the International Geophysical Year that encouraged the United States to go into the space business.

"Homer Edward Newell, later Chief of NASA, said, 'We can't put up a satellite with instruments in it because at those very high altitudes the batteries will bubble.'"

Margin Quote:
"If American industrial genius can mass-assemble and mass-distribute, why cannot the same genius mass-produce, mass-disassemble, and massively reuse the materials?'

Margin Quote:
"Waterman, Allan Shapley, and I were the three scientists who made the announcement in the summer of 1955 that the United States intended to put a satellite into space for IGY purposes."

"After the announcement from the White House lawn, the three military services vied for the honor of putting up the satellite. The Army, with Werner Von Braun, was best prepared to do it, but somebody decided it should go to the Navy. What happened is history. The Russians beat us to it with Sputnik in October 1957, while the Navy's vanguard fizzled on the launch platform. In 1958 the Army carried the first U.S. Satellite into space.

"Eleven years later, thanks to my being a trustee of the Aerospace Corporation, my second wife Gail and I got real VIP treatment when we went to see the takeoff of Apollo 11 on July 16, 1969. We had seats right among the cabinet members and foreign

ambassadors. Jim Webb, who'd been head of NASA under Kennedy and Johnson, was sitting behind us with former President Johnson and Senator Edward Muskie. Johnson looked around at all the cabinet members and heard somebody wondering aloud, 'Who's watching the store in Washington?' 'Well, President Nixon isn't here,' Webb remarked. Muskie quipped, 'Just the man to watch an empty store.'"

Chapter Seventeen

"Our New Age" and Computerizing Newspapers

Margin Quote:

"In 1958 I wrote a comic strip on science every Sunday for fifteen years. I decided to do it right after Sputnik, when I was disturbed about kids knowing very little about science. Rather than fight my own kids reading the funnies, which is a stupid thing to do, I decided to put something good into the comics, something that was more fun and that might give a little subliminal education."

"I wore out three artists in fifteen years, since it was really just a two-man team, me and the artist, with no staff. I treated the strip as a hobby, but the deadlines often got me down. The syndicate tried to put me into dailies, which I did for about a year. After that I just quit, the pressure wasn't worth it, so it became a weekly effort for the Sunday funnies.

"Even though I wanted to treat Our New Age as a hobby, its success really got out of hand, I think that happened because I was so active in science, and was able to relate it to everyday life in a way that was interesting to adults and children alike. It was read all over the world, but it was never put together in book form. When I got busy on a sculpture project in 1973, I decided to stop writing the strip. In a way, I regret having done this, because it was a very useful and pleasant activity for me. A lot of other strips tried to compete with Our New Age but none were ever as successful.

"His greatest contribution may be the comic strip. When you contemplate the number of children he touched with it, who may have later gone into science or simply understood scientific principles better, you realize it had to be a very, very powerful thing. It was an important contribution."

Fred Spilhaus
Director
American Geophysical Union

"I don't think there are any science-fact comic strips now being published. There are extremes in science fiction, from the very high-quality imaginative writing of Arthur C. Clarke, down to absolute rubbish—it is that way in all fiction."

Margin Quote:

"I enjoy looking at some science fiction. When I wrote my comic strip, I carefully kept it away from having a taint of science fiction, although I would be speculative about

ideas such as Jerry O'Neill's colonies in space, John Isaac's towing of icebergs from Antarctica for fresh water, or my idea of ice dams in headwaters to control floods in the Mississippi River. If science fiction warps the laws of physics too much, it becomes somewhat nonsensical. But I have no objection to that—one has the same worry with poor science fiction as with all fiction. While it's marvelous to have people reading anything, it's too bad that often their first choice is trash."

"I got the idea for writing the scientific comic strip while I was Ambassador to UNESCO. I was in Paris at a meeting, and we were discussing a typical UNESCO topic: reading material for new literates. In UNESCO jargon, 'new literates' were not youngsters learning to read, but the older people who were first learning to read, as in India.

"Ambassador Hussein of India was on the executive board of UNESCO. He was a great friend of mine and close to the United States. Suddenly, Ambassador Hussein started a tirade against the United States. He suggested that the U.S. stop exporting 'those dreadful comic strips' into India, because that was all his people ever got to read.

"I tapped my specialist on the shoulder and said, 'Let me answer that.' I looked around the Board and knew I needed its support. There were several issues involved, what with the Russians listening to the Indians suggest our comic strips were dreadful. I spotted my friend, Professor Mohammed Ahwad, Chancellor of the University of Cairo. He was a big man who wore dark glasses. (As he always told me, "That's so I can sleep during meetings without people noticing.") He was a great scholar, a social geographer, kicked out later by a change in government, but a really great man.

"I looked at Ahwad, and then over at Laugier from France, who was a real scientist from the Sorbonne, and then I started. I looked at the Russian Ambassador as I said, 'What Ambassador Hussein is essentially recommending is that the United States censor the material that goes into comic strips.'

"I continued, 'I'll be the first to admit that there is material in comic strips that personally gives me very little reward. However, we take the view in the United States that no one is omniscient enough to be able to censor material before our public at large exercises its own censorship by choosing whether to read or discard it.'

"I felt it was a pretty damn good speech. I was carried away with my own eloquence. Then I looked at Hussein, and said, 'Ambassador, you said this is the only material that your new literates have to read. Don't you think it's fortunate that they have this at least? Do you know, in the United States in the earlier days, and still to this day, we educate children who are younger new literates by McGuffey's readers, picture books with words in them? It seems to me, the picture-word combination is the best way for new literates to learn to read."

"'There's nothing new about the comic strip,' I continued. I was enjoying myself, because here I had no State Department position, and naturally that's when you can really

have fun. I looked at Mr. Ahwad and said, 'Professor Ahwad, think of those magnificent friezes you have in the Egyptian tombs—weren't they comic strips? Haven't they told us later generations the whole story of Egypt of that time?' Then I looked at Professor Laugier. 'What about those marvelous Bayeux tapestries, Mr. Laugier?' Finally, I sat down. Even the Russian was grinning. Outside of fighting in the meetings, we all got along beautifully.'

"When I returned to the United States, I thought about this episode and met with John Cowles, a good friend and owner of the Minneapolis Star and Tribune. I told him the story of the meeting. I suggested a science comic strip. This was 1957, a good time psychologically, after Sputnik, when everybody was worried about kids and science. Cowles made good his word and got it syndicated. I think at its high point the strip was in about a hundred newspapers, including many foreign countries. Even my home town, Capetown, South Africa, carried it, and Johannesburg carried it in Afrikaans.

"By 1961, my comic strip was a success, and I wanted the newspapers to get more information on science for the people. I was well known to some publishers, especially my friend John Cowles, and Otto Silha, later publisher of the Minneapolis papers. The American Newspaper Publishers Association asked me about giving them scientific advice on the use of computers and satellites in news gathering.

"That sounds strange today, but then, no newspaper had a computer, since it was fairly early in the computer days. So, I immediately got in touch with Trevor Gardiner, who had developed these marvelous high-resolution lenses used so much now for satellites. I thought, 'that's the photography side.' Then, I got John Pierce from Bell Labs, often called the Father of Telstar, because I envisaged we'd be talking about satellites.

"When I talked about using pictures from satellites in the newspaper business back in the early 1960s, I was thought an absolute dreamer. I had the three components: Pierce on computers and satellites, Gardiner on pictures, and myself, knowing nothing about anything, just putting the pieces together and doing the dreaming, knowing what these people could do.

"Athel and I were involved in changing newspapers from hot metal to cold type. He was our principal scientific advisor on this matter. We needed someone who understood how this conversion could be made—and Athel worked this out. It is a very practical method of printing newspapers. If it hadn't been for Spilhaus, we would never have accomplished it. He had so damned much good sense in his head. He showed us how best to bring about the change from hot metal type—he foresaw it in great detail. I guess someone else could have done this, but Athel is the one who did do it. We were all foreseeing this one step at a time—Athel foresaw the whole thing—and it changed everything. He brought us from the darkness of hot metal into the light of photo composition. It was enormously beneficial to the newspaper industry. It gave publishers a new sense of sensibility because of the timelessness it gave them."

D. Tennant Bryan
Newspaper Publisher
Richmond, VA.

"Our work was a great success. The newspapers began getting computers. The first use I recall was when John and Jim Knight, now of Knight Newspapers, had a strike on their Miami paper. They were bullheaded, and weren't going to settle the strike, so they began to automate their plant and to computerize it. They put in a computer for classified ads, a very simple task that a small computer can do.

Margin Quote:
"Computers in the printing of newspapers was the first idea we worked on at the ANPA (American Newspaper Publishing Association). Then I began to think about a perennial problem in the newspaper business—delivering them. We no longer can get milk left on the front doorstep and newspaper delivery by newsboys is also on the way out. My prediction was, "Cable-TV will take the place of the delivery boy."

"I had been Chairman of the Scientific Advisory Board of the American Newspaper Publishers Association since 1961. I gave a speech to the ANPA members at their annual convention a few years later and I shocked them. I asked, 'What will you do when your beloved printed page is no longer printed and no longer on a page?' I was talking about electronic delivery of news, not the one-way system of television which by then we were accustomed to, but a real feedback system, and I developed this into the suggestion of 'dial-a-newspaper.'

"In other words, a multichannel cable-TV system would allow a viewer to dial in and zoom to the particular item in the news he wanted to see, just like reading an ordinary newspaper. The beauty of reading a newspaper is that a reader can turn to the item he wants to read first, whether it's the comics or the stock market or the sports page—he doesn't have to wait for someone else to present the news in their own order of preference.

"This still hasn't come about, but it will, and soon. Some of the newspaper publishers in the 1960s were very smart. Men have come up to me and said, 'We took your advice—we bought up cable-TV franchises.' Notably in the Midwest, one of the publishers who took my advice was Gottleib, President of Lee Enterprises, a newspaper, radio and television group in the Midwest. I thought he was smart to buy up TV licenses, so in return I bought his stock. It's still good.

"Nowadays cable-TV franchises are very hard to get, and the government also worries about a newspaper owning a TV station, an antitrust argument that makes no sense from a technological point of view. I had said to the newspaper publishers, 'You are not in the newspaper business, you're in the information transfer business. You're information communicators and it doesn't matter how you communicate it, or whether you use many

ways to do it. You have to gather this information at great expense. You might as well use every way you can to disseminate it.'

"Antitrust actions prevent what would be an extremely sensible unified information utility. Perhaps it will come about some day. There are still major arguments about cable-TV and the newspapers joining forces, and the big broadcasting networks trying to decide whether to block cable-TV or take it over.

"Regardless of the outcome, the new technology in communications is upon us. There is no question that radiating waves to satellites and back to earth is the way we'll go for spanning oceans, as we do today, and spanning continents, much as the Wall Street Journal is now published all over the world.

"I enjoyed being Science Advisor to ANAP, Honeywell, General Electric, General Mills and even to government agencies, though the last is personally less rewarding.

Chapter Eighteen
The Seattle World's Fair: 1961-62

Margin Quote:

"In 1961, President Kennedy wanted me to salvage the Seattle World's Fair, at which the U.S. Science Exhibit was a mess, and it was Jerome Wiesner, President Kennedy's Scientific Advisor and later President of MIT, who called me and persuaded me to do take the appointment, arranging for me to talk personally to the President."

In 1961, I was in Guava Cay in the Bahamas, an out island and very primitive where the telephone communication was an on and off thing - only twice a day - a half hour in the morning and a half hour in the afternoon. A call came through to the operator asking for Dr. Spilhaus. The operator said, "The Doc don't get up this early." The caller said, "This is the White House calling." The operator repeated her previous statement, and told the White House they could call between three and three-thirty. The whole island was excited because the White House was calling the "Doc." It has been referred to since as "The day the White House called the 'Doc.'"

At 3:30, all the school children were sitting around the radio as my call came in asking me to come to Washington to talk to the President about running over the Seattle World's Fair. I told him I would be there in two days when I finished my fishing.

"I said to the President, 'OK, but who's my boss? I hope it's just the White House, because I don't want to be working for some Department of Commerce or something underneath.' President Kennedy said, 'Oh, no, the Department of Commerce just gives you the money.'"

"I decided the approach to our exhibit should be entertaining, as well as educational. Science is one of the highest forms of entertainment. We hoped to entertain adults and children with the exhibit, and if they were educated by it, fine. Education was not the intent of the exhibit—entertainment was.

"I was surprised President Kennedy picked me, not Wiesner for the job, though Wiesner did have some input.

"The Seattle World's Fair presented a challenge to me, because I actually had a very short time to prepare for it. I was commissioned by President Kennedy in March or April 1961, and the Fair had an absolute starting date of April 1962. It was great fun to construct it, and the fun came because of the help of my scientific friends. By 1961, I'd become a member of the Board of the American Association for the Advancement of Science, and we had a marvelous Executive Secretary, Dale Wolfle. With the assistance

of people like him and scientists such as National Science Foundation Chairman Allan Waterman, I couldn't miss. The best scientists in the world were willing to devote their time to making sure the exhibits on their discoveries were accurate and precise. Again, I was catalyst.

"I found the best people were those who were willing to accept the kind of showmanship I wanted to put into the exhibit, to make it enjoyable for the public, the same thing I did in the comic strip. I've learned that someone can write the best stuff in the world, but if it's so boring nobody reads it, it doesn't do much good. The Fair was for everybody, so it was a challenge to get people in the door who were uninterested in science, rather than the people who already enjoyed it.

Margin Quote:

"This is the kind of challenge one finds in writing any kind of popularization. A writer must start from where people are and try to take them somewhere, but never along a boring path. The Fair was a tremendous success, because I had great autonomy and great White House backing. When the GSA, which puts up all the "boot factories" for the government and tears them down again, told me I had to have a bomb shelter in the beautiful Yamasaki building, I said, "Look, this Fair is for the living, not for the dying, and let's turn that darned thing into a children's part of the Fair. "To create the children's room out of the bomb shelter, I was helped by great people such as designer Charles Eames, and many national companies pitched in with money. Boeing gave us a spacearium, and General Electric made synthetic diamonds at a Fair exhibit. We got tremendous help, and that really made the whole thing successful."

"When the Shah of Iran and his wife came to see the exhibit, the State Department was very concerned. They wanted me to put a Throne in the room! I said, 'Look, if I have to put in a big chair for the Shah, I'm going to have to put in smaller ones too. I'm going to have to design chairs of the right height for different dignitaries.' My policy was to be consistent: 'Everybody sits on the floor!' So I personally told the Shah, 'You know, this is going to be an experience for you, Your Emperorship,' or whatever they told me to call him, 'You're going to sit on a nice rug.'"

"That's not far from some of our Oriental customs," he said, and spread himself out on the floor. So did Julian Huxley, and Prince Philip of England. Prince Philip overstayed his visit by two hours. He'd allocated an hour, but spent three, and then came down to my houseboat for a drink. He was very enthusiastic about science and has done a lot in England, showing the Royal interest in scientific developments. The visit was very pleasant.

"Having been unable to come out to Seattle for the opening of the Fair, President Kennedy was scheduled to participate in the closing ceremonies. The Fair had opened in April, and it was perhaps in the middle of October that we were all looking forward to President Kennedy's visit. Then I learned a little bit about what was going on with Cuba. It was a very well kept secret, the Cuban Missile Crisis, but I did not believe that every-

body in Washington, D.C., who was a really big shot, had got a cold suddenly and couldn't travel, including the President. I had to be told that this was a dramatic excuse, for the President was engaged in a real crisis. So President Kennedy missed both the opening and the closing of the Fair, but Bobby Kennedy and Ethel did come out.

"On several occasions, in running the Fair, I simply called the White House and said, 'Look, I'm having too much interference, petty red tape, and I'm in a hurry. I'm too short of money, and I need your support. Otherwise I'll quit.' I tendered my resignation three times. Well, it wasn't any big thing for me, to have a Presidential appointment, so my strategy worked very well. As a matter of fact, Luther Hodges, the Secretary of Commerce, was a very decent fellow. When I was asked later on how I managed to get a government exhibit to be such a success artistically and scientifically, I gave a flip answer, but there was some truth to it.

"I said, 'Well, Seattle is 3,000 miles from Washington, and if I needed something—I never got bugged by Luther Hodges. First of all, he's a gentleman and he has plenty to worry him besides my little Fair. He delegated it completely to me. Secondly, if he did call me in the morning, I wasn't there yet because of the time difference, and by the time I got to my office, he was at lunch. By the time he got back from lunch I was at lunch, and by the time I got back from lunch, he'd gone home.' I observed, 'That was why the Fair was a success.'

Margin quote:

"The complete success we had at Seattle was because of the interest we had from the people of the State of Washington, and the citizens of Seattle. My greatest contribution was to see the buildings were preserved after the Fair ended, and not torn down as they usually were after Fairs were over. I intervened in the plan to tear the Fair down with the help of Senator Magnuson who was a power at the time. I wanted to leave the buildings there, as a contribution to Washington and Seattle as a conference center, art gallery, and opera house. I supported a monorail to service it, and supported the plan for a restaurant to be built at the top of the Space Needle. All of these things still exist in Seattle."

Today in the news, there is a story about an outgrowth of a new transportation system that eminates from the Seattle Fair grounds - it is building on the things Dr. Spilhaus insisted be left behind.

Chapter Nineteen
The Philippine Trip
November 1961

"Six months after President Kennedy appointed me Commissioner of The Seattle World's Fair, he was to visit the Phillipines in November 1961. The President was to dedicate the new Academy of Humanities and Science at Manila. He couldn't go at the last minute because of scheduling problems, so he asked me to go in his stead. I was already working for him on the Fair assignment, so I went out representing the President. This was during a presidential interregnum in the Philippines. They'd had their elections, and Carlos P. Garcia was the outgoing president, with Diosdado Macapagal coming in.

When I got to the Philippines, the American Ambassador, William McCormick Blair observed that with the change of governments, proper protocol was unclear. 'You must give a reception,' he said, 'but I don't know who to ask, whether it's the old regime or the new one.' 'Ask them both,' I suggested, but I thought to myself, "Who's the diplomat, him or me?" I told him, 'Ask them both—I know them all.'

"I had been to the Philippines during World War II when I left China temporarily. I had flown to the Philippines when Manila was still burning, and I arrived at a most curious moment. General Douglas MacArthur had ordered driving changed from the left to the right side of the road. He did it right in the middle of the war, just like that. He didn't fool around. People were still getting killed, and there was a war on. Nevertheless, he found time to straighten out the Filipinos. Accidents occurred, and people were killed until everyone became used to the new system, but it was nothing significant compared to what was going on in the war. Upon MacArthur's order, everyone immediately began driving on the right, and they've been doing it that way ever since.

"That visit was a wonderful one for me. Mary came with me, and I agreed to give some lectures all around the islands. We spent about a month in the Philippines, and I talked to students at a number of schools. They were terribly poor schools, with the teachers all saying, 'If you could only give us some scientific equipment for our schools.' So my lectures were based on the idea that one didn't need a lot of scientific equipment to do good science. I would take a shell or rock and hang it from a string and talk about the pendulum, or make hot air balloons out of paper bags and candles.

"From Cebu we flew to Mindanao, the country of the headhunters. Some brave man, a Catholic, had started a university in Mindanao. I thought it was a fantastically brave educational effort. Why I say this was a brave experiment was because there were notices for all to park their arms. This was literally a "shoot-em up" outfit in Mindanao - a wild part of the Philippines. That's why it was a brave thing for anyone to do. This

rather good president tried to emphasize the good parts—the dances and the positive side of the Mindanaoan people's culture, and yet to teach them to read and write.

"At the time of my Philippines visit I was writing the comic strip, and it was being published in the Manila Times. President Garcia introduced me at the party. He announced, 'This is Athelstan Spilhaus, whose fascinating scientific articles you read every Sunday in the Manila Times, and he is here representing President Kennedy.' I got up and made the crack, 'Mr. President, you do put first things first.'

"Through the years, during my involvement with UNESCO, IGY, the Fair, and many other activities, Mary was very busy bringing up our five children. I was busy, too, working and traveling a lot. I never realized that the traveling I did and being away in the war, and then serving on commissions and always going to Washington, would put such a terrible strain on our marriage. I think it has hurt quite a few marriages—just the being away. At least I know it did in my case. It was a very exciting life, but I was terribly busy.

Sometimes Mary came with me on the really fun trips and we went around the world. Mostly she was so concerned about the children that she couldn't join me on these trips. I guess that by that time I was infected with something; I thought I was a big shot and was having what is usually called the "mid-life crisis." When I went to the World's Fair, Mary came out only to cut the ribbon opening the Fair, and then she returned to Minnesota. I lived in a little houseboat by myself. When I returned to St. Paul, I talked about divorce to Mary. Finally, we were divorced—for no very good reason at all. She stayed on in St. Paul, and as I am a person who can't live alone, I very shortly remarried to a Seattle socialite. I guess I was alone and vulnerable at this time in my life.

"A fellow who had done such a wrong thing should not be as lucky as I was. My second wife, Gail Thompson, whom I married in 1964, was wonderful. My children were thoroughly shocked and angered by the divorce. I think some of them had seen that Mary and I were quarreling a lot, the way kids notice, but they were still very angry with Gail. The saddest thing to me was that on all our sides, Mary's and mine and the children, during the time before we were finally divorced, I didn't have any communication with the kids or with Mary. It wasn't talked out. I'm wiser now—I wasn't then. Mary was a very private person, hurt, as she had a right to be.

"There's no estrangement at all between my children and me now. There was difficulty, however, for quite a while. They were young at the time of the divorce. I never forced them to come and see me. That's one thing I did well. I didn't see their mother for a time, but then, because we had a common interest in one of the kids' problems, I went to see her, and I enjoyed seeing her very much. When I went to Minneapolis for a Donaldson Company board meeting, I'd go and ostensibly chat about the children, and gradually we seemed to enjoy the meetings, so we met, just the two of us, off and on, and still do. I call her up and we talk about things—so the rancor disappeared. It takes a long time—with the kids, there's none at all now—so that's a good thing, at least. Mary and I

now have lovely visits and enjoy each other's company. Kathy and Mary have become good friends which is a real joy to me.

"Of course, I was still at the University of Minnesota. Gail and I moved to a little farm out in the country, about forty miles from the University. It was a very long commute, but by then I was leading a leisurely life academically. Having remarried, I felt I was bursting out all over, and we had a great life.

"But I did make one very important decision with Gail. I did see that traveling alone was a bad idea, and I made up my mind that if I was going to go anywhere for meetings or anything, she'd go with me. We had no children, so there was no reason she shouldn't.

"In 1966, shortly after we were established in Minnesota, I took Gail down to meet my mother and father in Capetown. I called it a business trip because I had been invited by the South African Association of Architects to address them on the Experimental City.

"One of the highlights of our trip was going out to the wine farm that was my father's great hobby. He took it very seriously, and when he bought the farm, he bought many useless, almost vertical acres higher up the mountainside to make sure the water coming to his vineyards was untapped and untouched by others. On the farm was an 18th-century Dutch gabled wine cellar, with many huge oaken kegs of diameters greater than the height of a tall man. In contrast, the farmhouse was a charming, modest thatched building.

"One morning, the grapes were ready for picking, and we went out into the fields. All the farmhands were barefooted, and an open cart was drawn by horses up and down the rows of vines. The bunches of grapes were plucked and thrown in. When a cart was filled, it was taken to the winery. In the cool cellar the grapes were dumped into a huge basin sawed from one end of a big keg. The native workers jumped in and trod the juice from the grapes. The last of the pressings was reserved for the laborers, from which they made a heavy wine called Must. After the treading, they all washed their feet at a tap outside and headed back to the vineyard for another load.

"Observing this with my customary analytical detachment, I inquired of my father, 'Wouldn't it be better if the workers washed the dirt from the fields off their feet before they trod the grapes?' My father turned to Gail and said, 'Your husband may be a great scientist, but don't let him muck up my winemaking.' To me he said, 'This is the way we've always done it. Perhaps it is the enzymes and trace elements on their feet that make my wine so good.'

"The farm was more than thirty miles from Capetown, and my father used to visit it a few days at a time. That evening, as we prepared to spend the night at the farmhouse, we were having our 'sundowners,' when the fairly primitive, handcranking telephone rang. My father picked up his drink and went to answer the phone. We only heard one side of

the conversation.

"'Hello!' he shouted into the mouthpiece, not really trusting these modern contraptions. 'Oh, yes, Rabbi, I'm glad to talk to you.' He paused for a sip while listening and then replied, 'You want to buy my ordinary wine? I have no ordinary wine. Even what I sell to the cooperative is first class.' There was a longer pause while he listened to his old friend on the other end of the wire. 'I know you want it for sacramental purposes, you've bought some before,' he said. 'Come out tomorrow and put the seals on it.' My father listened intently as the Rabbi asked one more question. The Rabbi knew South African winemaking practices as well as my father did, but they went through the required ritual anyway. Winking at me and dropping his monocle, my father added, 'Of course, Rabbi, my wine is never touched by "human hands."'

"Two years later, my father went to his office in the morning, had lunch at the city club, and returned home. After walking the dog, he lay down and died peacefully, at the age of 92.

Chapter Twenty

Futuristic Problem Solving and Other Involvements

Margin Quote:
"The Seattle World's Fair was over at the end of the summer of 1962. When I returned to the University of Minnesota in November, I found the Institute running fairly well without me. That in itself was disturbing to me. It's a darned good lesson for people to learn, that they are indeed dispensable."

"I found that President Meredith Wilson of the University had thoroughly upset people in my mathematics department, so I had an immediate problem to solve. In fact, Wilson admitted it. He said, 'I am having difficulty keeping this brilliant man you've appointed as head of mathematics, Stevens Emmanuel Warschawski. He's had a number of offers, and I don't know how to keep him satisfied.' Wilson urged me to come back early for that reason.

"Fortunately, I was able to fix up the mathematics situation— Steve was a good friend. When I had appointed the modest Warschawski as head of mathematics, no one was more surprised than he. He demurred on the grounds that he was no administrator, but I told him my idea was to have excellent people in their fields as department heads and that my function as Dean was to help them in administration. It worked beautifully.

"Warschawski, through his own eminence, attracted top mathematicians, because they respected and wanted to work with him. A year or two later, principally because of a health condition and because of my interest through Roger Revelle in the new San Diego campus of the University of California, I agreed that Steve should accept Chancellor Herb York's offer and reluctantly blessed his departure for a less rigorous climate. Seeing him years later in La Jolla, I felt I'd done well, not only to appoint him head of my department, but in view of the circumstances, to facilitate his move to California.

"The problem that had arisen with Meredith Wilson was that he was one of the 'new breed' of social scientists—and how in hell can those people talk to a mathematician? These people are just poles apart—one deals with logic, the other deals with illogic."

"I guess after the experience of the Fair I was becoming a little blase` about things. All this meeting with Heads of State had gone to my damned head, and I thought I was too big for the job in Minnesota, which was quite ridiculous. I think I neglected it a bit.

"I became interested at that time in some very important pursuits, which were definitely

consonant with an academic career, but they were not consonant with "deaning", which is a bureaucratic activity. "Deaning" involved paperwork, which I always avoided as much as possible.

"The first of these new challenges was the problem of waste and pollution. This was during President Kennedy's term. Kennedy had appointed me to the Fair, and shortly after I returned to the University I was on a National Academy of Sciences committee concerned with energy and the availability of natural resources. I went to those committee meetings and kept hearing we were running out of resources. This was in the early 1960s, before we started running out of everything, but we knew we were running out of iron and steel. I also knew we allowed about half the annual production of steel to rust away each year.

"This is a very important concept to me. We waste more water than we use. Take any one of these essential resources, and it would be found that just the wastage, the undisciplined human use of the substance, was what caused the shortage. There are no real shortages, and I believe that to this very day. There is no real shortage of energy. It's just that we cannot discipline people on their use of energy. We are whittling at the problem now - not solving it. There is talk of recycling, but we haven't even cycled yet."

"The Industrial Revolution was marvelous in putting things in the hands of people to use, but after the items were used, people discarded the same mass that was put in their hands. Nothing was done, in the private sector or the technological sector, to salvage materials after first use. That was left to the public sector—to collect garbage, to dispose of all the refrigerators and other detritus. There were some very good people who were denigrated by being called "junk men." The junk industry is vital to my idea of the next Industrial Revolution. It would close the loop, manufacturer to user and then, after use, back to the manufacturer. This would close the cycle and we wouldn't waste all these materials by allowing refrigerator cases to rust and other useful materials to deteriorate.

"That hasn't come about yet, but maybe it will someday. I recognized the problem of diminution of resources when I wrote about it in 1970. I realized we were running out of raw materials, and this was the way in which we could solve the problem. Dentists have done this for a long time. When they put gold and platinum fillings in teeth and then extract the teeth, they reuse the metals because they are extraordinarily valuable. Now silver is being salvaged from photographic processing. It's coming about, but only with very valuable minerals. We still allow discarded steel to rust, and we came lately into the use of scrap steel—long after Japan.

Margin quote:

"Now, this is just the whole—the concept that everything should go around in a cycle. The only thing that would then be needed to put in to remanufacture, in the ideal situation, would be energy, to reorder the chaos."

"Another source needlessly wasted is water. New York doesn't even meter its water, we chlorinate when only a tiny fraction is used on our tooth brushes, and we use pure water for washing cars and watering lawns. Chlorinated water may actually put cavities in lawns. It would be perfectly possible, by redesign of existing towns or an experimental city, to have multiple water systems—a tiny pipe for the pure water that we ingest, a larger pipe for the water we use for bathing, and a very poor grade of water for flushing toilets, washing cars, and watering lawns.

"Now, in Windhoek, Southwest Africa, (now Namibia) in the Kalahari Desert, there is a recycling system for water somewhat along those lines—multiple use of water. Water is extremely scarce there, but they only have to top off the water they have for the little amount that's lost or evaporated. That's the only city I know of that does this, although I suppose there must be cities in the Middle East that have similar systems. If they don't, they should have, because their water is scarcer than their oil.

"It makes one think of the possibility of greenhouses in the desert, which someone is working on now with Saudi Arabia. In this concept, a plant doesn't use water, and it doesn't incorporate water in its material. The water is a carrier of nutrients into the roots, evaporated from the leaves, so that it creates a totally enclosed greenhouse. This doesn't have to be imagined, because someone has already built it, where the water goes round and round, and nutrients are fed into it, in liquid form—it evaporates into the greenhouse. This is the most sensible use of water, if anyone really thinks of ultimate uses of water.

"Unfortunately, water as a carrier and throw-away, both in agriculture and in our flush toilets, is how we usually waste this resource. The flush toilet by Sir Thomas A. Crapper was the worst invention ever created from an environment standpoint. What he essentially did was to take pure water, mix it with good organic fertilizer and render them both useless. Now we spend tremendous amounts of money on tertiary treatment plants to separate them and go back to square one. In places very short of water, ordinary desalination, which is essentially boiling off the water and leaving the salt behind and then recondensing the water, is an expensive business. We used it on ships for many years, of course, because there was no alternative. Desalination can be done even that expensive way in the Middle East because there the oil used for energy is so cheap, and the water is so precious. Even where energy is cheap, the idea of desalinating water and then throwing it away is wasteful. If we have to go to desalination, we should also go to multiple pipe systems and multiple reuse of water.

"The Israeliis are absolutely the leaders in all kinds of ways of using meager supplies of water in dry areas. They have even conserved dew, because in a desert area there is water in the air, and it condenses as dew at night. As soon as the sun comes up, it all evaporates again."

Margin quote:

"Invention is finding something that someone used a long time ago, and recognizing that the times are now ripe to do it again."

"With Israel's high technology, it's just natural that the Israeliis would become leaders in the use of water. Rather than desalinating water for agriculture, which is ridiculous except in very special areas, doesn't it make more sense to hybridize useful plants and vegetables (called halophytes) so that they can use brackish water? The Israeliis are doing that, and so are people in our country. There are many plants that take up salt. Mangrove trees are obvious, and asparagus is another. Plants take up salt in various amounts, and therefore they can live in brackish water."

"Desalinization by nature, not brute force."

"I dreamt once of having a desalination system made of plants. In other words, we'd start out with sea water, and mangrove trees would then take out the salt and incorporate it in themselves, the water is now slightly less brackish. Then maybe an asparagus bed takes out a little more salt, and we would have a kind of diffusion plant as the impure water comes out. I think it's somewhat of a dream, but it's an interesting idea, that plants can desalinate water.
They are now using plants to clean waste water, but it is very difficult because everything has to be an extension of the old system.

"Anyway, I went to Detlev Bronk, President of the National Academy of Science, and I said, 'You know, when you talk about natural resources on this report of the academy [on which there were ten volumes published, all kinds of renewable resources, mineral resources, water resources, and energy resources], you've missed one resource.' 'What's that?' he asked. I said, 'Waste, waste as a resource.' That's when I first coined the idea of waste as a resource. Now we have companies that are taking this up. Bronk said, 'That's a good idea. I'm going to go to the White House and suggest to President Kennedy that we have a committee on pollution.' He did, and the Committee on Pollution was funded, and I chaired that committee.

"But I insisted the committee's report be called <u>Waste Management and Control</u>, which is a positive way of putting it. As an engineer, I felt that was what was needed was to focus on the causes and not the doom. I've been an optimist right from the beginning, not a salesman of doom.

"I prepared a report for the Academy with the assistance of over a hundred of the finest people in the country. As chairman of the committee, I surprised the Academy, which had a tendency toward scholastic stuffiness, although Bronk was never stuffy. I selected a committee of about twelve people, and about six of them were Nobel Prize winners, while the other six were garbage collectors. When I say garbage collectors and Nobel Prize winners, I use the terms loosely— but that caliber of people. The garbage collectors were such people as the president of The Los Angeles By-products Company, an amazing company that collected dead animals off the streets, picking up a thousand each night in a big city. The company rendered them into what would have been perfectly edible fat, except that our esthetics about this don't permit us to sell it for human con-

sumption. However, it's used in pet food, bird seed cakes, and other animal foods.

