

The Association for Diplomatic Studies and Training
Foreign Affairs Oral History Project

WILLIAM H. “Bill” LITTLEWOOD

Interviewed by: Charles Stuart Kennedy
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INTERVIEW

Q: Today is November 26, 2001. This is an interview with William (“Bill”) H. Littlewood. This is being done on behalf of the Association for diplomatic Studies and Training and I’m Charles Stuart Kennedy. Well, Bill, let’s start at the beginning. When and where were you born?

LITTLEWOOD: I was born in Detroit, Michigan on April 16, 1924. My father was born in Manchester, England, and became a British immigrant to Canada. He came over with no particular skills or education, and became a farm boy in Ontario. He then got caught up in World War I and went with the Royal Canadian Regiment back to England, then into battle. He was wounded twice, and was eventually discharged as a first lieutenant. As an officer he thought he had the world by the horns, but found that he couldn’t get a job because there were a lot of others who came out of World War I with more background than he had. So he then crossed the river from Windsor, Ontario to Detroit, Michigan where auto companies were paying five dollars a day; unheard of in those days! He got a job in the office of an auto company. He stayed in Detroit as an immigrant, and met my mother, who was working at the YMCA as a receptionist or secretary. They married and moved to a suburb, Wyandotte, where I grew up.

Q: When did your father immigrate to Canada?

LITTLEWOOD: My father was born in 1893 and probably came over as a teenager. So that would make it around 1911. He was caught up in the war, so he probably was a late teenager when World War I started in 1914.

Q: You were very fortunate. So many Canadians were killed in the Battle of Asam, really wiped out.

LITTLEWOOD: I know he was in the Battle of Ypres, Belgium, and wounded in his arm and wounded in his leg by shrapnel. He was in the hospital twice over there. He just loved America because as a poor kid never would have had, in that period in England, a chance to get an education and rise in life. In the U.S. he eventually became a banker, then a lawyer, a Justice of the Peace, and then a Congressman in the Michigan state legislature.

Q: Oh, yes. What was your mother's background?

LITTLEWOOD: My mother was also of English ancestry. Her family maiden name was Grimwood, so she only changed part of her name to become a Littlewood! She grew up in Pennsylvania, in a Baptist minister's family, with parish assignments in Nebraska, Florida, and eventually in Detroit.

Q: How big was Wyandotte?

LITTLEWOOD: About thirty thousand population at that time. I went back to Wyandotte in 1991 for my fifty-year high school graduating class reunion, and found Whyandotte was still about that size. The town was much better than I thought it would look, as it modernized and kept up with the times. Wyandotte was an industrial chemical town with factories making smelly solvents and other chemicals. "Penn Salt" and "Wyandotte Chemical" companies were right on the Detroit River, ten miles down river from Detroit. The people generally had little interest in the world outside of Wyandotte. However, I started to collect stamps at about seven or eight. And that opened the world to me, and led me into a wonderful life of worldwide adventure and travel.

Q: How did that open the world to you?

LITTLEWOOD: Well, I started to learn all those names of other countries. I then would find out where they were on the map. And then I'd see that many, like Liberia, had lots of animals on their stamps. I wanted to go see those animals, as my mother taught me nature study. I was very much interested in animals. In fact, my degrees are in zoology.

Q: Let's talk first about grammar school. What courses interested you there?

LITTLEWOOD: I remember that I had geography in the third grade. And now they don't seem to teach geography very much, I'm sorry to say. But thanks to Miss Weatherwax, we learned about the Tigris and Euphrates River in third grade! That area was the cradle of civilization, and so the geography class started at that point. I don't remember a lot of

other details, but I do remember the Tigris and Euphrates, and the teacher's name. I also liked biology, particularly zoology.

Q: Do you have brothers and sisters?

LITTLEWOOD: I have one sister. Years younger than me, so we never were close.

Q: I was just wondering, at home your father had a variety of progressively important positions. Didn't he?

LITTLEWOOD: Yes. He got a job in a bank as a teller in this little Detroit suburb, Wyandotte. He did well and became a branch manager of a local bank. He then became the manager of a new bank in town, a branch of a big Detroit bank. He'd just gotten started there, but he was able to get to know nearly everybody in town by working in these banks. He wanted to improve his life and status, so we moved to Grosse Ile which is a posh area – something like Potomac in the Washington, DC area. He rented a house on the U.S. side of the Detroit River. I was in the fourth grade when the nationwide bank closings came. And that was a real blow, and the start of the “Big Depression.” So we moved back to Wyandotte because he lost his job, as the bank closed! He finally got a job after four months in another Wyandotte bank, a private bank which hadn't closed. But the job was as a teller. So he went from manager of the biggest bank in town to teller in a private one. He soon was raised to the level of head of their small loan department. He was about forty at this point and he decided he better have something better in his hip pocket than banking. I'm not even sure now that he had a high school education at that point, perhaps a GED. But he went to night school in Detroit then and earned a law degree at night school, while in his forties. I hardly saw him because he'd go right to the law school in Detroit by bus, and wouldn't be home until ten o'clock at night from his classes and then he'd study until one o'clock A.M.. I'd see him at breakfast and that's all. On Saturdays he locked himself in a room all day to study, but on Sundays he did make some family time. He finally got his law degree and passed the Bar exam. He just wanted that legal degree in reserve, and continued at his bank job. But he got offers from lawyers in town who wanted him to come join their practice. So, he left the bank and went to a friend's legal office on a one-third, two-thirds partnership deal. He left after a few years and opened his own office with his own partner (a “50-50” deal) for some years. He was then approaching sixty, so he retired. Ready or not, it was the custom then to retire at sixty. My mother moved down to Florida for a while to stay with relatives in Jacksonville. I went to “John Gorrie” Junior High School. We all know Edison for electric lights, and Bell for telephones, but few know John Gorrie, who invented modern refrigeration. I went to the University of Florida after I finished high school, back in Wyandotte.

Q: Well, in high school what were your interests?

LITTLEWOOD: I took biology of course, and all the other things in the pre-college science curriculum. There was a high school stamp club, and I became president of it. I

was the second youngest in a class of about one-hundred and fifty. I don't remember any particular course, but English, Chemistry, Physics, etc. were all there. As the required language, I chose a year of Latin, useful in interpreting biological names.

Q: So you would have graduated from high school in what year?

LITTLEWOOD: It was '41.

Q: That was an interesting year to graduate from high school.

LITTLEWOOD: Yes, particularly December 7!

Q: What happened to you? Were you caught in the draft?

LITTLEWOOD: That was June 1941 when I graduated, so I went that autumn to the University of Florida which had a good biology program. So Pearl Harbor happened late in that first semester. I was in ROTC then. At Christmastime, instead of going back home to Michigan, for the couple of weeks off we had, I had another plan. The head of the biology department, Professor Archie Carr, a very famous herpetologist, especially for turtles and frogs, was planning a collecting expedition in a Mexican jungle over the Christmas and New Year's holiday period. We would leave a little earlier, about December 18th and be back a little late, January 8th or so. The expedition was in cooperation with the Museum of Comparative Zoology at Harvard and the University of Michigan, which has a zoological museum and an excellent Department of Zoology. So I would love to go on that, but no, there were just graduate students going. I talked my way into it, and actually went on that expedition. My first expedition, at age eighteen, to the jungles of Tamaulipas State, Mexico.

Q: What were you looking for?

LITTLEWOOD: We were collecting, looking for new zoological species or new range perimeters for known species. We just collected samples of everything zoological that we encountered or could find. For example we had an entomologist, for insects, and others for herpetology (reptiles and amphibians), ichthyology (fishes), birds, small mammals, etc. The specimens went to the zoological departments and museums represented on the expedition.

Q: Now where was this in Mexico?

LITTLEWOOD: Tamaulipas State, northeast Mexico. We drove there in trucks and station wagons. By the way we weren't even sure that we could do this expedition because Pearl Harbor happened just a couple of weeks before we planned to leave the University of Florida. But all the permissions had been set up, and things didn't change immediately. So we did go, from Florida to Brownsville, Texas, and then crossed into

Tamaulipas in Mexico. It's a very tropical area. We had great adventures there and excellent collecting.

Q: Well, that sounds great. So what happened? Did you stay with ROTC?

LITTLEWOOD: Well, I finished the academic year, including ROTC, at the University of Florida. But I knew I'd be drafted, as I was eighteen in April 1942. So I decided to enlist, as you could pick your branch of service if you enlisted. And my father, being an old veteran from World War One, was all for this, but my mother was against it, as mothers are. She delayed me, for example, "Well, why don't you see the United States first?" Greyhound Bus had a great deal on travel from Detroit all the way to San Diego and up to San Francisco and everything for \$19 round-trip. And so I did that trip, with a friend. That used up part of the summer. Then I wanted to build myself up physically because I was planning to enlist in the paratroops, and I was a rather slight fellow. I got a job in a local steel mill for a while. And then my mother said to go down and visit relatives in Florida. So I did that in November and enlisted (in Florida) and went into Camp Blanding for the physicals, etc. And then north by train to Camp Toccoa, Georgia for paratroop training. There I got my first disappointment in life. A real big one. They took us all out from the train and put us up in a high "jump tower." We slid down the wire there and that was fine. That was great! But if anybody hesitated, they were out. They had too many paratroop volunteers applying, I believe. And then we had another physical exam. (We'd just had a physical five days before.) The doctor said I had a heart murmur, and I couldn't be in the paratroops and so they transferred me. That was a big disappointment. And no doctor has ever found that "heart murmur" since. My heart is perfect.

Q: Maybe he had a slew of heart murmurs.

LITTLEWOOD: I think the paratroops had too many applicants and wanted big physiques. I was not the big football type and even though I was in good shape at that point, as during the last part of my previous work, I asked to be in the general labor gang at that mill, moving scrap iron and things like that. Anyway, the paratroops moved me to Columbia, South Carolina to an infantry division that had already been together for a month of their three months basic training. I did the basic training, was immediately made Corporal because I had been on the ROTC crack drill squad, was a very good shot with a rifle and I had the year in ROTC. I was soon put in a sergeant's position. I'd get the sergeant stripes at the end of basic training. Just before the end of basic training, I planned to go to Officer's Candidate School, and get a commission there. I had a good IQ rating, 133 or something like that. I had all the qualifications for Officer's Candidate School. However, a few of us in the regiment were called into a "school room" and given a test, about a two day test! Nobody seemed to know what it was all about. It was multiple choice. But it was a long one (sort of like the graduate record exam which I had later in life). About the last day of "Basic Training," I was called to the headquarters, and I was told that I was being "reduced to private without prejudice" and that I was going to go back to university, where I'd get a university education and a commission. In other words the same thing as West Point or Annapolis. They were using about two-hundred

universities in the United States in a program called “ASTP” the “Army Specialized Training Programs.” The Navy had a similar program called “V-12.”

Q: ASTP?

LITTLEWOOD: ASTP. You know about it? And so I was reduced to private, and sent to Princeton University, but as a private again.

Q: Oh, boy!

LITTLEWOOD: And so we had regular Princeton professors. They compressed the semester to a term. We had very intensive study and training. Everybody was a Private! I got through the three terms of “Basic Engineering.” They had big dropouts and failures, and some dropped out because of being a private. For example, a staff sergeant from the Signal Corps was now a private. He decided to go back as Staff or Master Sergeant of the Signal Corps. If he flunked a term he would go back with his stripes returned! I got through the three terms of basic engineering, even though it had a lot of mathematics, not my main strength I got through that and at the graduation ceremony we knew something was happening. It was around Christmas in ’43 and we knew about a few weeks ahead ATSP was being disbanded, the whole program! They sent all of us Basic Engineering Privates to Army Divisions that were going overseas, and you could not transfer to OCS. I tried putting in “U.S. Air Corps Officers Training Application” papers; they threw them in the wastebasket. The problems is when you go to a unit like this, you couldn’t transfer out. By the way, they cut our class into three parts according to your last name. So I missed going back to my old “basic training” division by just a couple of letters.

Q: What was your old division?

LITTLEWOOD: The “Hundredth Infantry Division.” Instead, I was sent to the “98th Infantry Division,” down in Alabama. It was in the last stages of training before they were to go overseas. They had their “Table of Organization” filled, so there were no “Sergeant” slots available. And their attitude regarding these new “Privates” coming in was that they’ve been at school while the 98th Division had been together nine months training. We were replacement for future battle losses. So meanwhile, in no way can you get any promotion. Since the 98th never went into battle, it never needed “replacements.” I actually ended up as a Private First Class. [laughter]

Q: What division did you end up in?

LITTLEWOOD: The 98th Division! We “ASTP” privates were stuck there.

Q: 98th!

LITTLEWOOD: And this Infantry Division was assigned to go to guard the Hawaiian Islands against a second Japanese attempt to invade the Hawaiian Islands. As they never came, we didn’t have any casualties. I was in the Cannon Company then, by the way.