"They also collected all kinds of other things, and this is what I mean by garbage collection, because I saw in such procedures the waste management and control I was aiming at from the beginning. This apparently disparate conglomeration of really practical people, some of them with their hands in the garbage and others with their brains thinking of garbage, got along famously. It was so much better than having just the practical or just the theoretical minds.

"I had a great year. Again, I was just lucky; with the Academy's prestige and my World's Fair experience, where all the scientists helped me, I could get anyone in the country to come and help. We had a whole series of meetings, winding up having a two-week gathering at Wood's Hole, where we wrote the final report. The report was then directed to Congress. It was called Waste Management and Control——a very significant report, it was the first document that went to Congress and wasn't just shelved.

"There has been lots of writing about pollution—Rachel Carson and other great people wrote about their concerns for the environment, but the issue hadn't reached any serious levels yet. This report had a great impact. It had a considerable influence on my thinking, too, because every time we thought about what could be done to control waste, we discovered it was impossible to do it in an old established city. In fact, The Los Angeles By-products Company went out of business, because Samuel Yorty was elected Mayor of Los Angeles on his promise that he wouldn't make housewives separate organic from inorganic garbage. Separating the garbage had been the secret of the company's success, because it removed one separation process, a very expensive affair if the company had to do it. Combining organic and inorganic garbage for the convenience of housewives seemed to me a tremendously retrogressive step. The fact is that the politics we have in our cities often prevent rational acts. Today they have come back to separation of garbage. Again I was ahead of my time.

Margin Quote:
"I may sound like a dictator, but I do believe government is supposed to govern. It is very unfortunate that the democratic process, which makes our officials have to run for reelection, makes them often not govern, to avoid the decisions they know are important, because the things that are good to do are sometimes not the most popular. We see that today as we've seen it throughout all the ages."

"There is an awful lot of nonsense—emotionalism, for instance, in the early days of environmentalism there were a lot of people yelling—I called them 'enviromaniacs,' a word I invented. That doesn't mean I'm not a true conservationist, but I defined conservation as stewardship of the outdoors with a view to productivity for the well-being of people and other animals.

"Technology will not be the salvation nor the destruction of the planet. Technology, no matter how great and good, cannot solve the people and social problems of the world.

The consumer is creating the need for products which in turn create waste and pollution.

"When we wrote the final report, I began to realize that these Nobel Prize winners and practical garbage and junk collectors were the most moral people there are these days. These people, when they got together, had all kinds of marvelous ideas, such as how to treat and manage waste so we would not have pollution. Unfortunately, every time we looked at a city, we found it was impossible to introduce new methods.

"For instance, we talk about mass transit. When New York City builds 'a new subway,' it has to be the same design as the original subways of New York because it has to be compatible. Politicians can't, in a great city, sell municipal bonds and use public money to finance what is really an innovative idea—it's too experimental.

"These facts stuck in my mind, and I thought first of all about choosing a little city, not too big and not too small, and trying out waste management programs there. That was the beginning of the idea. Then I thought about how the same trouble exists in trying new mass transit systems. It applies to almost everything that makes a city function. It applies to the waste of water we have in cities. Water drains off the rooftops, the city is short of water in the summer, yet when thunderstorms occur, the so-called storm sewers overflow and flood basements and cause damage. Why are we allowing that beautiful rain water to run away? Why aren't we able to do something about it?

Margin Quote:

"I got very interested in conservation in the proper sense. Conservation if it's done well, is conserving while you use. We have to use the earth. If we don't, we will go broke, and not have the money to conserve."

"The origin of the word 'economics' had nothing to do with money. It came from the two Greek words Oikos and Nomo, meaning home and figures. This was the basis of stewardship of the land. The steward or overseer of a European baron's holdings had the job of seeing that the landowner's holdings were preserved and kept beautiful, and at the same time productive.

"It was during this era in my life, when the "ecomaniacs" were screaming,'Don't do anything, don't use anything, conserve everything.' This is totally absurd thinking. Thank God they have quieted down a bit now, but at that time the world was filled with people like that, who simply screamed 'no,' without offering any alternatives.

"We have to be practical about conservation. We must use certain things to live, and yet take care that things are not ruined for centuries to come—so I wrote a lot in those days on conservation in that sense.

"I wrote an article way back in the sixties called Waste as a Resource. The idea was that there is no such thing as waste. As an old German philosopher once put it, 'Waste is

some useful article in the wrong place.' My article was addressed to industries, telling them they could find ways of using their waste, explaining that waste was a useful product. It should be called 'by- products,' and I suggested that we use all the by-products. I said that if we didn't do this on our own, soon we'd get government regulation that forced us to recycle wastes. I reminded them it was better to do it ourselves. I wrote this article long before the government had thought up the EPA.

"But, government regulation came anyway, because we didn't do it ourselves. I served on many boards during this time. One that I especially enjoyed was the Nature Conservancy with Lady Bird Johnson. We saved the Big Thicket in East Texas. That's what I call maxi-conservation——the big things that big people can do.

"Another concept of mine is mini-conservation—the small things everyone can do. I bought the house in which I lived in Virginia during the seventies. It is eight acres of land, and down at the west end there is a little stream—just big enough so my grandchildren can take a bent pin and a piece of rotten meat, and hook a four-inch brown trout. Anyway, it was grown over— absolutely wild, and we haven't touched it yet. By allowing it to stay wild, it has become a game preserve. It amuses me. There is a two-acre foxes den in there. It's their refuge from the hunters tally-hoing all over the damn land. The fox is smart enough to hide there, so it's fun. We have deer that grew up with my 14-year-old dog, Corky. He licks their noses, and the horses don't scare them. They've all grown up together.

Margin Quote:

"One time, I was sitting in the toy museum with some friends having a drink, and Kathy comes running in to say she had just seen a wild turkey. I told her to go out and get the gun and shoot it and we'd drink it."

"Of course, I don't have a gun, and wouldn't shoot anything on my place. The point is, it seems to me even small little land owners could do a lot of conserving just by letting things grow wild. Every little land owner can do it, and get such pleasure out of it.

"I don't really like lawns. Lawns take fertilizer, which is a petroleum product. If one counted up what lawns cost the U.S. in energy, it would be tremendous. I don't mind people having a few golf courses and lawns—but the obsession with lawns, even on small farms, is ridiculous and very wasteful. They mow acres and acres, where if they allowed them to go wild——the wildflowers would grow, and they would be far more beautiful places for all.

"This is my idea of mini conservation, but I don't think it gets over. The developers , instead of building houses between trees, cut down the existing trees, bulldoze the whole area, and plant scrubby little trees all over—so it's 40 or 50 years before you get a good tree.

"We don't know yet about the ozone layer and the greenhouse effect, but we better get

concerned very quickly. Concerned, but not hysterical. There are two scenarios——the greenhouse effect is about temperature. You can burn less fossil fuel, but you can't turn the clock back because we are dependent upon them.

"Turning toward nuclear energy is a good thing. We have come to the point where nuclear energy is the safest energy on earth. Many more people have been killed by mining coal and explosions in petroleum plants than have ever been killed by nuclear energy, and are dying from pollution.

Quote:

When I queried Athel strongly about the safety of nuclear power, he replied: "We have invented more powerful things by technology, and they were are powerful in two ways. The technology has invented ways in which you can hurt people more powerfully but you can help people more powerfully. Technology, also, if it is responsible, controls these things more powerfully. Having said that, and given the increase of population, which, of course, I deplore—if you have to provide energy for people, you have to do it by more ways."

"You have to be more careful of your control by technology. If you do have an accident, as at Chernobyl, it will hurt many people, but I do not believe it would destroy the whole world or significant parts of it—that is boloney. I think we are backward in nuclear energy in the U.S., because being a very wealthy nation, we have emphasized safeguards and not production—that is one extreme on the spectrum. In Russia, they obviously had the opposite situation. There is all kinds of room in between. "

Margin Quote:

"You can't do anything if you aren't willing to take a risk."

"The trick is to look at the thing as maximum benefit versus risk. The risk is very small with nuclear energy unless you use it to kill people— but that's purposeful.

"Actually, the hysteria over Three-Mile Island should have been reported as a magnificent example of how a mistake was made, but controlled. It was not a disaster, but the media as usual, because of their attitude of, 'good news is no news', looked at the bad side.

"There are steps being taken about the ozone layer. Freon and aerosol sprays are being banned, and as a result, substitutes have been developed. We can find substitutions for the harmful things we do and use, but we seem to refuse to do this unless forced to. Doing these things without hysteria and force is the best way to approach these problems, but Congress fans hysteria to get re-elected, and by fanning the irrational emotion of the people, they do get re-elected.

"I can't say adequate steps are being taken presently, but we do know that steps can and must be taken without taking away peoples needs and livings."

"Legend has it I wrote this poem."

Praise Paean to an Ecologist
The Centipede

by Athelstan Spilhaus

The centipede is not quite nice,
he lives in idleness and vice, he has 100 legs.
He also has a hundred wives,
and each of these if she survives,
lays just 100 eggs. That's the reason if you pick up
any boulder, stone, or brick,
a thousand centipedes concealed,
scatter far across the field.
Perhaps one remains behind.
Not only this one luckless one,
but millions more of either sex
will never now be born.
I daresay it will make you sick
but so does all arithmetic.
The gardner says, "I want to add,"
"the centipede is not so bad."
the millipede is what he loathes
and uses fierce bucolic oaths
because it eats his roots.
The thing is, can one stand about
all day, and count the creatures legs?
It has too many anyway
so if I see a thing like this
I murmur without prejudice
and knock it on the head.
And if I see a thing like that,
I take a brick and squash it flat.
In either case it's dead.

Chapter Twenty One

The Experimental City

Margin Quote:
"I began the study of the Experimental City about 1962-1963. I decided the only way to do it was to build an Experimental City and label it by that name, not to call it 'Utopia' or some fancy title. I also wanted to avoid the idea being confused with what the government was then doing with its 'model city' concept."

"As I wrote about the Experimental City, I allowed my engineering imagination to rein free. It was natural for me to think about how to improve the function of city services through fundamental city planning. The experimental city had to be built, in my opinion, at least 100 miles from any other great city, because otherwise it would become a mere bedroom satellite. I was in Minnesota, and I thought Minnesota was a great place. There's only one great city there, the complex of St. Paul and Minneapolis. Miles from the Twin Cities was lots of absolutely virgin land.

"The idea was to build the city with plenty of undeveloped land around it, but part of the concept was also not to allow the city to grow. In other words, to plan it for a specific population and hold it to that. A major problem of cities is cancerous unplanned growth. Very few cities are fully planned, only the hearts of cities are planned. L'enfant planned the streets of Washington, D.C., so a cannon could command all the roads coming in. Today a single disabled automobile can affect all the roads that come into Washington.

"The experimental city, on the other hand, was to be built completely upside down. What happens when cities grow unplanned is that people move out from the edges, and they move into more or less undeveloped ground, a few suburban houses and dirt roads. A certain number of houses are needed before local government puts in sewers, runs in telephone lines, and provides various other services. The crime rate has to rise before government worries about a police force. Enough children must live out there before government worries about the schools. Therefore, all the essential human services, the way we do it in the United States and most other places in the world, must lag behind the given needs. Cities have to wait for human needs to become acute before they can even make a pitch for these things.

"So I said, 'Let's design a city for a quarter of a million people'—a modest proposal, I thought. Critics of the Experimental City idea responded, 'A quarter of a million people? What have you been smoking?'

"My reasoning for that figure was based on the United States' annual population increase

of about three million people. This was twelve times my city of a quarter million. Now, these people are taken care of with no planning at all. We could take one-twelfth of the annual population increase and build an experimental city for them.

"In 1966, I estimated that new housing would have cost a quarter-million people through conventional construction about two billion dollars, then doubled that figure as the estimate for my project because of its experimental nature. Heaven knows what it would be today. The city was to be built 'upside down,' since I was so insistent about human services being in place before the human beings arrived.

"Build the cellar first, and put into the cellar all the services that cause physical distress in cities—the screaming ambulances, the police cars, the fume-belching automobiles, the necessary services. All these should be under the city, with vents to remove the fumes. On the surface, where people's feet tread, have no vehicles at all. The mass transit systems would be one level above the walkways.

"The cellars would also contain modular piping and conduits for the wastes, as well as the gas, and electrical services. The housing would develop on the level above.

"I was on a HUD advisory committee, chaired by my good friend George McGee and presented my Experimental City idea to them. Skeptics asked, 'Where do you get the front money?' To build this enormous cellar, with all the engineering in it, would require a major cost of the city to be met before rents or purchase money came in.

"I said, 'Look, I'm figuring on 250,000 people. You give your little loans, figure it $20,000 apiece, for 250,000 people, and you get something like five billion dollars. That's what I need. Why can't HUD, instead of keeping all its people busy writing little loans of $20,000, write me a loan for 250,000 people of five billion dollars?

"That idea didn't sit very well at all, although Lewis Mumford thought the idea was great. Buckminster Fuller also found it a valid concept, particularly if I'd enclose the whole damn thing in one of his geodesic domes. I had to keep Buck happy—because he was worthwhile for his ideas, and I had to keep him on my team. 'I think there's a difference,' I said. 'Bucky, I'll enclose portions of the city in domes, certainly, such as allergy centers, but if we're building an Experimental City, why not build a hospital, a 'Mayo clinic' for allergy problems, where we would enclose the whole facility? Certainly we can do that.'

"'At the same time,' I added, 'I don't want to live in a city that's totally within a dome. What is it that you feel when you feel fresh air? Fresh air implies not zero movement of the air, it implies not exactly the same temperature, it implies little different movements, wafts of breeze, and it implies slight changes of temperature that are stimulating. I can't really believe in enclosing a city.'

Margin Quote:

"Bucky and I remained great friends. I considered him a genius. He ate an absolutely regular diet of coffee, steak, potatoes, and ate that meal three times a day. He charmed the young with his imaginative ideas. When asked to talk for one hour, he talked for three hours. He had a brand of math he called Synergistic and Energistic Geometry, which neither I nor any mathematician could understand."

"Initially, we had great support for the project. Many legislators were behind us, but after I left Minnesota for Philadelphia, things bogged down. Although the project didn't get off the ground, a few of the ideas of the Experimental City were adopted in a city that is being built north of Paris. Many of the ideas have also been adopted, notably in Sweden. We still need to build an Experimental City. No one would want to fly in an airplane of which a prototype had not been built. Would anyone live in a city of which a prototype, an experimental model, had not been built?

"I dream of a city which is essentially a non-building city, where the shelters are adequate and flexible, but the services to people are maximum and glorious. The city of the future will no longer be for the exchange of things. It will be primarily for the exchange of ideas.

The idea for an Experimental City, unfortunately, is now dormant—mainly dormant in the United States where it is needed most. A lot of similar ideas are being used in Japan and Europe, where available land is precious. The fact that the United States has had vast resources has led us into profligate waste. Being a country of great expanse leads us to lack of planning for our land areas. The indulgence of having too much of everything leads us into greater waste.

Later I thought the site for my Experimental City should be the deep oceans.

Chapter Twenty Two

The Sea Grant Concept

The concept of Sea Grant Colleges is considered by many to be one of Athel's three main contributions to science.

"The Sea Grant College resulted from the recognition of a need, a conception, a period of labor, delivery at the right time, gradual acceptance of the young infant; and, I now hope that its sponsors give it have a productive and useful life."

Athelstan Spilhaus

"If any one person deserves credit for generating the idea, it was Spilhaus—Sea Grant had many midwives. Senator Pell and Representative Rogers were also instrumental."

John Knauss
NOAA

"They say I was helpful with Sea Grant—I invented the bloody thing."

Athelstan Spilhaus

"The sea never changes, and its works, for all the talk of men, are wrapped in mystery."

Joseph Conrad

[found in Athel's files attached to a speech he gave on Sea Grant.]

"I was to give the keynote address to the American Fisheries Society in 1963. I fell for a very short time into the error of thinking: 'Oh, hell, I'm such a good speaker, I don't have to prepare this thing. I'll just do it off the cuff.' That is the worst mistake even the brightest man in the world can make. Anyone can prepare very carefully and then throw away the script—that's ok—but for Heaven's sake, never go up there unprepared.

"The theme of their meeting was the perennial one: how do we get Government, industry, and the universities to cooperate? There I was, quite literally, going from my home in St. Paul in a taxi, because I wanted to think and get prepared ahead of time, to the hotel where this meeting was being held in Minneapolis. I was thinking, what will I tell these people on a boring subject—an age old one? How do we get Government, industry, and the universities to cooperate? I suddenly thought—here's the University of Minnesota, a land grant institution."

Margin Quote:

"The universities, over a hundred years ago, were given grants of land, and they were to be institutions devoted to agriculture and the mechanical arts."

"In the taxi on the way to give the speech I thought: land grant—and then I thought: that's the way to do it for the sea. Once I had the idea, I had my keynote speech. I just copied the land grant idea for the sea. I began my speech with some heated remarks I'd been harboring for a long time—about how disgraceful it was that the United States let the heritage of the sea go down the drain.

"I made up my presentation as I went along. It was very imaginative, and just gripped the audience. I talked about Sea Grants and said, 'Instead of the grass roots of the land, we'll have the eelgrass of the beaches, the algae, and the grass of the seas . . .'

"I thought nothing would happen after this, until some people began to contact me. The letters kept coming in. I was in demand for lecturing, and would use various extensions of the same theme. This was a time in the mid 1960's, when the bottom had dropped out of Aerospace. During several speeches, I explained we could retrain unemployed Aerospace scientists to the sea."

Margin Quote

"It's nearer to us than space. Why do we know less about the ocean's bottom than we do the moon's backside?"

"Senator Claiborne Pell of Rhode Island contacted me, and explained that he was very interested in my concept. When he called me about Seagrant, I said, "Senator who?" He said, "Pell, from Rhode Island." I said, "Oh, yes, you have a land grant college and no land." We became close friends, and soon set up a national conference—it was held in 1965. By then I'd been stumping the whole country on the Sea Grant idea. It was described in the New York Times as 'the greatest brainstorming scene since Roosevelt's time.' Thanks to Senator Pell, and Paul Rogers from Florida, the bill was signed into law in 1966 by President Lyndon Johnson. The result was that we established a program that grew to fifty million dollars annually and a Sea Grant program that involves 26 universities.

"The bill went through so fast we didn't have a director. When asked, I said, 'Just hire Bob Abel.' He became our first director, and remained so even after it moved to NOAA.

Ned Ostenso became his successor."

"During the course of the program, I had many opportunities to confer with Dr. Spilhaus. He never hesitated to offer his wisdom, experience, and extraordinary imagination to the cause. He also served on The National Sea Grant Advisory Panel. It is impossible to overstate his value to us during those days of designing and operating the national program.

Senator Claiborne Pell

Rhode Island

Chapter Twenty Three

The Franklin Institute—1967

"My first impression was that the Franklin Institute would be like the World's Fair, and I'd be able to play with all the toys. It was very enjoyable, to be sure, but very different from the World's Fair. I didn't have ten million dollars to put on a show for six months, and I found I was expected to go out and raise money, which I didn't enjoy at all. I was good at ideas, but I thought other people should do the fund raising. Wynn Lepage, Chairman of the Board of Managers, was not used to the idea that in addition to my being President of the Franklin Institute, I kept up all my other activities, writing the comic strip and everything else—what I called my "ongoing work." About two years later, when we had a discussion about my leaving. I said, "Gentlemen, the best way I can put it is, I really am forced to relinquish this wonderful job because I find the job interfering with my work." Money raising should be a separate profession. In any event, it's not something a scholar or an idea man ought to do—although some do it very well. Maybe it's not so much that they shouldn't to do it, but whether they can do it well.

Chapter Twenty Four

Palm Beach and McGraw-Hill

In the late 1960s and early 1970s, Palm Beach County in Florida was a hot-bed of racial tension. Athelstan was intimately involved in the integration movement in Palm Beach. He was asked by Governor Claude Kirk to help bring about the inevitable change as peacefully and easily as possible; but, the intellectual climate was not easy for him to endure. This boredom, however, caused him to produce a powerful and lasting contribution to the world of arts and science.

"In 1969 we sold our house in Philadelphia and went down to Palm Beach. I had the idea that the small pursuits I'd always regarded as hobbies would take up my time. Apart from my major passions, like the Experimental City and the Sea Grant, I always had time for my hobbies.

"I found I was flying often to Washington to get somebody to talk to. Of course, I did have friends in Florida, and Governor Claude Kirk appointed me to the State Marine Commission. Nevertheless, ennui was quickly setting in. Then a wonderful thing happened—Wallace K. Harrison, the noted architect, called me up. I hadn't yet met him, but he'd come to the World's Fair and saw what I had done there. Wallace Harrison was more than an architect. He was a great artist as well—often the two don't go together.

"Wallace said, 'We have an interesting assignment. Rockefeller Center is spreading across Sixth Avenue, the Avenue of the Americas, and McGraw-Hill is building a skyscraper there. According to the concept of Rockefeller Center, buildings must be set back from the street—there must be a sunken plaza. McGraw-Hill has expressed an interest, because of the nature of its business, in having a plaza that has a scientific motif or a tinge of science to it. I told them there's only one person I knew who could do it, and that was you.'

"Harrison asked me if I would do it, and I said, 'Certainly,' because I wasn't really doing anything in Palm Beach. This idea of working in a physically perfect place, where I have to laze around anyway, where all my neighbors are doing absolutely nothing, is the most mentally enervating kind of thing imaginable, so I jumped at the McGraw-Hill assignment.

"In starting this project, I thought first of the idea of having nature designs in sculpture, instead of human designs. It would be fun to see if, in art, I could simply observe nature and emulate it and have a pleasing form, and also a little subliminal education for people.

I couldn't help but always get in this little subliminal jab—that is my nature.

"I developed this idea of the Plaza of the Solar System, which went through many contortions, and then I thought of my maps of the Earth that were the first to show the oceans as one. I thought of doing the map in "macro-cloissone terrazo" with bronze separators forming the outlines of the continents and stainless steel strips as the latitude and longitude lines.

"Then I thought of how New York's children live on land, so I did the obverse of the world ocean and showed the huge land islands in terrazo on the pavement of this plaza, which thousands of people traverse each day as they come out of the subway.

"The second feature was the solar system. The pool was designed to represent the sun and the planets, built to the same scale were polished stainless steel globes, set around the pool. The planets themselves are in diametrical proportion to the pool which represented the sun. There is a big Jupiter and a big Saturn, and Earth is a little baseball. They're strung around, from Mercury nearest the Sun right out to remote Pluto; but, of course, these distances are not to the same scale as the size of the model planets. If they were, Pluto would be miles away even on the model; but, that's the idea of the pool of the solar system.

"The dominant feature of the Plaza was the Solar Triangle. I looked at this area of concrete canyons and thought, wouldn't it be nice to have a sun dial of some kind in there? So I designed a huge one. Actually, I didn't invent that, I stole it. I remembered seeing a great brick sun dial just south of New Delhi, an old astronomical observatory that slopes up and has curved horns, and I took the idea from that.

"For the final part of the sculpture, I came down to this isosceles triangle, designed by nature, not by Spilhaus. When someone looks up the lowest side, it points exactly to the position of the sun in midwinter, while the steepest side points to the position of the sun in midsummer. The hypotenuse points up to the position of the sun at the spring and fall equinoxes.

"Wally Harrison loved the rudiments of the idea. We went in for a conference with the McGraw-Hill people, who are great publishers, but maybe not too understanding about art. One of the first remarks made about the sculpture was, 'Dr. Spilhaus, don't you realize we don't see the sun? It doesn't penetrate to the bottom of the man-made canyons.' "'That's exactly why you should have this thing,' I said. 'Think of all these people squinting along there, so they can see where the Sun would be, if they could possibly see it.'

"The sculpture came complete and whole on a flatcar from Cleveland and had to be brought up to the site in the wee hours of the morning, when the street could be blocked off. When it was slung into place, the whole plaza ended up as the maps and pool of the solar system and the solar triangle.

"Sculptor, Henry Moore, was very complimentary about my work. I said, 'You just like it because it's got a hole in the middle.' I knew some very fine people, such as Alexander Calder. I loved his clinking, clacking cans. We were all on good terms, Moore with his hole in the middle, Calder with his cans.

"I went up to New York after the Plaza sculpture had been set up, and I found a teacher there with a whole class of school kids—schools take field trips there regularly. The little boys were standing on the terrazo maps, twenty-foot long maps of the world. One little guy would say, 'I'll push you in the the Pacific Ocean.' Another little boy answered, 'I'll push you off of India.' They were rough-housing around, and I thought, what a marvelous way to learn geography. I felt completely rewarded.

"Then I got a frantic call from McGraw-Hill saying somebody had stolen the Earth! The little baseball-sized globe was gone. The thieves must have worked at it, fatiguing the metal. The company said, 'So what do we do about it?' I answered, 'Pay the money to replace it and put in a bigger stanchion. After all, you can charge it off to publicity. It's the first instance of cosmic larceny!' They laughed like hell and replaced it.

"What synergism there was between the white children and the black children in Africa when I was young boy on the farm! Why couldn't that have been the start of a friendship between the Blacks and the Whites instead of the terrible way it went. It was because of my admiration for the Blacks and their talents, as well as the fact that I had grown up without antipathy towards the Blacks, that I could cross Africa by car from Capetown to Cairo in later years. I didn't have my first real taste of racism until I visited America years later."

Athelstan Spilhaus

"About 1969, when the integration of schools was a burning issue, Florida, particularly Palm Beach County, was found to be very slow in doing anything about desegregation. Somebody complained to the Governor about it. Governor Claude Kirk summarily fired the Superintendent of Schools of Palm Beach County for malfeasance and misfeasance and all the other feasances imaginable. He then came to me and asked if I would take over the job of Superintendent of Schools. I said, 'Claude, you must be joking. I'm having a nice life here. I don't have to get into that can of worms.' He said, 'No, think it over, even temporarily.'

"Knowing what a problem integration was in Florida, with the economic cliff between gold-plated Palm Beach and depressed West Palm Beach and other parts of Florida to the west and the interior, I said, 'Claude, when you ask me to do this, are you basing it on my credentials as an educator, or on my experience in guerrilla warfare in China?' He

replied, 'Possibly a mixture of both.'

"It all happened very suddenly, and I decided the way to do this integration was to make it very public—in other words, do nothing underhanded. I was a short termer and I thought, I'll take it on, do whatever is necessary, and, of course, I won't remain superintendent of schools for too long.

"Before I even went to the superintendent's office on Monday, I got my chief honchos, the deputy superintendents, together at my home. I told them to prepare a list before I got to the office on Monday. It was to consist of the Athletic Directors at all public schools in the order of their heroism and ability, how the kids liked them, and a corresponding list of the band directors, who were the other heroes liked by the kids. I said, 'Rank these people in order of how the children respect them—after all, every kid loves football and every kid loves bands, then tell me which are black and which are white.'

"Then there was a second list they were to prepare—a list of where they thought the worst trouble spots would be with integration. Obviously, the worst would be on the eastern fringe of Florida, where there was the Gold Coast and what I called the Cliff of Poverty inland—that would be Palm Beach, West Palm Beach, and Fort Lauderdale. There were troubles in the interior, because Palm Beach County had considerable agriculture, meaning that the children of intinerant farm workers and Spanish-speaking Americans working on the farms would be a part of my integration program.

"These three lists were the only way I could think of to do the job. I took the white athletic coach who was number one on the list and paired him with the highest ranked black band director and vice-versa, and put them in the worst trouble spot. That was my idea of integration—I made them deans. Now, that's completely illegal—no superintendent who was brought up in a school of education would think of doing that—but I made them deans nonetheless. The trick was that they then had not only the responsibility for the athletics and band, but they also had responsibility for the kids' deportment in general.

"I must say, in the end it worked well. This was a situation where there had been some bloodshed—knifings, fights, and small riots in the schools—so it wasn't easy. In fact, even the state automobile that was one of the perks of the Superintendent of Schools, caused some concern. Security people came around to me, looked at my credentials, and said, 'We'd better make sure, in this rather dangerous situation, that your state car isn't bugged, bombed or followed.'

"I said, 'I don't need to drive it.' So they got a fellow about my build, and he would drive it to my office every day, in the early stages of this effort, and I would go a little later in my old 1959 Rolls Royce. Now, that's an amusing cover, which would work only in Palm Beach, where Rolls Royces are so common they go unnoticed. Who would think of the Superintendent of Schools driving one? It worked very nicely.

"I make light of it now, but really it was a tough business. I had to have my phones disconnected because of the numerous hate calls that came in. This is what I learned: The telephone calls came mostly from Whites, because they were more likely to be active that way. In all fairness, however, the whole problem was generated by a small minority of extremists, on one end by parents of the white school population, and on the other end by parents of the black school population. In the middle there was a great deal of understanding and humanity. I have a feeling that it was a microcosm of the United States, including the weirder fringes.

"I hoped the plan would begin to work. I had to be in touch with the police all the time, all over the county. We had a fracas one night football game. I simply told the dean of the school, who happened to be a football coach, that if this happened again, I would have no night football games in Palm Beach County. That was a pretty tough decision, not for me, but, it sounded pretty tough to the coaches.

"I always made the point of repeating these announcements on television and radio, so they were well disseminated. There were no under-the-table dealings. As soon as I'd said this to the coaches, I went on TV and said, 'I have said that if there is an instance of this again, I will abolish night football games.' That stopped the problem.

"We also had to go into the problem of bussing. I was not very much in sympathy with bussing, being a kind of dyed in the wool, very conservative educator, because I thought time on the bus was time away from the books. I also thought the best atmosphere for studying, regardless of the color of one's skin or one's race or religion or anything else, is closest to home. The younger you are, the closer to home you should be, branching out into the world as you grow older. Simplistic ideas, but still, I think, quite valid.

"However, this was a Supreme Court decision, and I organized the bussing, redistricted the schools, and tried to reduce the mileage and time waste of the students, while complying at the same time with the law.

"When I was given the Superintendent of Schools job in Palm Beach County, I saw how very difficult it was to do what I considered the proper thing, because actually the Superintendent of Education had to concern himself with things that had nothing to do with the education of the young—namely integration and bussing. These were issues that were visited on the schools because politicians felt it was too dangerous to their own jobs to visit these mandates on parents. The easier thing to do was to do it through the schools and wait thirty years for the kids to grow up. I thought that was a really cowardly approach, although I will say that in the long run it's probably had a very good effect.

"Nevertheless, I found this fussing with bussing and integration extreme, and from an educational point of view—destructive. The school superintendent was an elected official in Florida. I was not, however, elected. I had been appointed by the Governor—had I wished to continue, I could have run for election. I'm sure I would have won, but, I didn't choose to do that.

Margin Quote:
"I think I am the worst businessman you have ever met, because I am not really interested in the business side of things."

"I had met a fellow in Minnesota who was very involved with the oil business. He had a lot of money, and had the idea of setting up a fishery for expensive items like lobsters. The operations would be based in Costa Rica, and the lobsters sent to Los Angeles. Well, I thought this was a good idea, and the shellfishing was good in Costa Rica, so I joined him in this venture. He was to get state of the art equipment for finding the lobsters—locaters that told where they were. This intrigued me as a scientist and an oceanographer. He then made me president of the company.

"It seems that we had run into a small problem in that the State Department would not allow the equipment to be exported. Well, I knew the Inspector General in the State Department, and was able to get an exemption for these devices. They knew I was a respectable guy and made these exceptions.

"I wasn't in Costa Rica. I was in Palm Beach; but, we had a manager down there managing the fisheries. By this time, a few boxes of fish had been shipped to Los Angeles, but something was going wrong. Even the guy in L.A. began to realize it, and arranged for the two of us to go to Costa Rica and check things out. Immediately upon arrival, we discovered the manager had sold off the SONAR device to some foreign country that should never have gotten it. Now, this put me in deep trouble with the State Department because I had said it was for a different use.

"The manager in Costa Rica's idea for making money was to pack lobster and shrimp in frozen boxes, pack the boxes with illegal drugs, and ship them to L.A. So here I was, President of a company that was drug running and selling advanced restricted weapons to foreign countries.

"I told my 'partner' that I was calling Interpol, and notifying everyone that I could get to as to what was going on, then explaining the situation, and telling the State Department I had really goofed. It was finally OK, but by this time, the guy had skipped the country. He was completely amoral and believed in using others. All this shows how poor I am at business."

(Note: Insert two articles: The Palm Beach Post 11/17/70 and Minneapolis Tribune 3/1/70)

Chapter Twenty Five

The Woodrow Wilson Center and the AAAS
1971 - 1974

When Athelstan decided to leave Palm Beach, he was invited to be one of the first Fellows at the newly established Woodrow Wilson International Center for Scholars in Washington, D.C. There was no memorial in Washington to President Wilson, and Athel liked the idea of one that combined scholarship and public service.

"That idea was really the origin of the Woodrow Wilson Center, and this center was funded partly by Congress and partly by grants, much the way the Smithsonian funds are raised. It was housed in the old Smithsonian Castle, where it still is. The Center gave me a very nice, understandable reason to leave Florida. I wanted to come up and get in the middle of things anyway. So I moved to Washington in January 1971, and had my office there. The idea at the Center is to have about half Americans and half visiting foreigners, and they really had some wonderful people. The first director was Benjamin Read, who had been a high-ranking career official in the State Department.

"One Center scholar I remember with affection and humor was Rajeshwar Dayal from India. After Indian Independence, he was Foreign Secretary, Ambassador to France and Yugoslavia, and Permanent Representative of India to the United Nations. When he arrived, I took him down to visit with Dillon Ripley, who was Secretary of the Smithsonian and always very nice. We sat down to tea and he was talking about his recent visit to India. Not knowing Dillon's preoccupation as a conservationist, Dayal said to him, "Well, next time you come to India, Mr. Ripley, you must let me know. I'll take you on a tiger hunt. You know, there's no danger. You go up in a howdah on an elephant and ride there, and our beaters will get the tiger out and you shoot it." It was a funny situation, for Dayal did not know Ripley had devoted a lot of his life to the preservation of the Bengal tiger. There was no harm on either side. Dayal knew better than Ripley that these damned tigers eat people and ravage villages and are vermin to an Indian. Only someone as dedicated to the preservation of wildlife as Ripley, would not realize how he sounded when he said, "The hell with the eating of people, let's conserve the tigers." One of the many interesting twists of two men of good will who approach things from different points of view.

"The last time I saw my mother was in 1972. Ben Read had an invitation from the Chancellor of Germany, Willy Brandt, to bring some of the Woodrow Wilson scholars on a tour of Germany as guests of the German Government. We were to fly from Washington in a German plane, which was primarily used by the German Embassy. Gail and I

thought this would be an opportunity to swing down and see my mother in Capetown, so I flew over to Frankfurt on the group's plane, but then continued on independently to Johannesburg. Gail could not be included in the group, as spouses were not part of the official guest list; therefore, she left Washington in order to arrive in South Africa at the same time as I.

"We spent three lovely weeks with my mother. It was too good to be true. I announced my intention to take my mother out to lunch every day when I was there because there were beautiful places to have sea food at different luncheon rooms around the Peninsula. We took her out to lunch every day, and she loved it. By then, at an advanced age, she would get up late in the morning, and go to bed before supper in the evening, but that middle of the day was a time she just loved.

"Many of these little places around Capetown don't have licenses to sell alcoholic drinks of any kind, so I suggested to my mother that we take along for her a small bottle of good white wine, and she said, 'What about you?' I said, 'Well, gin and vermouth and stuff.' She herself, at the age of 94, insisted on packing our little picnic basket of beverages. The reason I mention this was that a few months after we left Capetown, having seen her in excellent health for her age, she passed away very peacefully. I just thought, how lucky we were to have seen her and had this wonderful time with her.

"My mother had a remarkable career. After bringing up and educating five children, she was one of the first women in South Africa to enter politics. She took on the most difficult causes, served on the University Board, was President of the National Council of Women, and started the Institute of Race Relations. In the 1930s, she became the first woman member of the Provincial Council and devoted herself to two causes: the rights and well-being of the black and colored people, and the rights of women. Under Dutch Reformed Civil Law, married women had no rights whatsoever—I always think my mother was ahead of her time.

Margin quote:

"In Africa, people of mixed blood are called colored people, and the pure Africans who have maintained their tribal connections and customs are called blacks."

"Following her example, I try to take a balanced view on South Africa; but to anyone who only sees one side of the problem, the balanced view is considered racist."

"When I arrived at the Woodrow Wilson Center, I was Chairman of the Board of the American Association for the Advancement of Science, having been President the year before. Earlier, when I had been elected to the board of AAAS, it was suddenly discovered I was not a member of the Association. The explanation was that they had looked up and found Athelstan F. Spilhaus' name on the membership list, not realizing it was my

son, Fred. I quickly became a member.

"During my presidency, we went through the usual nomination procedure for the election of the next president. Glenn Seaborg, Nobel Prize winner in chemistry and a professor of nuclear physics from Berkeley was duly nominated.

These were the days of what I called the "enviromaniacs." Then Seaborg was President of the Atomic Energy Commission and some of the wilder-eyed environmentalists on the Board of AAAS took exception to him being President of AAAS simply because of his position in government. I thought that was completely wrong—we don't elect people because of their positions outside—we elect them because they are genuine scientists. I said Seaborg was definitely qualified for the position and the Nobel Prize Committee had been given to him. So I had a real drag out battle with some of the members of the Board. It wasn't an acrimonious thing, but it was a hard battle.

The man who opposed it most vehemently was frequently in the news then - environmentalist Barry Commoner.

These were the Commoner and Ralph Nader days, when they were riding high. They were not true conservationists like I consider myself to be and many others are; but, they were the ones who said, "Stop doing anything that pollutes - they were against nuclear energy. I thought all this was nonsense, so I won my battle with the board, and Seaborg became President of AAAS.

I called this the "politicization" of AAAS. Politics does not belong in a scientific society. I tried to make the AAAS a respectable scientific society. I do not consider it as such - it is riddled with politics to this day. I found it was too political for me, and I simply did not feel comfortable in this situation.

Chapter Twenty Six

The Move to Middleburg

Athelstan had grown weary of big city life and a heavy social schedule. The time in Palm Beach and Washington had begun to grate on him, so he moved to the Virginia country-side where he lives today.

"Once we were invited to an occasion at the Egyptian Ambassador's. We liked the Ambassador and his wife, but I just didn't want to go that weekend. I called up the Ambassador's lady and told a white lie. I said I'd sprained my ankle and had it in a cast. She said laughingly, 'I'm sorry you'll miss our party, but I'll be down at the Smithsonian Castle on Monday. I'll drop in to your office and sign the cast.' There was nothing for me to do, but to get a fake, strap-on cast in time for Monday.

"Later, I asked Ambassador George McGhee how one could politely get out of such events. He said, 'There's one excuse that is always accepted. Just say, 'I always go to the country on weekends.'' I said, 'I don't have a place in the country.' He said, 'Get one!' I said, 'Where?' 'Middleburg, Virginia, of course,' he replied. 'that's where I live.'

"Gail drove the fifty miles to Middleburg many times looking for something small enough to fit our purse, with the old-fashioned charm and seclusion and the space for horses we both wanted. One Saturday afternoon she told me she thought she had found it.

"The next day, she took me out and showed me what I immediately recognized as 'Multum In Parva'—an eighteenth century stone house, separate smoke house, sheds, tack room, and stalls for two horses, on eight acres of wooded pasture with a tiny stream. Then we saw the beams in the attic and cellar, still with the bark of the trees from which they'd been cut, the three-foot thick stone walls and multiple original fireplaces with wrought iron meat hooks in the exposed beams of the smoke house. We didn't haggle about the price—we insisted upon completing the purchase that same Sunday.

"We both loved our place and the small town so much that we found ourselves spending less and less time in our Washington townhouse. By the time I went to NOAA, we had disposed of our house in Cathedral Park, and Middleburg was home.

"When I opened an account at the Middleburg National Bank, the President, Bill Curtis,

assured me that, although small, it was a full service bank. Gail listened quietly, and shortly after we moved in, she gave a housewarming luncheon for several friends. Just as the ladies had finished their first Bloody Marys, a huge snake crawled down the chimney and into the living room. I can only imagine the consternation, with ladies jumping up on chairs. Gail went to the telephone in the kitchen and called the President of the bank. 'You said you were a full service bank,' she said. 'What do I do about a live snake in my living room?'"

Bill replied, 'Our Vice President, John Palmer, knows all about snakes. He'll be right over.' In short order, John arrived, removed the snake, and told the ladies about the benefits of having harmless black snakes around. Later on, at the Bohemian Grove in California, I related this story to the President of the Bank of America and asked him where his snake department was."

Margin Quote:

"There was even a ghost in the old house whose antics Gail told me all about. Apparently, during the War Between the States, when the tide of battle ebbed and flowed across Middleburg, a Confederate soldier was hidden down the well when the Yankees came in. After they left, the householder went to retrieve the soldier and found, in his hurry, that he'd put him down too deep; so, he cut the rope to remove the evidence and left him there. During the height of the full moon, the soldier's bleached bones could still be seen in the well."

"During this time, I was spending Tuesdays, Wednesdays, and Thursdays at my city office in Georgetown, and the intervening nights at the Cosmos Club, a few blocks away. This left Gail alone in Middleburg. Again, I was making the same damn mistake I'd made before. I hadn't learned from past experience, and so I set the stage for tragedy.

"Gail became ill and soon she wasn't able to travel extensively with me as my demanding speaking schedule required. She seemed content to stay with her horses and our two large, white standard poodles, but her health steadily deteriorated.

"In early 1978, I went to Australia for a meeting of the Young Presidents Organization. I was on the 'faculty' with Arthur Burns, George Bush, and Bert Lance. Poor Bert, he'd just resigned and the SEC indictment came out in the Sydney papers while we were there.

"I returned to find Gail had apparently improved, and she urged me to fulfill a speaking schedule commitment. I went down to Mescalero, New Mexico, to lecture to the World Business Council, which was meeting in a great Indian-run hotel on the Apache reservation. While I was there, I got a phone call that Gail had died suddenly from a perforated ulcer. She had been all alone at home, and I still blame myself for not being there."

Margin Quote:

"After Gail died, I couldn't stand the look of the place we both loved so much, so I accepted a Visiting Professorship at the University of Texas in Austin. I was sick in mind

and body. I had been through a lung resection the previous December and was recovering from tuberculosis. In my life, I had very few tragic events, and I didn't know how to cope with them."

"I accepted the Texas appointment with great relief and looked forward to working with Creighton Burke, Head of the Marine Science Institute, a petroleum geologist and a superb scholar. Just before I got there, Creighton had a massive stroke that left him seriously impaired and institutionalized. Peter Flawn, later President of the University, took over the institute while Creighton was in the hospital. He told me, 'Come anyway. We need you even more now.'"

"I was very distressed by what had happened to Creighton, who was only 49 years old, and I didn't stay long in Texas. I returned to Middleburg before the end of the year and discovered—again—that I was hopeless at living alone. I was lucky enough to meet Kathleen Fitzgerald, who lived only a few miles away, and we were soon married. She has been a great help in my work and always travels with me, although we are always happy to get back to Middleburg.

"One day Dad called me to meet him at the Cosmos Club for lunch. When I arrived, he was seated with a red-haired lady whom he introduced simply as 'Kathy.' I assumed the lady had driven him to town, and we were halfway through lunch when he announced that he and Kathy had been married the day before. Lunch progressed as normal, and religion and politics were brought up. Kathy said something, and his reply was, 'You're a Democrat?!' Something else was said about religion and he bellowed, 'You're a Catholic?!' When he went to get the blood test before his wedding, he told them to put it on his Medicare. Such is my father."

Fred Spilhaus

"Athel will give you the concept—he doesn't want to be bothered with the nuts and bolts of how it is done—the engineers can build it. He has complete confidence that they can carry out his concepts."

Kathy Fitzgerald Spilhaus

I am a perennial student, and was a fan of Athel's work long before I met him while taking some courses in oceanography on a cruise. The first thing he did was to teach me to play hookey. We would sit on the deck and play backgammon while the lectures were going on. There I was, 40 years old and playing hookey.

Athel can be difficult, but he is fun to work with. He has opened many worlds to me. He is the first man I ever met who is smarter than I am, and I realized immediately that I still had a lot to learn, and he was the best teacher I would ever find.

Athel is a new book to read, a new encyclopedia to open, and I am his student. We

compliment each other in our work. Athel is a generalist, I am a detailist—a particularist, and this works well for both of us. These differences occasionally bring about "in depth" discussions, but they are profitable for both of us.

Athel is a self-driven workaholic who becomes a basket case when he isn't working. He cannot bear to deal with the details of everyday life—and does not suffer fools gladly. He is a perfectionist in his work, and becomes very upset if you don't get the job done before he thinks of it. He cannot stand to be idle, or to see anyone else be idle. Athel cannot bear to see me sit still. The minute I sit down, he thinks of six things for me to do immediately.

For someone who has invented machinery, labor saving devices, and scientific instruments, he is amazingly resistant to using modern machinery himself. He really carries this eccentricity to extremes at times. He hates phones and computers, but he does love the fax. However, he won't use it himself.

He is opinionated, imperious, and hates to depend on others to help him personally, yet is strangely appreciative when you do. He has always been so self-sufficient, when he has to depend on others for help, physical or whatever, he tends to be a little gruff. He does not like to burden others. It is hard for Athel to open up to people about himself, but I think I have made some breakthroughs in that area, especially in his relationship with his children.

The whole world misses the fact that Athel is shy and unsure of himself, and worries about whether he is putting out his very best effort. In other words, not worrying about what others think of him, but living up to what the world expects of him. He will overextend himself to come up to what he thinks others want. He is incredibly keyed up when he is about to give a speech. Once it is over, then he is fine; but, before he faces his public, he is a wreck.

The way he works is incredible. Athel learns naturally, through his ears, and has a conceptual grasp rather than grasping detail. As a former teacher, I am fascinated by how he learns and communicates. It is absolutely amazing what he can remember just by hearing it. I can be reading a speech or a letter back to him, and he will stop me and edit or change something I read to him several pages before. I find that amazing, since I learn visually.

Athel never makes me feel intellectually inferior—I won't let him. I fight back. I think he would if I allowed him to. He does that with a lot of people, and many are intimidated by this. He cannot intimidate me, because I won't permit it. I fight him sometimes just to maintain my intellectual integrity. I do find that I always have to take a strong position, so as not to be put down intellectually. It comes from the sexist bias he was brought up
with, so I have to fight that. Now he knows that I won't let him get by with that kind of thing, so he thinks about it, then he will argue on a strictly intellectual level. Still, you

cannot put anything over on Athel—ever. Also, if you roll over and play dead, he doesn't have time for you.

Athel and I love our toy collection; but, he did not expect me to just come into his life and love and understand toys, and many other aspects of his life immediately. Also, he does not expect me to love and understand things from his point of view, but encourages me in the things that interest me about a subject, which may be entirely different from his. He has taught me to enjoy his life with him—again, Athel the teacher. He must have been one hell of a good teacher in his time, because he doesn't tell you. He makes you want to do it yourself. Athel makes everything fun. Even looking for our toys and antique cooking equipment is a game - like a treasure hunt.

Athel is really feeling his mortality now, and is driving himself day and night - as if he must get things done; however, he is still excited and enthusiastic, just like a little kid.

Kathleen Fitzgerald Spilhaus

Chapter Twenty Seven

Current Pursuits and Toys

Margin Quote:

"Lately, my comparatively leisurely life in Middleburg has enabled me to concentrate on important things such as my lifelong interest in maps. Misuse of maps has bothered me since childhood. As a youngster, it irritated me in school that the North Pole was always put at the top of the map. It was my first brush with, let's say, 'polarized discrimination'. My reaction to this orientation was either to stand on my head to look at the map, or to turn the map upside down. As a matter of fact, an Australian friend of mine recently sent me a map the Australians had published—a rectified map of the world, put upside down."

"My early revolt against conventionality in maps stayed with me and later became what I call 'geo-art.' As a university student and teacher interested in the oceans, I was irritated that landlubbers almost always put the edges of their maps so they cut through the middle of my oceans. We are land creatures and think of the world as land. We make maps to show where we are on the land, and usually show the oceans only as featureless borders.

"But ours is a water planet, with a single great ocean covering nearly three-quarters of its surface. Winds and currents sweep around a watery globe and whales move from hemisphere to hemisphere in ways that cannot be shown on maps emphasizing land.

"Astronauts, who have seen our world from afar, are well aware of this truth. Oceanographers and navigators are, too. Mercator maps satisfy the purpose for which they were designed—plotting courses at sea—but they cannot ever show the entire world as it really is without gross distortion. The North and South Poles can never be included.

"In 1941, I designed a map for ocean people that showed for the first time the oceans as a whole. As in Genesis 1:9, 'Let the waters under the heaven be gathered together unto one place . . .,' once you have the right map, it is clear that the oceans are one.

"The old children's notion of digging vertically through the Earth (or the new nuclear scare story of melting through) and coming out in China is an obvious misconception. If you dug vertically from any point in the coterminous United States, you would come out in the Indian Ocean. In fact, if the game is played on almost any continent, the result is the same: you surface in an ocean! Only about three percent of the earth's land is antipodal, or opposite other land."

Margin Quote:

"Cartography is very much like art. It is art, in a way. The cartographer has to take a spherical surface, the Earth, and represent it on a flat piece of paper. A portrait artist has to take the solid head and shoulders of the man, and represent it on a canvas."

"I also developed a map where neither the ocean nor the land masses were interrupted by the edge of the map, showing both the ocean and the continents in their entirety. This was a revolutionary new approach to cartography. I produced these maps by hand while a visiting scholar at the University of Southern California. Now with the help of a computer specialist at the U.S. Geological Service, near my home in Middleburg, computer-drawn world maps with natural boundaries are being produced.

"I continue to work as a catalyst and stimulator to my old project of colonizing the oceans. It seems ridiculous to me that recently President Bush has spoken of colonizing the moon, when three-quarters of our world is yet to be colonized.

Athelstan has been involved in and effected many events of the Twentieth Century. His life has been interesting beyond measure; but, the thing he enjoys most in his life is his antique mechanical toy collection. You always see a smile when the subject of his toys comes up. He has recently written and "starred" in a video which features his collection. Thus, Athel once again educates and delights yet another generation. He and Kathy have written a charming book called Mechanical Toys which was published by Crown Publishing, in Christmas, 1989.

Margin Quote:

"People always ask me how and why I got into toy collecting, and that's very hard to answer. I usually say that when I was a child, because of living on the farm and going away to boarding school in England, I had very few toys when I was a kid. In fact, the only toy I remember and cherished, and have to this day was a Meccano set. I continually added to it, and I still use parts of it in fixing toys."

"I can't say I became interested in toys because I never had them to play with, because I don't think that's true. When I was furnishing the house in Cape Cod, after World War II, I went around to second hand antique stores to get furniture, and I would see curious scientific instruments and sometimes toys or music boxes, which at that early date were very inexpensive. The antique craze hadn't swept the country and been blown up to the extent it is now. I picked up a few music boxes, old clocks, and some toys.

"It was only in 1965, when I was married to my second wife, Gail, that we really began enjoying going around together in whatever city we were in, looking for toys. We did it casually, but we accumulated a great number of them. She loved them, and it was just our

hobby, something that gave a little spice to a business visit to Chicago, to go out and pick up a toy or two.

"By the time we finally came to Middleburg, in 1971, we had accumulated hundreds of toys. Before this, we'd grown accustomed to living in two homes, one in town and one in the country. When we moved into the Middleburg house, the toys took over the place. We couldn't even eat in our dining room. So I built three museum rooms onto the house."

Margin Quote:

"Toys are a marvelous hobby. To me a toy can be anything. It can be large or miniature, or even alive. In fact, the word "toy" was used in Middle English, "toying" implying amorous dalliance—a live doll, one might say. People collect fine automobiles or they drive a Mercedes or a Rolls Royce. Those are toys, too. Such a car is not essential to their transportation, but there's no reason why they shouldn't enjoy it."

"My toy collection may not be the best in the United States, nor the most expensive, but it all works. I think that is its charm, like the exhibits at the Franklin Institute, the toys can be operated. Visitors can't work them, but I can work them for guests, and that's why I have a huge billiard table to run the toys on. A billiard table, not a pool table, because a pool table has holes, and the toys would go down. The billiard table has rubber bumpers and is a beautiful greensward for the toys to play on safely.

"I find the collection of toys a satisfying experience on several levels. I can write articles about them. I can travel to auctions which gives a point to traveling, and, furthermore, I get to play with them. I am a member of the Antique Toy Collectors of America, ATCA. I'm a collector, not really a toy dealer, but I do get duplicates. Friends take them or sell them for me.

"I have always been fortunate enough to be unable to distinguish between my work and play. Now I play very hard at finding toys for my collection so I can work them. I have studied the anatomy of toys—old, very sick toys go into intensive care where they get new limbs to walk or new muscles to move; and, sometimes I perform miracle surgery to bring to life toys that, in the course of their ecstatic capers, have lost their heads.

"Regrettably, we can't have them all. I find myself drawn to the wonderful mechanical ones about the size of the human hand. They can be held in the hand, worked by hand. Many old toys operate by generating steam or using electricity. Modern moving toys use batteries. Perhaps the most intriguing are those based on the simplest mechanical principles which have lasted through the centuries. These toys use gears, wheels, swinging pendulums, gravity, centrifugal force, or balance.

"What is appealing is the color, the beauty of line, form, and shape, the humor of caricature, the charm of miniaturization. Some embody grace of rhythm, while the jerky antics of others evoke our laughter. They do things that we cannot do in real life, thus

keeping us in touch with fantasy.

"Toys stimulate the imagination, and are enormously satisfying, because they take the place of the real thing that is unobtainable. They can bring a whole circus onto a little table, and exotic characters can bring the world into your hand. Like science fiction, toys can show the shape of things to come as in the balloons, zeppelins, and airplanes made in the 19th century. Toys reflect the hopes, fears, and prejudices of their times, sometimes better than written history."

Margin Quote:

"We live in a world of reality. We have to make our livings in it. Toys can be a marvelous escape to a world of fantasy, and they enable us to rediscover the child in ourselves and to retain the childish virtues of wonder, curiosity, play, and puzzle solving."

"My toy collection ends where plastics came in and replaced the good old materials—wood, leather, cloth, and tin. This may be odd for a scientist to say, as plastics have marvelous uses, but plastics to me, in toys, will always be ersatz. My interest in toys also ends with the introduction of batteries instead of the good old spring-wound mechanism."

Margin Quote:

"We learn from toys how little the amusements of children have changed—how little the amusements of adults differ from those of children, except for purity of delight, and how toys are the additive to preserve our childish enchantment with magic, wonder, and play. Historically, toys were never intended to be just for children."

Margin Quote:

"I have quite an investment in toys that pays interest daily in the golden coin of joy."

Chapter Twenty Eight

A Look Into the Future

Athel has brought together two scientific disciplines—oceanography and meteorology. Often during his career, he has made predictions which frequently come true. Athel, it has been said, "has an exceptional gift for pulling into his mind an encyclopedia of assorted facts; and, synthesizing from them, better approaches by which science can serve humanity." In this chapter, rather than taking a look at the future as a soothsayer would, Athel has chosen to tell us about a dream of his.

"Dreams come quickly to reality if we work at making them come true. If we don't design and work, nightmares become reality. I want you to come with me on a little exploratory trip, and not wait for the future. We can enjoy it now by planning it and doing things toward that end. I would like to confine myself to "the dilemmas of mankind.'

"The two greatest dilemmas of mankind, to my way of thinking, are overpopulation—overgrazing the earth on one hand, and energy—because energy is the fundamental currency of civilization.

"If we work towards stabilization of population and the increase of per capita energy, all the stuff in between can be solved. However, if we cannot control our numbers, and I mean self control in whatever way suits each person according to their religious and moral tenets; then none of the solutions that I propose can really be effective in the long run.

"If we cannot increase our energy production in new, clean and economical ways, then even stabilizing population will be of no benefit.

"I remember listening to an after dinner speaker in Minnesota one time. My neighbor at the head table was Father Flynn, the distinguished President of St. Thomas College. The speaker, who was a genius and could take any subject and make it unutterably dull, droned on. Father Flynn sensibly went to sleep. I nudged him trying to keep him awake, and asked him what he thought about birth control. He looked up and said to the speaker in a loud voice, 'I'd be for it if it could be retroactive.'

"The trouble is, it can't be retroactive. Us doers who must face things as they are; and, must start from where we are with a knowledge of history so as to give true relevance to

planning the future.

"We talk about pollution, we talk about food and housing shortages, and we talk about resource depletion. All of this is caused by too many people than can be taken care of humanely.

"I don't need demographers to tell me whether there are too many people. As long as there is a sizeable proportion of the population in any country which are not having minimum humane treatment, we ought to slow down the manufacturing of people until we get humane treatment for the majority.

"The other problem we are painfully aware of now is the so-called energy crisis, which is not a crisis, but an awareness of the finiteness of the earth's carrying capacity. For instance, in pollution, it takes energy to clean up pollution. Energy is the fundamental currency. It is not a political gift as represented by some of our politicians. Ask any housewife if cleaning up doesn't take lots of energy.

"We used to throw things away, and then we had to throw them further away. The developments of sanitary engineering took place, and finally we discovered that with our numbers increasing, there is no longer any 'away.'

"History tells us in Troy where there were huge population concentrations as we now have in our cities, people just threw their trash on the floor of their rooms. When the garbage got so thick it was up to the door sills, so they raised the door sills. Archaeologists love that, but they are the only ones that are happy. Now that we have museums, books, and other ways of recording and preserving, we don't need piles of filth and waste for future archaeologists.

"Pollution is not anything that you put into pure air. Pollution only occurs when you put an excess of something into the air, land, or water that harms the quality of life. So if excess is pollution, then in many parts of our earth, the excess of numbers of human beings are not only polluting, but constitute a pollutant in themselves.

"Waste is simply some useful substance that is in the wrong place, or that we haven't had the wit to use. One of the solutions today is recycling; but, I think we have to be a little careful about recycling. The recycling of aluminum is energy economical; but, the recycling of bottles is nonsense. If you recycle a bottle, you have to collect the bottle, which costs energy. If you clean the bottle, that costs energy. When you crush it, that costs energy. Then you melt it down, and that costs about as much energy as it does to melt the virgin sand from which the bottle was made—so the trick with the bottle is reuse.

"In Morocco, you can buy wine for almost nothing—the bottle costs you more than the wine. You take the bottle back and get it refilled. What a sensible practice that is!

"Newsprint is in short supply, and you can either clean off the print and use the paper again, or it could be burned for fuel. There have been estimates that show we can cut our fuel consumption by some fairly large percentages if we burned all the used fibers we had.

"Energy economics is a very difficult thing. It is a new subject, because you have to decide between alternatives. One I really love is feeding all the Sunday papers from Atlanta into the end of a factory where they are fed to cows who can turn cellulose into protein with some additives and amino acids and you have steak come out the other end.

"The point is: We can manage waste. It is a tremendous challenge to scientists, engineers, and managers. These are challenges, not problems. They can be solved if we can get politicians to understand this kind of planning.

"We have to ask ourselves the question: How clean can we afford to be? I coined the word ecolibrium, which is the balance between ecology and economy. 'Zero risk' is another abstraction which has been adopted widely. What we must realize is that there is a risk-benefit ratio that all of us in our smallest daily decisions have to assess. We have lost sight of this in our present preoccupation of the great government protecting everybody from everything.

"If we really disperse people over the surface of the earth,and we do not have these amazingly over-large concentrations of people, we might not have such terrible pollution problems. Dispersal is a pretty good thing. Many years ago I suggested we should build experimental cities, and in them try new systems of transportation, nonownership of land in the cities proper. This is not an entirely new concept. Condominiums are a euphemism for ownership.

"What about this depletion of resources? Recycling in itself is a big step. We can't recycle energy. It's called the Second Law of Thermodynamics. As we look to the depletion of resources on land, we have two ways to get independence of resources. One way is to look to the sea, the other way is to find substitutes for the things we are running short of. Those substitutes must be renewable. You will find that we will have to use our most modern science and technology to advance to a new stone age and agricultural age.

"In the last analysis, we make everything from rock, vegetation, the energy of the sunshine and other energy sources. In the last analysis, there is no difference between the natural and the artificial except, generally, in the artificial, there is a greater seasoning with energy. We must find less energetically expensive and non-depletive ways of substituting for those things that we are running out of.

"Now we talk about 'bio-mass energy.' That means farming energy. We are suddenly restudying the lessons of history; and, with our new knowledge of science and technology, we are hoping to find that we can really meet our challenges in this way.

"If we use these various things, we are going to have to pay a great deal of attention to storage. Have you ever thought, that we make more than we can use for a time, and we need to store it so we can invest it in making more energy? Animals do this very well. The real difference between humans and animals is that humans don't learn from experience. We must learn to store, and must learn to store energy like nature has done for us in fossil fuels. We are generally not short of things, except brains.

"I always look at agriculture as being the first real engineering. When you begin to think that air and water are now becoming commodities, I wonder if we can't extend ourselves and think about the atmo-culture and hydro-culture in the same way as agriculture.

"Agriculture essentially grows things, we use them, we extract energy from them, and the same mass must return to the ground for other purposes. The proper use of air and water entails the dirtying of them—so the nonsense about zero effluents from industry is silly. Nevertheless, we have to recognize that we must dirty this water, dirty this air, and then reclean it for reuse, just as we grow, use, and regrow our food. I don't suggest that air and water will be futures on the commodity exchange; but, I think we ought to think of them as commodities with real costing and pricing. Anything that is thought of traditionally as free, costs everybody more, and air and water are generally under priced.

"We have problems now of waste heat. It is called low grade heat which we must put somewhere. Why are we afraid of reengineering the general circulation of the atmosphere or of the ocean? Why don't we try it?

"We have heard a lot about solar power, and of course the first engineering of solar power was again agriculture. Agriculture has been using solar power more and more efficiently for a very long time. It is still the best use of sunshine, and this means biomass energy farms, farming energy, growing energy on farms is not out of the question. We are certainly going to see it in the future. We will be lighting and heating and cooling and cooking with fastgrowing things like eucalyptus on poor land, giant kelp in the sea, water hyacinths, or waste such as manure and urban refuse, turning them into different kinds of fuel like alcohol, methane, and so forth—again keeping a balance between what can be best done by biological engineering, and what can be best done by physical engineering.

"Instead of slaughtering whales, and then inventing machines to harvest krill, why don't we start breeding whales and use them to do that job. Then take the renewable harvest when they are well established, as has been done by animal husbandry for years.

"Energy as a fundamental currency is a good thing because we can't juggle the exchange of energy. The ministers of finance get together and juggle the money around, and they arrange inflation and deflation. You can't do that with the laws of nature.

"We have talked about food, pollution, and cities. Now, let's talk about individual shelter. I think that in the future, we will all come to lifetime costing of shelter, I mean

the lifetime of the shelter, the cost of its lifetime rather than initial cost regardless of high maintenance costs. I think we will come back to what I call design with or by nature. Here again, we are returning to the lessons we have learned from what we call primitive people. They sensibly design with nature. We have forgotten all that and fight nature at every turn.

"Then we come to the future of transportation. The railroad was a pretty fine thing. It was hard to beat in terms of economy. I think we will re-examine these things, and maybe it will help us to re-examine them by seeing that if we travel comfortably, it doesn't have to be speedy. This would apply to long-range travel.

"We must have mass transit, but it must be designed so that people do not have to adapt to it—it will adapt to people's needs. We could have a private people pod system, computer controlled, where you have little pods which one or two people can use them on their own schedules and for their own needs.

"I spoke of looking for resources in the sea. It is called 'seaward advancement'. This means moving to the sea to stay there. I think we will see a time when people will live and work at sea, and they will visit the land occasionally for a holiday, just as people on land take a cruise.

"Now we must talk about human resources. We must work toward a time when leinot bring people to employ their leisure in creative and rewarding ways, we will fail, and the provision of extra leisure will be a tragedy instead of a boon.

"I have a new task for the EPA. I think the worst pollution is information pollution. What is worse than pollution of the mind, and most of the information transmitted for less and less energy now, creates more and more pollution of the mind.

"Hopefully, we will one day realize that we can't educate everybody in the world to be literate. We must take our electronic devices and skip over the difficulty of training in literacy, and at least unlock some of the genius that must lie in those unable to achieve literacy. I think in our great and wonderful idea of moving toward education for all, we may be moving rapidly toward education for none. I worry when we think that higher education is something better than education of a craftsman. I think we should offer choices of training in everything, and have education at all levels for all abilities so that somebody can have a creative and rewarding life at whatever level he is capable of. I think when we get to that stage, we will be able to bridge the gap, and we will have this ideal of not distinguishing for anyone between his leisure and his work.

"Someday we will see newspapers without paper and pages. We will have a dial-a-newspaper as soon as the lobbies of the obsolete radiation television drop out of sight, and we can really get broadband communication cabled. We must worry about creative conscious experimentations. This is how this great country was built—daring experimentation, and taking risks.

"Science and technology are the only tools to mold the future, but we still need to supply the imagination. I say today, that the most important thing to make these dreams come true-at least to provide choices for people—is to negotiate an alliance between science and technology on one hand, and politics and government on the other; there is no such alliance today.

"We must renew our faith in our fellow man. We have no time for heroes anymore. The present disbelief in one's fellow man is to me tantamount to doubting the original creator. We need heroes and leaders that put fact and the provision of choices for all above personal power. We don't need in our planning and in our dreaming for the future, the arrogance of trying to settle everything from here on out. We must simply have the faith that each succeeding generation is smarter than we, and for heaven's sake, leave them some challenges to keep them human.

"It seems to me in government today, we are always half expecting disaster. We have had a magnificent history in the last two hundred years. History, as you all know, is but a prelude, or as someone said, "You ain't seen nothing yet!" Let's go ahead and open that gate to ourselves and our dreams for the next two hundred years.

"Distinguishing between the important and unimportant is very difficult. What is truly important to me are the things I have done well. My life has been about the eternal thing of art and love—the basics. I've had a good life, and I'm still doing it.

The End 11-1-91

What follows are items for consideration as addendum.

Note: The following is an addition that can be inserted at the end of the text if desired.

Addendum-

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Preface

This small book is a long essay which can be read at one sitting. When I first read the manuscript I regretted that it was not at least twice as long, but I have changed my mind. Mr. Spilhaus's purpose is to give the non-scientific reader, like myself (who might better be described as a scientific illiterate), a conspectus of the immediate universe in a single span of attention. The order and proportion of this essay will be the envy of the professional man of letters. The essay has form, progression, and scale in the sense that a good poem has these rhetorical features. There is not a sentence which is beyond the comprehension of the liberally educated man. It is one of the anomalies of American culture that many of the men who "profess" the Liberal Arts have succumbed to the social pseudo-sciences, and write various illiberal jargons which neither they nor anybody else can understand. Mr. Spilhaus, a genuine scientist, writes English with unobtrusive ease with which an eighteenth-century *philosophe* wrote French. There is perspicuity, but none of the "popularization" which _____ of talking down to the reader.

What people are interested in today, whether they know it or not, is not merely *how* they can live in the universe of the nuclear physicist, but, beyond that question *where* they

are. This second question nobody asks, but everybody suffers from its uncertainties. The strongest impression that I get from the cosmic picture that Mr. Spilhaus draws issues in a kind of paradox. Medieval man, living in a limited cosmos, had no trouble relating himself to the entire universe: he knew where he was through a chain of imaginative coordinates which began with the earth and which led him by stages up to the outer rim, where he found abstract or essential fire, indistinguishable from pure light, and this was conceived as both literal and symbolic light. From this old geocentric (or Ptolemaic) hypothesis, we have moved through the heliocentric to the non-centric universe, until as last man literally finds himself *nowhere*. To live nowhere is a difficult thing to do, and civilized man has never tried it before. If we ask John Doe where he lives, he will tell us: "The corner of First Avenue and Thirty-seventh Street"—coordinates that lead off at right angles to each other, but that, having circled the earth, come back to the corner of First Avenue and Thirty-seventh Street. The endless repetition of galaxies in an expanding space has left John Doe stranded on a street corner from which he can't get away, because he can only come back to it. He may fly to another planet, but only to find the Martian equivalent of First Avenue and Thirty-seventh Street.