Q: Cannon?

LITTLEWOOD: "Cannon Company," something new at the time.

Q: Is that equivalent to what we used to call the "Coast Guard Artillery."

LITTLEWOOD: No, they haven't any big guns or a "tank company." This one is with mobile 105 mm howitzers. There are two versions. One is pulled by a truck, the other mounted on a General Sherman Tank chassis, completely open on the top.

Q: They're called "Priests."

LITTLEWOOD: You're right! In Hawaii we had those. But in the last of training in Alabama we had trucks that pulled 105 mm howitzers, not "tank-mounted."

Q: You must have been cranked up for the invasion of Japan weren't you?

LITTLEWOOD: We were cranked up against a possible Japanese landing on Hawaii, and we were cranked up for the invasion of Japan. In the meantime, I was so bored with cleaning latrines and doing "KP" and everything else. I was on the bottom rung there and out of boredom I wrote hometown newspaper stories to Wyandotte, the *Wyandotte News Herald*. They actually paid me ten dollars per story. It's kind of hard to make exciting stories in Hawaii though. But nevertheless I had a string of stories from there. I just did this in my own time. However, they had to be cleared through the Division Public Relations Officer who was supposed to censor them. I don't think there was much to censor from Hawaii. I think he maybe took out one word somewhere and I don't know what it was. But he however was aware of me. And he's in Division Headquarters, not Regimental Headquarters. Then, when the Division was cranking up for an attack on Japan, he called me in and said, "I want to have a public relations man in each Regiment. And I'd like you to be it for your 390th Regiment. However, it's not a slot in our organization structure, so I can't give you any stripes." And I said, "Never mind, it's better than cleaning the latrines." He said, "You'll work in the 'I & R' platoon, that's the "S-2" intelligence regimental unit, Headquarters Company. And you'll work under Major Andraska, a very nice guy." And he certainly was a very nice guy. So I completed the rest of my military career there. We did go to Japan, and eventually I had enough "points" to be discharged. I stayed as a PFC (one stripe - of course all Privates got that). I was an official enlisted "U.S. War Correspondent" for my last year. It was wonderful in Hawaii, because I could go to USO shows, get in and meet all the starlets. I interviewed them. Of course I didn't do anything with the interviews, but they didn't know that. They would sign pictures. I don't know if I still have any of those somewhere in the attic.

Q: Were you able to follow through in your interest in zoology at all while you were in Hawaii?

LITTLEWOOD: No, not really. We were always in training or something like that. We moved around to different places with our tanks (that is, before I moved to the Headquarters Company). We'd go out on maneuvers and fire our guns and such. And for most of us, it was simple guard duty along the beach coast. Our company was in the reefs area along the northwest coast of Oahu, the principal Hawaiian island.

Q: Did you have a feel for what you wanted to do when you got out?

LITTLEWOOD: I'd go back to zoology. And I did that. At least I picked up another year of college credits by being in "ASTP" in Princeton, so I came back as a junior rather than a sophomore.

Q: Which university?

LITTLEWOOD: Back to Florida.

Q: University of Florida?

LITTLEWOOD: Yes. I did my junior year in Florida, then I took a full load at the summer school of the University of Miami, completing the first half of the senior year there, then back the third time to the University of Florida to finish and get my Bachelor's degree. Then I went to Michigan, University of Michigan for my Master's. And again I took the summer session, but at Mexico City College in Mexico, and then back to Michigan.

Q: Why Michigan?

LITTLEWOOD: It's one of the country's leading universities. First of all, it was my "home university" and they have one of the leading zoological schools in the U.S. The U. of M. president of that time was actually a herpetologist. Herpetology was my main interest then.

Q: Well, when you say zoology, what at that time did this encompass? What were we talking about?

LITTLEWOOD: Zoology covers all the animal world, insects and everything. It's counterpart, "botany," is the plant world. But my interest was particularly in reptiles. I think I was influenced by Archie Carr and the influence of a lecture in Detroit that I heard when I lived in Wyandotte. My mother and father took me to a lecture series called "The World Adventure Series" in suburban Detroit. There they had members of the Explorer's Club. Raymond L. Ditmars, a famous herpetologist, was one.

Q: Well, he was the snake man.

LITTLEWOOD: “Herpetology” is the study of snakes, and other reptiles and amphibians, such as frogs, lizards, turtles, and toads.

Q: I remember hearing his name.

LITTLEWOOD: We all did then, because he was a very good publicist, and explained it to the public in an interesting way. Another lecturer was Roy Chapman Andrews, who had gone to the Gobi Desert and found the first dinosaur eggs, which proved that the dinosaurs laid eggs and were therefore “oviparous,” not “viviparous,” that is “live young.”

Q: Let’s discuss an age where these types of people had sort of a “start quality” about them. The adventurer! Did you get involved with sort of adventure books, like the Richard Haliburton books?

LITTLEWOOD: I read many of his books. Of course he was more of a showman than scientist.

Q: He was a showman?

LITTLEWOOD: “Showman,” like when he swam the Taj Mahal pool. And the Panama Canal. These are stunts. So it’s not really exploration or science.

Q: But it was an interesting period because all these things were coming out much more so than today. I think because not only there is so much happening, but by these adventurers getting out and seeing other parts of the world. The study of things beyond the United States and all. Like Ditmars. Today you’d ask me the name of any snake person and I never studied snakes, but I knew Ditmars.

LITTLEWOOD: Well, not many know that and how many people know “STP?”

Q: I take it you were doing your studies under the GI Bill at this point.

LITTLEWOOD: That’s right. I was thinking about a Ph.D. next that’s a pretty tough deal. I didn’t know just what I wanted to do. When I finished my Master’s (again a January graduate), my professor said that he had a friend of his who was Dean of Biology in a small college in Plattsburgh, New York. It was called Champlain College, part of an arrangement by the State of New York to start up some colleges in northern New York because they had all these New York GI Bill veterans coming, and New York State didn’t have the physical plant for them all. So they often were forced to go to other states to use their GI Bill. Therefore New York started up some new colleges. They were to be hard-basic courses, no frills. You had to study; to prove yourself. Let’s say you were poor in high school but you grew up in World War II and then planned to go for collegiate studies; you may have fooled around in high school but were really smarter than you appeared by your high school grades. So the concept worked very well. My U. of M.

professor said his friend needed somebody right away and he'd recommend me. So I took off in January and drove through a snow storm across Ontario to my first job, and signed up with that college there. I stayed there for a year. And I never got back for my Ph.D.

Q: Did you have a significant other at that point? Or were you married?

LITTLEWOOD: No, not at all. Just, probably couldn't afford it in those days. So I was still looking for jobs that took me traveling and took me into an adventurous type of work. In the zoology period I wanted to do a go-up-the-Amazon type of thing. Do the expedition! I loved that Mexican expedition I did go on earlier, but suddenly I learned from a classmate at Michigan that the Navy Hydrographic Office, (later called the Naval Oceanographic Office), was hiring anybody with a science degree as an "oceanographer." The reason for this was that sonar had been developed at the end of the war and "sonar" produced "pings" which were sent out, looking for a submarine traveling through the water. The "ping" bounces back from the submarine's hull, as you know. You can tell the distance by the "echo" time, as you know how fast sound travels in water and this "ping" comes back. You then can determine how far the reflecting surface is. You know what angle you used, when you picked up the echo. You can work all that out to locate the target. What depth it is and where it is and where to drop a depth charge. However, if there is a change in water density in that ping traveling through the water it will bend the "sound beam" and give you false information. A good analogy is a pencil in a fish bowl. It appears bent, but it isn't. Or if you've ever gone fishing with a spear in a small stream, and it's nice clear water, and there's that fish, and he's standing right there, and you're going to get him right behind that head there, and you plunge your spear down there and he swims off! It's because he's not really there, he's over there. He's further away. So the Navy found they didn't have any knowledge really of these "thermoclines," and changes in density. Density is really a function of changes in temperatures, change in temperature will make a change in density, as hot water rises. And also the changes in salt. The Great Salt Lake is very heavy with salt and you float very high because of that. So that density change, if it is three-hundred feet down, and your submarine is three-hundred fifty feet down, it's safer than it would be if it's two-hundred fifty feet down. So the Navy needed that information both for our own submarines and also if we're searching for enemy submarines. So it didn't matter where our ships traveled. We just didn't have enough data points to make predictions. And also we measured the sea bottom depth, as the echo sounder had just been invented. "Woods Hole," the oceanographic institute in Massachusetts, was constantly improving them. They supplied our echo sounders, these early ones. As our ship moved, we would get a graph of the bottom. Generally ships didn't care what the bottom was *as long as it wasn't close to their hull*. So they didn't care whether it was 3,000 or 2,000 fathoms or one-hundred. Now we had the chance to map the ocean bottom as we go around measuring water characteristics.

Q: So you joined the oceanographic service? What year was that?

LITTLEWOOD: That would be 1950. I left Champlain College and went down to Washington, DC, in January, and got this job. I went out to sea about fifteen days later as

an apprentice, I just learned on the job. I didn't have any particular background for it other than the usual physics, chemistry and everything else you have in the science curriculum. But I loved field work, and the chance to be paid while I saw the world.

Q: What sort of vessel were you going on?

LITTLEWOOD: These were sea plane tenders from World War II that had been converted to act as oceanographic vessels. They were remade inside, with a chart room, etc., and laboratories; a "wet laboratory," opening on the deck and a dry one for chemical analyses, etc. We did chemical analyses of the water salinity. We used "Nansen bottles," named after Fridtjof Nansen. They are metal bottles you can send down on a wire, weighted at the bottom end. You measure the wire as you pay it out. Also you measure the angle because your ship is constantly drifting; a sort of "slow trawling" type of thing. Nansen bottles are clamped on the wire at measured intervals, to take water samples at various depths. Very special thermometers are attached to the side of the Nansen bottles. They measure the temperature of the water where you've taken the sample. It is kind of hard to describe the system, but it worked. This was 1950s technology. It's somewhat different now.

Q: Did you know the basic procedures and computations? Were you learning your trade?

LITTLEWOOD: I was just learning the trade. I was not then the head man, but soon became the head man, the "senior" or "chief" oceanographer for the two ships, which worked in tandem.

Q: Where were you working?

LITTLEWOOD: Our base was the U.S. Navy Hydrographic Office in Suitland, Maryland south of Washington, DC, in the 1980s. Our two ships ran together because another science team was doing acoustic attenuation measurements between one ship and the other. If you aim a sonar beam or create a sound underwater, and you don't get a return it doesn't mean there isn't a submarine there. The sound beam has dissipated before it reached the submarine. It's the same principle if you shout across a canyon. If it's a narrow canyon you get your voice back; (an "echo") but at some points in the Grand Canyon, it's over a mile or two across, and the echo doesn't come back to you. Same principle. So they wanted to check that by having one ship moving away from the other ship, to measure this attenuation under different water conditions. Again, this is not recent technology I'm sure.

Q: Did this become pretty much your career?

LITTLEWOOD: It became my first career, and the Foreign Service became my second, and last. I was at sea fifty percent of my time. My first trip, in 1950, was a good three months. We went from Philadelphia down to Trinidad doing measurements every four hours, with roughly two hour stops. Move four hours and do another two hour "station." We got to Trinidad finally and had a few days ashore. We then went to Newfoundland

making a transect right up north, on the way catching the edge of the Gulf Stream at different points. We then went to the Azores, then on to Madeira and then to Dakar, Senegal and back. So if somebody wants to travel and see these places where your stamps came from this was it. Trinidad, Newfoundland, Azores and Madeira. And at each place there were Navy people that took good care of us. In Senegal for example I was taken to the island of Gore, infamous as a slave trade departure point. And then our ship's medical officer and I were invited to see a Senegalese native hospital where we saw a variety of medical problems. "Elephantiasis" for example. Then I got a chance to go down by seaplane to the French hydrographic ship working at Senegal's southern border.

Q: Were the Soviets doing the same thing? Or were you aware of what the Soviets were doing?

LITTLEWOOD: I'm sure they were. We never crossed their path. It's a "big ocean" type of thing. In July...

Q: 1951?

LITTLEWOOD: No, still 1950. My boss said, "Do you want to go up north on an icebreaker?" The Navy was sending two icebreakers to resupply Arctic stations, with an oceanographic team on each one up to the Arctic. "Sure." So in July and August I was up to eighty degrees North between northern Greenland and Canada. I was senior of the oceanographic teams on both ships. So I learned on that job; and then I stayed at the senior job until I left "Hydro" in late 1959.