The scope of Mr. Spilhaus's examination of the small satellite to which we are provincially confined is set forth prophetically in the first two lines of a stanza by John Donne, written probably at the end of the sixteenth century:

Moving of th' earth brings harms and fears,
Men reckon what it did and meant . . .

This "reckoning" deals with the instability of earthly phenomena which Mr. Spilhaus brilliantly describes: Fear is mitigated by progressive reckoning. But neither Mr. Spilhaus nor any other modern man could accept the comfort of the second two lines of Donne's Stanza:

But trepidation of the spheres,
Through greater far, is innocent.

Donne was not only the Dean of St. Paul's; he was a citizen of the cosmos. But that, alas, was the privilege of men who, never having been Up There, where "innocent" Pure Being prevailed, could run a co-ordinate out into space until it reached God. When Pascal, a younger contemporary of Donne, confessed that he was affrighted by *les silences vides* out in *empty* space, he was already changing into John Doe and beginning to live at the corner of First Avenue and Thirty-seventh Street.

Mr. Spilhaus is to be congratulated for showing us how we must make the best of the admirable non-_____.

Allen Tate

Spilhaus on:
The Purpose of Science

"I am going to talk about the purposes of science as related to the national purpose which, as I see it, must always be the sum total of the aims and ambitions of the people that comprise the nation.

"Purpose must be defined as that which one sets before himself as the object to be attained—the end or aim that must always be kept in view. Furthermore, purpose is a good word in relation to science because it connotes resolution and determination, and it seems in these days that some of our science appears to be drifting out of sight of purpose or is infirm of purpose.

"What are the aims of science? They are many. Science seeks primarily to understand, and scientific understanding of itself must not be set apart from our culture; but, be a strong, integral, and inextricable portion of it. To become this, science must be made understandable to everyone.

"To our top scientists, the doing of science is entertainment, in much the same way a talented musician or artist lives his work. To many of us who are not the doers in science, just as perhaps we can't play an instrument or paint, science can still be entertainment in the highest sense of the word in the way we listen to a symphony or enjoy a great picture or good book.

"Much of science has nothing to do with the development of devices. In the last ten or twenty years, biologists, physicists, chemists, and geophysicists have turned their attention to the unravelling of history—the History of our Earth and the History of the Universe of which our Earth is part. The scientist is no different from the historian in this aim or from the pre-historic archaeologist.

"The scientist records history as far back as he can, even to discussing such things as the origins of the Earth, moon, stars, and living things. The aims are the same—the methods are different. The geophysicist who now wants to place dates, just as the historian does, on events in our planet's life from babyhood to the present time, uses the decay of radioactivity in the natural elements that make up the Earth as a time-scale going back as far a 4 1/2 billion years. The meteorologist compiles records today of temperatures using a thermometer; but, from studying sea shells, from sediments in the bottom of the deep oceans, the scientist begins to push back our knowledge of climate about half a million years. The aim is still to understand the history, and the purpose of understanding history is to better be able to guide our course in the future.

"Though the aim of science is understanding, it seldom gives positive answers. For every question answered by scientists, half a dozen are raised. The known unknowns are our planet, our origin, and our universe. This is a fortunate thing. Otherwise, the material on

which to feed man's curiosity would dwindle. So, man with his theories supposes solutions; but, nature continually proposes new problems.

"Science is a discussion that continues from generation to generation; and, while it tends towards completeness and consistency, a scientist thinks less in terms of complete, consistent schemes than philosophers, lawyers or clergymen, and he certainly is far less dogmatic and certain than a politician.

"Science is an embodiment of two essential things that it shares with all other creative arts—literature, painting, music, and the like. The essentials are perception and communication. Sophocles, two thousand years ago, expressed this relationship of perception and communication in these words: 'Of all the wonders, none is more wonderful than man who has learned the arts of speech, of wind-swift thought, and of living in neighborliness.' Some might wonder today whether Sophocles was not an optimist. Not all of us place enough importance on the arts of speech, on the enjoyment of precise thought, and in this torn world, one wonders about the neighborliness. Nevertheless, if it is our national purpose to set, with other friendly nations, an example in this world, then we must in science, as well as all our other activities, encourage all of these things to communicate our thoughts with others in a spirit of neighborliness.

"No one should be afraid of science, even though its means are often complex mathematics or complicated machines. Its aims are essentially simple. No one, in trying to understand science, should be afraid of making errors. Science itself progresses by error and correction. The greatest scientists are those who are least afraid of making errors.

"We cannot have the innovation and invention that is necessary to keep our nation young and strong if people are afraid to innovate. In science today, there is a little too much emphasis on committee and team activity instead of individual effort. Here science shares a malady—"committeeitis"—from which we are suffering generally. In the same sense of individual effort rather than committee work, our science suffers a little, in that support is enlisted for projects rather than for good people. The best project in the world will not get off the ground without good people to work on it no matter how much you spend. A good person is bound to do something well, even though it isn't what you asked him do to, if he is allowed to work.

"Our national purpose in science, as in everything else, is plagued with the often misstated dichotomy 'quality or quantity' This is the question the educators ponder. The answer is clear—we must teach everyone to the limit of his ability. Excellence and quality must no more suffer by the attention to numbers than must our need to teach numbers be forgotten in a preoccupation with the intellectual elite. We need an intellectual elite, but we need a society that is <u>proud</u> of that elite which wends its way up among them.

"Some of the greatest discoveries of science were made with the simplest possible equipment. These classical discoveries have a style which is immediately apparent even

to the non-scientist just as good style and the exposition of a brilliant idea is recognized in art or literature by the economy and excellence of words in which it is communicated.

"Four of the ever-present needs of man are shelter, food, fresh water, and fire or power. Throughout history, improvements in providing these four needs have been accomplished by scientific discoveries which now have led to new materials which can provide shelter economically for millions. The beginnings of understanding what makes it rain, so that the ample fresh water of the Earth may be suitably distributed, and virtually inexhaustible nuclear power to provide the home fires we need. Science, in its continual efforts to innovate, supplies its share of the fifth need of man—a need on which to feed his curiosity, and to keep him an intellectual being—and therefore, human.

"The purposes of science in relation to the purpose of our nation and the aims and aspirations of the peoples of the United States, along with their hopes for friendship with mutual respect with other nations, must then, in summary, emphasize these points.

"Science is part of culture as entertainment in its highest sense—in the performing of it, the appreciation of it, and the enjoyment of the outcomes of it. Science should never be over-emphasized nor be over-directed. Science must be thought of, and taught in its relationship to all other aspects of our living because science alone is sterile, and only fruitful if it is allowed to grow naturally and freely as part of our total intellectual environment.

Spilhaus on:
The Oceans
Oceans
Sea Power, Past, Present, And Future

What I am really talking about is sea power. Sea power is not just navy. It involves taking fish and many other resources from the sea, and it involves the ability to carry things across the high seas. Sea power is a three-legged stool, with a navy leg, a sea resources leg, and a marine transport leg. If sea power is to stand, no one leg of this stool can be cut shorter than the others; and the foundation on which it stands is understanding and stewardship of the oceans.

In the past, the U.S. Navy has been an ON-and-OFF proposition. The United States has had the remarkable ability to turn ON Naval strength rapidly when needed but turn it OFF to languish during times of peace. Sea resource acquisition has also been an ON-and-OFF activity. The first settlers of New England were English landlubbers who engaged in coastal fishing because they had to, for food. They also developed an admirable whaling industry because they had to, for oil. That is the ON part. The OFF part came as the interior, with its vast land resources, opened up. New Englanders could

add value by manufacture to things and exchange them for food from the land. Then the discovery of oil in Pennsylvania killed the whaling industry. Whale oil was no longer essential. Also, the Civil War took away many whalers. The whaling industry never recovered.

Our Merchant Marine was ON at the peak of its glory carrying people and things across the seas, notably the Pacific, in the marvelous Clipper ships, the fastest sea carriers in the world. The triangular clipper trade from the Pacific islands with sandalwood for China, exchanged for silks for the United States and Europe, at one time had almost every ship in Hong Kong harbor flying the U.S. flag. Sandalwood was exhausted from the Pacific islands about the same time the British took a step-jump and moved into steam, and our Merchant Marine was turned OFF. It revived strongly in World War I to carry goods to allies in Europe, after which it dwindled again, to be turned ON once more in World War II. The interest in the seas was easily turned OFF because people believed the United States was protected by the great watery moats of the Atlantic and Pacific.

Now, in the present, how are our sea legs? The Navy was preeminent in World War II and for three decades thereafter. But recently somebody has fooled with the OFF switch again. Social preoccupations have taken priority over defense. Our Navy has been referred to as "depleted husks," as "paralyzed," and as "overstretched." As to overstretching, I would add that our Coast Guard, a vital component of sea power, is also terribly overstretched. It is supposed to know the who and where of all the ships around our shores but who will find the wherewithall with which to find who's where?

Limitations of armaments, SALT, etc., have contributed to this decline. But we still lead in activity under the sea. From the 50s until today, submarines and drilling for oil in deep waters are the things we are good at. During this period 20 years ago, the TRIESTE blazed the way down with its dramatic deepest dive.

But with food sources from the sea, high technology has not prevented costs from rising beyond our competitors. For each calorie of tuna that you eat, thirteen calories of external fuels are burned to acquire it. There is far less energy cost in the labor intensive coastal fishing of less developed nations. They eat their whole catch of fish; we throw away half of ours, calling it "trash fish." Our magnificant technological ability to tap oil from deeper and deeper seabed does not keep up with our appetite for oil, we are indeed "gasoholics." Nor does it keep down our dependence on foreign imports. These foreign imports come to our shores in foreign bottoms, because our carrying capacity at sea, our Merchant Marine, seems to be, not only sick, but in TERMINAL TRAUMA. The Merchant Marine has not, up to the present, been improved by applications of high technology. High technology cannot always be expected to fix self-imposed people problems.

Remember the SAVANNAH? The idea in the 50s was to compete in the Atlantic passenger and freight carrying, but the reason that people traveled on the QUEEN ELIZABETH or the ILE De FRANCE had nothing to do with the high technology, but

more to do with high living. On American vessels, because of high labor costs, three meals a day had to gobbled in a span of eight hours; otherwise there had to be multiple crews. The decision to build a nuclear-powered merchant ship had no relation to the problem. When the problem is food and good service, you can't solve it by putting a nuclear furnace under the vessel's boilers. One fairly new innovation is to simplify the intermodal transfer from ship at sea to rail or truck on land with minimum handling. Yet they are striking now because men are no longer needed for antediluvian hand stevedoring. An imaginative technical fix has produced an adverse people reaction. The maritime unions, who have contributed to the demise of the Merchant Marine and to the increase of foreign registry of our vessels, may find themselves without maritime people to unionize. Even if we agree that men who work at sea should live as well as men who work on land, we will have to find a technological fix for the long separations from normal home life.

Designing the future from past and present experience is better than just letting it happen. The Navy is good underwater, and we are advanced in the ocean of space. The future course for the Navy to chart is to add to underwater strength and develop a strong synergistic combination with the military arm in space. We navigate from satellites, we communicate via satellite, we launch missles from submarines. The oceans and the vast ocean of space are linked. This should be strengthened. We should consider a sensible solution to lessen the burden of land forces overseas by putting more reliance on a combination of Navy and Space.

Our history of subsidies shows that no amount of more money for continuing to do the same will revive our Merchant Marine. But, we need to remove costly regulations that protect others but not ourselves if we are to remedy inadequacies in our Navy sea-lift capabilities and permit a revival of merchant sea-lift. Since the British introduced steam propulsion, there has been little high technology except that the fuel of vessels has changed from wood to coal to oil to atoms. We have learned that we must avoid labor-intensive sea transport, but to avoid it we must not fall into the trap of energy-guzzling sea carriers. Too often we cure one ill and spawn another. We can reduce manpower by automation and reduce energy consumption for propulsion by using the wind. Can we design automated sailing ships?

Just as the automated sailing vessel is an entirely new concept and not just a return to sail, so our abilities with submarines make us think of taking another imaginative look at submarine transportation of bulk materials. A successful submarine cargo carrier took two loads of copper to Germany from the United States in 1915 and 1916 during the blockade. It was called DEUTSCHLAND. Germany lost the war and submarine carriers were forgotten. Now, 65 years later, from the tractor-trailer concept of our highways, should we not dream of nuclear tug-tractors under the sea, hitching on to submarine container trailers carrying bulk materials?

One of the cheapest forms of transportation of materials is the pipeline. Pipelines are now used for water, oil, sulfur, and coal slurries. Can we not develop marine transport pipelines on the seabed which could, in addition, transport slurries of fish or of neutrally buoyant ingots of metal, and so on and so on?

The future of sea resources is vast. With our country becoming dependent on most of the raw materials needed by our industries, we should see whether these materials or substitutes for them can be taken from the sea.

Taking of nodules from the deep sea in the Pacific, with the accompanying stirring up of nutrient-rich deep sea sediments and water emulates the natural upwelling of nutrients in seawater, equivalent to plowing on land and, far from doing harm to the sea, could make ocean deserts fertile.

I remember being called out to a proposed site on a cape on the west coast where there was a plan for a nuclear power plant. The citizens were up in arms, not for any sensible reason but they were worried about the bay and the possibility of waste heat changing the ecology. So they called in the experts, and when I arrived, I discovered that if this heat were put in at a certain depth, rich in nutrients, it would stir up, boil up, if you like, those nutrients to the surface and could only increase the productivity. I explained this to the people there and added, "If you do it sensibly, you can have your cape and heat it, too." In spite of this advice, the plant, although completed, is still not warming the citizens or their food.

Nevertheless, social laws, overzealously applied, sometimes stimulate entrepreneurship. The spectre of pollution fathered Holland's idea of an island for industries with objectionable wastes. Incinerator vessels, such as VULCANIS, which burn harmful things completely at sea, are similarly responsive.

Many people have wasted their time on the U.N.'s efforts to formulate a comprehensive Law of the Sea. We need a law of the sea to permit entrepreneurs to develop the resources of the sea. But the U.N. is obviously not the right body to develop it because it is composed of many land-locked countries with voting power equal to that of the great seafaring nations. They use their votes as blackmail for other rewards. Many criticize United States vacillations, which sometimes bend the law of the sea to temporary national enthusiasms, tolerating violations of others and over-regulating our own vessels.

For myself, if we are going to bend it, let's bend it our way. Only God can propose the ideal solution which magically separates the lovely concept of common heritage from the impossible idea of common ownership and combine it with workable ocean management practices.

The politics of attempting to set priorities when the conflicting activities and interests of the United States engender differences within our own nation as wide as between nations

at the international conference makes the United States' position at sea lack credibility.

Stewardship has always gone hand in hand with ownership. When whales are in nobody's inventory, nobody protects them. When everyone owns the sea, no one looks after it.

Shakespeare wrote, "There is a tide in the affairs of men which, taken at the flood, leads on to fortune. Omitted, all the voyage of their life, is bound in shallows and in miseries."

The tide in our nation's ocean affairs is not at low ebb. Let's prepare for the flood that leads on to fortune, or we will indeed be bound in shallows.

Three happenings make this time propitious. First, we have declared a wide economic zone in the sea. When you open up a new territory like that, you must homestead it. As in the old homesteading of this western land, if we do not use our new territory, we won't hold onto it. Will be be absentee landlords or will we go to sea to stay?

Second, there are all kinds of ideas for multiple uses of the sea. Ideas burgeoning from universities, industries, and government. Fragmented, these good ideas may never survive, but put together in a grand sea development plan, they can be fruitful.

Third, recent changes in our government may, hopefully, switch the government from its adversary position against industry to one of partnership with it.

These three elements are mutually supportive. To homestead and stay at sea, we will need to use and combine the many available ideas and, if we do so in a grand way, we can ensure proper protection of our investment of imagination and purpose. To homestead, we need deep water ports. We have the first off New Orleans. We need mariculture using wastes which are nutrients for the fish. This has started. We need power from the sea. Oil drilling has given us that. We should use the power there instead of just sending it, with great losses, to land to cause already overgrown cities on the seacoast to grow more.

We need true seaward advancement as a way of really planning new industrial complexes at sea which would combine all these ideas in a coordinated effort, forming a "platform" or island which would economically serve many uses where no one use could afford it.

The tools, instruments, ship designs, materials, power plants, and the foundation of marine science are at our fingertips. In these we are number one: in putting them to use, we are virtually nowhere. The problems are not technical. They are societal and political.

Can we not envisage cities at sea where energy, oil from the seabed, nuclear power or coal, is used in-situ for energy intensive manufacture right there from bulk materials that come easily into offshore harbors? Around our sea complexes, can we not emulate land?

The great big step for animal husbandry in the United States was the marvelous invention of barbed wire. How can we invent enclosures for the husbandry of life in the sea, mariculture, and also, as the cattle guard is necessary for free passage through barbed wire, invent ways of free passage through our fences at sea?

Can we not imagine economies of energy by, instead of burning fuel to make refrigeration, using the natural freezing temperature of the deep water of the oceans for storage? We have few technological problems today that would prevent the creation of ocean cities, but we have an abundance of people problems. The time it takes will be shortened as our purpose is strengthened. If we have no purposeful goal, it will be done anyway, but by others. Like putting man on the moon, our goal is man on, in, and under the sea. People would back it. They like imagination and challenge. They are tired of pedestrian whittling. We can help fire their imagination by paying attention to the art, literature, and music of the sea.

We must not allow gloomy predictions to destroy imagination, but we've had leaders who, if they'd had to name a toothpaste, would have called it "Gloom" instead of "Gleam."

Some time ago I was crossing a railroad track in Florida. The gate was up on the side from which I was coming, but down on the other. So I drove across and opened the other gate. The gate tender remonstrated, "You can't do that." I said, "Why do you have one gate down and one gate up?" He said, "I'm half expecting a train." We have been have expecting disaster and not half working to avert it.

We must take a few chances. There is no "zero risk." When we cross Hampton Boulevard or Main Street, we take a risk but gain the benefit of reaching the other side. The sea is only a step from Main Street. Let's extend Main Street into the sea through our American Ingenuity.

"We will master the sea only when we occupy it."

Athelstan Spilhaus.

"You will, I am sure, appreciate the following recipe for an oceanographer: Add to the curiosity and doubt, the adventurousness of the explorer which breeds the research scientist, and keep well stirred.

Athelstan Spilhaus.

"Oceanography's future depends on the uses to which we put the ocean. The science of oceanography is not a discipline but an adventure wherein any discipline or combination of disciplines may be focused on understanding and using the sea and all that is in it.

Oceanography is a field in which I have found great satisfaction and excitement, and I hope to be able to communicate to you the lively invigoration it brings.

"It is hard to talk about the oceans without bringing in the air and land. The problems of the motions of the air and of the motions of ocean water have much in common, and the interaction between ocean and atmosphere at the common boundary is a matter of profound importance to both fields.

"It is from the ocean that the water comes and enters the atmosphere and forms our clouds, falls on our continents, and returns by our rivers to the sea. It is the ocean which, by acting as a huge thermo-accumulator, stores heat in the summer, liberates it in the winter, and exerts a profound effect on the tempering of climate. On the other hand it is the winds in the atmosphere that stir up the waves and cause the surface currents of the oceans to flow.

"In the continual cycle of water from the oceans to the continents through the cooperation of the atmosphere and back to the sea via the rivers, land is continually being washed down into the sea. "All the rivers run into the sea, yet the sea is not full."

"It is the vastness of the oceans which contributes one of the ingredients that makes their study fascinating, that causes the study of the oceans to be a combination of the ideas conjured up in the word combinations: science and art, inventions and imagination, research and exploration, doubt and the probing of the unknown reaches where man as yet cannot go. These are the same ingredients which have made the epics of the sea in literature. The science of the sea is merely an account of man's heroic struggle to understand better, and thus be better able to withstand the majestic forces of the sea.

"In this way the science of the oceans gives life to those who maintain that technological progress strips life of part of its charm. Quite the reverse—it opens up a world so fantastic that pure imagination could never conceive it. It opens up the hitherto unknown recesses of our planet. It combines with science the 'great adventure' which together give all the raw materials for literature and poetry.

"There have been some marvelous sea expeditions in our time and even before. There was a whole series of Antarctic expeditions such as Nansen's expedition on the Fram and Sir Hubert Wilkin's plan to go under the North Pole in a submarine. More recent, and no less exciting, are such plans as the occupation of the Ice Islands in the Arctic Ocean, Heyrdahl's voyage on the Kon-Tiki and the Bombard voyage on the raft, L'Heretique.

"These expeditions all contain the ingredients of science and adventure, although it must be admitted, in different proportions. Some, like the regular expeditions of oceanographic vessels from various countries, are primarily scientific and tone down the pure adventure. Others, like the Bombard and the Kon-Tiki expedition, are calculated to emphasize the adventure, yet have a scientific peg that they hang on.

"In man's scientific quest it is characteristic that he is continually dissatisfied with the range and sensitivity of his normal senses. He tries to extend these in all ways. When he was hunted in primitive fighting he used his ears to detect the snap of a twig to indicate the approach of an enemy. He now uses an extension of these hearing devices when he is hunted on a destroyer by a submarine. This extension of his senses has revealed a remarkable thing about the stillness and quietness that is usually believed to exist in the great, great depths of the ocean. Believe it or not, one can actually hear noises of the fish.

"The exploration of space and of the sea are not either/or propositions. We first have to recognize that our major expenditures in space are not for pure scientific research. Most of the money is going into the vehicles to carry us there. We may gain some military advantage in the process, but the space race is highly unique in not having the kinds of specific objectives we associate with large outlays of money.

"The military advantages which accrue from oceanography are obvious now that we have the Polaris submarine. Over and above this aspect, the seas hold tremendous potential for the development of cultural, social, and economic advantages. The oceans are within easy access of virtually everyone today. This is not true of space. I believe that science is sterile unless it can be employed usefully. Oceanography will make the seas more useful as well as more enjoyable for people. These are some of the economic and social objectives.

"The population explosion is a definite consideration in oceanography. People will be spending more of their time on the oceans, not because they are squeezed off the land, but because it makes sense to do so. We have an increasing amount of time for recreation. People will be looking to the sea for more room to re-create their spirit.

"There is plenty of potential food in the ocean, but the big problem is

gathering and processing it. Right now we are going about it like a like a blind man with a butterfly net.

We have indeed, in the past, exploited the land without regard to the stewardship which should accompany exploitation with a view to the preservation of the continuing resource. We must only take the renewable harvest from the land. This is what I call stewardship of the sea. We must go into the sea having learned from the past experiences and mistakes we have made on the land.

"In our use of the sea today we are only skimming the surface . . . literally and figuratively, and the amount of money allotted yearly to oceanography will only support the very basic oceanographic studies."

"*Clare Luce once said: 'One tenth has been spent on the oceans than has been spent on space. From time immemorial people have looked upwards for hope and downwards with dread.' I think she nailed it.*"

Allyn Vine

Scientist Emeritus
Woods' Hole Oceanographic Institute

"Man is going to colonize the oceans, and it might just as well be our men. To compete successfully, we must be able to move faster in the sea, to go deeper, to stay down longer, than anyone else. We must understand more about the sea—its interfaces, its interaction with the atmosphere, its bottom, and deep into its bottom, its shorelines, the motions within its bulk, everything it contains, the life and chemicals in it.

"We are already beginning to occupy the sea, from massive vessels to oil platforms. At the same time, we are beginning to go under the sea. Experimental submarines are being built.

"In colonizing and exploiting the oceans we will have formidable competition from the Russians and the Japanese. To meet these challenges, we must organize our efforts better. Along these lines I suggested the establishment of Sea Grant colleges.

Margin quote:

"I would like to think we are entering a Sea Age, an age where the horizons are broad and challenging—where imagination today will be the reality tomorrow. It will require the development of new concepts in legislation in establishing national and industrial rights to the use of the open seas. Oceans offer exciting opportunities for industrial, recreational, and cultural development. These opportunities lie not in outer space, but at our doorstep, the shoreline.

"We haven't begun to use our oceans. We could farm whales like cattle, train dolphins to herd fish, and other sea animals could be domesticated. Our foods come from hybridizing wild plants, and this could be done with ocean plants.

"Colonizing the oceans must be done. This is not "blue-sky" thinking. As long as we have runaway overpopulation, we are in danger of destroying the land and the oceans no matter what we do.

"Some of us connected with scientific research fear that the sources of support for research will unduly control scientific thinking. I do not mean that these sources of support, whether they be private, Federal, or State, will actually prescribe the thinking; but, rather that they will define too specifically areas which will be supported and that this will effectively determine fields of concentration. Ideas flourish best in an atmosphere as fresh and free as the salt sea breeze itself."

"Athel, along with the Hon. James Wakelin, previously Assistant Secretary of the Navy, and Assistant Secretary of Commerce, was responsible for much of the early evolution of

our country's ocean program."

Robert B. Abel

President

New Jersey Marine Sciences Consortium

Spilhaus on:
Education

"I think being an ideas man is an attitude of life. It is a mixture of the childish virtues—curiosity, wonder, playfulness, and puzzle solving. I have never lost these things. Usually they are beaten out of children in schools."

Athelstan Spilhaus

"It is a mistake to think learning or training the mind must be done only in distinct disciplines. I have heard someone say they are good in art, but not in mathematics. That is nonsense. If you can do one thing well, you can do another well. I believe a curriculum should include only two subjects——language, which includes language, art, speaking, and history; and numbers——mathematics and science. Training the mind is simply training the mind—without these separations of disciplines. That is why I dabble in everything from toys to science.

"Children don't have inhibitions about learning. It is only when you get older that you get inhibitions about it. The fundamentals are what children need. My now famous blast at secondary education that said there was too much 'tapdancing, typing, and tomfoolery' in schools still stands. We need a very serious re-examination of American educational purposes by new people. We need to go back to the fundamentals such as mathematics, non-candy coated history, and science, and students should even be expected to learn English.

Margin quote:

"Sports are a dreadful drain on the time needed for educating the mind."

"We should also take a hard look at our teachers, cull the bad ones out, and pay the good ones what they deserve. The teachers who have learned only a single doctrine that permeates from the top are a tremendous force against the free growth and development of better school education. Such doctrinaire mass-thinking fosters forces which work against improvement, forces which attempt to over-pattern and overcontrol so that many good teachers in the system feel frustrated. It would be interesting to know how many of the teachers who are well enough educated to be good teachers, through frustration, find work elsewhere. If many do, the system becomes a filter through which the good pass freely, and which retains the mediocre. Instead of giving present educational leaders more money, I think we should insist on a change of faces, and money used for the right purposes.

"The tendency toward vocationalism in the schools is a tendency toward education for obsolesence. In this continuum of education the colleges commit many of the same errors which degrade the meaning of education for which we criticize the schools. In many of the colleges and universities in the nation, we have courses which are subcollegiate, they are to meet the needs of those products of the high schools who do did not learn fundamentals. We have courses which are so specialized in nature they should be offered in good trade schools. Just as the schools fail to achieve their real purpose by attempting to do everything, so the colleges are spreading more and more in certain areas to take over that part of training which would be better learned by a modern type of apprenticeship. Vocational training should occur in vocational schools, not colleges and universities.

Margin quote:

"We must lay stress on fundamental learning in a disciplined manner, and on the development of individuality, which is the basis on which to build a useful life and to get experience for future leadership."

"We should not think of education in the schools as one package, and college and university education as another. Education at all levels in fundamentals is essential. Our education must be aimed toward the productive use of leisure time in individual pursuits that bring inner satisfaction, rather than toward an overemphasis of passive mass spectatorship which leads to frustration. It is the slower students that must be counseled to stick to fundamental studies. It is only continual competition, and continual self-evaluation, that can lead to steady improvement."

"I believe that accrediting agencies should accept their responsibi-lity of quality discernment instead of the pseudoscientific formula approach. The teacher licensing procedure

which requires one to have taken a certain number of courses in the College of Education, is the policy which most of all needs revision. When you think that the greatest scholars in our universities and colleges would not be considered fit to teach in our public schools, you begin to see how ridiculous the system of licensing has become. Many of the teachers colleges throughout the nation have lowered their standards to fill the teacher deficit, so much so, that they have devaluated the currency of academic degrees and doctor's degrees in education. No one would quarrel with the view that a teacher should take some work in educational method and psychology, but it is the low quality of such offerings that drives the good students away from them and compounds the shortage.

"Our schools must keep the real purposes before themselves, laying the groundwork on which to build broad understanding, whether in college or life, emphasizing in this education, discipline which is the prerequisite to leadership. We must have an education which can be the basis for the development of mature decision making, sometimes called wisdom. It is an important quality in people as they increase their power to alter the face of the earth, or to destroy themselves. If we allow our education to be degraded to mere training, if we become a nation of narrow vocational specialists, if we judge the worth of learning solely for its usefulness, or if we justify inquiry, research, and exploration only by predictions of material gain; then, even though we may not destroy ourselves physically, we degrade the nature of our being human—we must redirect the purpose of all our schools.

NAME: MARTUCCI, FELIX A.

SSAN: 133-09-2101

RANK: CAPT (Maj, Ret)

SERVICE #: 731393

BRANCH: USAF

DATE OF BIRTH: 5/12/19

PLACE OF BIRTH: NY,NY

CAREER FIELD: BOMBADEIR, ATC, INTEL OFFICER

ROSWELL DATA: SEE ATTACHED

DECEASED - DATE/PLACE:

LAST KNOWN ADDRESS: ~~1 WESLEY ST MONMOUTH BEACH, NJ~~ 111 E Kellog Blvd Apt 1403 St Paul MN Unlisted Phone #

NOTES: GOOD OPRS

ID: 8

ORGANIZATION COPY

CHECK CHANGES RECEIVED	1. LAST NAME-FIRST NAME-MIDDLE NAME	2. ARMY SERIAL NUMBER	3. GRADE	4. COMPONENT	5. ARM OR SERVICE
	MARTUCCI, FELIX ANTHONY	A0-731 393	1st Lt	RES	BASIC: DUTY:

6. CITIZENSHIP STATUS	RELIGION (Voluntary)	8. HEIGHT	9. WEIGHT	10. RACE	11. CATEGORY	12. MOS (SSN)
Native	Roman Catholic	5' 7"	140	W	AFSS	PRIMARY: 1035 DUTY: 1035

13. SOURCE OF COMMISSION	14. DATE OF EAD (Current tour)	15. CITY AND STATE FROM WHICH ORDERED TO EAD	16. DATE OF BIRTH
~~AFES~~ ORC WD Cir 97 1947	10 Oct 42	New York City, New York,	12 May 1919.

17. CHRONOLOGICAL LIST OF ACTIVE DUTY MILITARY AND CIVILIAN SCHOOLING

NAME OF SCHOOL	TITLE OF COURSE (and SSN)	LENGTH	RATING	YEAR
Ft Bragg, N C	Radio Sch(Code)	2 mo	Cmpl	1941
SantaAnaCalif	Pre-Flt Tng	2 mo	Cmpl	1942
Victorville,Calif	Bmbdr Tng	3 mo	Cmpl	1942
Midland, Tex	Bmbdr Instr Cse	3 mo	Cmpl	1942
Tampa Fla	Radar Sch (PQ-13)	2 mo	Cmpl	1945

18. GRADE STATUS

GRADE	TYPE	EFFECTIVE DATE	DATE RANK
2d Lt	Res	10Oct42	10Oct42
par 1 SO#260 Hq Victorville Calif			
1st Lt	AUS AC	31Oct43	31Oct43
Ltr Hq 12AF 1943 (AUS-AC)			
1st Lt	AUS	1Aug44	1Aug44
WD SO 183 par 1, 1944			
1st Lt	Res	10Oct45	10Oct45
Ltr AGRO-P201 10Oct45			
CAPT	Res	26Jan48	26Jan48
Ltr Hq 10AF dtd 26Jan48.			
1ST LT	AFUS	30Jun48	31Oct43
par 12 DAF SO#128, 30Jun48.			

19. RECORD OF PHYSICAL STATUS

MEDICAL CLASSIF.	MEDICAL INSTALLATION: NAME AND AUTHORITY	MEDICAL INSTALLATION: DATE	DATE STATUS CHANGE DUE	ASSIGNMENT LIMITATION
G/S	WAFB, Roswell N Mex	30Apr48		None

20. RETIRED (Grade, reason, date)

21. EFFICIENCY INDEX

INDEX	DATE FIG.

22. CATEGORY

TYPE	DATE TERMINATED
I	26Aug48
AFSS	1May52

23. GENERAL AND ANNUAL EFFICIENCY RATING (For WD use only)

YEAR														
GER														
AER														

24. MILITARY OCCUPATIONAL SPECIALTIES

DESIGNATION	SSN	DATE	QUALIFYING AUTHORITY
(P) Bombardier	1035	10Oct42	Unk

25. DETAILS

ARM OR SERVICE	DETAILED (Date & Auth.)	TERMINATED (Date & Auth.)

26. FOREIGN SERVICE DATA

DATE DPTD Z/I	OVERSEAS COMMAND	DATE RTD Z/I	MONTHS: PCS	MONTHS: TDY	MONTHS: TOTAL
11Mar43	EAME	24Dec43	9		9
5 Feb 48	Japan	12 Mar 48		1	10
12Aug48	Labrador	20Aug48		.09	10.09
29Apr49	EuCom (UK)	15Jun49		1.17	11.26
19 Jan 50	Labrador	28 Jan 50		.10	12.06

27. CAMPAIGNS

CAMPAIGN	AUTHORITY AND DATE
Tunisia (BS)	WD GO 85, 1945
Salerno (BS)	WD GO 33, 1945
Naples-Foggia (BS)	WD GO 96, 1945
Sicily (BS)	WD GO 91, 1945
North African (BS)	WD GO 33, 1945
Air Combat Balkans	WD GO 85, 1945 (BS)
Air Offensive Europe	WD GO 85, 1945 (BS)

LAST NAME-FIRST NAME-MIDDLE NAME: MARTUCCI, FELIX ANTHONY
ARMY SERIAL NUMBER: A0-731 393
GRADE: 1st Lt
COMPONENT: RES
ARM OR SERVICE: BASIC: DUTY:
MOS: PRIMARY: 1035 DUTY: 1035

WD AGO FORM 66 1 JULY 47 (2 PART) REPLACES WD AGO FORMS 66-1, 66-2, 66-3, 178-2, & 178-3, WHICH ARE OBSOLETE.