"Woods Hole" was the leading east coast oceanographic institution, and "Scripps" was the west coast one. There were pockets of specialties like fisheries and such up at the University of Washington and University of Miami and a few others. Because there weren't many institutions teaching oceanography, it was a graduate study entirely. That's why they took anybody with a science degree. They suddenly needed a lot of oceanographers. Not necessarily to analyze the data, but to get the data.

Q: How Navy was the oceanographic service on these ships?

LITTLEWOOD: These ships were straight Navy. They're out there to do our work. They're supposed to do what we civilians said. Sometimes there was a little trouble with some of the captains. I never really had much trouble. I had trouble with one of them in the North Atlantic one time and he said, "Well the Navy has to have their gun drills and such." They would call "general quarters" and the scientists were supposed to go and sit in the officers wardroom and "drink coffee and sort of stay out of the way." In actual war time the wardroom mess table becomes the ship doctor's operating table. That was fine, but this commanding officer felt that those civilians were getting it pretty soft. He wanted us to report to the bridge during any "general quarters." Maybe three of us or so. So I said okay. So we reported to the bridge and of course we just got in the way. He expected to have a little argument, I didn't give him an argument and of course he sent us back to the

wardroom after. Otherwise I could influence them. Actually we drew up the track the ship was going to take, and the ports we'd visit, usually three months out and three months in. I planned the expeditions after that.

Q: Working with icebreakers in high latitudes. Was this more difficult than the normal?

LITTLEWOOD: Well, it was different. I don't know about difficult. Of course when you're in ice you don't have any real high seas like you do have in open ocean. On one expedition with out regular ships we were north of Scotland in a bad weather belt. The season we were there was in early spring with very, very heavy seas, which actually broke the transducer on the ship's hull. (The transducer sends the depth recorder "pings.") The ship carried about one-hundred twenty-five sailors. These are not small ships. In fact, they were the largest oceanographic ships worldwide, until the Russians built larger ones. They were also fully packed with sailors, as the Navy didn't have many ships at sea at that time so they wanted to put all the sailors they could get on board to give them "sea duty." Otherwise, some sailors would have two years in the Navy and never be at sea. So we were sorry to be so crowded all the time. The ship had a hammock swung in my laboratory one time. "Mr. Littlewood, I got to go on watch in two hours; do you have to do that now?" (I was doing chemical titrations.) I answerd, "Sorry, but I do."

We learned later a freighter went down about eleven miles from us according to the newspapers that we read in port. I measured the waves, which was part of my duties, by standing on the bridge, and as I know the bridge height and I know my eye height, I added those two together, and then I used a sextant to measure the angle from the crest of a wave while we were level in the bottom trough of the wave. Then I could calculate the wave height. We were in sixty-foot waves. Normally people overestimate big waves and underestimate small waves. In ten years at sea, that was the biggest I ever encountered.

Q: Did you get involved with other countries? The French, British doing the same thing?

LITTLEWOOD: Yes, but we didn't really *work* with them in a cooperative sense. We would go where we wanted to go. There was so much to learn it didn't matter where one went. We went to Denmark for example. And that really made a change in my life, I'll explain later. Our two ships were tied up in the public dock and the Danes had an oceanographic ship that had just come home from making a two-year voyage around the world, dredging the Philippine Trench and other operations. They had a very famous leader, Anton Bruun. They had just returned home and we docked behind their ship. So three oceanographic ships were lined up, the Danish and our two together. We had a lot of visitors, as we were at a public dock. We of course visited their ship, the "Galathea," an old British frigate that had been converted, and they visited our ships. We also visited their oceanographic headquarters and laboratories ashore. So the four days that we were there was very busy with official duties, but I did notice the pretty girls there. We can come back to that later on.

Q: A lot of the information, was this being published? There must have been a secret side and a public side?

LITTLEWOOD: Yes, there was some confidential data. Later it was all released of course.

Q: Were you working more on profiling the bottom or working more on sonar and that sort?

LITTLEWOOD: More of the physical properties of the water because the depth echo sounder ran continuously, and they had sailors trained to change the graph paper, etc. You get a continuous graph of the bottom, from an automatic reader on the ship's bridge. It's all automatic, there's not a lot you have to do.

Q: When did you end up in Denmark again? I take it to meet your wife?

LITTLEWOOD: I saw the pretty girls but I had no time for them. With my sea-going life, I was at sea fifty percent of the time on different expeditions. In 1951, in the Mediterranean, I had dinner with Prince Rainier of Monaco. Our ships stopped there for a visit, and we also stopped at Tangier. It was an exciting job. Back to the sequel to this Danish stop. I knew that I would never be able to get married because I was at sea most of the time, three months in, three months out. And I'd meet somebody in Washington and what am I going to do-she looks interesting, a couple of dates and then I'm going off for three months. But when I got home, I heard that the Fulbright program had added Denmark to its list (the year actually that I was there), and that you did not need to know the language! Normally you have to know the French language to go to a French University and such. But not in Denmark. The majority of Danes speak excellent English. It's required in their schools. So I thought, "nothing ventured, nothing gained." I would apply for a Fulbright Scholarship to Denmark. And I now knew the oceanographic leaders since I had just visited their institutions and I was sure they would support me in this, which they did. I would be over there as a guest worker and I would be matriculated in the University of Copenhagen. So I got the Fulbright Grant, much to my surprise. I took a years leave without pay from the U.S. government and went to Denmark. Actually I first went on one of our oceanographic expeditions as far as England where I got off and turned our program over to the second-in-charge oceanographer. I then went on to Copenhagen by train and I stayed in Denmark a school year. On the side I was looking for a wife now, hoping to bring back a Danish wife. I was twenty-eight when I applied, twenty-nine when I went there, and turned thirty while I was there. I found a potential wife at a University of Copenhagen tea dance; I don't dance, but I went to this tea dance, and she was there also. Her name was Bente. I was with a French friend who danced very well. We both danced with her but I got the first date with her and I kept her tied up with dates so he never had a chance. That was in about late February. In March, as part of my Fulbright program, I planned to visit the Swedish and Norwegian oceanographic centers. There was a very famous Harald Sverdrup in Oslo, Norway. By the way, I had been in Norway before, as our ships made port in Bergen, Norway, on the west coast. They have

an oceanographic center in Bergen, and the people there had been very gracious to us-the city actually threw a big party for the ships! So first I went from Copenhagen to Gothenburg, Sweden to meet Professor Kullenberg, who invented the “Kullenberg Corer” for sea bottom sampling. I then went up to Oslo to meet the famous scientist Harald Sverdrup. But before I went on this trip I asked Bente, “How about going steady?” because I wanted to keep that Frenchman away. I didn’t tell her that, of course. She didn’t know what “going steady” meant! I said, “That’s a good question, I guess it’s an “unannounced engagement,” which was the closest definition I could come up with. I had never gone steady before. I guess going steady is easier to break off than an engagement. So I said, “Let’s think about getting married, but let me know when I come back from this trip.” I thought that would keep the friendship going, and the Frenchman away. I got to Oslo, met Dr. Sverdrup, and decided that I couldn’t hold the suspense any longer. I was supposed to go on to Bergen, where I had been before, but instead I telephoned Bente from Oslo and said, “I’m coming back early.” I took the train back, and she met me at the Copenhagen train station and said, “Yes!” I learned later on that one day was a “yes” day, and one day was a “no” day. So I was lucky. That was in the end of March, 1954, and we were married in mid-May and had a honeymoon in Holland. That was about the end of my “Fulbright” school year. But, I was able to get an extension of my Fulbright through the summer, as the Danes invited me to participate in their summer expedition to the Faeroe Islands, Iceland and Greenland. And I would have to take a freighter back from Greenland because their expedition ship wouldn’t be back in time for my departure to the U.S. I got back in August and Bente’s immigration papers were through, so we came to the U.S. on the S.S. Bergensfjord, a Norwegian-American Line ship. That was in early September, 1954.

Q: What happened then?

LITTLEWOOD: I went back to my job, of course. Somebody else had done my seagoing job in the meantime. So I found myself with a desk job. But I wanted field work. Oceanography, and later Foreign Service, is really the way to see other parts of the world. So I was needling my Division Director to put me back in the sea-going job. He said that we were starting to prepare for the “International Geophysical Year” (IGY) coming up. Everybody will remember that the IGY was when “Sputnik” went up. The Antarctic program “Operation Deep Freeze” would be starting, as the U.S. had to find sites for the research bases that were going to be built there. The Navy (I was still working for the U.S. Navy), would be the one that did the ocean transportation, logistics and the operations. We would do an oceanographic program on the way down, there, and on the way back, because there were very little oceanographic data from the Antarctic areas at that time. We would have oceanographic teams on each of the four icebreakers. We often would be operating very far apart, for example one icebreaker on one side of the Antarctic and another on the other side, I was in charge of that programming for oceanography so I wrote up the plan and instructions. I was away for about six months each time. My wife knew she was marrying an American civilian sailor, but I told her longest I would be away was three months. Now it’s *six* months down and *six* months back, not the three that I had promised. We had a little girl, I’d see our little girl every six months; not good!

Q: Where was she “stationed” more or less?

LITTLEWOOD: She stayed in Washington. I had friends, and we'd bought a house, a small house, in the area of District Heights, Maryland. I had a lot of colleagues that would look after her and Bente adapted very quickly, she's a very smart girl. But it was just such a long time. I said, "Well it all ends in four years." A couple of years finding base sites and making the stations, and then a year and a half for the official IGY seasons down there. Which means two more Antarctic seasons. And so it's really four years and then it's all over and I'll go back (I presumed) to the other routine of three months away and three months back. What then happened was The "Antarctic Treaty." The thirty-year Antarctic Treaty is still going on! It's passed its thirty years '91. It's now over forty years and going strong. So Antarctic scientific work is still going on there. Its purpose was to continue the great international scientific studies there that occurred during the IGY. We hope it will never stop. All national claims on the Antarctic are put aside under the Antarctic Treaty.

Q: Were you involved in the Antarctic Treaty negotiations?

LITTLEWOOD: No, I was an Antarctic Treaty scientist, but I wasn't involved in the negotiations. I knew some people who were, but my job was in the field.

Q: You were keeping tabs on these icebreakers? Was that what you were doing?

LITTLEWOOD: I'd keep tabs on their oceanographic aspects, but they were pretty independent though, operating in different sectors of the Antarctic. The Antarctic continent is the size of the United States and Western Europe together. I was in charge of planning where our teams would go. They had to go more or less where the icebreakers had to go, but then there were some deviations to do oceanographic work too, provided they don't get called away on some emergency once they finish their continental station support work. We oceanographers weren't very popular when the ships were heading home, as we would stop to do an oceanographic station. Everybody wants to get home and every two-hour station we would make, delayed the ship's arrival back at home port. We compromised in a lot of those.

Q: I imagine the equipment was getting more and more sophisticated as each year went by.

LITTLEWOOD: No, speaking only for the IGY period. It had some changes, but the subsequent electronic field changes really had not come in. We were still using Nansen bottles and a lot of physical instruments rather than a lot of electronic instruments. I got out of oceanography as the Antarctic Treaty program started, with many changes later.

This leads up to how I got into the U.S. Foreign Service. My wife Bente was very unhappy. She knew she was marrying this American sailor who is gone in and out six

months total per year but in smaller pieces, two months, or three months. But now he is gone six months away at a time. Remember we didn't have cell phones, didn't have e-mails, or anything like that. I'm talking late 1955 to the end of 1959. It was all supposed to stop at the end of those original IGY-related four seasons. So when that time came up and the Antarctic Treaty was starting, it was clear it wasn't going to stop, so there was no end to my "six-month chunks" Antarctic job. My wife's doctor (she must have been complaining to him), said, "Why don't you tell him to get a new job or a new wife." So I tell people I flipped a coin, it came up a new job. A friend of mine, an oceanographer actually, had moved over to Smithsonian and was working for the Assistant Secretary for Science at the Smithsonian. She saw a notice from the Department of State that they were looking for Science Attaché for Scandinavia, posted at our embassy in Stockholm. They had one there, but it was a two year appointment. They wanted a first deputy on hand. I applied for that and got it, after interviews and such. I had already prepared the fifth year's expedition. And I actually went as far as the Panama Canal Zone on that expedition, but I flew back and joined the Department of State. I had quick briefings in early January, 1960. By January 11th I was on my way to Stockholm, with my wife, our daughter, and a new baby son. No more long absences by Daddy!

Q: You were in the foreign service from when to when?

LITTLEWOOD: That would be January 1960 until I retired from government and the foreign service in 1981. I quickly adapted to the new job and did well. Stockholm was wonderful for my wife, whose parents in Copenhagen and we were mutually accessible for visits.

Q: In 1960 when you went to Stockholm what did being a Science Attaché consist of? What were you doing?