OFFICER'S, WARRANT OFFICER'S AND FLIGHT OFFICER'S QUALIFICATION RECORD

28. MARTUCCI, FELIX ANTHONY AO 731 393 CHRONOLOGICAL RECORD OF MILITARY SERVICE

DATES FROM	DATES TO	MOS (SSN)	DUTIES	NO. OF NON-DUTY DAYS	UNIT OR ORGANIZATION AND STATION OR THEATER	TYPE OF REPORT SUBMITTED
16Jan41	18Apr42		Enlisted experience: Pvt, Inf, in line co. Radio School.			
19Apr42	90ct42	A/Cadet	Tng AT-11 Norden, D-8, (75hr)			NONE
100ct42	3Mar43	1035	Bombardier B-17 Norden		Various Sta USA	
4Mar43	17Mar43	1035	Bombardier B-17 Norden (20hr)		Salina, Kans	NONE
			Processing(Dep US 11 Mar 43)			MOPR
18Mar43	24Dec43	1035	Bombardier B-17 Norden		2d Bomb Gp 49 Bomb Sq	
			Ret US 24 Dec 43		NATO	
25Dec43	3Feb44	0001	Processing & Reasgmt		AAERS#3, SantaMonicaCalif	NONE
4Feb44	1Sep44	2700	Student Bmbdr Instr Cse AT-11		AAFIS Midland Tex	NONE
			Norden (45hr)(TDY WBGH El Paso			
			29Mar44 to 1 Sep 44)			
2Sep44	10Jan45	1035	Bombardier Aerial Instr		3035BU VictorvilleCalif	MOPR
11Jan45	30Jul45	1035	Bombardier Instr (167hr)		Gp 1 AAFBS BigSpringTex	67
31Jul45	300ct45	1035	Bombardier Instr		326BU, MacDillFld, Fla	MOPR
310ct45	31Jan46	1035	Bombardier Instr		326BU, MacDill Fld, Fla	67
1Feb46	30Jun46	1035	Bombardier		393BS, 509BG, Roswell, NM	67
1Jul46	8Aug46	1035	Bombardier		393BS, RAAF, Roswell, NMex	NONE
9Aug46	30Sep46	1035	Bombardier		715BS, RAAF, Roswell, NMex	MOPR
10ct46	31Dec46	1035	Bombardier		393BS, 509BG, Roswell, NM	MOPR
1Jan47	30Jun47	1035	Bombardier (6)	7	393BS, RAAF, Roswell, NMex	67
1Jul47 (4)	29Feb48	1035	Bombardier B-29		393BS, RAAF, Roswell, NMex (14)	67-1
		(2)	Transferred to Dept of Air			
			Force per order 1, NME 26Sep47(Bul 1, Dept of Army, 12Nov47)			
(4) 1Mar48	31Aug48 (1)	1035	Bombardier B-29; Tdy Labrador	30	393BS 509BG RoswellNMex	67-1
			12-20Aug.			
(7) 1Sep48 (9)	28Feb49	1035	Bmbdr B-29 (10)	12	393BS 509BG RoswellNMex	67-1
(10) 1Mar49 (11)	28Apr49	1035	Bmbdr B-29 (11)	13	393BS 509BG RoswellNMex	None
(11) 29Apr49 (13)	15Jun49	1035	Bmbdr B29 TDY Marham AFB England	0	393BS 509BG RoswellNMex	ER No
16Jun49	30Jun49	1035	Bmbdr B-29	0	393BS 509BG RoswellNMex	ER
(13) 1Jul49 (15)	30Nov49	1035	Bmbdr B-29 DS Lead Crew Sch	0	393BS 509BG RoswellNMex	ER
(12) (15) 1Dec49	5Jun50	1035	Bmbdr B-29	6	393BS 509BG RoswellNMex	ER
			OFFICER RELIEVED FROM ACTIVE DUTY			

(m)

860

29. PERMANENT MAILING ADDRESS (No., Street, City and State)	30. BIRTH PLACE (City, State, Foreign Country)	31. EMERGENCY ADDRESSEE (Name, relationship, Number, Street, City, State)
(9) ~~388 Pleasant Avenue~~ 165 E. 10th St. c/o Harding New York City, New York.	New York City, New York	MRS. FLORENCE HARDING (SISTER) (8) 465 EAST 10TH ST., NEW YORK CITY, N.Y.

32. MARITAL STATUS	33. NO. OF DEPENDENTS		
	WIFE	CHILDREN	OTHER
Single			

34. PARENTS BIRTHPLACE		
PARENT	COUNTRY OF BIRTH	CITIZENSHIP STATUS
FATHER	Italy	Natur
MOTHER	USA	

35. FOREIGN LANGUAGES						
LANGUAGE	DIALECT	SPEAK	READ	WRITE	INTERPRETER	TRANSLATOR
Italian	Naples	F	P	P	F	P

36. EDUCATION	NAME AND LOCATION	MAJOR SUBJECT	GRADUATE YES	GRADUATE NO	DEGREE	DATE
HIGH SCHOOL	James Monroe, New York City, N. Y.	Academic	X		Dipl	1936
COLLEGE OR UNIVERSITY	New York Univ, New York City, N. Y.	Advertising 2½ yrs		X	NG	1939
POST GRADUATE						
OTHER						

37. CIVILIAN OCCUPATIONAL EXPERIENCE (Main and secondary)

TITLE OF POSITION	Advertising Agent	CODE 37.951	Clerk, General Office	CODE 01.050
NAME AND ADDRESS OF EMPLOYER	United Artists Mfg. Co. New York City, N. Y.		Fruit Produce Co. New York City, N. Y.	
DATES EMPLOYED	FROM 1938 TO 1939		FROM 1937 TO 1938	
DUTIES PERFORMED	Asst Manager's Aide: took care of advertising for Summer Theaters and New York Shows.		Clerk: worked in office, did typing and bookkeeping.	

38. SPORTS	PARTICIPATE	EXCEL	COACH (School, etc.)
Tennis	P		
Swimming	P		

39. AVOCATIONS

40. QUALIFICATION IN ARMS

WEAPON	COURSE	QUALIFIED	SCORE	DATE
.45 cal Pistol	D	Mkm	67%	Feb 43
.30 cal Carbine	Fam		20 rds	Apr 42
(6) .30 cal Carbine	Fam	Unqual	119	Apr 48
Pistol .45 cal	D (13)	SS	75%	6Apr49.

41. AWARDS, DECORATIONS AND CITATIONS

TYPE	AUTHORITY AND DATE	PRESENTED (Yes or No)
Air Medal	SO 23 par 2 Hq 12AF No	(14) ~~Yes~~
10 Bronze OLC	(AM) SO61par7SO62par3 Hq12AF	Yes
	SO 78 par30 Hq 15AF 1943	
EAME	WD Cir 160, 1943	Yes
American Defense	WD Cir 118, 1946 No	(14) ~~Yes~~
1 O/S Bar	WD Cir 268, 1944	Yes
World War II Victory	WD Cir 326, 1945	Yes
American Theater	WD Cir 90, 1945	Yes
D. F. C.	SO 61 par 7 Hq 12AF No	(14) ~~Yes~~

42. REMARKS (3) ~~964~~ Aptd Captain, USAFR, 26Jan48; accepted 3Feb48. (5) ~~964~~ ~~Officer not entitled to $500 a year Lump Sum Payment under par 3, AR 35-3420, as amended, unless specifically ordered to active duty as an United States Air Force Reserve Officer.~~ (6) ~~Foreign Sv Credits 10, as of 12Mar48,~~ (7) ~~11, as of 20Aug48. GAC plus PBI completed 18 Jun 48, results filed IGPM Hq 1A~~ (8) GAC plus CBI completed 17 Dec 48, results filed IGPM Hq 8AF. ~~Foreign Sv Credits, 13, as of 15 Jun 49.~~ (13) (10) Foreign Sv Credits, 14 as of 24 Dec 43.

43. FLYING STATUS			44. RATINGS, SPECIALTIES, AND DESIGNATIONS		
AUTHORITY	DATE	RESTRICTIONS	RATING, SPECIALTY, OR DESIGNATION	EFFECTIVE DATE	AUTHORITY
par 11 PO 264 Hq WC AAF TC.	10Oct42		Bombardier	10Oct42	par 10 PO 264 Hq WCAAF TC

45. AIRPLANE QUALIFICATIONS (Military)			46. FLYING HOURS	
NO. OF ENGINES		TYPE OF PLANE	HOURS	MONTH AND YEAR
CONVENTIONAL	1		250	Apr 1943
	2		500	Sep 1943
	OVER 2		750	Oct 1944
"JET"	1		1000	Sep 1945
	2		1500	Jul 1947
	OVER 2		2000	May 1948.
OTHER			3000	Sep 1949.
			5000	

47. CIVILIAN FLYING EXPERIENCE (*Nature, type equipment, no. hrs., last date flown, licenses*)

None.

48. COMBAT DATA (*AAF only*) 50 combat missions; 347 combat hours. B-17 ETO.

49. INTERNSHIP			
HOSPITAL (*Location*)	TYPE	TOTAL MONTHS	YEAR COMPLETED

51. RESIDENCIES AND FELLOWSHIPS			
HOSPITAL (*Location*)	SERVICE	TOTAL MONTHS	YEAR COMPLETED

52. POST GRADUATE INSTRUCTION			
INSTITUTION	COURSE	TOTAL MONTHS	YEAR COMPLETED

54. HOSPITAL AND TEACHING APPOINTMENTS				
INSTITUTION	TYPE	HOURS WEEKLY	DATES (*From - to*)	

50. PRIVATE PRACTICE		
LOCATION AND TYPE	% OF TIME	FROM / TO

53. CERTIFIED BY AMERICAN BOARD OF — YEAR

SUB SPECIALTY — YEAR

LICENSE (*Type*) — STATE OR TERRITORY AND YEAR

55. BOOKS AND TECHNICAL PAPERS PUBLISHED — YEAR

56. PROFESSIONAL AND EDUCATIONAL SOCIETIES (*with degree of membership*)

Air Force Association (M) 1946

57. COLOR HAIR: Brown

58. COLOR EYES: Brown

60. COMPLEXION: Ruddy

61. BLOOD TYPE: O

62. SPECTACLES DATA

59. PHOTO

63. AUTHENTICATING SIGNATURE. TYPED NAME, GRADE AND ARM OR SERVICE OF OFFICER AND DATE

Felix A. Martucci

FELIX A. MARTUCCI, 1ST LT, AC, 6 November 1947.

NAME: SAGER, EDWARD M.

SSAN: 455-50-9657

RANK: COL

SERVICE #: 018914

BRANCH: USAF (RET)

DATE OF BIRTH: 1/3/01

PLACE OF BIRTH: YEAGERTOWN, PA

CAREER FIELD: STAFF SURGEON

ROSWELL DATA: NONE

DECEASED - DATE/PLACE: 3/19/51 / FORT WORTH TX

LAST KNOWN ADDRESS:

NOTES: STAFF SURGEON 8TH AF CARSWELL JUL 47.

ID: 14

GANIZATION COPY

CHECK CHANGES RECEIVED	1. LAST NAME-FIRST NAME-MIDDLE NAME	2. ARMY SERIAL NUMBER	3. GRADE	4. COMPONENT	5. ARM OR SERVICE
	SAGER, EDWARD MILLER	19 049A ~~018 914~~	Col	USAF ~~RA~~	BASIC MC(MC) DUTY MC

6. CITIZENSHIP STATUS	7. RELIGION (Voluntary)	8. HEIGHT	9. WEIGHT	10. RACE	11. CATEGORY	12. MOS (SSN) PRIMARY 3000 DUTY 3000.3
Native	Presbyterian	6' 1"	190	W		

13. SOURCE OF COMMISSION	14. DATE OF EAD (Current tour)	15. CITY AND STATE FROM WHICH ORDERED TO EAD	16. DATE OF BIRTH
ROTC, Yale (11) DP-Mil Stat	1Jul1930	Petersburg, Virginia	31Jan1901

17. CHRONOLOGICAL LIST OF ACTIVE DUTY MILITARY AND CIVILIAN SCHOOLING

NAME OF SCHOOL	TITLE OF COURSE (and SSN)	LENGTH	RATING	YEAR
ArmyMedSch, Wash DC	Review ofLab Work	4mos	Cmpl	1932
MedFldSvSch, Carlisle, Pa	Fld Tng MD Off	4mos	Cmpl	1933
Randolph Fld, Tex	Aviation Medicine	4½mos	Cmpl	1934
Educ. Equiv. Armed Forces Colg Reg Course 6-10-47				

18. GRADE STATUS

GRADE	TYPE	EFFECTIVE DATE	DATE RANK
1stLt	Res	3Jun30	3Jun30
1stLt	RA	1Jul32	1Jul32
Capt	RA	1Jul33	1Jul33
Maj	AUS	10Mar41	10Mar41
LtCol	AUS	10Apr42	1Feb42
P4S071 WD/42			
Maj	RA	1Feb39	1Feb39
WDSO164P13/47			
Col	AUS	10Apr43	10Apr43
WDSO100P12/43			
LtCol	RA	1Feb47	1Feb47
WDSO169P16/47			
Lt Col	USAF	1 Jul 49	1 Feb 47
P 5 DA SO 141 Dtd 22 Jul 49			

19. RECORD OF PHYSICAL STATUS

MEDICAL CLASSIF.	MEDICAL INSTALLATION NAME AND AUTHORITY	MEDICAL INSTALLATION DATE	DATE STATUS CHANGE DUE	ASSIGNMENT LIMITATION
2nd Flt	AFRB Brooke WH I-SHT	29Aug49		

21. EFFICIENCY INDEX

INDEX	DATE FIG.

22. CATEGORY

TYPE	DATE TERMINATED

20. RETIRED (Grade, reason, date)

23. GENERAL AND ANNUAL EFFICIENCY RATING (For WD use only)

YEAR														
GER														
AER														

24. MILITARY OCCUPATIONAL SPECIALTIES

DESIGNATION	SSN	DATE	QUALIFYING AUTHORITY
(P) Medical Off Stf	3000	10Jun47	SGO, Wash, DC
Med Off Internist	3139D	20Jan44	SGO, Wash, DC

25. DETAILS

ARM OR SERVICE	DETAILED (Date & Auth.)	TERMINATED (Date & Auth.)

26. FOREIGN SERVICE DATA

DATE DPTD Z/I	OVERSEAS COMMAND	DATE RTD Z/I	MONTHS PCS	MONTHS TDY	MONTHS TOTAL
3Dec44	12thAF	19Sep45	10		10
3Sep47	EUCOM	20Sep47	~~1~~ 0	01	10
(3) 13 Mar 48	Pacific	17Apr48		01	010

27. CAMPAIGNS

CAMPAIGN	AUTHORITY AND DATE
Rome-Arno (BS)	GO135/45 12AF
N Appnnines (BS)	MTOUSA Ltr 6Jul45
Poe Valley (BS)	GO94/45 WD

WD AGO FORM 66 1 JULY 47 (4 PART) REPLACES WD AGO FORMS 66-1, 66-2, 66-3, 178-2, & 178-3, WHICH ARE OBSOLETE

OFFICER'S, WARRANT OFFICER'S AND FLIGHT OFFICER'S QUALIFICATION RECORD

28. CHRONOLOGICAL RECORD OF MILITARY SERVICE

LAST NAME-FIRST NAME-MIDDLE NAME: SAGER, EDWARD MILLER

ARMY SERIAL NUMBER: 19049A

GRADE: Col

COMPONENT: RA USAF

ARM OR SERVICE: BASIC MC DUTY

MOS: PRIMARY 3000 DUTY 3000.3

28. CHRONOLOGICAL RECORD OF MILITARY SERVICE

DATES FROM	DATES TO	MOS (SSN)	DUTIES	NO. OF NON-DUTY DAYS	UNIT OR ORGANIZATION AND STATION OR THEATER	TYPE OF REPORT SUBMITTED
1Jul30	1Jul31	3139	Rotating Internship		WR Gen Hosp, Wash, DC	None
2Jul31	15Aug32	3150	Asst General Surgery		" " " "	None
16Aug32	30Jan33	2700	Army Ded Sch, Student Off		WR Gen Hosp, Wash, DC	None
31Jan33	10May33	2700	Student Officer		Carlisle Bks, Penn.	None
11May33	8May34	3100	DS on CCC dyMed O in Charge ofC		2d Med Regiment	None
9May34	12May38	3162	Flight Surg & Attending Surg		Sta Hosp, RandolphF, Tex	None
13May38	1Jan40	3100	Gen Med Off & Psychiatrist		Tripler GH, Hawaii	None
2Jan40	11May40	3162	Hickam Fld, TH Flt Surgeon		Hickam Fld, TH	None
12May40	25Aug41	3162	Flight Surg AC Det-EENT Spec		USMA, West Point NY	None
30Aug41	12Dec43	3001	Base Surgeion		Barksdale Fld, La	MOPR
13Dec43	31Mar44	3001	Base Surgeon		Maxwell Fld, ~~La~~ Ala	MOPR
1Apr44	30Jun44	3001	Base Surgeon		AAF Reg Hosp, Maxwell, Fld, Ala	MOPR
1Jul44	14Jul44	3001	Base Surgeon		" " " "	None
15Jul44	29Aug44	3001	Base Surgeon		" " " "	MOPR
30Aug44	6Nov44	3001	Base Surgeon		" " " "	MOPR
7Nov44	10Dec44	0001	Enroute overseas			None
11Dec44	30Jun45	3161	AF Staff Surg		Hq 12AF, Italy (67)	MOPR
1Jul45	27Aug45	3161	AF Staff Surg		" " "	MOPR
28Aug45	2Nov45	0001	Processing and Leave		Ft McPherson, Ga	None
3Nov45	15Nov45	0001	Awaiting Reassignment		SAD, AAFPDC, SanAntonio, Tex	None
16Nov45	31Dec45	3161	AF Staff Surgeon		Hq 3AF, Tampa, Fla (67)	MOPR
1Jan46	20Mar46	3161	AF Staff Surgeon		" " "	None
21Mar46	21May46	3161	Staff Surgeon		300AAFBU, TAC, Tampa, Fla	None
22May46	30Jun46	3161	Staff Surgeon		300BU, Langley Fld, Va	MOPR
1Jul46	5Sep46	3161	Asst Staff Surgeon		" " " "	MOPR
6Sep46	15Oct46	3001	Base Surgeon		AAF Reg H, Salina, Kans	MOPR
16Oct46	3Nov46	3001	Base Surgeon		" " " "	MOPR
4Nov46	31Dec46	3161	AF Staff Surgeon		Hq 8AF Ft Worth, Texas (67)	MOPR
1Jan47	30Jun47	3161	Staff Surgeon		" " " (67)	MOPR
1Jul47	(1) 12Mar48	3000	Staff Surgeon		Hq 8AF FtWorth, Texas	(2) None
(1) Remains asgd to D/A per TO 1, NME, 26Sep47						
13 Mar 48	17Apr48 (5)	3000	Staff Surgeon		Air Task Gp 7.4 (Prov) Fwd APO 187-1 Kwajalein Atoll, Navy 824	(6) None
(3) 18Apr48	(6) 31May48	3000	Staff Surgeon	0	Hq 8AF, FtWorth, Tex	(6) 67-1
(6) 1Jun48	(10) 6Feb49	3000	Staff Surgeon	5	Hq8AF, FtWorth, Tex	(10) None
(10) 7Feb49	(12) 19May49	3000	Air Surgeon	34	Hq8AF, FtWorth, Tex	(12) None
(12) 20May49	(12) 31May49	0001	No duty assigned	12	Hq8AF, FtWorth, Tex	(12) 67-1
(13) 1Jun49	(13) 4Jul49	0001	No duty assigned	34	Hq8AF, FtWorth, Tex	(13) 67
(15) 5Jul49	(14) 19Jul49	0003	Patient	15	DOP, CAFB, FtWorth, Tex	(2) None
20Jul49	30Sep49	0003	Patient	73	DOP Brooke GH, FSHTex	ER
Transfd to Dept. of the Air Force UP J'AFAR 1-11-62 dtd 16 May 1949						
30 September 1949 - Retired						

AAG
File 201

29. PERMANENT MAILING ADDRESS (No., Street, City and State)	30. BIRTH PLACE (City, State, Foreign Country)	31. EMERGENCY ADDRESSEE (Name, relationship, Number, Street, City, State)
The Adjutant General Washington 25, DC	Yeagertown, Pa	2-1-3 (Brothers) 2 age 1 wife 1 1713 Calton, Ft Worth, Tex

32. MARITAL STATUS	33. NO. OF DEPENDENTS		
	WIFE	CHILDREN	OTHER
Married	1	3	

34. PARENTS BIRTHPLACE		
PARENT	COUNTRY OF BIRTH	CITIZENSHIP STATUS
FATHER	US	
MOTHER	US	(Dec)

35. FOREIGN LANGUAGES

LANGUAGE	DIALECT	SPEAK	READ	WRITE	INTERPRETER	TRANSLATOR

36. EDUCATION

	NAME AND LOCATION	MAJOR SUBJECT	GRADUATE YES	GRADUATE NO	DEGREE	DATE
HIGH SCHOOL	Petersburg, Virginia	Science	X			1919
COLLEGE OR UNIVERSITY	Hampden Sidney Col, Va	Science	X		BS	1925
	Med Col of Va.	Medicine	X		MD	1930
POST GRADUATE						
OTHER						

37. CIVILIAN OCCUPATIONAL EXPERIENCE (Main and secondary)

TITLE OF POSITION	Proffessional Soldier	CODE 99.943		CODE
NAME AND ADDRESS OF EMPLOYER				
DATES EMPLOYED	FROM TO		FROM TO	
DUTIES PERFORMED			DUTIES PERFORMED	

38. SPORTS	PARTICIPATE	EXCEL	COACH (School, etc.)
Hunting	X		
Fishing	X		

39. AVOCATIONS Reading

40. QUALIFICATION IN ARMS

WEAPON	COURSE	QUALIFIED	SCORE	DATE

41. AWARDS, DECORATIONS AND CITATIONS

TYPE	AUTHORITY AND DATE	PRESENTED (Yes or No)
WWII Vic Med	WDCir326/45	~~No~~ Yes
AmerCpn Med	WDCir345/45	~~No~~ Yes
~~EAME Rb 3/BS~~ BSM	~~GO135/45 12AF~~ AR 600-65 Not Available	~~No~~ Yes Yes

42. REMARKS (7)Foreign Service Credits 12 as of 17 Apr 48 (9)GAC plus CBI completed 30 Dec 48, results filed IGPM, Hq8AF.

43. FLYING STATUS

AUTHORITY	DATE	RESTRICTIONS
CACP0190P15/41	14Aug41	None
⑧P5 P0147 Hq USAF	3Aug48	

44. RATINGS, SPECIALTIES, AND DESIGNATIONS

RATING, SPECIALTY, OR DESIGNATION	EFFECTIVE DATE	AUTHORITY
Flight Surg	10Oct42	HqAAFS0236P2/42
⑧Acft Obsvr (Medical)	3Aug43	P4, P0147, HqUSAF

45. AIRPLANE QUALIFICATIONS (*Military*)

NO. OF ENGINES		TYPE OF PLANE
CONVENTIONAL	1	
	2	
	OVER 2	
"JET"	1	
	2	
	OVER 2	
OTHER		

46. FLYING HOURS

HOURS	MONTH AND YEAR
250	
500	
750	
1000	
1500	
2000	Jan47
3000	
5000	

47. CIVILIAN FLYING EXPERIENCE (*Nature, type equipment, no. hrs., last date flown, licenses*)

48. COMBAT DATA (*AAF only*)

49. INTERNSHIP

HOSPITAL (*Location*)	TYPE	TOTAL MONTHS	YEAR COMPLETED
Walter Reed Gen Hosp	General	12	1931
Walter Reed Gen Hosp	Surg	13	1932

50. PRIVATE PRACTICE

LOCATION AND TYPE	% OF TIME	FROM / TO

51. RESIDENCIES AND FELLOWSHIPS

HOSPITAL (*Location*)	SERVICE	TOTAL MONTHS	YEAR COMPLETED

52. POST GRADUATE INSTRUCTION

INSTITUTION	COURSE	TOTAL MONTHS	YEAR COMPLETED

53. CERTIFIED BY AMERICAN BOARD OF — YEAR

SUB SPECIALTY — YEAR

LICENSE (*Type*) — STATE OR TERRITORY AND YEAR

54. HOSPITAL AND TEACHING APPOINTMENTS

INSTITUTION	TYPE	HOURS WEEKLY	DATES (*From - to*)	

55. BOOKS AND TECHNICAL PAPERS PUBLISHED — YEAR

56. PROFESSIONAL AND EDUCATIONAL SOCIETIES (*with degree of membership*)

AMA (M)
Aero Medical Assoc (M)
Masons (32)
Shriners
Kappa Alpha Social Fraternity
O.D.K.

12Jul48

57. COLOR HAIR: Dark

58. COLOR EYES: Blue

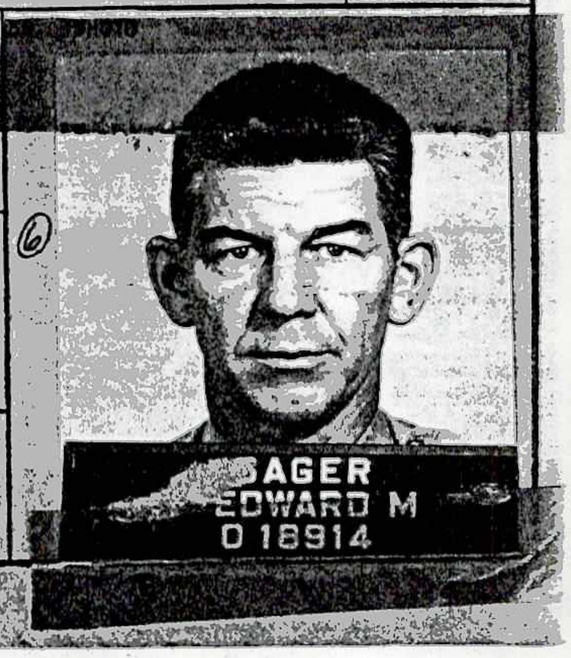
60. COMPLEXION: Ruddy

61. BLOOD TYPE: O

62. SPECTACLES DATA: For Close Work

63. AUTHENTICATING SIGNATURE. TYPED NAME, GRADE AND ARM OR SERVICE OF OFFICER AND DATE

EDWARD MILLER SAGER, Col, MC 17Oct47 Edward M. Sager



DEPARTMENT OF THE AIR FORCE
WASHINGTON 25, D. C.

CASUALTY REPORT

Death

TYPE

DATE OF PREPARATION 9 April 1951

NAME Sager, Edward M.

SERVICE NUMBER 19 049 A

GRADE Col

PLACE OF CASUALTY
Carswell Air Force Base Hospital, Texas

DATE OF CASUALTY
19 Mar 1951

CAUSE OF CASUALTY
Acute coronary occlusion

ENEMY ACTION
☐ YES ☒ NO

ORGANIZATION

ARM OR SERVICE
USAF - MC

HOME ADDRESS (Number, street, city, zone, county and state)
Fort Worth, Tarrant County, Texas

COMPONENT
USAF - Retired

NEXT OF KIN Mrs. Lois B. Sager, wife, 1712 Carlton Street, Fort Worth, Texas

DATE OF BIRTH
31 Jan 1901

BENEFICIARY (Name, relationship and address)

PRIOR SERVICE
☑ YES ☐ NO

DATE ENTRY CURRENT SERVICE *

AERONAUTICAL RATING

ON FLYING PAY STATUS
☐ YES ☐ NO

REMARKS
* Retired 30 September 1949.

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BY ORDER OF THE SECRETARY OF THE AIR FORCE

KENNETH L. PLATT
CWO, USAF
Asst Chief, Casualty Branch

M.H.

DISTRIBUTION
OLF

AFHQ FORM 1 MAY 50 0-529 REPLACES W/D AGO FORMS 52-1, 0365, 0365-1, AND 0570-1 WHICH ARE OBSOLETE IN THE AIR FORCE

DEPARTMENT OF THE AIR FORCE
WASHINGTON 25, D. C.

CASUALTY REPORT

TYPE: Death

DATE OF PREPARATION: 9 April 1951

NAME: Sager, Edward M.

SERVICE NUMBER: 19 049 A

GRADE: Col

PLACE OF CASUALTY: Carswell Air Force Base Hospital, Texas

DATE OF CASUALTY: 19 Mar 1951

CAUSE OF CASUALTY: Acute coronary occlusion

ENEMY ACTION: ☐ YES ☒ NO

ORGANIZATION:

ARM OR SERVICE: USAF - MC

HOME ADDRESS (Number, street, city, zone, county and state): Fort Worth, Tarrant County, Texas

COMPONENT: USAF - Retired

NEXT OF KIN: Mrs. Lois B. Sager, wife, 1712 Carlton Street, Fort Worth, Texas

DATE OF BIRTH: 31 Jan 1901

BENEFICIARY (Name, relationship and address):

PRIOR SERVICE: ☑ YES ☐ NO

DATE ENTRY CURRENT SERVICE: *

AERONAUTICAL RATING:

ON FLYING PAY STATUS: ☐ YES ☐ NO

REMARKS

* Retired 30 September 1949.

454

BY ORDER OF THE SECRETARY OF THE AIR FORCE

KENNETH L. PLATT
CWO, USAF
Asst Chief, Casualty Branch

M.H.

DISTRIBUTION
OLF

AFHQ FORM 0-529
1 MAY 50

REPLACES WD AGO FORMS 52-1, 0365, 0365-1, AND 0570-1 WHICH ARE OBSOLETE IN THE AIR FORCE

NAME: GILDENBURG, BERNARD

SSAN: 130-22-2208

RANK: GS-14 (RET)

SERVICE #:

BRANCH: DEPT OF THE

DATE OF BIRTH: 6/19/25

PLACE OF BIRTH:

CAREER FIELD: METEROLOGIST/ PHYSICAL SCIENCE ADMINSTRATOR

ROSWELL DATA: NONE

DECEASED - DATE/PLACE: N/A

LAST KNOWN ADDRESS: Box 31 Tularosa NM 88352
PHONE # (505) 437-3645
585-2887

NOTES: RETIRED USAF GEOPHYSCIAL LAB- HOLLOMAN. STUDENT AT NYU DURING BALLOON PROJECT. WORKED AS INTERN ON PROJECT (SEE ATTACHED).

Greenfield

ID: 17

13151323?5

STANDARD FORM 57—NOV. 1947
U. S. CIVIL SERVICE COMMISSION

APPLICATION FOR FEDERAL EMPLOYMENT

INSTRUCTIONS: In order to prevent delay in consideration of your application, answer every question on this form clearly and completely. Typewrite or print in INK. In applying for a specific United States Civil Service examination, read the examination announcement carefully and follow all directions. If you are applying for a WRITTEN examination, follow the instructions on the admission card regarding disposition of this application. If you are applying for an UNWRITTEN examination, mail this application to the office named in the announcement. Be sure to mail to the same office *any other forms required* by the announcement. Notify the office with which you file this application of any change in your address.

APPLICATION NO. / ANNOUNCEMENT

1. NAME OF EXAMINATION OR KIND OF POSITION APPLIED FOR
Meteorologist GS-9

2. OPTION(S) *(if mentioned in examination announcement)*

3. PLACE OF EMPLOYMENT APPLIED FOR *(City and State)*: Alamogordo, New Mexico

4. DATE OF THIS APPLICATION: Feb 23, 1951

5. MR. / MRS. / MISS XX (First name) Bernard (Middle) David (Maiden, if any) (Last) Gildenberg

6. (A) STREET AND NUMBER OR R. D. NUMBER: c/o W.J.Brown P.O.Box 555

(B) CITY OR POST OFFICE *(including postal zone)* AND STATE: China Lake, California

7. LEGAL OR VOTING RESIDENCE *(State)*: California

8. (A) OFFICE PHONE: 71675

(B) HOME PHONE:

9. DATE OF BIRTH *(month, day, year)*: June 19, 1925

10. ☐ MARRIED ☒ SINGLE

11. PLACE OF BIRTH *(city and State; if born outside U. S., name city and country)*: Hazleton, Pennsylvania

12. ☒ MALE ☐ FEMALE

13. (A) HEIGHT WITHOUT SHOES: 5 FEET 11 INCHES (B) WEIGHT: 140 POUNDS

14. (A) HAVE YOU EVER BEEN EMPLOYED BY THE FEDERAL GOVERNMENT? ☒ YES ☐ NO

(B) IF SO, GIVE LAST GRADE AND DATE OF LAST CHANGE IN GRADE: GS-7

DO NOT WRITE IN THIS BLOCK
For Use of Civil Service Commission Only

☐ APPOR. ☐ NON-APPOR. | MATERIAL ☐ SUBMITTED ☐ RETURNED | ENTERED REGISTER:

NOTATIONS: | APP. REVIEW: | APPROVED:

RECEIVED FEB 27 1951

OPTION	GRADE	EARNED RATING	PREFERENCE	AUGM. RATING
			☐ 5 POINTS (TENT.)	
			☐ 10 POINTS	
			☐ WIFE OR WIDOW	
			☐ DISAL.	
			☐ BEING INVES-TIGATED	
INITIALS AND DATE				

15. (A) WHAT IS THE LOWEST ENTRANCE SALARY YOU WILL ACCEPT? $ 3825 PER YEAR.
You will not be considered for any position with a lower entrance salary.

(B) CHECK IF YOU WILL ACCEPT SHORT-TERM APPOINTMENT IF OFFERED, FOR:
☐ 1 TO 3 MONTHS ☐ 3 TO 6 MONTHS ☐ 6 TO 12 MONTHS

NOTE. *Acceptance or refusal of a temporary short-term appointment will not affect your opportunity to obtain a probational appointment.*

(C) IF YOU ARE WILLING TO TRAVEL, SPECIFY:
☐ OCCASIONALLY ☒ FREQUENTLY ☐ CONSTANTLY

(D) CHECK IF YOU WILL ACCEPT APPOINTMENT, IF OFFERED:
☐ IN WASHINGTON, D. C. ☐ ANYWHERE IN THE UNITED STATES
☐ OUTSIDE THE UNITED STATES

(E) IF YOU WILL ACCEPT APPOINTMENT IN CERTAIN LOCATIONS ONLY, GIVE ACCEPTABLE LOCATIONS:
Alamogordo, New Mexico

16. EXPERIENCE: It is important for you to furnish all information requested below in sufficient detail to enable the Civil Service Commission and the appointing officers of agencies to give you full credit in determining your qualifications. Use a separate block for each position. Start with your present position and work back, explaining clearly the principal tasks which you performed in each position, accounting for all periods of unemployment. Experience gained more than 15 years ago which is not pertinent to the work for which you are applying may be summarized in one or more of the blocks. If your duties changed materially while working for the same employer, use a separate block to describe each position. You may include any pertinent religious, civic, welfare, or organizational activity which you have performed, either with or without compensation, showing the number of hours per week and weeks per year in which you were engaged in such activity. Military experience should be described in the spaces below in its proper sequence.

(*a*) If you were ever employed in any position under a name different from that shown in Item 5 of this application, give under "Description of your work" for each position, the name used.

(*b*) If you have never been employed or are now unemployed, indicate that fact in the space provided below for "Present Position."

① PRESENT POSITION

DATES OF EMPLOYMENT *(month, year)*: FROM: Sept 1950 TO PRESENT TIME 3/51

EXACT TITLE OF YOUR PRESENT POSITION: Ballistic Meteorologist

CLASSIFICATION GRADE *(if in Federal Service)*: GS-7

SALARY OR EARNINGS: STARTING, $ PER PRESENT, $ 3825 PER yr

PLACE OF EMPLOYMENT *(city and State)*: China Lake, California

NAME AND TITLE OF IMMEDIATE SUPERVISOR: Mr.N.R.Williams Branch Head

NAME AND ADDRESS OF EMPLOYER *(firm, organization, or person; if Federal, name department, bureau or establishment, and division)*: Atmospheric Studies Branch N.O.T.S.

KIND OF BUSINESS OR ORGANIZATION *(e. g., wholesale silk, insurance agency, manufacture of locks, etc.)*: Rocket Research

NUMBER AND KIND OF EMPLOYEES SUPERVISED BY YOU: none

REASON FOR DESIRING TO CHANGE EMPLOYMENT: Return to const.level balloon research

DESCRIPTION OF YOUR WORK

Acting as meteorological advisor to the rocket people at N.O.T.S.
Accumulating and preparing a climatological history of the rocket ranges at N.O.T.S.
Maintaining a seismograph outpost on the range for U.C.L.A.
Participating in miscellaneous Navy research programs at N.O.T.S. such as the Sierra Wave Project
Making special high altitude flights
Preliminary investigations of vertical velocity measurements

(CONTINUED ON NEXT PAGE)

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Processed under E.O. 9835, Part I, Section 3 AUG 14 1951

16. CONTINUED

② DATES OF EMPLOYMENT (*month, year*) FROM: June 1959 TO: Sept 1950 | EXACT TITLE OF YOUR POSITION: Research Asst. | CLASSIFICATION GRADE (*if in Federal service*): | SALARY OR EARNINGS: STARTING $ PER FINAL $ 1.25 PER hr.

PLACE OF EMPLOYMENT (*city and State*): Bronx 53,N.Y.

NAME AND TITLE OF IMMEDIATE SUPERVISOR: Dr.W. Pierssen Dept.Head

NAME AND ADDRESS OF EMPLOYER (*firm, organization, or person; if Federal, name department, bureau or establishment, and division*): New York University,N.Y.

KIND OF BUSINESS OR ORGANIZATION (*e. g., wholesale silk, insurance agency, manufacture of locks, etc.*): Oceanography Research

NUMBER AND KIND OF EMPLOYEES SUPERVISED BY YOU: none

REASON FOR LEAVING: appointment to civil service

DESCRIPTION OF YOUR WORK:

Aiding in the construction and design of a model wave tank
Computing data and constructing charts and graphs for the
study of ocean wave forecasting
Photographic work

③ DATES OF EMPLOYMENT (*month, year*) FROM: May 1948 TO: June 1950 | EXACT TITLE OF YOUR POSITION: Research Asst. | CLASSIFICATION GRADE (*if in Federal service*): | SALARY OR EARNINGS: STARTING $ 175 PER FINAL $ 200 PER mo.

PLACE OF EMPLOYMENT (*city and State*): New York,N.Y. Alamogordo,N.M.

NAME AND TITLE OF IMMEDIATE SUPERVISOR: Mr.W. Murray Project Director

NAME AND ADDRESS OF EMPLOYER (*firm, organization, or person; if Federal, name department, bureau or establishment, and division*): Research Dept.New York University

KIND OF BUSINESS OR ORGANIZATION (*e. g., wholesale silk, insurance agency, manufacture of locks, etc.*): Research

NUMBER AND KIND OF EMPLOYEES SUPERVISED BY YOU: none

REASON FOR LEAVING: Completion of Contract

DESCRIPTION OF YOUR WORK:

see attatched sheet

④ DATES OF EMPLOYMENT (*month, year*) FROM: June 1949 TO: Sept 1949 | EXACT TITLE OF YOUR POSITION: Research Asst. | CLASSIFICATION GRADE (*if in Federal service*): | SALARY OR EARNINGS: STARTING $ 380 PER FINAL $ PER mo.

PLACE OF EMPLOYMENT (*city and State*): Alamogordo,New Mexico

NAME AND TITLE OF IMMEDIATE SUPERVISOR: Major Edward Doty Project Officer

NAME AND ADDRESS OF EMPLOYER (*firm, organization, or person; if Federal, name department, bureau or establishment, and division*): Air Force Contracts

KIND OF BUSINESS OR ORGANIZATION (*e. g., wholesale silk, insurance agency, manufacture of locks, etc.*): Research

NUMBER AND KIND OF EMPLOYEES SUPERVISED BY YOU: four

REASON FOR LEAVING: Completion of Contracts

DESCRIPTION OF YOUR WORK:

see attatched sheet

16—[illegible]-1

⑤ DATES OF EMPLOYMENT (month, year)	EXACT TITLE OF YOUR POSITION	CLASSIFICATION GRADE (if in Federal service)	SALARY OR EARNINGS
FROM: Sept 1943 TO: March '46	Weather Cryptographer		STARTING $ 50 PER FINAL $ 110 PER mo.

PLACE OF EMPLOYMENT (city and State)	NAME AND TITLE OF IMMEDIATE SUPERVISOR
U.S.A. and Aleutian Theater	

NAME AND ADDRESS OF EMPLOYER (firm, organization, or person; if Federal, name department, bureau or establishment, and division)	KIND OF BUSINESS OR ORGANIZATION (e. g., wholesale silk, insurance agency, manufacture of locks, etc.)
Weather Service U.S.A.F.	Weather

NUMBER AND KIND OF EMPLOYEES SUPERVISED BY YOU	REASON FOR LEAVING
six	Honorable Discharge

DESCRIPTION OF YOUR WORK

Cryptographic work at the Pentagon Building
Maintaining and operating R.D.F. 658
Operating Friez radiosonde recorder
Making surface, upper air and sea observations
Maintenance of all weather station instruments
Preparing climatological data
Teaching aircraft identification
Drill instructor and truck driver

If more space is required, use a continuation sheet (Standard Form No. 58) or a sheet of paper the same size as this page. Write on each sheet your name, address, date of birth, and examination title. Attach to inside of this application.

17. MILITARY TRAINING: In the space below, describe any training received in the Armed Services (not already listed under Item 16) that would assist appointing officers in placing you most effectively. Indicate actual amount of training received, such as hours per week. Detailed information regarding any special service schools you attended is especially important. (Extra pages may be used to give full descriptions.)

DATES FROM	DATES TO	LOCATION	DESCRIPTION OF TRAINING
1/44	5/44	Chanute Field	Weather Observor's School
8/44	1/45	Cryptography School Asheville, N.C.	Cryptography School

18. EDUCATION. (*Circle highest grade completed*):

1 2 3 4 5 6 7 8 9 10 11 12X

MARK (X) THE APPROPRIATE BOX TO INDICATE SATISFACTORY COMPLETION OF:

X ☐ ELEMENTARY SCHOOL ☐ JUNIOR HIGH SCHOOL X ☐ SENIOR HIGH SCHOOL

(A) GIVE NAME AND LOCATION OF LAST HIGH SCHOOL ATTENDED: Fort Hamilton H.S. Brooklyn, N.Y.

(B) SUBJECTS STUDIED IN HIGH SCHOOL WHICH APPLY TO POSITION DESIRED: mathematics, all sciences

(C) NAME AND LOCATION OF COLLEGE OR UNIVERSITY	MAJOR AND SPECIALTY	DATES ATTENDED FROM	DATES ATTENDED TO	YEARS COMPLETED DAY	YEARS COMPLETED NIGHT	DEGREES CONF TITLE		SEMESTER HOURS CREDIT
New York University college of engineer.	meteo.	Feb'47	June'50	4		B.S.	6/14/50	133

(D) LIST YOUR CHIEF UNDERGRADUATE COLLEGE SUBJECTS	SEMESTER HOURS	LIST YOUR CHIEF GRADUATE COLLEGE SUBJECTS	SEMESTER HOURS
Meteorology	30	Meteorology	9
Mathematics	27		
Physics	16		

(E) OTHER TRAINING, SUCH AS VOCATIONAL, BUSINESS, STUDY COURSES GIVEN THROUGH THE ARMED FORCES INSTITUTE (*show name and location of school*) OR "IN-SERVICE TRAINING" IN PUBLIC OR PRIVATE EMPLOYMENT

SUBJECTS STUDIED	DATES ATTENDED FROM	DATES ATTENDED TO	YEARS COMPLETED DAY	YEARS COMPLETED NIGHT

19. INDICATE YOUR KNOWLEDGE OF FOREIGN LANGUAGES

	READING EXC.	READING GOOD	READING FAIR	SPEAKING EXC.	SPEAKING GOOD	SPEAKING FAIR	UNDERST'NG EXC.	UNDERST'NG GOOD	UNDERST'NG FAIR
German			X			X			X
French			X			X			X

20. IF YOU HAVE TRAVELED OR RESIDED IN ANY FOREIGN COUNTRIES, INDICATE (1) NAMES OF COUNTRIES, (2) DATES AND LENGTH OF TIME SPENT THERE, AND (3) REASON OR PURPOSE (*e. g., military service, business, education, recreation*)

see attatched sheet

21. LIST ANY SPECIAL SKILLS YOU POSSESS AND MACHINES AND EQUIPMENT YOU CAN USE, SUCH AS OPERATION OF SHORT-WAVE RADIO, MULTILITH, COMPTOMETER, KEY-PUNCH, TURRET LATHE, SCIENTIFIC OR PROFESSIONAL DEVICES

see attatched sheet

APPROXIMATE NUMBER OF WORDS PER MINUTE IN TYPING ____, SHORTHAND ____

22. ARE YOU NOW OR HAVE YOU EVER BEEN A LICENSED OR CERTIFIED MEMBER OF ANY TRADE OR PROFESSION (*such as pilot, electrician, radio operator, teacher, lawyer, CPA, etc.*)?

☐ YES X NO GIVE KIND OF LICENSE AND STATE:

FIRST LICENSE OR CERTIFICATE (YEAR):

LATEST LICENSE OR CERTIFICATE (YEAR):

23. GIVE ANY SPECIAL QUALIFICATIONS NOT COVERED ELSEWHERE IN YOUR APPLICATION SUCH AS:
(A) YOUR MORE IMPORTANT PUBLICATIONS (*do not submit copies unless requested*)
(B) YOUR PATENTS OR INVENTIONS
(C) PUBLIC SPEAKING AND PUBLIC RELATIONS EXPERIENCE
(D) MEMBERSHIP IN PROFESSIONAL OR SCIENTIFIC SOCIETIES, ETC.
(E) HONORS AND FELLOWSHIPS RECEIVED

A) Application of Constant Vorticity Methods to Upper Air Trajectories
D) American Meteorological Society

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(CONTINUED ON NEXT PAGE)

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24. REFERENCES: List three persons living in the United States or Territories of the United States who are NOT related to you and who have definite knowledge of your qualifications and fitness for the position for which you are applying. Do not repeat names of supervisors listed under Item 16 (EXPERIENCE).

FULL NAME	PRESENT BUSINESS OR HOME ADDRESS (*Give complete current address, including street and number*)	BUSINESS OR OCCUPATION
1. Mr.C.S.Schneider	Research Dept.N.Y.U.Bronx,N.Y.	Adm.Asst.to Director of Res.
2. Mr.James R.Smith	Ankara,Turkey U.S.Dept.Defense	Meteorologist
3. Mr. S.M.Greenfield	Rand Corp.Santa Monica,Cal.	Research

INDICATE "YES" OR "NO" ANSWER BY PLACING "X" IN PROPER COLUMN	YES	NO
25. MAY INQUIRY BE MADE OF YOUR PRESENT EMPLOYER REGARDING YOUR CHARACTER, QUALIFICATIONS, ETC.?	X	
26. ARE YOU A CITIZEN OF OR DO YOU OWE ALLEGIANCE TO THE UNITED STATES?	X	
27. ARE YOU NOW, OR HAVE YOU EVER BEEN, A MEMBER OF THE COMMUNIST PARTY, U. S. A., OR ANY COMMUNIST ORGANIZATION?		X
28. ARE YOU NOW, OR HAVE YOU EVER BEEN, A MEMBER OF A FASCIST ORGANIZATION?		X
29. ARE YOU NOW, OR HAVE YOU EVER BEEN, A MEMBER OF ANY ORGANIZATION, ASSOCIATION, MOVEMENT, GROUP, OR COMBINATION OF PERSONS WHICH ADVOCATES THE OVERTHROW OF OUR CONSTITUTIONAL FORM OF GOVERNMENT, OR OF AN ORGANIZATION, ASSOCIATION, MOVEMENT, GROUP, OR COMBINATION OF PERSONS WHICH HAS ADOPTED A POLICY OF ADVOCATING OR APPROVING THE COMMISSION OF ACTS OF FORCE OR VIOLENCE TO DENY OTHER PERSONS THEIR RIGHTS UNDER THE CONSTITUTION OF THE UNITED STATES OR OF SEEKING TO ALTER THE FORM OF GOVERNMENT OF THE UNITED STATES BY UNCONSTITUTIONAL MEANS?		X
If your answer to question 27, 28, or 29 above is "yes," state in Item 39 the names of all such organizations, associations, movements, groups, or combination of persons and dates of membership. Give complete details of your activities therein and make any explanation you desire regarding your membership or activities therein.		
30. SINCE YOUR 16TH BIRTHDAY, HAVE YOU EVER BEEN ARRESTED, INDICTED, OR SUMMONED INTO COURT AS A DEFENDANT IN A CRIMINAL PROCEEDING, OR CONVICTED, FINED, OR IMPRISONED OR PLACED ON PROBATION, OR HAVE YOU EVER BEEN ORDERED TO DEPOSIT BAIL OR COLLATERAL FOR THE VIOLATION OF ANY LAW, POLICE REGULATION OR ORDINANCE (EXCLUDING MINOR TRAFFIC VIOLATIONS FOR WHICH A FINE OR FORFEITURE OF $25 OR LESS WAS IMPOSED)? *If your answer is "Yes," list all such cases under Item 39 below. Give in each case (1) the date; (2) the nature of the offense or violation; (3) the name and location of the court; (4) the penalty imposed, if any, or other disposition of the case. If appointed, your fingerprints will be taken.*		X
31. HAVE YOU EVER BEEN DISCHARGED, OR FORCED TO RESIGN, FOR MISCONDUCT OR UNSATISFACTORY SERVICE FROM ANY POSITION? *If your answer is "Yes," give in Item 39 the name and address of employer, date, and reason in each case.*		X
32. HAVE YOU EVER BEEN BARRED BY THE U. S. CIVIL SERVICE COMMISSION FROM TAKING EXAMINATIONS OR ACCEPTING CIVIL SERVICE APPOINTMENTS? *If your answer is "Yes," give dates of and reasons for such debarment in Item 39.*		X
33. HAVE YOU ANY PHYSICAL HANDICAP, DISEASE, OR OTHER DISABILITY WHICH SHOULD BE CONSIDERED IN ASSIGNING YOU TO WORK? *If your answer is "Yes," give complete details in Item 39 so that consideration can be given to your physical fitness for the job.*		X
34. DO YOU RECEIVE AN ANNUITY FROM THE UNITED STATES OR DISTRICT OF COLUMBIA GOVERNMENT UNDER ANY RETIREMENT ACT OR ANY PENSION OR OTHER COMPENSATION FOR MILITARY OR NAVAL SERVICE? *If your answer is "Yes," give complete details in Item 39.*		X

INDICATE "YES" OR "NO" ANSWER BY PLACING "X" IN PROPER COLUMN	YES	NO
35. ARE YOU AN OFFICIAL OR EMPLOYEE OF ANY STATE, TERRITORY, COUNTY, OR MUNICIPALITY? *If your answer is "Yes," give details in Item 39.*		X
36. DOES THE UNITED STATES GOVERNMENT EMPLOY IN A CIVILIAN CAPACITY ANY RELATIVE OF YOURS (BY BLOOD OR MARRIAGE) WITH WHOM YOU LIVE OR HAVE LIVED WITHIN THE PAST 24 MONTHS? *If your answer is "Yes," show in Item 39 for EACH such relative (1) full name; (2) present address; (3) relationship; (4) Department or Agency by which employed, and (5) kind of appointment.*		X

SPECIAL INSTRUCTIONS FOR CLAIMING VETERAN PREFERENCE

A. If you are claiming preference as a PEACETIME VETERAN who has been awarded a campaign badge or service ribbon, or as a DISABLED VETERAN, or as the WIFE OF A DISABLED VETERAN, or as the WIDOW OF A WAR OR CAMPAIGN VETERAN, attach Veteran Preference Claim, CSC Form 14, together with proof specified therein.

B. If you are a WAR-TIME VETERAN not claiming disability preference, you should NOT submit your discharge with this application. Preference will be tentatively credited to you and if appointed, you will be required to submit to the appointing officer prior to entry on duty, official evidence of separation from active service in the armed forces of the United States in time of war.

	YES	NO
37. (A) WERE YOU EVER IN THE UNITED STATES MILITARY OR NAVAL SERVICE DURING TIME OF WAR?	X	
(B) IS THE WORD "HONORABLE" OR THE WORD "SATISFACTORY" USED IN YOUR DISCHARGE OR SEPARATION PAPERS TO SHOW THE TYPE OF YOUR DISCHARGE OR SEPARATION?	X	
(C) WAS SERVICE PERFORMED ON AN ACTIVE FULL-TIME BASIS, WITH FULL MILITARY PAY AND ALLOWANCES?	X	

(D)

DATE OF ENTRY OR ENTRIES INTO SERVICE	DATE OF SEPARATION OR SEPARATIONS
Sept 1943	April 1946
BRANCH OF SERVICE (*Army, Navy, Marine Corps, Coast Guard, etc.*) Army Air Corps	SERIAL NO. (*if none, give grade or rating at time of separation*). 32997559

	YES	NO
38. (A) IF YOU SERVED IN THE UNITED STATES MILITARY OR NAVAL SERVICE DURING PEACETIME ONLY, DID YOU PARTICIPATE IN A CAMPAIGN OR EXPEDITION AND RECEIVE A CAMPAIGN BADGE OR SERVICE RIBBON?		X
(B) ARE YOU A DISABLED VETERAN? *If so, and you have not listed your disability in answer to Item 33, explain in Item 39 below.*		X
(C) ARE YOU A VETERAN'S WIDOW WHO HAS NOT REMARRIED?		X
(D) ARE YOU THE WIFE OF A VETERAN WHO HAS A SERVICE-CONNECTED DISABILITY WHICH DISQUALIFIES HIM FOR CIVIL SERVICE APPOINTMENT?		X

THIS SPACE FOR USE OF APPOINTING OFFICER ONLY

The information contained in the answers to Question 37 above has been verified by comparison with the discharge certificate on _____, 19____.

Agency: _____ Title: _____

39. SPACE FOR DETAILED ANSWERS TO OTHER QUESTIONS (*indicate item numbers to which answers apply*).

ITEM NO		ITEM NO.	

If more space is required, use paper the same size as this page. Write on each sheet your name, address, date of birth, and examination title. Attach to inside of this application.

Before signing this application check back over it to make sure that you have answered ALL questions correctly.

I CERTIFY that the statements made by me in this application are true, complete, and correct to the best of my knowledge and belief, and are made in good faith.

False statement on this application is punishable by Law (U. S. Code, Title 18, Section 80).

SIGNATURE OF APPLICANT Bernard J. Hildenbrand

(Sign your name in INK (one given name, initial or initials, and surname). If female, prefix Miss or Mrs. and if married use your own given name as "Mrs. Mary L. Doe")

U. S. GOVERNMENT PRINTING OFFICE 16—53946-1

Bernard David Gildenberg
C/O W.J.Brown P.O.Box 555 China Lake,Cal.
June 19,1925
Meteorologist GS-9

Item 3

At Holloman Air Force Base

Rigging of balloons and equipment
Pre-flight computations
Pre-flight radio checking of the AM-1 transmitter,olland cycle, ballast command and dribbler,minimum pressure switches
Maintaneance and operation of brush recording oscillograph, R.D.F. 658 and Friez radiosonde reciever
Calibration of barothermographs,olland cycles and pressure switches
Flying of constant level plastic balloons,seven to seventy feet in diamater

At New York University

Construction of ballast cans and other flight controls
Calibration of Olland cycles and Lange barographs using vacuum chambers and cold chambers
Complete analysis of data obtained from field flights
Statistical ~~of~~ analysis of Olland Cycle data and operation
Construction of evaluation charts
Forecasting trajectories for continental and trans-oceanic constant level balloon flights
Flying constant level balloons at Long Island,Rome A.F.B., Watson Laboratory,New Jersey
Report Writing

Item 4

Dust Diffusion sub-contract Rand Corp.

Development of titanium tetrachloride smoke bomb
Forecasting trajectories
Modification of radiosonde equipment
Directing remote launching flights
Construction of bomb housing
Diffusion and internal pressure tests of various balloons
Calibration of instruments
Setting up remote tracking stations

Bernard David Gildenberg
C/O W.J.Brown P.O.Box 555 China Lake,Cal.
June 19,1925
Meteorologist GS-9

Item 4

Atmospheric Sampling sub-contract Air Force,Cambridge
Geophysical Division

Testing special large rubber and neoprene balloons
Setting up and computing double theodolite methods
Forecasting flight paths
Construction and testing of special rigging devices
Recovery of instruments
Directing launchings
Operating tracking equipment

Item 20

Canada 1944 4 days military service
Alaska 1944 1 month military service
Aleutian Islands 1944-45 military service
Mexico 1948,49 4 days recreation

Item 21

Frieden Marchand and Monroe Computers
R.D.F. 658
Friez Radiosonde Recorder
Brush oscillograph recorder
telotype machine
theodolite
still camera
large reflecting telescopes
slide rules
photographic dark room equipment
weather chamber equipment

NAME	TITLE & POS NO.	GRADE & SERIES
INSTALLATIONS SECTION		
FOLAN, William L.	Supv.Electronic Eng (Gen.) BMT-385	GS-855-13
SLED BORNE UNIT		
BENTON,Clarence U.	Electronic Eng.(General) BMT-391	GS-855-12
HOYLE, Embry L.	Instrumentation Sys.Modifier BMT-386	WB-83-54-20
HOLMES, Thomas J.	Elect.Test Equip.Repairer BMT-462	WB-26-80-17
BLOOM, Kenneth D.	Elect.Test Equip.Repairer BMT-471	WB-26-80-17
FIELD UNIT		
EVANS, Wilbur E.	Supv. Elect.Engineer (Gen.) BMT-384	GS-855-12
DE ROY, Robert C.	Instrumentation Sys.Modifier BMT-389	WB-83-54-15
McALEE, Christopher J.	Inst.Devices Fabricator BMT-383	WB-83-53-15
GRAHAM. Willie (NMI)	Elect. Equip.Repair Helper BMT-371	WB-26-00-05
LIQUID ENGINE UNIT		
FITZGERALD, Robert E.	Experimental Rocket Eng.Tester BMT-390	WB-86-85-20
KELLER, Eugene A.	Elect.Test Equip.Repairer BMT-468	WB-26-80-17
DATA COLLECTION SECTION		
MARTIN, WILFRED T.	Supv.Elect.Tech (General) BMT-311	GS-1671-13
MAGEE, Evelyn B.	Elect.T est Equip.Repairer BMT-367	WB-26-80-17
TORRES, James S.	Laborer BMT-352	WB-35-02-03
TELEMETRY UNIT		
BRITT, Alan A.	Elect.Tech.(Instrumentation)BMT-295	GS-1671-11
HANOVER,Joe C.	Elect.Tech.(Instrumentation)BMT-296	GS-1671-9
SNEED, Harold C.,	Elect.Tech.(Instrumentation)BMT-296	GS-1671-9
SPACE TIME UNIT		
BRADLEY,Milton R.	Elect.Tech.(Instrumentation)BMT-375	GS-1671-11
LANFAIR, Billie B.	Electronic Engineer BMT-420	GS-855-5
JACKSON, Bill C.	Engineering Aid (General) BMT-322	GS-802-3
WISKOTT, Hans (NMI)	Instrumentation Systems Modifier BMT-466	WB-83-54-15
TAPE RECORDING UNIT		
McLEMORE, Thomas E.	Instr.Systems Modifier BMT-374	WB-83-54-15
DEVELOPMENT SECTION		
MELTON, Elvin W.	Supv.Elect.Eng.(Gen) BMT-376	GS-855-13
ACCEPTANCE UNIT		
DOHERTY,Jim M.	Elect.Eng.(Gen.) BMT-337	GS-855-7
IN HOUSE UNIT		
PHIPPS, John H.Sr.	Elect.Tech.(General) BMT-372	GS-1671-9
FUTURE UNIT		
WELLS, Bobby D.	Elect. Sys. Experimenter BMT-370	WB-26-92-20
MOTT,Darrell R.	Elect.Equip.Experimenter BMT-460	WB-26-92-15
SMITH,Benny G.	Elect.Equip.Experimenter BMT-460	WB-26-92-15
PROJECTS BRANCH		
RETHMEL, Robert C.	Supv.Gen.Eng.(Track Planning)BMT-406	GS-801-13
DAUGHERTY, Julia I.	Clerk-Dict.Mach.Transb. BMT-395	GS-316-3
PROJECTS SERVICES SECTION		
MC INTYRE, Edward B.	Electronic Eng.(General) BMT-404	GS-855-12
BATTLE, Morris F.	Gen.Eng.(Sled Track Testing) BMT-405	GS-801-12
CHAMBERS, William H.,Jr.	General Engineer BMT-326	GS-801-11
PARRISH, James C.	Mathematician BMT-397	GS-1520-7
SANCHEZ, Lydia (NMI)	Clerk Dict.Mach.Transb.	GS-316-3
PROJECT LIAISON SECTION		
LIVINGSTONE, Hal A.	Supv.Gen.Engr.(Sled Track Testing)BMT-396	GS-801-12
RUMSEY, Atwell N.	Mechanical Eng.(General) BMT-400	GS-830-11
BEST, Harry H.	Engineering Tech.(Mechanical)BMT-197	GS-802-9
ARNOLD,Mary L.	Clerk-Typist BMT-394	GS-322-3

NAME	TITLE & POS NO.	GRADE & SERIES
HIGH ALTITUDE TEST DIVISION		
SORGNIT, Ernest F.	Aero. Res. Administrator (High Alt. Vehicles) BMT-449	GS-1301-15
LIDDLE, Donna J.	Clerical Assistant BMT-49	GS-301-5
BALLOON BRANCH		
BUTTS, Rae M.	Clerk (Typing) BMT-331	GS-301-4
OVERMAN, Carol J.	Clerk-Typist, BMT-380	GS-322-3
OPERATIONS SECTION		
TENNEY, Blair N.	Flight Test Exper. Instr. Fab. BMT-266	WB-33-85-17
LAUNCH OPERATIONS UNIT		
GOMEZ, Eliseo (NMI)	Balloon Launch Specialist BMT-171	WB-88-87-13
RECOVERY OPERATIONS UNIT		
BLANKENSHIP, Robert G.	Aircraft Crash Truck Driving Frmn BMT-51	WF-57-08-06
TECHNICAL SUPPORT SECTION		
GILDENBERG, Bernard D.	Phy. Science Admin. (Balloon) BMT-228	GS-1301-13
REYNOLDS, Ralph D.	Meteorologist (R&D) BMT-387	GS-1340-12
KAUFMAN, John W.	Balloon Scientist BMT-438	GS-1301-11
INSTRUMENTATION SECTION		
MARKLEY, Herbert G.	Supv. Elect. Eng. (Gen.) BMT-229	GS-855-13
INSTRUMENTATION UNIT		
WILLARD, David S.	Supv. Elect. Eng. (Gen.) BMT-217	GS-855-13
BALLOON INSTRUMENTATION DEVELOPMENT LABORATORY UNIT		
BROWN, Milford N.	Elect. Scientist (Gen.) BMT-365	GS-1312-11
GRABBE, Richard L.	Elect. Equip. Fabricator BMT-219	WB-26-81-20
FLIGHT INSTRUMENTATION SUB-UNIT		
RICHARDS, Ernest G.	Instr. Systems Mod. Foreman BMT-414	WF-83-54-10
WHEAT, Baxter (NMI)	Instr. Systems Modifier BMT-413	WB-83-54-20
BROWN, Robert B.	Instr. Devices Fabricator BMT-432	WB-83-53-19
KOHLHAAS, Richard R.	Instrumentation Sys. Officer BMT-463	WB-83-54-15
PERALES, Jesus J.	Engineering Aid (Gen.) BMT-304	GS-802-4
DATA COLLECTION UNIT		
CARLSON, HARRY A.	Elect. Eng. (Gen.) BMT-435	GS-855-11
COMMUNICATIONS UNIT		
SHUTTLEWORTH, Harry C.	Radio-Radar Equip. Inst. Foreman BMT-434	WF-26-61-08
ROCKET SONDE BRANCH		
WILSON, Priscilla M.	Clerk-Typist BMT-112	GS-322-3
OPERATIONS SECTION		
MEYER, Vernon E.	Powered Grd. Equip. Elect. -Steamfitter BMT-216	WB-28-52-15
INSTRUMENTATION SECTION		
BELLES, Hillery W.	Supv. Elect. Eng. (General) BMT-211	GS-855-13
STOKES, James W.	Elect. Development Tech. BMT-446	GS-1671-12
WIANT, Robert C.	Elect. Scientist (Instr.) BMT-276	GS-1312-9
RONNING, Albin C.	Instr. Sys. Modifier BMT-445	WB-83-54-20
NICHOLS, Charles E.	Inst. Sys. Modifier BMT-447	WB-83-54-15
SEARCY, Talmadge R.	Instr. Sys. Modifier BMT-447	WB-83-54-15
SMITH, Vernon E.	Instr. Sys. Modifier BMT-447	WB-83-54-15
STRATOSPHERE BRANCH		
ABERNATHY, Arthur H. Jr.	Supv. Mech. Engr. (Gen.) BMT-416	GS-830-14
FAIRE, Janice R.	Clerk-Stenographer BMT-402	GS-312-4
ENVIRONMENTAL TEST SECTION		
PHILLIPS, Clyde O.	Electr. Eng. (General) BMT-415	GS-855-13

NAME: KAUFMAN, FRANK J.

SSAN:

RANK: 1LT

SERVICE #: 0-306767

32421439?

BRANCH: USAF

DATE OF BIRTH: 1921

PLACE OF BIRTH:

CAREER FIELD:

ROSWELL DATA:

DECEASED - DATE/PLACE:

LAST KNOWN ADDRESS:

NOTES: ONLY FRANK J. KAUFMAN THAT FIT ERA. ONLY RECORD IS A DENTAL EXAM. APPEARS TO HAVE BEEN ASSIGNED TO 100TH AAFBU MITCHEL FIELD, NY

Call From Bill Siebert 22 Dec 95 1000
Friedman Request For Records of Frank Kaufman 32421439
DoB 3/1/16
Enlisted - NYC Aug 5, 1942
1944-966 Bomb Training Sq
- Roswell NM
Separated Oct 30, 1943

ID: 7

REGISTER OF DENTAL PATIENTS AT

MITCHEL FIELD, N. Y.