LITTLEWOOD: A Science Attaché basically deals with the scientific relationships between the countries. In Stockholm for example, they have a *Karolinska Institute*, which is their equivalent of our National Institutes of Health. The NIH is *the* leading medical research institute in the world and *Karolinska* is close behind. They are the ones that select the medical Nobel Prize winners. Their directors pick Nobel Prize winners which are often some of our researchers in our National Institutes of Health and U.S. universities, and of course from other countries too. So my job was to meet the senior scientists in the country and make sure our relationships go smoothly and help them with information, contacts, and appointments if they are coming to the United States. I would help them meet the right people to be able to do what they want to do over here, and conversely help American scientists coming over to do something there; to get to the right people, and introduce them and help solve their problems too if problems come up.

Q: One thinks of Swedish science as being very advanced. What was going on? You were in Stockholm from when to when?

LITTLEWOOD: I was there for five years from '60 to '65. My sphere was actually all the Nordic countries. But I mostly was in Stockholm. That kept us busy enough there. My first year there they hosted a huge international geographic conference in Stockholm, followed by a geophysical conference over in Helsinki, Finland. And then a geological conference in Copenhagen. I didn't go to the one in Copenhagen. I did go to the one in my "backyard" for a couple of weeks, and then I went over to Helsinki and then I had to get back over Stockholm. This was a *big* international conference; thousands of people. My usual work was whatever came up. Actually one time, my old chemistry professor from Princeton turned up. I was privileged to help him do whatever he was looking for in his visit to Sweden.

Q: How did you find the embassy to deal with? You were sort of an odd outfit?

LITTLEWOOD: The Science Office was attached to the ambassador's office so that helped. Our embassy was relatively small at that time, maybe sixty counting everybody, Marine guards on up. Through most of that time Jeff Parsons was our ambassador, do you know him?

Q: Yes.

LITTLEWOOD: Jeff Parsons was great, and we got along very well. He gave me a promotion in fact.

Q: What areas was Sweden in those days particularly preeminent?

LITTLEWOOD: Well, I mentioned medical science at the *Karolinska*. Geophysical expertise was also tops. Sweden was and is a neutral country; they kind of gave us their geophysical data and said they were interested in vibrations in the ground. Particularly ones that might have been started by Soviet nuclear testing. Overall, Sweden is very technically advanced. They've got a lot of engineers, all top quality. The ancient ship *Vasa* was found and recovered when I was there, and I became quite good friends with Anders Franzen, the one that discovered the ship, which had sunk in the harbor of Stockholm in 1628! Have you heard of the *Vasa*?

Q: Oh, yes, I've seen pictures of it in National Geographic.

LITTLEWOOD: Anders actually wrote some articles for the National Geographic. He's long dead now. I remember when they brought the ship up to the surface. He arranged so my wife and I could witness the event.

Q: As Sweden was neutral, and much of our scientific work at that time had a military component, were the Swedes a bit cautious about things that might have a military application?

LITTLEWOOD: Well, we didn't have any military in Sweden.

Q: But the research that was going on?

LITTLEWOOD: Their research may have had a minor military aspect relating to their own defense, but I wasn't in the intelligence or military side so I can't really address that. The Swedes were cooperative. However, I do know one case where a Swedish company was importing some special instrument from the United States, and apparently covertly shipping them to the Soviet Union, against European trade agreements. This was a special "gravity meter" made only in the U.S., in Texas. It was very scarce at that time. A Swedish authority mentioned it to our Economics Officer, who asked me about it as the Swedish company produced playing records. He asked, "What do gravity meters have to do with playing records?" I said, "Nothing, no relationship whatsoever." And I am sure our Embassy told the Swedes and Sweden probably stopped them from being transhipped to the Soviet Union, which undoubtedly was after that type of instrument for military reasons.

Q: This was in the '80s.

LITTLEWOOD: Okay.

Q: Did you find that many Swedes went to the United States to study science, and vice versa?

LITTLEWOOD: Yes. There was a good exchange there. NIH for example had scientists at *Karolinska* and *Karolinska* had scientists that were on sabbatical to NIH. And we did have a problem that arose. There was one Swede who was a *Karolinska* medical researcher. He had a grant from the U.S. National Institutes of Health to support his medical research. This was one of the largest grants to Sweden that NIH had at the time. He was working on a live cancer vaccine. I consulted with the Swedish medical board and learned that this fellow was being very public about his research. He would appear on television where he said the Swedish medical board called his vaccine dangerous and on Swedish television he would plunge a needle into his arm and appear to inject his vaccine. I'm sure it was just a harmless saline solution. But apparently in the public mind he gave himself a shot of his own vaccine to prove it was safe. By the way, this grandstanding is *not* a typical Swedish approach. He had *not* gone through the required testing on animals before he tested on humans. So the Board was very nervous, and against him, and here he was stirring up the public in the tabloid newspapers and TV. He would in substance say, "They say this and that about me but I have the biggest medical grant from the United States from the most wonderful medical institution in the world (NIH)." So we were interested in this and I looked into the matter and brought NIH's attention to it. The head of the NIH foreign grant program came over to Sweden, which is what I had hoped for. What he found was that the mistake NIH had made was in not knowing that this fellow had applied for the NIH grant without the *Karolinska* knowing about it. He was on a "sabbatical," that is, he was on leave from the institution. He still had his office in *Karolinska*, but he wasn't in it. So NIH assumed when he put in his

proposal that it had been approved by the parent institution, *Karolinska*, but it hadn't. They also found that he was paying some of his NIH grant money to himself. He was raising racehorses on the side, and he was taking the serum from his own horses and then charging the NIH grant for that. That's a conflict of interest there. So the Board and NIH were able to stop the whole thing and fortunately nobody died from his experiments. But it would have been very bad for NIH if somebody had died in Sweden, and you can imagine all the adverse publicity that would have arisen. That's the kind of thing you just pick up and take care of as a Science Attaché. It's a good example of keeping good relations between host country and U.S. scientific institutions.

Q: After '65 you left this place. I imagine your wife was delighted to be in Scandinavia.

LITTLEWOOD: It was very nice for her, particularly as she was an only child. Her mother and father could now come up and spend Christmas and other times with us. And we could go down to Copenhagen; we now had another baby, a boy. So the grandparents could see both grandchildren. For their only child to marry and go off to the U.S. was pretty tough on them so our being nearby was really nice. Well, after five years I came back home. I had a choice, but I chose to take a Department of State detail to NASA. State had one slot at NASA headquarters, where they had a Foreign Service Officer working in NASA's foreign relations office. This is because NASA dealt with a lot of countries, and a lot of things. I worked with a great fellow named Oscar Anderson. I asked Oscar when I first met him, I said, "What is your field?" He said, "Actually, I'm an historian. I've written some books." I said, "Well, what books?" He said "The History of Refrigeration." Oh, you mean John Gorrie? [laughter] And boy, immediately we were great friends. So I stayed there for a year. It was to be a two-year assignment at NASA, but State called me back earlier to cover oceanography matters. I was supposed to go to Tokyo next, but that was not open at that point. State said they would save it for me and they did follow through, they did save it for me.

Q: While you were with NASA did you get involved with any negotiations with foreign countries?

LITTLEWOOD: Not so much negotiations. I did edit the about an inch and a half book on NASA's foreign relations for the Congress and I'm credited in that book. I was just editing. No, nothing earthshaking. John Glenn walked into my office one time; that was nice, I had about fifteen minutes with him. We're now approaching '66. This is '66, '67. In '66, while I was at NASA, oceanography boomed. The whole world went to a big international oceanographic conference in Moscow, which I went to; the only diplomat in the American delegation. The KGB tried a couple of little things I can tell you about if you're interested.

Q: Yes, sure.

LITTLEWOOD: At this April 1966 conference, I was in my hotel in Moscow, an old hotel. I got a telephone call. I was sharing a room with a young marine scientist from New

Hampshire. New Hampshire actually has a little coastline with a marine station on it. I answer the phone and I hear a blast of Russian which I don't know at all, and the young lady's voice on the phone breaks into English. I thought it was the hotel desk calling, perhaps someone looking for me? There was music and girlish laughter in the background. I'd just checked into the hotel and there might have been a restaurant down there. I hadn't noticed. I said, "Where are you" or "What are you after?" She said, "You're American! We love Americans. We're having a party, come over and join us and we'll pick you up. We're close by the hotel." Well, I could see through that one. Some Congressmen have not seen through it and may never. But you can go to the party in all innocence and the Soviet KGB can have some nude lady jump on your lap and a photo is taken. You'd have a lot of explaining to do. So I said thanks but no thanks. The rest of the story is that there was a post-conference tour I wanted to go on. An oceanographic friend and I went down to Leningrad. Russia has a famous polar institute there and I wanted to meet the people, as we would have a lot in common. I had five years Antarctic experience now plus my Arctic experience. I was warmly welcomed there. I shared a hotel room with a fellow named Al Vine from Woods Hole who had also come on this post-conference tour. He went with me to this Antarctic Institute, but when we were back at the hotel, I got another invitation from a female at a party. I guess KGB up in Moscow didn't tell KGB Leningrad. Because the phone call was the same ploy. So again, thanks but no thanks. But I did get another call and that was from the Office of the Hydrographer of the Soviet Navy. I was invited to come down and see their new oceanographic ship. They said they would send a Navy car around for me, with an invitation for dinner on the ship. The car came and this one sounded legitimate. We went into their Navy yard; this is in the middle of the Cold War, but a warmer time at that point. We went to the ship and they showed me around. The ship was named after some Soviet scientist. I looked at their laboratories as I was an oceanographer, I did the right things and they could see that I was an oceanographer and not some kind of a plant or spy. For example, I handled their reversing thermometers in a certain way that only an oceanographer would know. And I didn't look at the ship's antennae because I wouldn't have known what I was looking at. People can read a lot from antennae I know. I was waiting for other people to come, but I was the only guest. They had an interpreter. So we had dinner in the wardroom with about twelve at the table. We had some vodka toasts back and forth to the U.S. and the U.S.S.R. I didn't get drunk or anything like that. And they just took me back to my hotel. It was a very good and warm experience.

Q: You went to Tokyo. You were in Tokyo from...?

LITTLEWOOD: That Science Officer position opened up in 1967. Late '67. They pulled me out of NASA back into State to be their oceanographic officer as I mentioned before. There was an interagency Committee on Oceanography, so I represented State at that. The White House had a "Marine Council chaired by the Vice President." So I backstopped that. The State representative had to be the Secretary or the Under Secretary of State. They couldn't go any lower than that. U. Alexis Johnson was Under Secretary at that time. Later he was Ambassador to Japan. It was a very good experience, so I sat in on

some of those Council meetings. And did the background work and other interesting things within the oceanographic field, from an office chair, not a ship...

Q: Concerning oceanography, was this at the time we're talking about, the late '60s and all, was oceanography becoming more and more of a shared, open knowledge both with Europeans and also the Soviets and others?

LITTLEWOOD: Absolutely. In the Antarctic we had complete cooperation between the Soviet Union and the U.S. The Antarctic Treaty was the only treaty that we had in common with the Soviets. Our Congress was very happy to have that treaty going because it was something that they could point to.

Q: In Tokyo you were there from when to when?

LITTLEWOOD: '67 to '70.

Q: What were you up to?

LITTLEWOOD: There, the same job as Sweden. To meet oceanographers and other scientists there and work with whatever came up with a scientific content. The U.S. had a special cooperative arrangement with Japan, run on our side by the Department of the Interior. It had about twelve different panels. One would be on forestry, another one would be on oceanography, rain sciences, another would be on earthquake resistant building, another on water pollution, etc. In fact, the water pollution meeting occurred first ten to fifteen days after I arrived. So I was helping it to be arranged from the Japanese side and the American side. I was the intermediary. I would help the American side arriving, meet their planes, pass customs, etc. We could tell the late arrivals, "You forgot about the dateline." [laughter] Other problems were when we wanted to substitute somebody, and I'd have to report that to the Japanese and see if they had any objections, or if they had any suggestions. Then I would sit in on the meetings and help the American delegation any way that they needed. Maybe we'd have eight people on the American delegation, all water pollution experts, representing both government and non-government, e.g. from a university. So my first real view of Tokyo was with the water pollution field trip going up the canals in Tokyo, and I would just think about, here I'm seeing downtown Tokyo, through their polluted canals. I hadn't really settled there in Tokyo. I was living pretty close to the Embassy and really hadn't traveled around the city. And our delegates would say, "Wow, look at the pollution coming out of that thing." All that hydrogen sulfide. That comes from so and so. It was kind of a different first view of the city.

Q: Japan was just really getting cranked up for the Japanese miracle about the time you arrived.

LITTLEWOOD: I guess one could say that. My focus was on the science side and we had lots of counterparts. The Japanese had a station down in the Antarctic and they were

planning certain things like over the ice travel to the South Pole. They needed fuel depots and things like that. They had to depend on the U.S. for many things. When they get to the South Pole they'd be out of fuel but by pre-arrangement they could get enough fuel from us to get back to the coast and their ship. So I was really able to help. I was the perfect person for them, as I knew all of the U.S. senior people in the Antarctic. They were my friends after four years. So I could arrange all of that for them. I did that, and I met all of their oceanographic people, I gave a talk at a breakfast meeting at the Japanese DIET about research on manganese nodules on the deep sea floor, which could be dredged up. This is possibly a new source of manganese but what environmental harm does it do?

Q: Now, did you tell them what you were doing or did...?

LITTLEWOOD: I could give them new information that had not yet gotten into the literature. I could talk because this was a cooperative program; what's going on, what we were working on in our laboratories and in the field. My focus is to help anything that can promote joint cooperation in the scientific fields in both countries.

Q: We were all terribly impressed by the Japanese manufacturing and Japanese system which was beginning to develop: automobiles, electronics, and all that. And it was beginning to get started while you were there, wasn't it? Did you find that the Japanese were more into practical science or experimental science, I mean how did you find it?

LITTLEWOOD: Of course much of that technical activity comes over to the commercial side and that's not in my field, but I was quite aware they were becoming competitive in automobile production. They took away our business by making a better automobile, I presume. And they took away from the Germans their earlier optical leadership; think Zeiss. The Germans made nice lenses, they were the greatest in the world - and suddenly they come up against the Japanese. Cameras and microscopes and other lens-related instruments. And the Japanese did this just by their own ability, and probably Japanese government money, too.

Q: Were we working to find out, you know, sort of the reverse of that side, to find out what fields the Japanese were working in to get information back to the United States?

LITTLEWOOD: I think that the industrial companies themselves would have their representatives over and could do a better job of that commercial intelligence. I don't remember anybody in the Embassy focusing on a large scale of that, obviously it's part of the commercial and economic side of the Embassy, not science. We were promoting cooperation to advance science.

Q: But it was more, we were relying on sort of the powerful American business side to take care of this. How about Japanese going to the United States to study, in the science field?

LITTLEWOOD: There was a certain amount of that but I don't remember it being a big factor. I think Japan did a lot of just-on-their-own. Of course they started from scratch. When you've got a big factory that's all tooled up for the latest model it's hard to change, I suppose. When you've got a *new* factory you can tool it up for a new model right away. Perhaps that's most of Japan's big advantage, in that they don't have to change Detroit around. Their government obviously has more input and power. I can't imagine the U.S. Government dictating the design and price of a car.

Q: It took about twenty years to get Detroit to get back into full competitive swing.

LITTLEWOOD: Even then, the Japanese still have an edge I think with some of the cars, in that they are more efficient, less likely to break down, I'm not into that field, but I have a Toyota Camry. Car and Driver says it's the best car.

Q: Well, I've got one. It's about eight years old.

LITTLEWOOD: Mine is five years old.

Q: When looking from your vantage point, were we looking at what was going on in China at all, from the Tokyo perspective?

LITTLEWOOD: No, I certainly was not involved at all in anything like that. We had enough science activity between the United States and Japan to keep us busy. The Antarctic cooperation was very profitable scientifically, to them and to us. One of the groups under our science cooperation agreement that came over was the Forestry group. This was great cooperation. And Ed Cliff, the U.S. Chief Forester through three administrations, was the head of the U.S. Forest Service and Chairman of the U.S. forestry team. He was a very nice guy. I went with this Japan-U.S. forestry group on their field trips in Japan and would sit in on their meetings. It was a very good education for me, too, plenty of different viewpoints. Then there was something that influenced me later in my work. I earlier mentioned a group on earthquake resistant construction. The Japanese had a "shake table" where they could build a module of a house or an apartment or something, and give it various earthquake shake forces to see where the cracks began, and how they spread. They then could figure out from an architectural viewpoint how you could strengthen the construction so that particular motion, the lateral motion of the earthquake, will *not* bring the building down. And they, the Japanese, were doing this because they were about to build a lot of modular housing. There were to be a hundred apartments, a hundred of the *same* all along the street or elsewhere, all low-cost housing. So they would take various designs and test a model of each from an earthquake viewpoint, before they built a hundred or a thousand of them. That makes a lot of sense. So I gained expertise, I later visited our National Bureau of Standards, now called "NIST," the National Institute of Standards and Technology, which was a leader in U.S. delegation to Japan on this subject. They were very good. They were also working on this earthquake-resistant construction on our side. I was made very aware of this and later in

my story we'll get to Indonesia. Indonesia has earthquakes and volcanoes and in some earlier work there I actually used that team from NIST. I was then with USAID.

Q: Were the scientists, Japanese scientists, well supported by their government?

LITTLEWOOD: Yes, yes they were. And I had no problems, in fact I have not had any problems in my career with cooperation with the other scientists. It's been a great job.

Q: Well you left Tokyo when?

LITTLEWOOD: I left Tokyo in early July, 1970, when the USG's fiscal year ended on June 30. I left State and moved to AID.

Q: Okay. We'll pick this up in 1970 when you left Tokyo and joined AID.

LITTLEWOOD: Okay, great. Thank you very much.

This is the 7th of December, 2001, the 40th anniversary of Pearl Harbor. We're now 1970, and you said you left Tokyo in June, '70.

LITTLEWOOD: I believe I said July but it could have been June. We took a leisurely trip back to Washington, where we lived in Bethesda. I had received, actually some months earlier, the offer of moving to AID as the Associate Director of the new Office of Science and Technology (OST), which was a central office in the Technical Assistance (TA) Bureau of USAID. It was a relatively new office. The Director of TA/OST knew me and I knew him. He used to be Science Attaché in Moscow when I was in Stockholm. The science attaché community was rather small, and we certainly knew each other. Glen Schweitzer was his name, and he is still a prominent person. Glen asked me to come in and take this new job, and I was happy to do so, though I did ask him to wait until late June, because our children were in school in Japan. Our two children were six and nine at that point, and we hated to break them out of their Japanese school. So I took that job; I didn't realize it at the time, but he had held the job for me for months. I entered AID on July 1, 1970, and what I didn't realize until I got there was that it was actually a promotion to the senior ranks. So I came in there as "Associate Director."

Q: Let's talk about, you were doing that from 1970 until when?

LITTLEWOOD: Until 1976. It could have gone on longer but I wanted to get back in the field, and we had hoped in that office eventually to have our own field positions, but that just never materialized. We traveled a lot, but it didn't materialize to have AID science officers or science attachés from OST doing field work. And I enjoyed very much working in the field.

Q: What were your responsibilities in this office of science and technology?

LITTLEWOOD: My immediate responsibility was the AID contract with the National Academy of Sciences. The National Academy of Sciences [NAS] had a Board of Science and Technology in Development [BOSTID]. And AID provided the major funding for that office staff, a library which they built up, and a staff with the AID grant, a multimillion dollar grant. And I was in charge of that so I had the wonderful opportunity to work with the National Academy of Sciences senior staff people, in a very interesting job that was just opening up in a lot of new fields. Some of these people that they had were very experienced in working overseas, in Africa for example, so they had field knowledge. That's why they were hired, and they would go over and work with the local governments concerning some certain science or technology issue or problem that the government was having and needed outside help from experienced people. I can give you more detail on that.

Q: This was all looking outward, wasn't it? I mean we were trying to help people, this wasn't trying to figure out what another country was doing and getting something from them.

LITTLEWOOD: No, it's *entirely* to help the developing nations, and I was pleased to see that that was exactly what they did, and that's what I was able to participate in. The AID job proved to be the most rewarding and best job in my life.

Q: What particularly happened as you moved into this period of lots of scientific breakthroughs? What were some of the areas of science and technology while you were there that were particularly pertinent to what we were trying to do around the world?

LITTLEWOOD: It wasn't so much the high science technology but rather the selection of what science and technology applications to use for their particular situations. Things that work in the United States don't necessarily work as well in other countries, particularly in developing countries. So we were to try to focus on some important field where we had a good experience in the United States. I'll give you an example. And with that advice from the United States, once we understood what their issues were, we could go over and help them with a variety of possibilities. They would choose. An example would be the agricultural extension system that is very famous in the United States, I think you're familiar with that. Our Department of Agriculture has extension agents in various parts of our country. These agents are also in tune with the farmers, locally, but they're also in tune with the most recent agricultural advancement out of our universities and elsewhere. So they're bridging between the two entities, farmers needs and experts' knowledge. In Ghana for example, they had an agricultural research unit, in one of their ministries, working on their agricultural problems. But they didn't have, if they came out with some agricultural advancement, they didn't have any extension system to bring it out to the farmers. So it was something that the NAS [National Academy of Sciences] learned about and wrote a paper about. But NAS knew that the "paper" had no effect in Ghana. This was the type of thing OST [Office of Science and Technology] did. We would then send one or two of these people from BOSTID [Board of Science and Technology in Development], out to the country, like Ghana, and they would sit down with the leaders

and different factions and farmers, their Department of Agriculture, other administrators, etcetera, anybody that would be interested or involved in this. And they would find out exactly what the situation was. Then they would go back to the U.S. and formulate a team as the Academy normally does, to advise the U.S. government, but in this case to advise this developing country's government. And the team would be very balanced in that it would take people who might be pro one way and then balance that with somebody who was kind of against that way, and preferred another way, so they really got a balanced team. They would draw upon our government, universities and academia, and industry. And they could even draw from experts in other countries. The Academy would pay all of the costs of those people coming from a national meeting in Washington, where they would get together, and go on to that developing country and stay there a couple of weeks or so. They would have field trips there, and then sit down with those local scientists and administrators and discuss the whole issue and offer them their advice. And the country hopefully would take it and be better off for it.

Q: Was there a going back later on to see how well these countries were following through?

LITTLEWOOD: Yes, yes. The NAS "BOSTID" did, although the AID TA/OST [Agency for International Development Technical Assistance Office of Science and Technology] wouldn't keep track of it. BOSTID would keep the more detailed track. And there of course were reports on this, which were made available to other countries with similar needs.

Q: Well, I can understand where agriculture would certainly be one of our strongest points. In terms of developments. How well did our agricultural work in the United States translate abroad?

LITTLEWOOD: That wasn't my field, of course all AID missions have agricultural offices, which would be highly involved in this example. So OST focused on science and technology, but that "agricultural extension" example was to illustrate the problem - the mechanism - the solution method, and how that team worked through the NAS, all funded by our AID Office and Technology, under my supervision.

Q: What were the fields of science and technology that we were particularly trying to get out to the field in this 1970 to '76 period?

LITTLEWOOD: Well, we were looking at the fields that the AID general offices did not cover. Most AID missions have a health office, a family planning office, a rural development office, an agricultural office and other things like that. Maybe some that were unique to a certain country. They generally had some standard offices that all developing countries could use help with, and always dealt with. In our OST office, we were trying to fill in other factors that came up, were important to the country, but that were not represented in our AID missions. So we would supply that through our National

Academy of Science contract. When I left that office and moved out in the field, I lost track of OST activities.

Q: Well, lets talk a little more about the office. How did you find that your particular operation fit with the AID hierarchy; it's a big organization? Did you feel that you were listened to? Or were you sort of given short shrift, or what?

LITTLEWOOD: Generally we were going to compete with some office like the population office, agricultural, etc. We had no problems at all. So there was a niche there that was just waiting for us which is, I guess, why they established such an office. We did quite well in that office.

Q: How about, there is a promising scientific development in water preservation, or something like this. I'm sure you have people who are sort of water officers. I mean, did you find yourself bringing AID people up to educate them up to development standards.

LITTLEWOOD: AID also had an engineering office and they might have handled water problems depending on whether it was pollution, depending on the nature of the water problems. Soil erosion would fall in the agricultural, if it were urban pollution, urban water problems. So we didn't really get into that. I mentioned earthquake effects earlier, we got into that one. Other fields, fisheries, we got into that somewhat. Not in the usual sense, but in special aspects, such as utilizing "trashfish" [fish brought up in nets but discarded as not marketable]. The University of Seattle had a very good reputation in fisheries and judging fish populations, for example.

Q: How did you find in Washington the AID bureaucracy? Was it smooth flowing? Was it more difficult to operate within? Did you have any feel for it?

LITTLEWOOD: What I used to work with, the scientific side of State, worked very well. I don't recall that we had any particular difficulties. OST had very good relations with other USA scientific-type agencies, like NOAA, Interior, Smithsonian, etc. We often contracted specific expertise or services with them-that always makes you popular, when you are providing money.

Q: In 1976 you went where?