USN

(1) SURNAME	(2) CHRISTIAN NAME	
KAUFMAN,	Fran'k J.	0-396767

(3) RANK	(4) COMPANY	(5) REGIMENT OR STAFF CORPS
1st Lt.	Hq Sq,	100th AAFBU

(6) AGE, YEARS	(7) RACE	(8) NATIVITY	(9) SERVICE, YEARS
26	W	Pa.	8-1/2

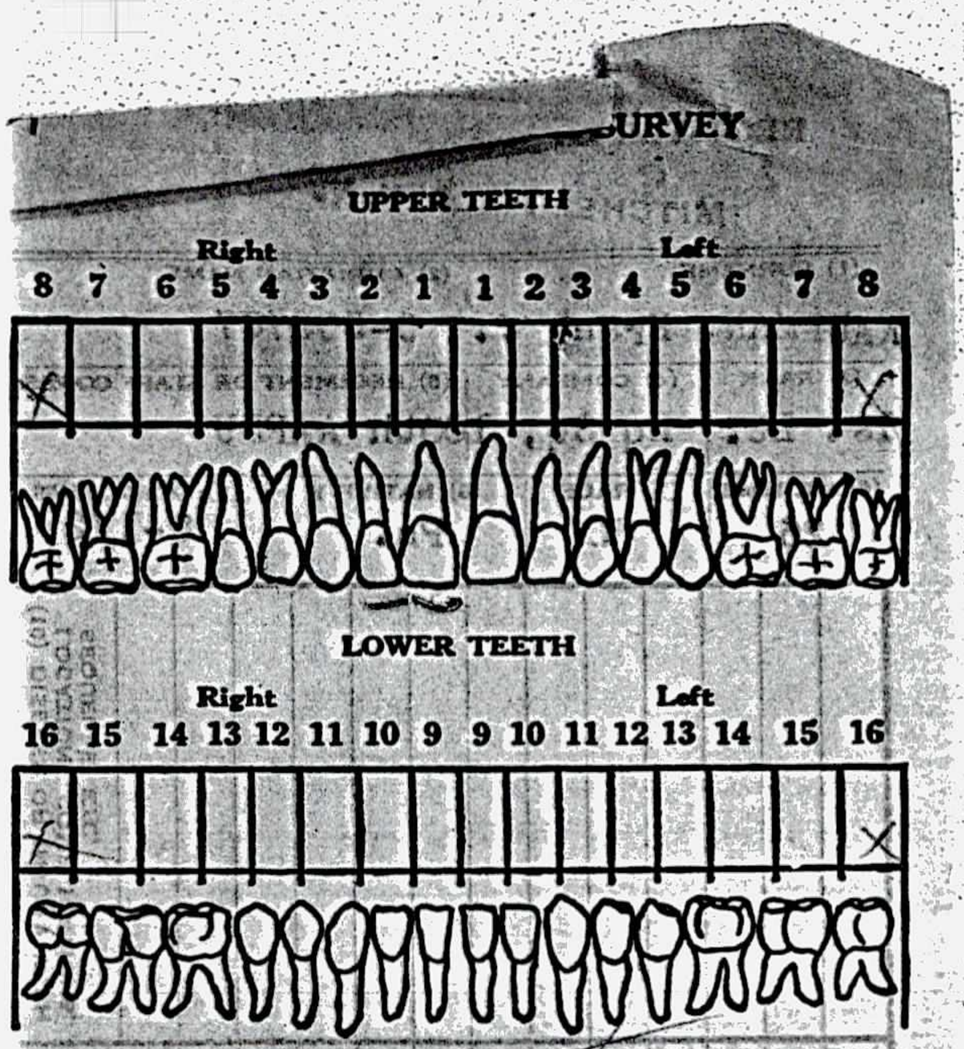
(10) DISEASE OR INJURY WITH LOCATION, COMPLICATIONS, SEQUELAE, ETC.	(11) DATES AND NATURE OF TREATMENTS AND OPERATIONS	(12) RESULTS AND REMARKS
	1947	
	Exam&Rx	IV Steele
	Feb. 7	

Stanley J. Steele, 1st Lt.

Dental Corps, U. S. A.

FORM 79—MEDICAL DEPARTMENT, U. S. A.
(Revised Feb. 24, 1941)

16—20622



CLASS IV

Occlusion Poor; Calculus: Slight, Medium, Heavy

Periodontoclasia None

Dental foci suspected: Yes (No)

Other conditions _____

Date 1 Feb, 1947

L. F. Steele Lt. Col
Dental Corps, U. S. A.

*Restorable carious teeth by O
Nonrestorable carious teeth by /
Missing natural teeth by X

Teeth replaced by denture (horizontal line)

Teeth replaced by fixed bridge (oval to include abutments)

16—20622

NAME: YOAKUM, CECIL T.

SSAN:

RANK: SSGT

SERVICE #: 6796626

BRANCH: USA (RET)

DATE OF BIRTH: 7/4/09

PLACE OF BIRTH: GOULD, OK

CAREER FIELD: COOK

ROSWELL DATA: SEE ATTACHED

DECEASED - DATE/PLACE: 3/3/74 / ONTARIO, CA

LAST KNOWN ADDRESS:

NOTES: REDUCED IN RANK JUST PRIOR TO RETIREMENT.

ID: 10

NOTE: DO NOT ATTEMPT TO FILL OUT THIS CARD WITHOUT FIRST READING INSTRUCTIONS CONTAINED IN TM 12-425. VERY CAREFULLY

SOLDIER'S QUALIFICATION CARD

THIS CARD MUST ACCOMPANY THE SOLDIER UPON TRANSFER

(21)- ⓣ PREVIOUS MILITARY EXPERIENCE

ARM OR SERVICE	YEARS IN EACH	HIGHEST GRADE	CATEGORY R A N.G. E R C. C C C ETC.	LAST DISCHARGE (YEAR)	SPECIAL TRAINING RECEIVED: SPECIFIC NATURE	YEARS	MO'S.	LAST DATE (YEAR)
C. A. C.	7	Sgt	RA	1945				
Demand, Cal	3	Pfc	RA	1930				
Armor Trps	3	Cpl	RA					

(22)- ⓡ SERVICE SCHOOLS, ARM, OR SERVICE	NUMBER OF WEEKS	COURSE	SPEC. SERIAL NO.	YEAR GRADUATED AND RATING (IF ANY)
M Food Sv Sch FSH Tex	8	"B" Mess Steward	824	Ex 1949

(23)- ⓑ ASSIGNMENT LIMITATIONS

P	U	L	H	E	S	X	R	D	DATE	INITIALS	LIMITATION (IF ANY)
2	1	1	1	1	1	Va			30 JUNE 49	EJM.	

(24)

(25)

(26) ASSIGNMENT RECOMMENDED BY RECEPTION CENTER Cook (060)

(27)- ⓣ CLASSIFICATION IN MILITARY SPECIALTIES DESIGNATION	SPEC. SERIAL NO	POTENTIAL	SEMI-SKILLED	SKILLED	TYPE OF EQUIPMENT
Cook	060			9Jan47	
Mess Steward 9 June 49 (P)	824			9Jun47	
Cook (P)	060			11Jul49	
(P) Cook	0060	Adjtd 0060 Gr 3 - 1190 Prmtd 20Sep49			

(28) REMARKS (P) 824 deleted. (P)0060 designated as P 1 SO 55 4121 ASU, FSHT, 11 Jul 49. Soldier did not have adequate grade for the MOS 824. Ref(8) G.E.D. (Hs Stry) Form A, Passed, 11 Mar 48.

DISCHARGED

(29) RECORD OF CURRENT SERVICE

DATE	ORGANIZATION AND STATION	GRADE	PRINCIPAL DUTY	SPEC. SER. NO.
15Jun47	SqK 427thAAFBU, R.N.M.	Pfc	Cook	060
1 Sep 47	SqK 427thAAFBU, R.N.M.	Cpl.	Cook	060
3Dec47	SqD 509th A/D Gp. R.N.M.	Cpl	Cook	060
	Transfered to the Department of the Air Force per Transfer Order 1, NME, 26 Sept 47.			
1Aug48	H. Sq. Hq. 509 Bd Hdqrs. Roswell NM.	Cpl.	Cook.	060
[illegible]	Det "A" 7010 AF Cons Flgt Sq. APO 69	Sgt	Rpt	—
12Oct48	7124 Food Serv Sq 7120 Air Base Gp	Sgt	COOK	060
4 DEC 48	DOP 31 7 STA Hosp	SGT	PATIENT	—
15Jan49	DOP 3194 STA Hosp APO 69	SGT	PATIENT	—
16Feb49	DOP Brooke GH FSH Tex	Sgt	Patient	
3 May 49	--Trfd to Dept of Army Cpl, TWX UE POK 11369 Wash DC dtd 31 Mar 49			
3 May49	Food Sv Sch, FtSamHouston	Cpl	Mess Steward	824
11Jul49	4121 ASU FSS, FSHT		Cook	060
1 Aug 49 3 May to 19 Aug 49	ENL DET 4005 ASU STA Com Gp Hood, Tex 3 Jul 49 Fd Sv Sch Ft Sam Houston, Tex	Cpl Cpl	Instr (Cook) Spec EER (060)	060 116
1 Aug 49	ENL DET 4005th ASU CP Hood Tex	Sgt	INST	0060
3 MAR 50	4121st ASU Fd Sv Sch FSH Tex	Sgt	COOK	0060

(30)- ⓑ DATE OF (CROSS OUT ONE) Re-ENLISTMENT INDUCTION 9 June 1947 AF (3 Yrs)

	FIRST INTERVIEW	SECOND INTERVIEW
DATE OF INTERVIEW	10 June 1947	17 Dec 48
STATION	RAAF, Roswell, N.M.	WIESBADEN Mil Post, GER
SIGNATURE: INTERVIEWER	Donald J. Fiola Pfc /S/	Alkeaton Sgt.
SIGNATURE: CLASSIFIER		James McCallan, Jr Sgt
SIGNATURE: SOLDIER	Cecil T Hopkins	Cecil T Hopkins

(31) DRIVES: AUTO [X] — TON TRUCK [X] MOTORCYCLE [X]
HOLDS New Mexico STATE DRIVER'S PERMIT

(32) QUALIFICATIONS IN ARMS

WEAPON	COURSE	QUALIFIED	SCORE	DATE
Carbine		M	133	5Apr48

WD AGO FORM 1 DEC 1944 20

IMPORTANT -- UNDER NO CIRCUMSTANCES WILL THIS CARD BE FOLDED, ROLLED, OR CREASED.

MCBEE KEYSORT U. S. PAT. NO. 2,213,607

NAME: MULLINER, LEE J.

SSAN: 534-18-4300

RANK: TSGT

SERVICE #: 006559718

BRANCH: USAF

DATE OF BIRTH: 7/17/14

PLACE OF BIRTH: MARYSVILLE,UT

CAREER FIELD: MESS STEWARD, FOOD SERVICE SUPV

ROSWELL DATA: SEE ATTACHED

DECEASED - DATE/PLACE: 10/20/72

LAST KNOWN ADDRESS: 2209 E 32ND ST VANCOUVER WA98663

NOTES: "SUPERIOR EPRS, ARTICLE 15 21 SEP 54-DUI, REDUCED IN RANK BEFORE RETIREMENT.

ID: 11

LAST NAME—		RACE OR COLOR
Mulliner, Lee J	~~AR~~ 6559718 ~~WAF~~ AF 26 Sep 47	White

COVERING PERIOD

FROM 16 Oct 1946, TO Oct 1950, INCLUSIVE

ARM OR SERVICE FOR WHICH ENLISTED OR TRAINED (*Enter arm or service ONLY, not the Organization.*)

~~WAAC~~ ~~WAF~~ A.F.
~~AAF~~ Unasgd.
~~AC~~ 6 Dec. 46

COMPONENT (*Place "X" in box indicating Component*)

REGULAR ARMY	REGULAR ARMY RESERVE	ARMY OF THE UNITED STATES	NATIONAL GUARD	ENLISTED RESERVE CORPS
X				

SERVICE RECORD

THE LETTERING ON RUBBER STAMPS USED FOR THE PURPOSE OF MAKING ENTRIES IN THE BODY OF THE SERVICE RECORD WILL NOT BE LARGER THAN PICA TYPEWRITER TYPE. RUBBER STAMPS MAY BE USED IN LIEU OF TYPEWRITER.

THE SERVICE RECORD WILL NOT BE FOLDED OR CREASED.

FOR INSTRUCTIONS SEE AR 345-125 AND TM 12-230A.

LAST NAME—FIRST NAME—MIDDLE INITIAL—SERIAL NO.

MULLINER LEE J. ~~AF~~ AF 6559718

(*Information will not be entered in this space by typewriter*)

WD AGO FORM 1 JUN 1945 24A

c9—16—45843-1

SECTION 4—ARTICLES OF WAR—READ AS REQUIRED

DATE	DATE	DATE	DATE	DATE	DATE	DATE
21 OCT 1946	11 Jan 48	30 SEP 1948	6 Jan 49	15 JULY 50		
JUL 9 1947	FEB 19 1948	22 Jan 49	FEB 4 1950			

SECTION 5—ORGANIZATIONS TO WHICH ATTACHED

CO., REGT., OR COMPARABLE ORGANIZATION	STATION	FROM	TO (*Incl.*)
401st AAF BU	Hamilton Fld, Cal	26 Oct 46	5 Dec 46
10/29/47	407TH AFBU, HAMILTON FIELD, CAL	7 Oct 47	8 NOV 48
	407TH AFBU. HAMILTON FLD CAL	7 OCT 47	8 Nov 48
2225TH AFORD	CAMP KILMER, N. J.	11 SEPT. 48	17 SEP 1948
2225th AFORD, Cp Kilmer, NJ		22 Oct 47	27 Oct 47
~~314th Medical Group~~	~~SAFB Smyrna Tenn~~	6 Dec 49	~~7 Dec 49~~ 9 Aug 50

SECTION 6—ORIGINAL ASSIGNMENT AND ORGANIZATIONS TO WHICH SUBSEQUENTLY ASSIGNED DURING THIS PERIOD OF SERVICE

CO., REGT., OR COMPARABLE ORGANIZATION	STATION	FROM	TO (*Incl.*)
401 AAF BU	Hamilton Fld Cal.	5 Dec. 46	14 Jul 47
HQ AAF ORD	Hamilton, Field Calif	15 Feb 47	29 Dec 47
3010th AF Base Unit	Williams Field, Arizona	19 Dec 47	7 Feb 48
Sq "D" 509th Airdrome Gp	WAFB, Roswell, NM	8 Feb 48	31 Jul 48
Transferred to the Department of the Air	Force per Transfer	Order 1 NME 26	Sept 47
Food Sv Sq 509th Airbase Gp,	WAFB, Roswell N M	1 Aug 48	
Det "A" 7010 AF Cas Proc Sq, APO 872		2 Sep 48	8 Oct 48
Hq & Hq Sq 86th Fighter Wing	APO 407	9 Oct 48	11 Oct 48
Hq & Hq Sq 86 AIR BASE Gp	APO 407	12 Oct 48	14 Oct 48
86th Food Service Sq, Ftr SE	APO 407	14 Oct 48	5 Oct 49
314th Food Service Sq Trp, Carr(M)	SAFB Smyrna, Tenn	4 Nov 49	7 Dec 49
314th Medical Group	SAFB, Smyrna, Tenn.	~~6~~ Dec 49	11 Aug 50
314th Food Service Squadron Trp Carr(M)	Sewart AFB Tenn	12 Aug 50	7 Nov 50

SECTION 7—COMBAT RECORD

PARTICIPATED IN (*Battle or Campaign*)	THEATER OF ACTION	FROM	TO (*Incl.*)

SECTION 8—WOUNDS RECEIVED THROUGH ENEMY ACTION

BRIEF DESCRIPTION	DATE	BRIEF DESCRIPTION	DATE

c9—16—45848-1

NAME: CARDELL, WILLIAM J.

SSAN: 335-24-6944

RANK: SSGT

SERVICE #: 16247992

BRANCH: USAF (RET)

DATE OF BIRTH: 10/20/24

PLACE OF BIRTH: SOUIX CITY, IA

CAREER FIELD: COOK, COMMISSARY NCOIC

ROSWELL DATA: SEE ATTACHED

DECEASED - DATE/PLACE: 2/27/77

LAST KNOWN ADDRESS:

NOTES: LAST EPR VERY LOW; NOT RECCOMMENDED FOR PROMOTION.

ID: 16

YEARS	MONTHS	DAYS

TYPED OR PRINTED NAME, GRADE AND ORGANIZATION OF RESPONSIBLE OFFICER

SIGNATURE

SECTION 4—ARTICLES OF WAR—READ AS REQUIRED

DATE	DATE	DATE	DATE	DATE	DATE	DATE
JAN 20 1948	14 Nov 49	6 JAN 51				
30 SEP 1948	1 MAY 50					

SECTION 5—ORGANIZATIONS TO WHICH ATTACHED

CO., REGT., OR COMPARABLE ORGANIZATION	STATION	FROM	TO (*Incl.*)
5012 ASU Central Examining Station	FORT SHERIDAN, ILLINOIS	29 July 47	
3543d ABF BU, ORSE, Lackland Air Base, San Antonio, Texas		2 Aug 47	AUG [illegible]
Sq "K" 427AAFBU, RAAFld, Roswell, N.Mex.	Roswell A.A.F.	29 Aug 47	SEP 16 1947
Food Sv Sch, FT/S	Ft Sam Houston, Tex.	13 Feb 48	
2225 THAFORD	QM Food Sv Sch FSH Tex	13 Feb 48	12 MAR 1948
EAT SP EXT, 75TH GEN HOSP	CAMP KILMER, N. J.	11 SEPT 48	17 SEP 1948
Det of Pnts Brooke Gen Hosp Ft.	APO 407 Sam Houston, Tex.	1 Jan 49	8 Jan 49

SECTION 6—ORIGINAL ASSIGNMENT AND ORGANIZATIONS TO WHICH SUBSEQUENTLY ASSIGNED DURING THIS PERIOD OF SERVICE

CO., REGT., OR COMPARABLE ORGANIZATION	STATION	FROM	TO (*Incl.*)
715th Bomb Sq (VH), 509th Bomb Gp (VH)	Roswell, New Mexico	27 Aug 47	SEP 16 1947
SQ K 427th AAFBU	Roswell N. w Mex.	SEP 16 1947	3 Dec 47
SQ K 509th Bombe GP	Roswell N. w Mex	[illegible] 1947	31 Jul 48
Transferred to the Department of the Air Force per TRansfer	Order 1, NME,	26 Sept 47	
Food Sv Sq 509th Airbase Gp	WAFB, Roswell, N. M.	1 Aug 48	8 Oct 48
Det "A" 7210 AF Cas Proc Sq, APO 872		28 Sep 48	
Hq & Hq Sq 7200th AF Depot Wg	APO 207 U.S. ARMY	9 Oct 48	10 Nov 48
DET OF PATIENTS, 3DF GENERAL HOSPITAL	APO 407	11 Nov 48	19 Nov 48
DOP 3194 Station Hospital	APO 69	20 Nov 48	8 Jan 49
Det of Pnts Brooke Gen Hosp Ft.	Sam Houston, Tex.	9 Jan 49	18 March 49
330TH ASSEMBLY SQ	SCOTT AFB ILL	18 MAR 49	2 May 49
91ST Food SU Sq 91ST AB Gp	McGUIRE AFL N J	2 MAY 49	1 Oct 49
91ST Food SU Sq 91ST AB Gp	BARKSDALE AFB LA.	20 Oct 49	6 Jan 50
21 FEB 50 2349th AF ORD HAMILTON AFB [illegible]		9 Feb 50	3 MAR 50
6 MAR 50 AF ORD HAMILTON FLD [illegible]		9 FEB 50	[illegible]
6403 OS Repl Sq	AF ORD HAMILTON FLD CALIF APO 503	9 Feb 50 6 APR 50	APR 5 1950 14 APR 50

SECTION 7—COMBAT RECORD

PARTICIPATED IN (*Battle or Campaign*)	THEATER OF ACTION	FROM	TO (*Incl.*)

SECTION 8—WOUNDS RECEIVED THROUGH ENEMY ACTION

BRIEF DESCRIPTION	DATE	BRIEF DESCRIPTION	DATE

69—16—45848-1

NAME: HUNDLEY, JAMES W

SSAN:

RANK: SSGT

SERVICE #: 13036665

BRANCH: USAF

DATE OF BIRTH: 7/30/20

PLACE OF BIRTH: STEWART, VA

CAREER FIELD: COOK, CLASSIFICATION CLERK

ROSWELL DATA: SEE ATTACHED

DECEASED - DATE/PLACE: 5/21/83

LAST KNOWN ADDRESS: 1417 WINDER DR NORFOLK VA

NOTES:

ID: 12

NOTE: DO NOT ATTEMPT TO FILL OUT THIS CARD WITHOUT FIRST READING INSTRUCTIONS CONTAINED IN TM 12-425. VERY CAREFULLY

SOLDIER'S QUALIFICATION CARD

THIS CARD MUST ACCOMPANY THE SOLDIER UPON TRANSFER

(21)-Ⓣ PREVIOUS MILITARY EXPERIENCE

ARM OR SERVICE	YEARS IN EACH	HIGHEST GRADE	CATEGORY R. A., N. G., E. R. C., C. C. C. ETC.	LAST DISCHARGE (YEAR)	SPECIAL TRAINING RECEIVED: SPECIFIC NATURE	YEARS	MO'S.	LAST DATE (YEAR)
AAF	3	S/Sgt	RA	Oct 45	Mess Sergeant	3	3	45

(22)-Ⓡ SERVICE SCHOOLS, ARM, OR SERVICE

SERVICE SCHOOLS, ARM, OR SERVICE	NUMBER OF WEEKS	COURSE	SPEC. SERIAL NO.	YEAR GRADUATED AND RATING (IF ANY)

(23)-Ⓑ ASSIGNMENT LIMITATIONS

P	U	L	H	E	S	X	R	D	DATE	INITIALS	LIMITATION (IF ANY)
1	1	1	1	1	1				26 Sep46		
											AAF

(24)

(25)

(26) ASSIGNMENT RECOMMENDED BY RECEPTION CENTER: Mess Sergeant 824

(27)-Ⓣ CLASSIFICATION IN MILITARY SPECIALTIES

DESIGNATION	SPEC. SERIAL NO	POTENTIAL	SEMI-SKILLED	SKILLED	TYPE OF EQUIPMENT
Mess Sergeant	824		Feb43	May43	
Cook	060			May43	
Air Plane Eng. Med.	747		3 Feb	Nov46	
Classification Spec	275	8 Jul48			

(28) REMARKS

Comp 13 Weeks Basic Training (Feb. 1942) Dep for ETO

21 Oct 43 Ret 1 Oct 45 24 Mos overseas service credit as of 1 Oct.45 // 28 Mos pr Foreign Service as of 2 Feb.49 Left US 17 Sep 48 Ret'd US 27 Jan 49// Qualifided for Trans. in Mos 824 11 Oct 46

(29) RECORD OF CURRENT SERVICE

DATE	ORGANIZATION AND STATION	GRADE	PRINCIPAL DUTY	SPEC. SER. NO.
24Sep46	Roanoke, Virginia	S/Sgt	Re-enlisted	
30Oct46	AAF Assembly Sta., Andrews Field, Wash.	S/Sgt	Proc	
11Oct46	603 Air Eng Sq, Roswell New Mexico	S/Sgt	Mess Sgt.	824
3Feb47	603 Air Eng Sq.	S/Sgt	A/P Eng Mec	747
20May47	Sq K 427 BU RAAF Roswell	S/Sgt	Cook	060
18Nov47	" " " " "	S/Sgt	Cook	060
13Sep47	" " " " "	S/Sgt	Mess Steward	824
3 Dec47	Sq D 509th AD Gp "	S/Sgt	Cook	060
	Remains assigned to the Department of the Air Force per Transfer Order 1, NME, 26 September 1947			
17May48	SQ D 509th AD Gp Roswell N.M.	S/Sgt.	Cook	060
8July48	Sq D 509 AD Gp Roswell NM	S/Sgt.	Classification Spec	275
1Aug48	Fld Sv Sq 509 AD Gp Roswell	S/Sgt.	" "	275
29Sep48	Det A 2010 AF Cas Proc Sq	S/Sgt.	Repl	
28Oct48	HQ B Sv. Sq AD Burton Wood Depot.	S/Sgt	Mess Sgt.	824
23Jan49	Det Pnts 97th General Hosp.	S/Sgt.	Patient.	
8 Feb 49	Out of Pnts Oliver GH Augusta, Ga	S/Sgt.	Patient.	

(30)-Ⓑ DATE OF (CROSS OUT ONE) ENLISTMENT ~~INDUCTION~~

24 Sept. 1946 RA 3 yrs/AAFUSSR

	FIRST INTERVIEW	SECOND INTERVIEW
DATE OF INTERVIEW	27 Sept. 1946	3 Feb 49
STATION	Ft. George Meade, Md.	OGH Augusta, Ga.
SIGNATURES: INTERVIEWER	/s/ Joseph Lance T/4	Sgt. Chas. Coulter
SIGNATURES: CLASSIFIER		
SIGNATURES: SOLDIER	James M Hundley	

(31) DRIVES: AUTO ✓ — TON TRUCK ☐ MOTORCYCLE ☐

HOLDS Virginia STATE DRIVER'S PERMIT G.I.

(32) QUALIFICATIONS IN ARMS

WEAPON	COURSE	QUALIFIED	SCORE	DATE
Carbine		Q		Aug 45
Pistol		Q		Aug 46
Carbine	FAM.	"		Aug 48

IMPORTANT -- UNDER NO CUMSTANCES WILL THIS CARD BE FOLDED, ROLLED, OR SED

MCBEE KEYSORT U. S 2,213,607

NAME: HANSHAW, CHARLES E.

SSAN: (b) (6)

RANK: SSGT

SERVICE #:

BRANCH: USA

DATE OF BIRTH: 9/15/28

PLACE OF BIRTH: ACHISON, KS

CAREER FIELD: TRUCK DRIVER

ROSWELL DATA: NONE

DECEASED - DATE/PLACE:

LAST KNOWN ADDRESS:

NOTES: MAY NOT BE CORRECT INDIVIDUAL. ENTIWETIK DUTY JUL 56- JUN 57. OUTPROCESSED FOR FAILURE TO PAY DEBTS.

ID: 15

NAME: POWELL, ERNEST O.

SSAN:

RANK: SSGT

SERVICE #: 39255667

BRANCH: USAF

DATE OF BIRTH: 9/3/14

PLACE OF BIRTH: HOBART, OK

CAREER FIELD: COOK

ROSWELL DATA: OCT 47 - 509TH AIRDROME GROUP/ NOV 48-

DECEASED - DATE/PLACE:

LAST KNOWN ADDRESS:

NOTES:

ID: 9

NAME: HASTINGS, HAROLD T.

SSAN:

RANK: LTCOL

SERVICE #: 395157

BRANCH: USAF

DATE OF BIRTH: 3/29/18

PLACE OF BIRTH: KINGSTON,OK

CAREER FIELD: PILOT, INTEL OFFICER

ROSWELL DATA: NONE

DECEASED - DATE/PLACE:

LAST KNOWN ADDRESS:

NOTES: 8TH AF INTELL OFFICER- CARSWELL JUL 1947.

ID: 13

DEPARTMENT OF THE AIR FORCE
OFFICE OF INFORMATION
PUBLIC INFORMATION DIVISION

RET 31MAR61
28AUG93

LIEUTENANT GENERAL DONALD N. YATES, USAF

Part I - Narrative

Donald Norton Yates was born in Bangor, Maine, on November 25, 1909. He graduated from Bangor High School in 1927, and attended the United States Military Academy, graduating in 1931. He was commissioned a Second Lieutenant in the Cavalry.

Second Lieutenant Yates" first assignment was that of student officer at the Air Corps Flying School at Kelly Field, Texas. He received his pilot's wings the following year, and now is rated a Command Pilot.

In December 1932, he went to Luke Field, Hawaii, for duty with the 23rd Bomb Squadron. He was transferred from the Cavalry to the Army Air Corps on January 25, 1933.

In November 1935 First Lieutenant Yates was assigned to Brooks Field, Texas, serving in various assignments until June 1938. At that time he became a graduate student at the California Institute of Technology, and a year later received a Master of Science degree in meteorology. He then was assigned to the Third Weather Squadron at Barksdale Field, Louisiana, as weather officer.

Captain Yates became executive officer of the Sixth Air Base Group at Barksdale in March 1941, and served subsequently as group commander and post operations officer. He became Assistant Chief of the Weather Section in the Operations Division of the Office, Chief of Air Corps, in December 1941, and in March of the following year was appointed Deputy Director of Weather at Army Air Force Headquarters.

From May to December 1942 Lieutenant Colonel Yates was in the U.S.S.R. as a member of a military mission, coordinating weather matters. He received the Distinguished Service Medal for his part in this mission and the Air Medal for operations which included a flight from Washington, D. C. to Yakutsk, Siberia, over South America, Africa, the Middle East, and Russia.

In February 1944 Colonel Yates became Director of Weather Service for the U. S. Strategic Air Force in Europe, in addition, serving on General Eisenhower's staff. For his participation in the selection of June 6 as D-Day for the Normandy invasion, he was decorated by three governments. The citation accompanying the U.S. Army Legion of Merit stated that "through Colonel Yates' good judgment, skill and sound leadership, reconciliation of the differences in forecasting methods were effected, resulting in the development of a procedure capable of utilizing the talents and facilities of

both nations and all services in a unified manner. The value of Colonel Yates' advice has since been proven as the day selected for the continental assault was probably the only day during the month of June on which the operation could have been launched." For this he received the Degree of Chevalier in the National Order of the Legion of Honor of France.

Upon his return to the United States in January 1945, Colonel Yates was made Chief of the Weather Division which later was merged with the Weather Wing to form the Air Weather Service, which he commanded at Andrews Air Force Base, Maryland, until 1950. During this period he was promoted to the rank of Brigadier General on February 5, 1947, and transferred to the U. S. Air Force on September 26, 1947. On March 17, 1947, he flew the first scheduled weather reconnaissance mission over the North Pole.

In July 1950, Brigadier General Yates was appointed Assistant Deputy Chief of Staff for Development at Headquarters, U. S. Air Force, and the following April he became Director of Research and Development with the Headquarters. He was promoted to the rank of Major General on February 2, 1952.

Major General Yates was Commander of the Air Force Missile Test Center, Patrick Air Force Base, Florida from July 31, 1954 to May 4, 1960. During this tour he was awarded the Navy Legion of Merit on May 22, 1958 by Secretary of the Navy Thomas S. Gates, Jr. The citation praised his outstanding services in connection with the Navy Project VANGUARD and the Navy Ballistic Missile Program POLARIS. It stated that "he repeatedly authorized unusual courses of action in order to expedite the projects." In addition, on August 24, 1960, Secretary of the Army Wilber M. Brucker presented him with the Army Legion of Merit, which stated "his broad knowledge of the missile and space testing programs of each member Service was instrumental in shaping top level policy and crucial decisions which progressively advanced the successful development of the REDSTONE, JUPITER and PERSHING missiles, the EXPLORER satellites and other space vehicles."

In addition, General Yates has been awarded the Croix de Guerre with Palm "for exceptional war services rendered in the course of operations for the liberation of France", Honorary Officer in the Most Excellent Order of the British Empire, a decoration as Grande Oficial de Ordem Militar de Cristo of Portugal.

On May 4, 1960 General Yates was promoted to the rank of Lieutenant General and appointed Deputy Director of Defense Research & Engineering (Ranges and Space Ground Support), Office of the Secretary of Defense, Washington, D. C.

General Yates is the son of Archie O. and Gertrude A. Yates of Bangor, Maine. He married the former Gertrude I. Hansen of San Antonio, Texas. They have a daughter, Mrs. Richard P. Floyd, residing in Silver Spring, Maryland and a son, Donald N. Yates, Jr., living in Los Angeles, California.

General Yates is a member and former president of the American Meteorological Society, a member of the Institute of Aeronautical Sciences, and a Fellow of the American Rocket Society.

Part II - Fact Sheet:

A. Personal Data:

1. Born 25 November 1909, Bangor, Maine; Father - Archie O. Yates; Mother - Gertrude A. Yates.

2. Married 6 February 1932; Wife - Gertrude Hansen Yates; Children - Mrs. Richard P. Floyd and Donald N. Yates, Jr.

3. Home Town Address: 149 Norway Road, Bangor, Maine.

B. Education:

1. Graduate Bangor High School, Bangor, Maine, 1927.

2. Graduate U. S. Military Academy, 1931.

3. Flying School, Kelly Field, 1932.

4. Master of Science Degree in Meteorology, California Institute of Technology, 1939.

C. Service Dates:

1. September 1927 - June 1931 - Cadet, U. S. Military Academy

2. June 1931 - 1932 - Flying School, Kelly Field, Texas.

3. December 1932 - 1935 - Luke Field, Hawaii, 23rd Bomb Squadron

4. November 1935 - June 1938 - Brooks Field, Texas, various assignments

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6. December 1941 - March 1942 - Assistant Chief, Weather Section, Operations Division, Office, Chief of Air Corps

7. March 1942 - February 1944 - Deputy Director of Weather, AAF Headquarters

8. February 1944 - January 1945 - Director, Weather Service, U. S. Strategic Air Forces, Europe

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F. Unusual Experiences:

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January 9, 1961

Air Force Times/September 13, 1993

Lt. Gen. Donald Norton Yates (Ret.), 83, of Longwood, Fla., died Aug. 28 of heart complications. He suffered from emphysema.

Originally from Bangor, Maine, he graduated from the Military Academy, N.Y., then studied engineering and meteorology at the California Institute of Technology and received his master's degree in 1939.

He served as director of weather service for Strategic Air Forces in Europe in 1944. He advised Gen. Dwight Eisenhower in the Normandy invasion, in which weather proved to be a crucial issue. He then became weather officer for the U.S. atomic bomb project.

He was a meteorologist rated as a command pilot and was one of the first advocates of the development of long-range missiles.

He also helped launch one of the country's first earth satellites — the Navy Vanguard — when he was commander of the Brevard County test center, now called the Air Force Eastern Test Range, from 1954 until 1960.

Upon retirement from the Air Force in 1961, he worked for nearly 13 years at Raytheon Co. in Lowell, Mass. He retired as an executive vice president.

Yates was predeceased by his first wife, Gertrude Yates.

Survivors include his second wife, Doris Gibbs Yates of Longwood; one daughter, Marydean Floyd of Silver Spring, Md.; one son, Donald N. Yates Jr. of Cape Carancahua, Texas; two brothers, Maj. Gen. Elmer P. Yates of Tikworth, Maine, and Lester Yates of Florida; nine grandchildren; and 15 great grandchildren.

Burial will be at Arlington National Cemetery, Va.

DEPARTMENT OF THE AIR FORCE
OFFICE OF INFORMATION
PUBLIC INFORMATION DIVISION

RET 31MAR61
28AUG93

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Brigadier General	5 February 1947	24 November 1952
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Lieutenant General	4 May 1960	

F. Unusual Experiences:

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January 9, 196-

DIED 1 MAR 63
RET 31 JAN 57

DEPARTMENT OF THE AIR FORCE
OFFICE OF INFORMATION SERVICES
PUBLIC INFORMATION DIVISION

Neg. 6-24
D

LIEUTENANT GENERAL ROGER M. RAMEY, USAF

Roger Maxwell Ramey was born in Emblem, Texas, on September 9, 1903. He attended North Texas Teachers College and then entered the United States Military Academy in 1924, was graduated and commissioned a second lieutenant in the Regular Army on June 9, 1928.

That Fall General Ramey entered the Air Corps Primary Flying School at Brooks Field, Texas, and was graduated from the Air Corps Advanced Flying School at Kelly Field, Texas, in September 1929. He was then assigned to Selfridge Field, Michigan, with the 27th Pursuit Squadron, and in October 1930 was made operations officer of the squadron. Becoming operations officer of the 17th Pursuit Squadron at Selfridge Field, Michigan, in August 1932, General Ramey was made commanding officer of the 38th Pursuit Squadron and post photographic officer there a year later. In July 1934 he was transferred to Randolph Field, Texas, as a flying instructor at the Primary Flying School and three years later became assistant to the basic stage commander.

Going to Wheeler Field, Hawaii, in March 1939, General Ramey served as intelligence officer of the 18th Pursuit Group, was named commanding officer of the 19th Pursuit Squadron that July, and the following April became executive officer of the 18th Pursuit Group there. Transferring to Hickam Field, Hawaii, in October 1940, General Ramey assumed command of the 42nd Bomb Squadron and in January 1942 became plans and training officer of the Seventh Bomb Command. The following February he was named Acting Deputy Chief of Staff for Operations of the Seventh Air Force at Hickam Field.

General Ramey transferred to the Fifth Air Force in October 1942. The following January he was appointed commanding officer of the 43rd Bomb Group, going with it to the Southwest Pacific where he assumed command of the Fifth Bomb Command in June 1943. Assuming command of the 38th Flying Training Wing at Kirtland Field, New Mexico, that December, the following May he was transferred to Peterson Field, Colorado Springs, Colorado, where he assumed command of the 314th Bomb Wing. In June 1944 General Ramey was named Chief of Staff of the 21st Bomb Command, and that November moved with it to the Pacific.

Assuming Command of the 58th Bomb Wing in India in January 1945, General Ramey took it to the Marianas that April, was transferred with it to the Continental Air Forces at Bolling Field, Washington, D. C. in September 1945, and two months later moved with it to Fort Worth Army Air Base, Texas. During June and July 1946 General Ramey commanded Task Force 1.5, the Army Air Force portion of the combined Army-Navy operations at Bikini Atoll.

When the 8th Air Force was reactivated, the 58th Wing, under General Ramey was incorporated with remnants of the Eighth, and headquarters was established at Fort Worth Army Air Base on November 1, 1946. For a few weeks General Ramey was Chief of Staff of the Eighth, and in January 1947 assumed command of the Eighth.

In June 1950 General Ramey became Assistant to the Deputy Chief of Staff for Operations at Air Force headquarters, Washington, D. C. and the following month, when the Directorate of Plans and Operations split into two directorates under the Deputy Chief of Staff for Operations, General Ramey was appointed Director of Operations.

General Ramey assumed command of the Fifth Air Force, Far East Air Forces, Korea, in May 1954.

His decorations include the Distinguished Service Cross, Distinguished Service Medal with one Oak Leaf Cluster, Legion of Merit, and Distinguished Flying Cross. He is rated a command pilot.

PROMOTIONS

He was commissioned a second lieutenant (permanent) June 9, 1928; promoted to first lieutenant (permanent) September 1, 1934; to captain (permanent) June 9, 1938; to major (temporary) January 31, 1941; to lieutenant colonel (temporary) January 5, 1942; to colonel (temporary) March 1, 1942; to brigadier general (temporary) July 1, 1943; to major (permanent) June 9, 1945; to major general (temporary) October 29, 1947; to colonel (permanent) April 2, 1948; to brigadier general (permanent) June 11, 1948; to major general (permanent) July 21, 1952; to lieutenant general (temporary) June 1954.

END

Up-to-date as of December 1955

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON

5 March 1963

SUBJECT: Funeral Service

TO: ALL MILITARY PERSONNEL, HEADQUARTERS USAF

1. Memorial Service for Lt General Roger M. Ramey, 91A, USAF Retired, who died 4 March 1963 will be held on 6 March 1963 at 1000 hours at the White & Day Funeral Chapel, Redondo Beach, California. Remains will be sent to the Schmitz-Floyd-Hamlett Funeral Home, Denton, Texas. Funeral Service will be held at 1000 hours on Friday, 8 March 1963. Interment will follow in Roselawn Memorial Park, Denton, Texas.

2. Lt General Ramey is survived by his wife, Latane W. Ramey and one son of 108 Rocky Point Road, Lunada Bay, Palos Verdes Estates, California.

CARL J. STURPF
Colonel, USAF
Deputy Director of Administrative
Services

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON DC

2 October 1990

MEMORANDUM FOR ALL PERSONNEL, HEADQUARTERS UNITED STATES AIR FORCE

SUBJECT: DEATH OF GENERAL CURTIS E. LEMAY, USAF (RETIRED)

We are deeply saddened to inform you of the death of General Curtis E. LeMay, former Chief of Staff of the Air Force. General LeMay succumbed to cardiac arrest on 1 October 1990 at March AFB, CA. He retired on 31 January 1965. At the time of his death, General LeMay was a resident of Riverside, CA. General Curtis Emerson LeMay was born 15 November 1906 in Columbus, OH, and was graduated from high school in his hometown and the Ohio State University with a Bachelor of Civil Engineering degree.

General LeMay became an aviation cadet in 1928, completed pilot training at Kelly Field, TX, and received his commission and wings in October 1929. His first assignment was with the 27th Pursuit Squadron at Selfridge Field, MI. He served with other fighter operations for several years, with promotion to first lieutenant in March 1935. He was assigned to bomber operations in 1937, with the 2nd Bomb Group at Langley Field, VA. During 1937-38, he was the lead navigator on two mass flights of B-17 Flying Fortresses to South America, with the group receiving the Mackay Trophy in 1938 for this outstanding aerial achievement, the first such mass flight in history. Just prior to our entry into World War II, he also pioneered air routes over the South Atlantic to Africa and over the North Atlantic to England for the countless ferrying missions to come.

General LeMay was promoted to captain in January 1940, to major in March 1941, to lieutenant colonel in January 1942, and to colonel that June. By then he had organized and trained the 305th Bombardment Group at Pendleton, CA, taking it to England for combat where he personally led many missions. To improve bombing accuracy he initiated straight-in bomb runs and formation patterns, new techniques and procedures which were eventually used by all B-17 bomber units throughout the theater, and later by the B-29s against Japan.

In England he also commanded the 3rd Bomb Division, being promoted to brigadier general in October 1943, and leading it on the famed Regensburg raid, a B-17 shuttle mission that originated in England, struck deep in Germany, and terminated in Africa. In March 1944 General LeMay got his second star and in July was transferred to the Pacific to direct the B-29 heavy bombardment activities of the 20th Bomber Command in the China-Burma-India Theater. He moved to Guam to be the commanding general of the 20th's attacks on the Japanese mainland and later became Chief of Staff of the Strategic Air Forces in the Pacific.

Medal. His foreign decorations include the British Distinguished Flying Cross; the French Legion of Honor--Degree of Commander, and the Croix de Guerre with Palm; the Brazilian Order of the Southern Cross, and the Order of Aeronautical Merit; the Russian Order of Patriotic War--1st Degree; the Belgian Croix de Guerre with Palm; the Moroccan Oissam Alaouite; the Chilean Order of Merit--Grade of Grand Official and Grade of Grand Cross; the Swedish Commander of the Grand Cross of the Royal Order of the Sword; the Chilean Medalla Militar de Primera Clase; the Ecuadorian Order of Aeronautical Merit (Knight Commander) and the Uruguayan Aviador Militar Honoris Cuasa (Piloto Commandante).

General LeMay was a jet-qualified Command Pilot. He also holds the aeronautical ratings of Aircraft Observer, Combat Observer, and Technical Observer.

General LeMay is survived by his wife, Mrs. Helen LeMay of Riverside, CA., and one daughter, Mrs. James Lodge of Irvine, CA. In lieu of flowers, the family has requested donations to the General and Mrs. Curtis E. LeMay Foundation, 17050 Arnold Drive, Riverside, CA 92508. This Foundation provides assistance to residents of Air Force Village. Funeral services are scheduled for 1400, Thursday, 4 October 1990 at the Air Force Academy Chapel with interment immediately following at the Academy Cemetery.

L. E. TRAPP, ORL, Colonel, USAF
Assistant for General Officer Matters
Deputy Chief of Staff Personnel

RET 31 JAN 65
DIED 1 OCT 90

GENERAL CURTIS E. LeMAY
BIOGRAPHY

Curtis Emerson LeMay was born at Columbus, Ohio, on Nov. 15, 1906. He attended Columbus public schools and Ohio State University, graduating with a Bachelor of Civil Engineering degree. In 1928 he entered the Armed Services as a flying cadet. He completed pilot training at Kelly Field, Tex., and was commissioned a second lieutenant in the Air Corps Reserve in October 1929. He received a regular commission on Feb. 1, 1930.

The general's first tour of duty was with the 27th Pursuit Squadron at Selfridge Field, Mich. He served in various assignments in fighter operations before transferring to bomber aircraft in 1937. General LeMay participated in the first mass flight of B-17 Flying Fortresses to South America in 1938. This won for the 2nd Bomb Group the Mackay Trophy for outstanding aerial achievement. Prior to our entry into World War II, he pioneered air routes over the South Atlantic to Africa and over the North Atlantic to England.

General LeMay organized and trained the 305th Bombardment Group in 1942 and led that organization to combat in the European theater. He developed formation procedures and bombing techniques that were used by B-17 bomber units throughout the European Theater of Operations. These fundamental procedures and techniques were later adapted to the B-29 Super Fortresses which fought the war to its conclusion in the Pacific.

As commanding general of the 3rd Bombardment Division (England), he led the famed Regensberg raid, a B-17 shuttle mission that originated in England, struck deep in Germany, and terminated in Africa. In July 1944 he was transferred to the Pacific to direct the B-29 heavy bombardment activities of the 20th Bomber Command in the China-Burma-India theater. He later commanded the 21st Bomber Command with headquarters on Guam, and still later became chief of staff of the Strategic Air Forces in the Pacific. At the conclusion of World War II, he returned to the United States piloting a Super Fortress (B-29), on a non-stop, record flight from Hokkaido Island, Japan, to Chicago, Ill. He was then transferred to the Pentagon at Washington, D. C., to be the first Deputy Chief of Air Staff for Research and Development.

In October 1947 General LeMay was selected to command the U. S. Air Forces in Europe with headquarters at Wiesbaden, Germany. He organized air operations for the Berlin Airlift. A year later he returned to the United States, assumed command of the newly formed Strategic Air Command, and established its headquarters at Offutt Air Force Base, Nebr. This central location was to become the nerve center of a worldwide bomber-missile force.

Commanding SAC for nearly nine years, he built, from the remnants of World War II, an all-jet bomber force, manned and supported by professional airmen dedicated to the preservation of peace. Under his leadership and supervision, plans were laid for the development and integration of an intercontinental ballistic missile (ICBM) capability.

In July 1957 the general was appointed Vice Chief of Staff of the United States Air Force and served in that capacity until July 1961, at which time he was appointed Chief of Staff.

General LeMay holds Honorary Doctor of Laws degrees from John Carroll University, Kenyon College, the University of Southern California, Creighton University, and the University of Akron; Honorary Doctor of Science degrees from Tufts University, Ohio State University, and the University of Virginia; and an Honorary Doctor of Engineering degree from Case Institute of Technology. His fraternal organizations include Sigma Tau, Tau Beta Pi and Theta Tau.

General LeMay's distinguished service has won him many awards and decorations from his government, as well as from foreign governments.

General LeMay is rated a command pilot and is qualified to fly jet aircraft. During his career he held aircraft observer, combat observer and technical observer aeronautical ratings which were later replaced by the current navigator or aircraft observer rating.

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ASSIGNMENTS

Unit or Organization	Duties	From	To
1st Pursuit Group Selfridge Fld, Mich.	Plans & Opns Officer	October 1929	September 1934
18th Pursuit Group Wheeler Fld, Hawaii	Opns & Comm Officer	September 1934	December 1936
49th Bomb Squadron Langley Fld, Va.	Opns Officer	January 1937	January 1941
7th Bomb Squadron Langley Fld, Va.	Squadron Officer	January 1941	June 1941
Ferry Command, North Atlantic Washington, D. C.	Pilot, Opns Officer	June 1941	October 1941
34th Bomb Group Westover Fld, Mass.	Group Opns Officer	October 1941	April 1942
306th Bomb Group Wendover Fld, Utah	Group Exec Officer	April 1942	June 1942
305th Bomb Group Edwards Fld, Muroc, Calif., (then to England)	Commanding Officer	July 1942	May 1943
4th Bomb Wing England	Commanding Officer	July 1943	September 1943
3rd Bomb Division England	Commanding General	September 1943	June 1944
20th Bomber Command India	Commanding General	August 1944	January 1945
21st Bomber Command Harmon Fld, Guam, Marianas	Commanding General	January 1945	July 1945
20th Air Force Harmon Fld, Guam, Marianas	Commanding General	July 1945	August 1945
Strategic Air Forces, Pacific Harmon Fld, Guam, Marianas	Chief of Staff	August 1945	November 1945
Hq AAF Washington, D. C.	DC/AS Research and Development	Dec. 5, 1945	Oct. 9, 1947

Hq USAFE Germany	CinC	Oct. 10, 1947	Oct 15, 1948
Strategic Air Command Offutt AFB, Nebr.	CinC	Oct. 16, 1948	June 30, 1957
Hq U. S. Air Force	Vice Chief of Staff	July 1, 1957	June 30, 1961
Hq U. S. Air Force	Chief of Staff	July 1, 1961	Jan. 31, 1965

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CHRONOLOGY

1906 Born Nov. 15, Columbus, Ohio.

1928 Reserve officer, field artillery.
Flying Cadet, 28 Sept 1928.
Resigned in July to accept National Guard commission.

1929 Completed pilot training Oct. 11.

Commissioned second lieutenant, Air Corps Reserve, Oct. 12.

1930 Commissioned second lieutenant, Regular Army, Feb. 1.

1932 Bachelor of Civil Engineering degree from Ohio State University.

1934 Married Helen Maitland of Lakewood, Ohio.

1937 Transferred to the 49th Bomb Squadron at Langley Field, Va., after various assignments in fighter units since 1930.

1938 Participated in mass flight of B-17 Flying Fortresses to South America. This won for the 2nd Bomb Group the Mackay Trophy for outstanding aerial achievement.

1939 Completed the Air Corps Tactical School 14-month course in October.

1941 Pioneered air routes over the South Atlantic to Africa and Persia, and over the North Atlantic to England.

1942 General LeMay, then a colonel, trained the 305th Bombardment Group and took it to England. With this group of B-17s he originated the lead crew system to improve bombing accuracy.

1943 Commanding general of the 3rd Bombardment Division in England.

Led the famed Regensberg raid, a B-17 mission that struck deep in Germany and terminated in Africa.

1944 Transferred to the Pacific in July to direct the B-29 Super Fortress heavy bombardment activities of the 20th Bomber Command in the China-Burma-India theater.

1945 Assumed command of the 21st Bomber Command (later the 20th Air Force) based in the Marianas Islands.

Established a nonstop record flight from Hokkaido Island, Japan, to Chicago, Ill., piloting a Super Fortress.

Appointed Deputy Chief of Air Staff for Research and Development

47 Assumed command of the U. S. Air Forces in Europe with headquarters at Wiesbaden, Germany.

1948 — Organized the air operations for the Berlin Airlift.

From Oct. 16, 1948, to June 30, 1957, commander in chief of the Strategic Air Command.

1957 — Appointed Vice Chief of Staff, U. S. Air Force, July 1.

On Nov. 11-12-13, General LeMay set world records in a Boeing KC-135 as follows:

1. Distance in a straight line for jet aircraft without refueling, from Westover AFB, Mass., to Buenos Aires, Argentina, 6,322.85 miles in 13 hours, 2 minutes and 51 seconds. (Nov. 11 and 12)

2. Speed record of 471.451 miles per hour for 5,204 miles from Buenos Aires to Washington, D. C., in 11 hours, 3 minutes and 57.38 seconds. (Nov. 13)

1961 — Appointed Chief of Staff, U. S. Air Force, July 1.

1965 — Scheduled to retire Feb. 1.

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AWARDS AND DECORATIONS

United States

Distinguished Service Cross
Distinguished Service Medal with 2 oak leaf clusters
Silver Star
Distinguished Flying Cross with 2 oak leaf clusters
Air Medal with 3 oak leaf clusters
Distinguished Unit Citation with 1 oak leaf cluster
American Defense Service Medal
American Campaign Medal
European-African-Middle Eastern Campaign Medal with 3 service stars
Asiatic-Pacific Campaign Medal with 4 service starts
World War II Victory Medal
Army of Occupation Medal with the Berlin Airlift emblem
Medal for Humane Action
National Defense Service Medal

Argentina: Order of Aeronautical Merit -- Grades of Grand Official and Grand Cross

Belgium: Croix de Guerre with Palm

Brazil: Order of the Southern Cross and Order of Aeronautical Merit

Chile: Order of Merit and Medalla Militar de Primera Clase

Ecuador: Order of Aeronautical Merit (Knight Commander)

France: Legion of Honor -- Degree of Commander and Croix de Guerre with Palm

Great Britain: Distinguished Flying Cross

Japan: The First Class of the Order of the Rising Sun (Presented Dec. 7 1964)

Morocco: Oissam Alauite

Sweden: Commander of the Grand Cross of the Royal Order of the Sword

Uruguay: Aviador Militar Honoris Causa (Piloto Commandante)

U.S.S.R.: Order of Patriotic War -- 1st Degree

OBITUARIES

Flamboyant General Curtis LeMay, 83, Dies

By Richard Pearson
Washington Post Staff Writer

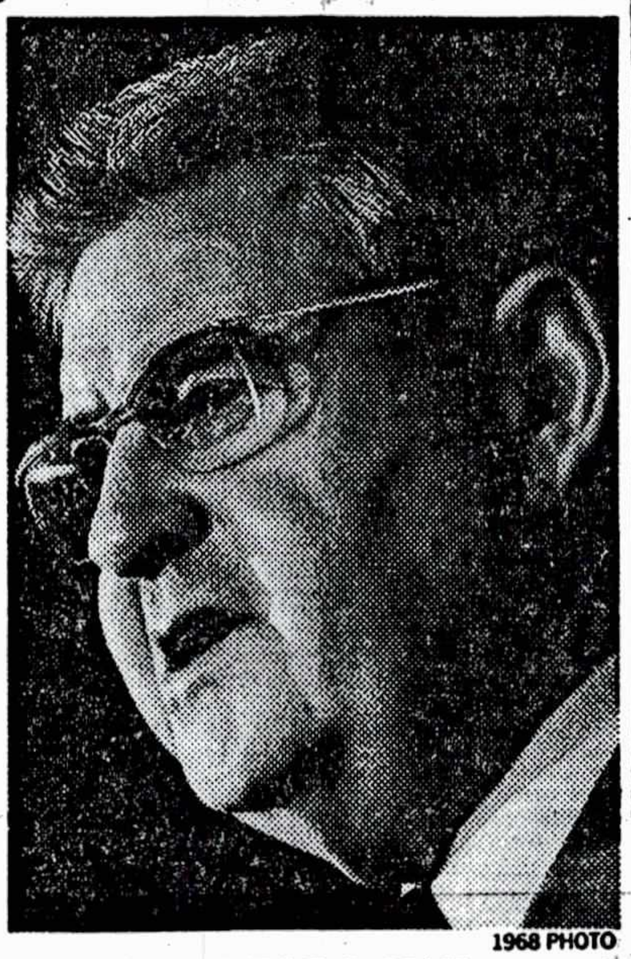
Retired Air Force Gen. Curtis E. LeMay, 83, a legendary leader of men and bombers during World War II whose career culminated as Air Force chief of staff and who also ran as a third-party candidate for vice president in 1968, died yesterday at the hospital on March Air Force Base, Calif., after a heart attack.

The retired four-star general carved a colorful, cantankerous and at times quixotic swath through recent military history. During World War II, he led what may have been the first U.S. bomber group to take on the Germans over Europe. He pioneered precision daylight bombing, often leading the group with a cigar clamped firmly in his jaw.

He later led heavy bombers in daring raids against Japan that set Tokyo ablaze. As a staff officer, he helped develop the plans to drop nuclear bombs on Nagasaki and Hiroshima, and passed the word from President Harry S. Truman that sent the planes aloft.

Gen. LeMay served as the first postwar chief of Air Force research and development, in a period when the service took enormous technological strides. He returned to Europe in 1947 as commander of all U.S. air forces in Europe, and from June 26 to Sept. 30, 1948, directed and led what became known as the Berlin Airlift, a breathtaking exhibition of logistical air power that stunned the world and left the Soviets utterly defeated in their attempt to starve West Berlin into submission.

In October 1948, he was named commanding general of Strategic Air Command and built that organization into a global striking force that was the most efficient and feared nuclear arm of the 1950s and 1960s. He commanded SAC until June 1957, longer than any other general. He then served as Air Force vice chief of staff, then as chief of staff for four years until retiring in 1965.



1968 PHOTO

CURTIS E. LeMAY

He ran as the running mate of Alabama Gov. George C. Wallace in the 1968 presidential election. Their American Independent Party ran best in the South and appealed to those most against the civil rights advances of the 1960s. But Gen. LeMay spoke mainly to those who disliked the seemingly unkempt and uncouth youth who so vocally opposed the war in Vietnam in particular and the country's military establishment in general. The personification of the "hawk" (he is said to have speculated on bombing Vietnam into the Stone Age), he was not a success on the campaign trail.

Upon learning of Gen. LeMay's death, Wallace said, "He was one of the real American heroes of World War II. I am proud to have served under him in World War II and proud to have had him on the ticket as a vice presidential candidate in my third-party campaign .... I will always count it a high honor to have been his personal friend."

Curtis Emerson LeMay was born in Columbus, Ohio. He said he remembered being happiest prowling nearby hills with a gun and bowie knife. The son of an ironworker, he worked in a foundry at night so he could attend Ohio State University.

In 1928, he dropped out of school when he received a reserve commission in the Army field artillery. Called to active duty in 1929, he transferred to the air corps in 1930. In 1932, he received his bachelor's degree in civil engineering from Ohio State.

During the 1930s, he served in Army fighter and bomber squadrons. He was promoted to major in 1941, to lieutenant colonel in January 1942 and colonel in March 1942. Named commanding officer of the 305th bombardment group, he trained it in California, then led it and its B-17 Flying Fortress bombers to Europe and combat.

One of his most famous acts of the war occurred when he ordered his men to stop taking evasive maneuvers while over the target. He both doubted whether such maneuvers did any good and was sure they threw off bombing accuracy. He personally led the first raid after the order, flying dead straight over Saint-Nazaire, with cigar firmly in place and pulverizing the air around him with antiaircraft fire. The flight became legend.

He also pioneered a battle formation of 18 Flying Fortresses that gave the ships greater defensive power against enemy fighters. And he led a famous "shuttle" mission against the Germans' largest Messerschmitt plant, in Regensburg, Germany, in which bombers took off from bases in England and landed in North Africa.

Gen. LeMay was promoted to brigadier general in September 1943, then major general in March 1944. He commanded the Eighth Air Force's 3rd bombardment division before being sent to the China-Burma-India theater in August 1943.

His first command as a general was the 20th bomber command and its new and giant B-29 Superfortress bombers. In January 1945, he began leading low-altitude nighttime assaults on the Japanese mainland.

Leading a force of 300 bombers, he set Tokyo and other Japanese cities ablaze. In July 1945, he became chief of staff of U.S. Strategic Air Forces.

In that post, he took a major part in the atomic bombings of Nagasaki and Hiroshima. He later wrote that he was against the strikes, largely because he believed that his fire-bombings would have brought Japan to its knees within days anyway.

He left the Pacific for peacetime service in Washington in typical style. His trans-Pacific flight set new records for distance and speed. He continued to fly as well as command. During the Berlin Airlift, when the Soviets blocked the United States land access to Berlin and Americans responded to the supply needs of the city with unending relays of heavy transports, Gen. LeMay was the more-than-occasional pilot. He claimed that he had to be in Berlin "for a conference," and said he might as well fly a much-needed transport as travel as a VIP passenger.

The macho image of "Old Iron Pants" continued to grow at SAC. He took an organization composed of the tired pilots of World War II, opened new headquarters in Omaha, and built his organization into a proud, elite force that kept waves of nuclear-armed heavy bombers aloft 24 hours a day. He perfected aerial refueling and boasted a force that with nearly 20 bases worldwide was ready to strike anywhere at any time.

One of many famous stories about Gen. LeMay was that he once found a SAC sentry who had put down his weapon to eat a sandwich. "This afternoon I found a man guarding a hangar with a ham sandwich. There will be no more of that," he raged in a memo.

Yet, he also became known for his interest in the physical well-being and comfort of his men, as demanding of the brass as he was of his pilots and men, and was known as a general who ordered his men to do nothing he would not do himself.

At times, he seemed to identify more with the men than with his fellow generals. During World War II, another story goes, he finally amended the series of seemingly endless memos that came down from Allied Command trying to forbid fights between American and British servicemen. Gen. LeMay shouted that he endorsed the order, but if his men did fight, they were ordered to win.

As Air Force chief of staff, he tangled with Defense Secretary Robert S. McNamara over his plans to cut back on manned bombers for ballistic missiles. McNamara had denied Gen. LeMay the B-70, which the general wanted as the successor to the B-52, and forced him to accept the F-111 fighter-bomber. Gen. LeMay also disagreed with McNamara's restraints on U.S. air power in Vietnam, a sore point for a former combat pilot who believed in and had fought in all-out war.

After retiring, he thundered that McNamara's plans "may be signaling the end of the country."

In recent years, Gen. LeMay had lived in Air Force Village, a retirement home for Air Force officers near March Air Force Base. He had been board chairman of a Los Angeles electronics firm before being fired for supporting George Wallace in 1968.

His military decorations included the Distinguished Service Cross, two Distinguished Service Medals, the Silver Star and numerous Air Medals.

Survivors include his wife, the former Helen Estelle Maitland, whom he married in 1934, and a daughter.

9 JAN
DIED 1959

RET 28 FEB 54

CLEMENTS McMULLEN

Clements McMullen was born at Largo, Florida, on February 5, 1892. He attended Washington and Lee University in Virginia and engaged in Civil Engineering in Florida for five years. He became a flying cadet on September 18, 1917, and was commissioned a second lieutenant in the Aviation Section, Signal reserve on March 6,1918.

PROMOTIONS

He was commissioned a second lieutenant in the Air Service of the Regular Army on July 1, 1929, and promoted to first lieutenant on the same day; to captain on September 1, 1931; to major (temporary) on April 20, 1935; to major (permanent) on August 15, 1939; to lieutenant colonel (temporary) on December 30, 1940; to lieutenant colonel (permanent) on December 18, 1941; to colonel (temporary) on February 1, 1942; to brigadier general (temporary) on August 6, 1942; to major general (temporary) on April 29, 1943.

SERVICE

Upon becoming a flying cadet, he entered the School of Military Aeronautics at the Georgia School of Technology at Atlanta, Georgia. Upon receiving his commission in March 1918, he went to Kelly Field, Texas, to enter the School for Instructors. The following month he transferred to Gerstner Field, Louisiana, as a student in the pursuit course and instructor in combat flying.

In July 1918 he became Officer in Charge of Flying at the Gunnery School at Rockwell Field, California. He joined the 90th Aero Squadron at Eagle Pass, Texas, in July 1919 for border patrol duty with that squadron. He became a Flight Commander with the 1st Surveillance Group there in January 1920.

He became Assistant Engineer Officer at the Montgomery Air Intermediate Depot in Alabama in January 1921. He went to Carlstrom Field, Florida in December 1921 as the Officer in Charge of the Machine Shop and Motor Tests. In July 1922 he became Commanding Officer of the 62nd Service Squadron at Brooks Field, Texas.

In September 1924 he was made Engineer Officer of the San Antonio Air Intermediate Depot in Texas. He went to Camp Nichols Philippine Islands in July 1926 for duty with the 2nd Observation Squadron. The following October he joined the 3rd Pursuit Squadron at Clark Field, Philippine Islands.

He returned to the United States in July 1928 to enter the Air Corps Engineering School at Wright Field, Ohio. Following Graduation in June 1929, he remained at Wright Field as Chief of the Repair Branch of the Experimental Engineering Section. He became Chief of the Power Plant Branch in April 1932.

He entered the Air Corps Tactical School at Maxwell Field, Alabama, in September 1933. He was graduated in June 1934 and remained there as Post Engineering Officer. In March 1935, he became Assistant to the Operations and Training Officer, G-3, at the Headquarters of the General Headquarters Air Force, Langley Field, Virginia. In July 1936 he became G-3 of the General Headquarters Air Force.

In August 1937, he entered the Command and General Staff School, Fort Leavenworth, Kansas. He was graduated in June 1938 and then became Chief Engineering Officer of the San Antonio Air Depot. He became Commanding Officer of the 3rd Air Service Area Command in January 1942 at Atlanta, Georgia. In August 1942, he was assigned to Headquarters, Air Service Command, Washington, D. C., as Chief of the Maintenance Division. In December 1942, he was assigned to serve in that same capacity at Patterson Field, Ohio.

From December 1942 until 30 September 44 he was assigned to Patterson Field as Chief of the Maintenance Division. And from September 44 until December 45 he was Commanding General of the Far Eastern Air Service Command. From that date until 23 October 46 he was Chief of Staff of the Pacific Air Command United States Army. Later he was made Commanding General of the Eighth Air Force at Fort Worth, Texas which was reactivated in November. Since January 1947, he has been Deputy Commanding General of Strategic Air Command. TO OCT 1948; ALSO CHIEF OF STAFF 3 MAR 47 - OCT 48

General McMullen holds the following decorations: Air Medal; Distinguished Service Medal with oak leaf cluster; Commendation Philippine Liberation with bronze star; Pacific Theatre Ribbon with 3 battle stars; American Defense Ribbon & Medal; European Theatre Ribbon; Japanese Occupation Ribbon; World War I Victory Ribbon and World War II Victory Ribbon.

He is rated as a Command Pilot, Combat Observer and Technical Observer.

UP TO DATE AS OF: 22 July 1947

Retired 28 Feb 59

DEPARTMENT OF THE AIR FORCE
OFFICE OF INFORMATION SERVICES
PUBLIC INFORMATION DIVISION

GENERAL EDWIN W. RAWLINGS, USAF, 9 5 A

Edwin William Rawlings was born at Milroy, Minnesota on September 11, 1904 and was graduated from Hamline University at St. Paul, Minnesota with a Bachelor of Arts degree in 1927.

General Rawlings was appointed a Flying Cadet on February 19, 1929; commissioned a second lieutenant in the Air Corps of the Officer's Reserve on February 15, 1930, and on May 8, 1930 was appointed a second lieutenant in the Air Corps of the Regular Army.

First assigned to Luke Field, Hawaii as Assistant Photographic Officer, the General later served successively as Commanding Officer of the 11th Photographic Section and Squadron Mess Officer of the Fourth Observation Squadron. In December 1931, while serving with the 18th Composite Wing, he was placed in charge of construction of the Fort Shafter Flying Field at Hawaii.

In May 1932 General Rawlings went to Brooks Field, Texas, and during three years at that station served as Adjutant and Assistant Operations Officer, Post Executive Officer, Assistant Post and Group Adjutant, and Engineering and Armament Officer for the 12th Observation Group.

Going to Wright Field, Ohio in September 1935, General Rawlings became Assistant Chief of the Administration Branch in the Field Service Section, Materiel Division. In August 1937 he enrolled in the Harvard Graduate School of Business Administration, completing his studies there in June 1939. Spending the following four years at Wright Field, the General served as Assistant Budget Officer of the Statistical Branch, Air Corps Materiel Division; Assistant Budget Officer of the Materiel Center, and Chief of the Production Resources Section, Production Division.

Still at Wright Field in October 1943 General Rawlings was named Administrator of the Aircraft Scheduling Unit in the Office of the Assistant Chief of Air Staff for Materiel, Maintenance, and Distribution for the Air Force. A year later he was given additional duty as Chief of the Readjustment Division of the Air Technical Service Command (ATSC) there, and on August 30, 1945 was appointed Chief of the Procurement Division at ATSC. The following January he was appointed Special Assistant to the Commanding General of the Air Materiel Command there. In June 1947 General Rawlings received the degree of Doctor of Business Administration from Hamline University.

MORE

Joining Air Force Headquarters in Washington, D. C. on November 1, 1946, General Rawlings became Air Comptroller. He was redesignated Comptroller of the U. S. Air Force in September 1947 and two years later his title was changed to Deputy Chief of Staff, Comptroller.

On July 28, 1951 General Rawlings assumed command of the Air Materiel Command at Wright-Patterson Air Force Base, Dayton, Ohio.

His decorations include the Distinguished Service Medal, Distinguished Flying Cross, Soldier's Medal, and the Most Excellent Order of the British Empire (Honorary Commander). He is rated a command pilot, combat and aircraft observer.

General Rawlings and his wife Muriel have four children: Peter Edward, born September 15, 1931; Charles Frederick, born December 30, 1936; Richard William, born May 30, 1939; and John Frazier, born October 17, 1940.

PROMOTIONS

He was promoted to captain (temporary) April 20, 1935; to first lieutenant (permanent) May 8, 1940; to major (temporary) March 21, 1941; to lieutenant colonel (temporary) January 5, 1942; to colonel (temporary) January 24, 1944; to brigadier general (temporary) January 23, 1945; to brigadier general (permanent) April 1, 1945; to major general (temporary) February 3, 1947; to lieutenant general (temporary) October 1, 1947; to major general (permanent) August 11, 1950; to general (temporary) February 19, 1954.

END

Up to date as of July 1956