LITTLEWOOD: To Indonesia. I developed an AID project which concerned the effect of high winds on "low cost-low rise" buildings such as village schools in the Philippines. In our central AID office, the Office of Science and Technology (OST), we developed and funded projects in various developing countries. The projects usually had to be tried in two geographical regions, had to be at least two different areas of AID; in other words, South America and Asia, or Asia and Africa, or even all three. So we looked for problems found in two or more continental areas, e.g. malaria. If somebody thought they had a new approach to fighting malaria, OST might be interested in supporting field tests. This was a challenge for me. Remember, Science Attaches were in the developed countries, but

AID dealt with “developing” countries. My Japan experiences with STATE made me conscious of building construction vs. earthquakes. But high winds, whether typhoons, hurricanes or monsoons are all very damaging to simple, low-cost homes, schools, etc. in many developing countries. I started an OST-funded project in the Philippines, approved by the USAID Mission Director there, Tom Niblock. Tom later became USAID Director in Indonesia, and I was invited to make a survey there on science and technology projects that would help the people. He and Indonesia liked my report, so he offered me a job there. I accepted and we moved there in mid-1976. Our daughter stayed in the U.S. to continue college; our son came to the International High School in Jakarta. TA/OST gave me an AID Meritorious Honor Award for my work with them.

Q: Where did Indonesia fit in the developed, underdeveloped?

LITTLEWOOD: Well, Indonesia is still very underdeveloped. *Underdeveloped*, not undeveloped. Maybe “developing” is a nicer word. We hope they are “developing” and not back-sliding. Afghanistan, I guess, has been “backsliding.”

Q: In Indonesia, you were there from '76 to...?

LITTLEWOOD: To '81 when I retired. My Philippine project used “NIST,” the former National Bureau of Standards. As I mentioned earlier, we funded NIST to study wind-resistant housing. Remember, I learned about NIST and earthquake-resistant construction when I was in Japan. The Philippines has a big problem with winds and earthquakes. It's a natural “wind laboratory.” More strong winds, “typhoons,” hit the Philippines than any other country in the world.

To work with our TA/OST project in the Philippines, I had to meet all the officials in Manila who were involved with housing construction policy, that is, the government housing administrators. It included their social security system, which sponsors housing as a social benefit. Our project aimed at making it safe housing. So, as mentioned earlier, I went to Jakarta. Initially Tom Niblock invited me out for a “survey of science and technology in Indonesia.” Now that's a country with the fourth largest population in the world. They have some scientific centers and things that the Dutch had perhaps started, and which are still continuing. I had a series of local visits in two weeks in early 1976. Really I think Tom Niblock also wanted me to know what the situation was because he hadn't formally asked me to go out there at that point. In Indonesia I met various “science and technology” people and had discussions that gave me a pretty good inkling of what I was going to be involved in if I was asked to move there. So I spoke as though I were probably coming to Indonesia again, not just to talk, but to do something. When I came back to USAID I waited until July to move there with my wife and son arriving in August.

Q: When you went to the Philippines what was your impression of the Philippines government's program to build low cost housing. Because one hears about the horrendous “ all thumbs” of Manila and all that.

LITTLEWOOD: I was not focused on that. I was just focused on why village schools and houses blew down in typhoons, or collapsed during earthquakes. Our focus was on technology and design, not administration. We would fund a NIST team of experts in this field. This approach worked in other countries and our own country. The NIST experts would analyze the village buildings' design and construction. They never got into the issues of who was getting housing and things like that. The focus was always on the science and technology aspect.

Q: How did you find dealing in Indonesia? When you got there and the whole time you were there, it was Suharto in command. How did you find the government as far as your approach?

LITTLEWOOD: They were very supportive; after all, they were going to get help. And of course I'd already met senior people on the S&T side of the government when I did that two-week survey. So I fit right in with the Indonesian government and with our Embassy too. The Embassy was very good. Ambassador David Newsom was our ambassador and he was very fine. Ed Masters was the U.S. Ambassador later on. They were both excellent ambassadors and completely cooperative with my new "Science and Technology Office" in the USAID Mission. I also "double-hatted" as a "Science Counselor" for the Embassy, since there wasn't one there, and I had five years experience in Sweden, and three in Japan.

Q: What about the scientific leaders of Indonesia. Where did they get their education?

LITTLEWOOD: Most of them in the United States. Which was very good for me. Of course I had an assistant/interpreter in my office because I didn't have to know the language. They spoke very nice English. The officials I worked with at the senior level, the Minister for Science and Technology, B.J. Habibie, and his deputy, Dr. "Billie" Joedono. We became very close friends. Billie had a Ph.D. in economics from the University of California at Berkeley. Many others in the Indonesian government had degrees from Berkeley, nearly all under AID grants. By the way, the Dutch didn't allow the Indonesians to get into higher education; that was reserved for the Dutch. So the earlier AID missions were very much interested in increasing Indonesian higher education, particularly sending them over to U.S. universities. The University of Kentucky had an earlier USAID grant for improving Indonesian universities. They graduated a lot of faculty now running the Indonesian universities. Of course I'm talking twenty years ago, so now we have another whole generation.

Q: What were your particular areas that you were looking at in the interviews?

LITTLEWOOD: The charge which came directly from President Carter was that AID should look at how the United States could help the common man in these countries. Because of the bureaucracy in these countries, which are so different from ours in the sense that there are few at the top and there are many, many, many at the middle and bottom. They lack education, and most are rural farmers. A very low standard. They can

still be happy doing that; as long as they're keeping alive and such. When the Dutch were tossed out by the Japanese occupation, it was worse. But that's history. Under the Dutch, maybe one or two Ph.D.s were native Indonesian. I think one of those was in Islamic religion, something like that. And that's the only way a small country like the Netherlands could run a country that big. Maintaining the top leadership, and not allowing the local people to move up. But now they're all Indonesians in there and many are now trained in the United States or some other advanced country. The Minister of Science and Technology, not the one that was acting in that position when I first came, but the later one was B.J. Habibie, as I mentioned before. When he was young, he lived down the street from Suharto, who took a liking to him. I picture it as a sort of "godson" relationship. Habibie went to Germany, learned German, and attained a Summa Cum Laude Ph.D. degree in aeronautical engineering from Aachen University. He then joined Messerschmidt, and became Vice President for Engineering. President Suharto brought him back to Indonesia, and he became Vice President under Suharto.

Q: Oh, yes.

LITTLEWOOD: I got to know Habibie quite well as I met him about twenty-eight years ago. He was on a visit to Washington and I was assigned by OST to help him arrange the details, appointments, and to escort him. So we met at that point. He came to my office and we talked about opportunities and details. He had dinner at my house and invited me to visit him in Hamburg, which I did later. That was before I went out there for this USAID project. He was always bitter that he wanted to get his Ph.D. in California, and then immigrate to the U.S. and work at Boeing, for example. But our laws allow you to come here for an education, but you must then go back to your country.

Q: We called it an exchange. You can't become an immigrant. You have to return to your country for two years I think.

LITTLEWOOD: That's to prevent brain drain, especially from developing countries. He tried to get his son into Berkeley, but this was much later on of course, I think he did get turned down there again. Habibie certainly is exceptional. He told me he designed the wings of the "Airbus."

Q: What areas did you find particularly responsive for your work when you were in Indonesia?

LITTLEWOOD: Well, just about anything I suggested. They went along with it. For example, an "alternative energy" project from my OST projects, one with Georgia Tech. It was to process agricultural waste, such as rice hulls, or sugarcane "bagasse" into usable fuel, like charcoal, briquettes, for family cooking. I worked with the technical university in Bandung, central Java, Indonesia's "MIT." They had a small center at the university, they were trying to help the local people through science and technology. So I funded them to work with us and of course it's very easy, when you have money, to get people to listen to you and go along. In this case they have no particular knowledge of these

techniques and such, so they're welcomed it, and I included the Georgia Tech experts in the project. They would send their experts to Bandung periodically to help it to succeed. I'll give you some other examples.

Q: Would you please.

LITTLEWOOD: Let's talk about earthquakes and volcanoes. Indonesia had a little volcano institute. This is a country where Krakatoa Volcano erupted, in the 1890s.

Q: Worst disaster.

LITTLEWOOD: Tremendous.

Q: It caused a year without much sun.

LITTLEWOOD: Affected the entire world. You've a great knowledge of that; that's unusual. The reason it caused so much loss of life and such is that it is located in the narrow straits between Java and Sumatra. It was explosive so it created huge Tsunami waves, commonly called a "tidal wave," nothing to do with tides of course. Krakatoa is about a half mile, mile away from the Java coastline. Along those straits were a tremendous number of fishing villages and a great number of people. The slopes, from the mountains of Java, and the mountains of Sumatra, come down to the slopes there. This wave just went up and washed all those people and villages into the ocean, many thousands! Anyway, Indonesia had a little vulcanology institute. They didn't have much money, probably the staff was eight or something like that. Maybe one or two of them had degrees from a western university.

What had happened on our side was that Mt. St. Helens, in a state park in Oregon, had erupted explosively on a nice weekend when the park would have had thousands of visitors. However, the U.S. Geological Survey, a U.S. Government agency, had experimental "tilt meters" and other instruments on the mountain side, to monitor the mountain for "swelling" that would indicate an impending eruption. The monitoring system gave warning, and the U.S.G.S. warned the State Park's Service, "Close the park for the weekend, and maybe longer." And of course the Park Service was, I'm sure, very unhappy and took a lot of convincing because the mountain had never erupted for many years. They agreed finally, and they did evacuate as many people as would come out, and they didn't allow visitors to come in. So there was a tremendous saving of life there, when it erupted. The ones that did lose their lives included a U.S. Geological Survey person who was up there, and several who had concessions up there who didn't want to leave. They had their houses up there and they for example would sell gasoline or run a restaurant or cabins, near the top end of the road up the mountain.

Most of my projects were just common sense in putting the right things together. So I put those three together, the Indonesian vulcanologists, the U.S. Geological Survey, and several million dollars of AID money, mostly transferred to the U.S.G.S. of course to take

their team and tilt meters etc. to the Indonesian vulcanology center in Bandung. The project provided that they should put a U.S.G.S. volcanologist out there to stay for the length of the project. It was to be something like a three or four year project. He would be there to assist, teach, and solve simple problems, etc. In addition there had been a U.S.G.S. project there once before some years back to help on a geological mapping project in Indonesia. They taught Indonesia the U.S.G.S. mapping procedures, particularly topographic mapping. It is very important if you're going to work in opening up minerals, mining and a lot of other things, to have good maps of the country. They had improved, but they were not yet up to international standards of mapping. We put that goal in the U.S.G.S./Indonesian project, since the mapping people on both sides already knew each other. It was a good meshing between the two organizations. So by now there should be tilt meters on many of the mountains down there that are considered dangerous mountains. Jogjakarta, one of the big cities in Java had about 30,000 people (squatters) around the base of a nearby volcanic mountain (Mount Merape) considered dangerous. I believe the mountain is now instrumented with tilt meters, and a vulcanology station. It had only "gongs" twenty years ago, a "too late" warning system.

Q: During the same time you were there, I was Consul General in Naples. When Mount St. Helens blew, we could see through our window, Vesuvius. And an awful lot of farming, very good looking tomatoes and all that. And buildings were up and down the slopes of Mount Vesuvius.

LITTLEWOOD: Mt. Etna has been very active, too.

Q: That one took the book. Vesuvius hasn't done anything since 1944 but it can.

LITTLEWOOD: That was one example of a project where it didn't cost a lot of money but it should save a lot of lives. To help the common man, there's a limit to what one can do. But to save his or her life is a good start.

Another project idea concerned the potentials of introducing to Indonesia something called "ferrocement." I learned about it from the National Academy of Sciences team I worked with when in OST. Ferrocement has been around for a long time, since about 1890 when someone made a rowboat out of it. With "ferro" we think of "rebars," those heavy bars used in poured concrete, which is cement, water and stones. The process uses molds. But with ferrocement, you plaster instead of pouring, and you mix Portland cement with clean, sieved sand, to make a paste to plaster, not pour. What do you plaster this "cement/sand" paste on? Well, it is "free form." That is, you use a coil of wire, about 1/4" thick, and make the desired form by bending and cutting it to make a form, and tying the wires together where they cross, using small wires twisted with pliers. And then you fill it in the spaces with wire mesh, such as "chicken wire." Ferrocement never caught on in advanced countries because it is so labor-intensive. Perfect for Indonesia!

Q: Oh, yes.

LITTLEWOOD: When we say, “science and technology” in an AID context, we do not mean using extremely sophisticated methods like we do in the States. This is “B.C.”—before computers. For the sand, presumably from a beach, you have to be sure all the salt is washed out, but there is plenty of rain water in Indonesia to do that. The reason you want fine grains it that you get the maximum surface area. A bowling ball has a certain amount of surface area; if you grind that into small grains of “bowling ball sand” it has a tremendous surface area. So the water and sand are there, and Indonesia produces and even exports cement. The steel is an import. But they make wire in Indonesia, at least the labor of making the wire is local. So the raw costs doesn’t seem significant. Think about it, you can make your form any shape you want and it will be as strong as sheet steel. So you can follow local cultural shapes, such as a swooping roof. There are some beautiful roof designs in Indonesia. If they have thatch roofs, which often leak, you can put ferrocement under it. Also, it’s bug, mouse and termite proof. You also save wood since wood such as teak is an export, helping to get foreign currency. Also, too many trees are being cut down anyway. Another use is for water containers. You can make them any size and shape you want, to fit whatever space you have. So I talked this over with the leader of our pyrolytic conversion project at the Institute of Technology Bandung (ITB), that is, the ITB rural development office, Dr. Filino Harahap. He was so happy to have all this extra funding to do this project. I asked him to find about eight recent graduates in mechanical or civil engineering, from ITB and several other universities, because we wanted to try this not just in one site, but countrywide. So he found eight new graduates, including some from other islands, e.g. Sumatra and Sulawesi universities. We sent them for a special course on ferrocement at a civil engineering university north of Bangkok, Thailand. By the way, there was one place that ferrocement was used in a developed country. It’s the very famous Sydney Opera House in Australia. That famous roof is ferrocement!

Q: The opera house!

LITTLEWOOD: Those multiple arching roofs. Those roofs are ferrocement. They will never leak or deteriorate!

Q: They look like billowing sails.

LITTLEWOOD: Because they’re free-form. You can make all these beautiful shapes. So we sent the selected graduates to a Thailand graduate school for civil engineering. We sent them for a three month course in the basic principles of ferrocement. The school had tension and torsion instruments there to teach the limits of ferrocement. Our students would study what was already proven uses for ferrocement in Thailand. How to use it for food containers, water containers, roofs, other things. Our Indonesians would be the ones in a way that are going to make the “recipe” for Indonesia. When you think about it, there must be a very trained and innovative person, who “creates” a cooking recipe, but what is produced should be very simple to use. In other words, a lot of people could follow that recipe without any great education or training. The three-month course would give them

confidence. Each had to create a useful product of ferrocement as a class requirement; food storage, pipes, a small boat, or whatever.

Q: Yes, it really is remarkable.

LITTLEWOOD: So everything can be done by the local person with a little bit of training. The only tools you need are a trowel, and even that can be made of wood. You need some pliers because you have to tie this mesh wire to the basic form wire. You have to be careful that the cement completely covers the mesh as you don't want the wire to be exposed through the cement, as it will carry rust inside. Also, you don't want any "voids" (air voids) in it. However, if something *does* happen to that ferrocement it's easily repairable. You just chip off the broken cement to expose the mesh wire, push in or lace in some new wires, and plaster some new cement, covering the hole and all wires. Good as new!

Q: It's too good to be true.

LITTLEWOOD: Another factor is you don't have to keep ferrocement dry in rainy Indonesia. Cement can even set under water. The chemical reaction to "set" requires water. You've noticed, here at home, when they put down new cement they will put straw on a road for example, and spray a little water on to keep it wet until it has fully hardened. So all of these things fit the Indonesian scene. Easy labor, no foreign currency (except basic steel to make the wire), and direct benefit to the people. Now, we took these graduates from this Thai summer school and under our project we sent them back to their school areas, or to villages, and asked them to use their expertise to identify anything where ferrocement would help the people and save foreign currency (imports) and just be useful in some way. And also may supplant wood usage. Actually, I had an idea when I saw that every village had a little mosque, all of which had a small dome which is supposed to be very round. To be holy the dome should be smooth. When you build the village mosque and with a dome only eight feet in diameter, you have a problem in this village, which probably built the mosque with village labor. But for the dome they can't. So they must buy a steel plate and then to get a person to cut it with an acetylene torch make a dome out of it which is kind of difficult. A lot of welding there, and how to get a round dome out of a flat plate.

Q: With the dome shape

LITTLEWOOD: They have the classic problem of half an orange peel conversion to a flat thing. It has to be cut in pointed pieces which must be bent and welded, but will never be smooth. Also it will rust. It is difficult. They try and galvanize it, but it doesn't last in that kind of climate. So these are not perfectly shaped and it costs the village a lot of money in the sense that they had to hire somebody to buy and bring the plate, with arc-welding equipment, etc. He would have to bring his own generator to run the arc-welding. You've got to have a trained person to do the welding, and the product will never be smooth. Costs go up for an imperfect solution. Now look at the ferrocement approach. Take wire

loops and cut them in half loops, like northern hemisphere longitude lines, then tie them at the “North Pole” intersection. Then put loops (rings) for the “latitude” lines, and tie them at intersections. And of course the bottoms of the wires are in cement or something like that to hold the dome to the mosque. It’s really very simple. Another thing one should think about is the “acceptance” of some new technology. In this case I felt that a ferrocement dome would help with acceptance, because although people aren’t used to this kind of roof, if their prayers are going through it, it’s going to be okay.

Q: Yes! It’s remarkable that in a way it hadn’t spread around before.

LITTLEWOOD: Worldwide it has. An “International Ferrocement Center” in Thailand which I helped get started while in OST in Washington, has been going great guns-it has a journal, and sends teaching materials around the world, to universities in developing countries. Regarding Indonesia, the mosque dome idea has spread widely. The biggest mosque in Aceh, Sumatra, had a wooden roof on its dome which leaked. A ferrocement dome was constructed under that. It’s about eighty feet across! Our grad student from Sumatra made a house for himself out of ferrocement and a “shopping mall” with different stalls of ferrocement, because it resists water and earthquakes. Another one of our trainees went to a mountainside small village in Java to see what one can do to help this village with this rediscovered technology. What he did was actually marvelous. This village, of perhaps two-hundred or three-hundred people had developed around two sides of a small stream about twelve feet wide. The streambed had, because the water would usually run fast, had eroded to about six feet deep. It came from a lake way up the mountain and the mountaintop nearly always had rain so the lake was pretty full all the time but even more full sometimes and the stream would flood their coconut log bridge. And of course they lived on both sides of the village so they were always crossing it. They would fell palm trees and walk across the trunks. When the water came down heavy it would wash them out, so they would just cut some more palm trees and replace them. When it was low, they had stepping stones down in the stream bottom, but you had to go down this slippery bank where they cut steps, and walk across the stepping stones and up the other side. The river was used for toilet and washing and drinking water (upstream, I hope). Our project man found ways, using ferrocement, to help this village improve life. He taught the local people to help him, and actually lived with them for months. So he was working with simple, uneducated villagers, and he had access to cement, wire and wire mesh. He made an aqua-duct. Not in the Roman style but a ground level aqua-duct all the way from that lake, 1.4 kilometers. He did that in sections about fourteen inches wide and seven feet long. Think of Lionel train tracks that are made in straight pieces and curved pieces. He followed the contour of the land by making many of these sections, with a half-round bottom and a flat, removable lid at ground level. They dug a trench up to the lake! He wanted to do a “quality control” check on this section lid design, because there were water buffalo around and the water buffalo can weigh a ton almost; hope I’m not exaggerating. He walked a water buffalo across this ground-level lid on a section to see if it would hold. It did. So the village now had a source of fresh, clean water from this lake all the time. It would help them avoid diseases carried by dirty water. Then he made a “pissoir,” with running water, for the men, and something for the women. He made

water tanks and then he made a bridge over that stream using ferrocement. It takes an engineer, that's why I wanted an engineer, to know what arc to put in.

Q: I would imagine.

LITTLEWOOD: To know whether to put a real steep arc or a real shallow arc or none at all. So he figured that out and then he used local stones from the mountainside to act as anchors on each side of the bridge. And rods came out of that base, and went across the stream at the correct arc, and down into the other base. So of course they were cemented into those rocks. Then he put other rods across and lengthwise to fill it in. This guy had a good head on him. He knew that the only vehicle that could get to this mountain village would be a Jeep. And he knew that sometime, somebody would try to drive a Jeep across the bridge, which was designed for people, not a vehicle. So he made the width of the bridge a little less than the axle length of a Jeep, to keep the Jeep from going over it. If you look at the bridge, you're looking at something that's only half an inch thick.

Q: Oh, boy!

LITTLEWOOD: As he made the edges, he bent the wires in a curve down, as that prevents it from getting easily chipped on the edge. Because it's rounded now, it looks like it's much thicker than it really is. I have a picture of the whole village standing on that bridge. Those are examples of what that guy did. I really complimented him on doing a great job.

Q: Was that taken as a test case and replicated elsewhere?

LITTLEWOOD: If you mean helping at other villages, I hope so. Our project was to demonstrate and prove, hoping it will grow on its own. Each of our eight engineers did different things in different areas. When I developed the project I put in a section that each sub-project would include teaching plans to spread the technology. It doesn't do any good to have these AID people in the center of things. You've got to replicate. So that was all part of the project. They had courses on this on how to teach it to others. It was very easy to teach. Just demonstrate and teach in other villages.

Another one of our eight engineers ended up by a fairly large, swift river in Java. A main road went down to the river, and continued on the other side, but there was no bridge. For the nearest bridge you had to go sixty to seventy-five miles or something like that up or down river. So they had strung cables across this swift flowing river, and they would pull a barge across with a car or truck on it, and then pull the barge back. Instead of wood and such, we built a large barge with ferrocement pontoons, to carry four cars at a time, under our ferrocement project. Also, our barge would not wear out as fast as the traditional one of fifty-five gallon drums and a wooden platform and prows. When the barge runs up on the river's sandy shore, wood wears out quickly, and ferrocement does not.

Q: You made it out of cement?

LITTLEWOOD: You make the pontoon hull out of ferrocement and the on-off ramps. Someone might say, "Oh, it will sink!" Well, so does steel, it sinks even faster, and we have plenty of steel ships out there, carrying big loads, like the oil tankers and such.

Q: Actually they built "Victory ships" out of the ferrocement.

LITTLEWOOD: You're right! Victory ships were cargo ships for WWII. We needed all the steel for war, but also needed big cargo ships, normally made of steel. Ferrocement had the same strength, but used much less steel. Also they were easily repaired if "holed," as I explained earlier. Actually, in my project I excluded ships or yachts, as they would chew up the money without helping the villagers. I'm surprised you knew about the "Victory" ship.

Q: I just remembered it.

LITTLEWOOD: Very few people know that and don't laugh. The steel makers then probably were not happy with the ferrocement competition.

Q: What about the lasting ability of ferrocement?

LITTLEWOOD: If a mortar shell went through one, you just clean out the debris, lace up the wires, and paste in a new cement/sand mix. It's so patchable, that is, you don't have to have any expertise or special equipment to speak of, to patch it.

Q: I guess the main thing is to have, obviously the frame, but to get the formula right too.

LITTLEWOOD: Well, the formula is about fifty percent cement and fifty percent sand which is different than concrete. I'm not sure what it is in concrete. This is more cement I think and it's fine sand. All of our graduate students, if they have any technical questions, they can go back to the teacher of their courses in Bangkok.

Another one of our ferrocement graduates worked in his university on another island. They had no campus bus stops so he built bus stops out of ferrocement. Completely water proof with beautifully shaped roofs with concealed water drainage. You can make telephone poles out of cement instead of wood. You just take long rods and put rings around it and a frame around that and you've got your telephone pole. You can build in other things, steps to go up it or cross bars for wires. Termite and waterproof! I guess I'm not sure if they ever built those. In all, the ferrocement project was a great success.

Q: It sounds like you kept busy with so many projects, etc. in your five years there...

LITTLEWOOD: Absolutely! I had a lot of things going. It was exciting. Best time I ever had.

Q: Did you run across the problem of people in Indonesia at the time and that is the senior people and the Suharto family, and others wanting a piece of the action.

LITTLEWOOD: There was no money because there was nothing they could get. It's not like giving a chunk of money to the local government in this case. We controlled it, with their agreement. I had great senior counterparts in the S&T area.

Q: Oh.

LITTLEWOOD: We gave just money to help run an already established center for applying technology to local people at a certain university. Other money was to pay for the ferrocement students and that money went to the university in Thailand. Of course there are tickets and subsistence. No way can anybody get into that. I can't think of any of my projects where they could get into it. We were not giving them a chunk of money. These were just several of the many projects I developed there. Our projects included audit rights to make sure U.S. money was spent as agreed, under the project agreements. Near the end of my Indonesian stay, the U.S., Indonesia and others had a new situation come up: "the energy crisis!" But it didn't effect my ongoing projects. One project I quickly developed was to the U.S. National Academy of Science, "BOSTID" office (which I described before), to come to Jakarta to review Indonesia's energy resources, and to advise us on formulating a relevant S&T project. They did that, and we had good meetings with our relative Indonesian counterparts, including field trips. We focused on "alternative energy," alternative to oil and liquified gas, which Indonesia exports. Alternatives like hydro-power, peat moss, waste wood, better stoves, etc., were our focus, which was on domestic energy needs, not exportable energy sources. That was towards the end of my stay where in Indonesia (AID), so I don't know how they all worked out. I did put a large chunk of AID S&T money to help develop an Indonesian "energy research laboratory," including training their people and equipping the laboratory, etc. All together I had about twenty million dollars to program in my five years, dollars of that time. An AID energy officer came over at my request, and agreed to pick up responsibility for monitoring our alternative energy project.

Q: Unlike so many of these projects, where you kind of set them up and they go for a while and they kind of die. It sounds like this was something that took deep roots.

LITTLEWOOD: I think so. I don't know what's happened to the energy part. It was just as I was preparing to leave and retire.

Q: Were you picking up any feeling that this, this was some time ago, that Suharto was not, was he a popular person?

LITTLEWOOD: Yes, he was quite popular as far as I could see. His government kept the many ethnic groups together in a way. Of course others resented it. The Javanese were scattered in a lot of the rest of the country and running the government. Being a military person Suharto had many people in civilian clothes that ran the government but who were actually military officers, many of them educated in the United States. By the way, Habibie was not military. There were many very fine people there. I think that things

went fairly well, but of course it wasn't really that democratic. They're having bigger problems now that he's out. He had become too old anyway.

Q: What about East Timor? Did that come up on your watch?

LITTLEWOOD: I could have gone down there, as AID was allowed to go into Timor but I didn't see any S&T reason for me to go. The embassy wanted us to have projects not just around Jakarta which is easier to monitor of course, but to go out into the field. So I did that, but I didn't go into Timor, nothing to do there from my S&T viewpoint. Again, problems there were mainly political and not my bailiwick.

Q: How about Irian? Did you get over there?

LITTLEWOOD: I did go over to Irian Jaya with minister B.J. Habibie, as his guest one time when he was making an inspection there. Our Ambassador went also. I visited General MacArthur's old WWII headquarters there, and learned that there had been a brass plaque there honoring MacArthur, and it had been stolen. You never know, but I'm sure someone had stolen it to melt down the brass, to sell. I suggested to the Ambassador that it would be a nice gesture during the visit to say that we'll remake the plaque and you officiate putting it up. I looked at some different things there as S&T project possibilities, but I didn't find anything. I had so many projects going, I didn't fund anything there. I also had not funded something in today what's known as the "Spice Islands." Ambon, in Maluku, is the capital. They had a university there (it's still there) but the Dutch had made that area a center for legal training. This area, Maluku, is an island, and has a large fisheries industry which was declining. There were some problems. The bait fish that they use for tuna and such were dying out and they didn't know why. Here their university is focusing on law and such, instead of the sea, but they did have an oceanographer who had gotten some training in Leningrad. So I was in touch with the person in charge of the Ministry of Fisheries in Jakarta and learned about this. Dr. Aprilani is his name. I talked to him about this. Maybe we could have a joint project in Ambon to increase interest in studying the sea and fisheries, and to help the oceanographer. They have a library there, but with very few fisheries books in it. My program could provide it with the biggest library of fisheries and marine science books, etc. in Indonesia. The fisheries center was up in Bogor, close to Jakarta. That's in the middle of the country. Ambon is a long way off. But they did have something to build upon there. Just like the volcano institute and the rural development center in ITB. I wanted to leave something in Ambon that's right to help out and expand a marine focus. Later I went down to Ambon again, and met with this professor. We met with the university deans and such. One person was missing, that was the director of the university, he wasn't in that meeting. But everybody else was. In fact they competed with a couple of other universities who wanted us to help them, but we decided this was where we were going to put our S&T effort. I had a marine specialist from the States come over and assist me. I was familiar with a lot of it, but he had a lot of clout and knowledge. It ended up we actually contracted with the University of Seattle (in their fisheries institute), because they knew how to monitor fish populations, whether it's declining or such, so you have some warning. Also maybe to find out what was killing all

the bait fish. Is it pollution? Predatory disease? Or some poison from the industry? A few things like that. Ambon should be teaching fisheries at this university there. People from that area should study fisheries, not just law. So we set up, by contract with the University of Seattle, to give Ambon the biggest marine library in the country, bigger than the one in Bogor, on fisheries, and taught the staff and gave them all kinds of instruments and things they needed to do for oceanography. They had no particular research ship, but they got a ship finally, a research ship. We also gave U.S. graduate school scholarships in fisheries to two or three of their staff. I don't have many other projects to tell you about. They were all fun projects. I really enjoyed my job. The best time of my life!

Q: Part of the fun and the feeling of achievement was you were dealing with Indonesians.

LITTLEWOOD: That's right! And helping them to help themselves.

Q: Because you could be somewhere else, but it sounds like you gave them the ability to do it on their own.

LITTLEWOOD: That's the whole idea. Just thinking it all through and coming up with a project which had to be approved by Washington and had to be approved by the Indonesian government was both a challenge and fun.

Q: Once you set it in motion, things just happened.

LITTLEWOOD: As far as I know. I never had a project turned down. I received promotions as Senior Foreign Service Officer and reached a rank equal to a multi-star General or Admiral. I really liked the Indonesians.

Q: They're very bright people.

LITTLEWOOD: There are lots of bright people. There are wonderful people all over the area. I had no problem with anyone. I had other projects, these I've described are my favorites of course. I also represented the U.S. in different Asian scientific meetings and small industry development meetings. When the energy crisis occurred of course, we all focused on that, but I never saw the results, since I retired.

Q: Did the Australians, who have always taken a particular interest in Indonesia, who want the Indonesians to be happy and prosperous, and stay away from Australia... Did you find you were working with them? Were they active in these things too?

LITTLEWOOD: My office just didn't have any real connections with any other countries except the aforementioned Thailand. Other U.S. resources might interact with Australia, but I don't know. Something in the sense of science and technology, that's a broad term I know, but that's the only term that fits. Minister Habibie left his job in Messerschmidt in Hamburg, and the President Suharto asked him to come home, so he started commuting to Indonesia while I was there, I'd met him earlier. He would come down from Germany

for a couple of weeks, or a couple of months and then he'd go back to Hamburg. He had married an Indonesian pediatrician working in Hamburg. They had children who were now in high school. When I was back in the central office he had asked me to come visit him in Hamburg and I did that on the way home one time. Halfway around the world, you can either go east or west there, it didn't matter. I stopped in Hamburg for a day. He told me that he had to stay five years in Messerschmidt before he could retire and leave Messerschmidt, because he knew corporate secrets. After five years they would be considered obsolete. I personally think he wanted to see the lay of the land in Indonesia. He had been so long in Germany that he didn't really know what was going on in Indonesia. He came in with Suharto's blessing and Suharto's direction so he could do whatever he wanted and would have to find his way in between the existing ministries to be careful of other peoples' turf. My advantage in the AID mission was that what I carefully designed was not in anybody else's turf. So I became an important part of the AID mission program. I was sorry to leave the job in Washington, but I was really happy to have the field experience. I had an award when I left the office, they gave me a meritorious honor award for my work, six years there.

Q: How did you and your wife, like, how did your family like Indonesia to live in?

LITTLEWOOD: My wife did. I'm not sure about our son. He enjoyed it, it was different, but of course he had left all of his classmates and friends at home, but he made some new ones in Indonesia. It was just two years and then he went off to Florida State University. I would have stayed longer in Indonesia actually, but my wife was anxious to get home. I'm sure part of that was because both children were in the U.S. at that point. Our daughter was married to a man she met in Indonesia, an assistant air attaché. She was visiting us for a year. Otherwise she was staying in Copenhagen with her grandparents.

Q: You retired in '81? But I take it you didn't really retire?

LITTLEWOOD: Well I retired. I thought I'd try and do a little consulting. I'm such a generalist. The science attaché, the science officer is going to be a generalist. You sort of look at the whole field. So I'm one of those who doesn't know a lot about anything but knows a bit about everything. It had worked out very well. What was the question again?

Q: You retired. What did you do after you retired?

LITTLEWOOD: I tried a little bit of consulting, but I found that generally they just wanted me for a few days to talk about something in Indonesia and then that was it. The preparations for it was more time than the money. But then I got an offer from the National Bureau of Standards [NBS not yet NIST], which knew me from my AID/OST days in Washington. They asked me to help them deal with an exchange program they had with the People's Republic of China. At that time, this would be in the early eighties, before the Tiananmen Square incident. The people in China were equivalent "standards" people as those at the National Bureau of Standards. (Again, now the National Institute for the Standards and Technology [NIST].) So NBS asked me to help them (under a

contract) with Chinese “standards” groups that came to the U.S. for about two or three weeks to see how the U.S. handled “standards.” (China reciprocated, so NBS also sent groups over to China.) These people would visit the National Bureau of Standards and all its different parts. They would then go to, for example, if they were concerned with weights and measures they would go to Annapolis to the Maryland State weights and measures center which is a very good one, and also the one in Los Angeles County. They’d had these groups before and they received new groups with open arms and gave them great tours. It was a good exchange. The first group we had was about ten, I would say, because my wife helped me in this, as we had to drive two cars. We set up transportation and visits. Anyway we went to various institutions that dealt with whatever their specialties were. Including the Underwriters Laboratory and the Sears Tower in Chicago. Sears Roebuck had a very good standards program, I learned. And also it was nice for them to see the top of that big tower. Then we went to the NBS branch in Boulder, Colorado. Working on fiber optics, for example. The Bureau of Standards is set up with some of the best scientists in the world, it’s really a broad group of subject matter that they deal with. It is the highest level, after all, “they set the standard.” They also advise a lot of U.S. government agencies on standards. If regulations say we can’t have more than .0003 percent of this business chemical in this “whatever,” you have to be sure that your business has instruments that can measure that small. So there’s a relationship there that effects everybody, through the business and academic world, EPA and FDA and many others. I gained a very high respect for the NBS/NIST institution and people.

As mentioned earlier, what happened to that U.S.-China program was “Tiananmen Square.” We escorted about three groups that we took on different itineraries and everything went very well. They were happy with us and they invited me to go over to China, but they didn’t pay for me to go over so I didn’t go. And after Tiananmen Square the U.S. cut off that entire program. I don’t think it’s ever been resumed.

Then immediately I got involved in the annual AAFSW [Associates of American Foreign Service Worldwide, a 501-(c)3 organization which sponsors charitable and scholarship programs] “Book Fair” at the State Department. I run the “Stamp Corner.” I’m an old stamp collector, I’ve collected stamps since I was eight. We were doing about \$900, mainly from stamps sent in by embassies for their annual Book sale which had a stamp corner. Since I took it over we’ve been probably averaging \$13,000. This highest was not this year, October, but the one before it. \$16,207. So I can’t seem to get out of that job. I enjoy it. I work at it all year, preparing stamp donations for our once-a-year sale.

I’m also very active in the Explorers Club, Inc. The Explorers Club is just what it says, a company of explorers. It started in 1904 with Admiral Peary and others. Its headquarters is in New York ever since, and it’s approaching its Centennial in 2004. I’ve been a member since 1956 because of my worldwide oceanographic work and the Antarctic experience and everything else. At that time you had to really be in a leadership position and be sponsored by two members. I knew at least two members of the Explorers when it was much smaller than it is now, i.e. 1956. Ten years ago I was Chairman of the biggest chapter, the “Washington Group” chapter (ECWG) which covers DC, Maryland, Virginia

and West Virginia. So it's kept me pretty busy. I still produce the ECWG's membership directory every year, with about 260 members.

Q: Oh, boy.

LITTLEWOOD: I'm still in the ECWG education committee, and the steering committee.

Q: Are you part of the thrust to get the upcoming generation familiar with world geography?

LITTLEWOOD: Yes, in a way. Although exploration now is not just geographical. We want to point out to the young people that exploring the human genome is exploration. You don't even have to travel anymore. You don't have to go to the Antarctic, or you don't have to go to the moon. There are people in Baltimore in a building where they are monitoring the Hubble telescope. The people who are analyzing what they're seeing, not the technicians, but the ones who decipher what they are seeing and describe to us how far it is that they're exploring, they're the explorers and they're just as much so as somebody who has gone in the first submarine to the North Pole or something like that or the deepest part of the ocean. One of those persons is part of our group here, George Martin, a great guy. He was on the Trieste when it made historic dives. It went down to the deepest part of the ocean which is very close to the highest point on earth, Mt. Everest. The deepest part of the ocean and the highest part of the Earth are only a few hundred feet of each other, a thousand at most.

Q: You wonder, that's almost a design. [laughter]

Bill, I think this is probably a good place to stop. I do want to emphasize that if there are things you would like to cover. Feel free when you get the transcript to add them.

LITTLEWOOD: Okay, and thanks very much for giving me the opportunity to recall parts of a wonderful life. I'll be 80 in 2004, and still going strong!

Q: Great!

End of interview